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Maryna Rebenko

ENGLISH PROFICIENCY in CYBERNETICS

B2 – C1

Textbook for Students of
Computer Science and Cybernetics



Reviewers:

Candidate of Economic Sciences, Docent P. V. Dziuba,
Doctor of Economic Sciences, Full Professor R. O. Kostyrko,
Doctor of Economic Sciences, Full Professor V. G. Shvets,
Candidate of Pedagogic Sciences, Docent L. M. Ruban

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Rebenko Maryna

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The *English Proficiency in Cybernetics* textbook has been designed for the students completing their 4th year of undergraduate study in Applied Mathematics, Computer Sciences, System Analysis, and Software Engineering. The course applies for those students who have a specific area of academic or professional interest. Technology-integrated English for Specific Purposes content of the textbook gives the students the opportunity to develop their English competence successfully. It does this by meeting national and international academic standards, professional requirements and students' personal needs.

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Preface

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Передмова

Навчальний посібник "English Proficiency in Cybernetics" розроблено для студентів ОКР "Бакалавр" напрямів підготовки 6.040301 прикладна математика, 6.040303 системний аналіз, 6.050103 програмна інженерія, 8.04030201 інформатика, галузей знань 0403 системні науки та кібернетика, 0501 інформатика та обчислювальна техніка. Цей курс подано для студентів, які зацікавлені у формуванні професійно орієнтованої мовної компетентності та поглибленні навичок ефективного спілкування в академічному та спеціалізованому середовищах. Зміст і структура навчального посібника відповідають національним і міжнародних академічним стандартам, професійним вимогам сучасного ринку праці, а також особистим потребам студентів.

UNIT 1. CYBERNETICS

PART I. Birth of the Science

A. Discussion Starters

Look at the pictures below. Match the images (A-E) to the notions (1-5):

1. Self-regulated systems
2. Feedback mechanisms
3. Complex systems organization
4. Information transfer
5. Neurophysiological principals

A



B



C



D



E



Choose from the box below the key principles to describe each phenomenon (1–5).

Some notions can characterize not a single phenomenon.

- mind activity and cognition
- game theory
- steady or dynamic state (=equilibrium)
- 3D map of human brain
- stimulus and response
- electric stimulation therapy
- data storage
- self-development
- access phase
- collective behaviour

B. Before You Read

Define the role of control mechanisms in the notions (1–5). What science do you think may define such mechanisms as ‘governing’, ‘controlling’, ‘managing’?

C. Read the essay about the formation of cybernetics.

The Formers of Cybernetics

Cybernetics is the discipline that studies communication and control in living beings and the machines built by a man. A more philosophical definition, suggested by Louis Couffignal in 1958, considers cybernetics as "the art of assuring efficiency of action". The word *cybernetics* was reinvented by Norbert Wiener in 1948 from the Greek ‘κυβερνητικός’ (*kubernetes*) meaning "steersman" or "ship pilot". The word was first used by Plato in the *Laws* to refer to the "the art of steering" or "the art of government". Ampère used the word cybernetics to denote "the study of ways of governing". One of the very first cybernetics mechanisms to control the speed of the steam engine, invented by James Watt and Matthew Boulton in 1788, was called a governor, or a ball regulator. Cybernetics has in fact the same root as government: the art of managing and directing highly complex systems.

The first paper to bring together the central concepts of cybernetics was one written by the British psychiatrist W. Ross Ashby in 1940. There he outlines a theory of how a concrete physical mechanism can exhibit adaptive properties once thought only to be abstract

properties held by living, thinking beings. His theory is based on the concept of 'homeostasis' developed by the physiologist Walter Cannon (1932) to explain the biological mechanisms which maintain vital balances within an organism, such as the regulation of blood pressure, blood sugar, and body temperature.

Ashby's idea is that a mechanism which can alter its internal configurations can do a random search for a configuration which achieves some desired 'goal'. The objective of an organism is to maintain a vital quantity in a stable equilibrium, like body temperature, by a complex set of mechanisms such as sweating and shivering. For a machine, the goal is to keep the values of certain "essential variables" within a desired range, and when these fall outside that range, to randomly vary the non-essential variables it can control until the values of the essential variables are restored. He called this mechanism of trial and error a "functional circuit" because it responded to its own success or failure, but later recognized it to be identical to the concept of feedback.

The theory thus offers a way to explain learning and biological adaptation, in terms of a single type of physical mechanism. In 1947, Ashby built an analogue computer to demonstrate his idea. Called the Homeostat, it consisted of four interconnected units which sought to establish a pattern of electrical currents between them such that the whole ensemble would resist various external disturbances. The model of a goal-directed search which it embodied has become central in Artificial Intelligence.

However, the birth of cybernetics is often dated back to 1943, with the publication of two foundational papers in the U.S.: Rosenblueth, Wiener and Bigelow's "Behaviour Purpose and Teleology" and Warren McCulloch and Walter Pitts' "A Logical Calculus of the Ideas Immanent in Nervous Activity".

In 1940 Wiener worked with a young engineer, Julian H. Bigelow, to develop automatic range finders for anti-aircraft guns. During the course of their work Wiener and Bigelow were struck by two astonishing facts: the seemingly "intelligent" behaviour of these machines and the "diseases" that could affect them. Theirs appeared to be "intelligent" behaviour because they dealt with "experience" (the recording of past events) and predictions of the future. There was also a strange defect in performance: if one tried to reduce the friction, the system entered into a series of uncontrollable oscillations.

Impressed by this disease of the machine, Wiener asked Rosenblueth whether such behaviour was found in man. The response was affirmative: in the event of certain injuries to the cerebellum, the patient cannot lift a glass of water to his mouth; the movements are amplified until the contents of the glass spill on the ground. From this Wiener inferred that in order to control a finalized action (an action with a purpose) the circulation of information needed for control must form "a closed loop allowing the evaluation of the effects of one's actions and the adaptation of future conduct based on past performances". Thus, Wiener and Bigelow discovered the closed loop of information necessary to correct any action – the negative feedback loop – and they generalised this discovery in terms of the human organism.

During this period the multidisciplinary teams of Rosenblueth were being formed and organized. Their purpose was to approach the study of living organisms from the viewpoint of a servomechanisms engineer and to consider servomechanisms with the experience of the physiologist. An early seminar at the Institute for Advanced Study at Princeton in 1942 brought together mathematicians, physiologists, and mechanical and electrical engineers. One man working with Rosenblueth in getting these seminars under way was the neurophysiologist Warren McCulloch, who was to play a considerable role in the new field of cybernetics. In 1948 two basic publications marked an epoch already fertile with new ideas: Norbert Wiener's *Cybernetics, or Control and Communication in the Animal and the Machine*, and *The Mathematical Theory of Communication* by Claude Shannon and Warren Weaver. The latter work founded information theory.

The ideas of Wiener, Bigelow, and Rosenblueth caught fire like a trail of powder. At the conclusion of the work of his group on the organization of the cortex of the brain, and especially after his discussions with Walter Pitts, a brilliant, twenty-two-year-old mathematician, McCulloch understood that a beginning of the comprehension of cerebral mechanisms (and their simulation by machines) could come about only through the cooperation of many disciplines. McCulloch himself moved from neurophysiology to mathematics, from mathematics to engineering.

D. Comprehension Check

Answer the following questions.

1. Outline the main issues of the British psychiatrist W.Ross Ashby's theory based on the concept of 'homeostasis'. What did it explain?

2. What papers were published in 1943? Why are they considered as fundamental?
3. What facts were N. Wiener and Julian H. Bigelow struck by?
4. What functions of the closed loop of information were discovered by Wiener and Bigelow?
5. What can you say about Warren McCulloch and his essential work?

E. Find a word in the text that means the same as the words and phrases below:

- a) the tendency toward a relatively stable equilibrium between interdependent elements, especially as maintained by physiological processes (paragraph 2);
- b) information about reactions to a product, a person's performance of a task, etc., used as a basis for improvement (paragraph 3);
- c) a form of computer that uses the continuously changeable aspects of physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved. (paragraph 4);
- d) movement back and forth at a regular speed (paragraph 6);
- e) the part of the brain which function is to coordinate and regulate muscular activity (paragraph 7);
- f) an automatic device that uses error-sensing negative feedback to correct the performance of a mechanism and is defined by its function (paragraph 8);
- g) the outer layer of the brain, composed of folded grey matter and playing an important role in consciousness (paragraph 9).

F. Translate the following collocations from the passages given above:

- Виявляти адаптивні властивості,
- підтримувати життєво важливий баланс,
- випадковий пошук,
- суттєві змінні,
- відновлювані змінні,
- бажаний діапазон,
- механізм спроб і помилок,
- поняття зворотного зв'язку,
- сервомеханізм,
- стійка рівновага,

- зовнішні порушення,
- неконтрольовані коливання,
- мозочок,
- посилювати рухи,
- зробити висновок,
- завершена дія,
- замкнена петля,
- мозкова діяльність.

Use these word combinations in the sentences of your own.

G. Pair Work

Summarize the major theoretical ideas and the contribution into the development of cybernetics of the scientists mentioned in the article *The Formers of Cybernetics*.

Complete the table *Pioneers of Cybernetics* and compare your options with those of your partner.

PART II. Norbert Wiener, the Father of Cybernetics

A. Before You Read

What do you think such sets of words as *a child prodigy, post-graduation courses of zoology, 17 years old Doctor of Philosophy, a staunch pacifist* might stand for in Norbert Wiener's biography?

B. Read the article.

Five parts of sentences have been removed from the text. Put the correct sentence from A–F below in each space (1–5) to form a logical text. There is one extra item you don't need.

Norbert Wiener, the father of cybernetics

Norbert Wiener (November 26, 1894 – March 18, 1964) was an American mathematician and philosopher. He was Professor of Mathematics at MIT. (1) _____, Wiener later became an

early researcher in stochastic and noise processes, contributing work relevant to electronic engineering, electronic communication, and control systems. Wiener is considered the originator of cybernetics, a formalization of the notion of feedback, with implications for engineering, systems control, computer science, biology, neuroscience, philosophy, and the organization of society.

Norbert was educated by his father at home until 7 years of age. After graduating from High School in 1906 at 11 years, Wiener entered Tufts College where he was awarded a BA in mathematics at the age of 14, whereupon he began graduate studies of zoology at Harvard. In 1910 he transferred to Cornell to study philosophy. Harvard awarded Wiener a Ph.D. in 1912, when he was merely 17 years old, for a dissertation on mathematical logic, where he was the first to state that ordered pairs can be defined in terms of elementary set theory.

In 1914, Wiener travelled to Europe, (2) _____, and by David Hilbert and Edmund Landau at the University of Göttingen. During 1915–16, he taught philosophy at Harvard, then was an engineer for *General Electric* and wrote for the *Encyclopaedia Americana*. He was briefly a journalist for the *Boston Herald*.

Although Wiener eventually became a staunch pacifist, he eagerly contributed to the war effort in World War I. He tried to join the military, but the government again rejected him due to his poor eyesight. After the war Wiener became an instructor of mathematics at MIT, where he spent the remainder of his career, becoming promoted eventually to Professor. In 1926, Wiener returned to Europe as a Guggenheim scholar. He spent most of his time at Göttingen and with Hardy at Cambridge, (3) _____.

Many tales were told of him at MIT, especially concerning his absent-mindedness. It was said that he returned home once to find his house empty. He inquired of a neighbourhood girl the reason, and she said that the family had moved elsewhere that day. He thanked her for the information and she replied, "That's why I stayed behind, Daddy!"

During World War II, his work on the automatic aiming and firing of anti-aircraft guns caused Wiener to investigate information theory independently of Claude Shannon and to invent the Wiener filter. His anti-aircraft work eventually led him to formulate cybernetics. After the war,

his fame helped MIT to recruit a research team in cognitive science, (4) _____, including Warren Sturgis McCulloch and Walter Pitts. These men later made pioneering contributions to computer science and artificial intelligence. Soon after the group was formed, Wiener suddenly ended all contact with its members, mystifying his colleagues.

Wiener later helped to develop the theories of cybernetics, robotics, computer control, and automation. He discussed the modelling of neurons with John von Neumann.

After the war, Wiener became increasingly concerned with what he believed was political interference with scientific research, and the militarization of science. (5) _____ to consider the ethical implications of their work. After the war, he refused to accept any government funding or to work on military projects.

A. a famous child prodigy, the first kid of the Jews of Polish and German origin

B. his article "A Scientist Rebels" for the January 1947 issue of *The Atlantic Monthly* urged scientists

C. working on Brownian motion, the Fourier integral, Dirichlet's problem, harmonic analysis, and the Tauberian theorems

D. to be taught by Bertrand Russell and G.H. Hardy at Cambridge University

E. was trained actively and single-mindedly as a scholar

F. composed of researchers in neuropsychology and the mathematics and biophysics of the nervous system.

C. Comprehension Check

Answer the following questions.

1. What are the most essential stages in N.Wiener's educational process? Characterize each of them.

2. Which professions was N.Wiener engaged in?

3. How can the World War I period of N.Wiener's research be featured?

4. What were the key issues of N.Wiener's investigation during World War II?

5. What do you think caused N.Wiener's concern of the ethical implications of his work?

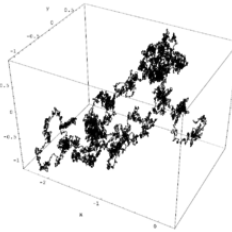
D. Indicate what events from Norbert Wiener's biography the suggested years go to:

7, 1947, 1894, 1914, 1910, 1915–1916, 11, 14, 1912, 17, 1964.

E. Find in the text the facts from Norbert Wiener's biography connected with the places and prominent figures below:

MIT, John von Neumann, Europe, David Hilbert and Edmund Landau, *Boston Herald*, Tufts College, Harvard, Bertrand Russell and G.H. Hardy, *Encyclopaedia Americana*, Cornell, Claude Shannon, *The Atlantic Monthly*, Cambridge University, Warren McCulloch and Walter Pitts.

F. Match the notions (1–4) to the names of achievements (A–D) from Norbert Wiener's professional profile.

1	A simple mathematical representation of Brownian motion, this issue assumes the current velocity of a fluid particle fluctuates randomly. Since velocity changes instantly in this formalism, this equation is not suitable for short time scales.	A. "Wiener filter"
2	It is a mathematical object in measure theory, used to construct a "decent" (strictly positive and locally finite) measure on an infinite-dimensional vector space.	<p>B. "Wiener process"</p>  <p><i>A single realization of a three-dimensional Wiener process</i></p>
3	The purpose of this phenomenon is to reduce the amount of noise present in a signal by comparison with an estimation of the desired noiseless signal.	C. "Wiener equation"
4	In mathematics, it is a continuous-time stochastic process which is also often called standard <i>Brownian motion</i> . It occurs frequently in pure and applied mathematics, economics, quantitative finance, and physics.	D. "Abstract Wiener space"

G. Speaking Test 1

- Define the most valuable facts of the birth of cybernetics.
- Make up a short list of some prominent cyberneticians' scientific achievements. Discuss it with your partner.
- Share your thoughts as for the following quotes and sayings:

1. *The world of the future will be an even more demanding struggle against the limitations of our intelligence, not a comfortable hammock in which we can lie down to be waited upon by our robot slaves.* – Norbert Wiener, the founder of cybernetics and artificial intelligence theory.

2. *Control is as much an effect as a cause, and the idea that control is something you exert is a real handicap to progress.* – Steve Grand, A.I. researcher, developer of a robot orang-utan called *Lucy*.

3. *Your brain may give birth to any technology, but other brains will decide whether the technology thrives. The number of possible technologies is infinite, and only a few pass this test of affinity with human nature.* – Robert Wright (one of the top 100 global thinkers) *Nonzero: The Logic of Human Destiny*.

4. *It bears emphasizing: our traditional ways of thinking have ignored – and virtually made invisible – the relationship between people and technology.* – Kim J. Vicente, a researcher in the field of human factors, the University of Toronto.

5. *It would be possible to describe everything scientifically, but it would make no sense; it would be without meaning, as if you described a Beethoven symphony as a variation of wave pressure.* – Albert Einstein, a theoretical physicist, the developer of the general theory of relativity.

Speaking Test 2

- Make a comparison of linear sequence phenomenon of classical Newtonian science with the cybernetics' notion of "circularity". Substantiate your ideas.
 - Single out the principle of circularity which can help to understand such fundamental phenomena as *self-organisation*, *goal-directedness*, *identity*, and *life*.
 - Give examples of circular processes which are ubiquitous in a large number of biological, social, economic and other structures.

H. Checklist

1. Explain what the term "cybernetics" means.
2. Name the formers of cybernetics. What is special about their discoveries?
3. Speak about the origin, formation and application of cybernetics.
4. Consider why the history of cybernetics is a tangled story whose contents and significance are subject to multiple interpretations.
5. Prove the complexity of cybernetics history.

I. Home Reading Task

Work with Norbert Wiener's papers *"The Human Use of Human Beings. Cybernetics and Society"* and *"Cybernetics, or Control and Communication in the Animal and the Machine"*.

Prepare concise summaries of their plots.

Keep a list of at least five interesting ideas that you come up with. Some may work to fit into your summary.

UNIT 2. SUBDIVISIONS OF CYBERNETICS

PART I. Application of Cybernetics

A. Discussion Starters

- What areas of science do you think cybernetics is applied in?
- Have a look at the pictures below and name the fields of cybernetics' application.

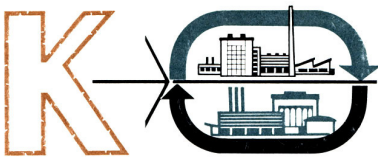
1



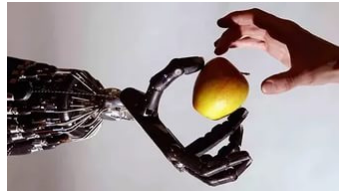
2



3



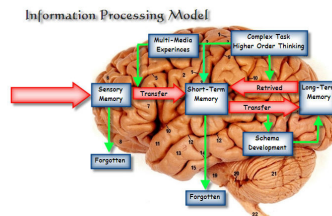
4



5 Unlocking your real personality



6



- Describe some images which appeal to you the most.

B. Before You Read

What do you think is implied in the idea of focusing on technology, not people?

C. Read the essay and compare your thoughts with the author's ones.

Artificial Intelligence Ideas: focus on tech, not people

Artificial Intelligence (AI) has always been hyped by its enthusiasts. Companies like *Google*, *Facebook*, *Yahoo* make headlines with technological successes that were science fiction even a decade ago: we can talk to our phones, get recommendations that are personalized to our interests, and may even ride around in cars driven by computers soon. The world has changed, and AI is a big part of why.

AI is the field within computer science that seeks to explain and to emulate, through mechanical or computational processes, some or all aspects of human intelligence. Included among these aspects of intelligence are the ability to interact with the environment through sensory means and the ability to make decisions in unforeseen circumstances without human intervention. Typical areas of research in AI include game playing, natural language understanding and synthesis, computer vision, problem solving, learning, and robotics.

Thinking machines and artificial beings appear in Greek myths. Human likenesses believed to have intelligence were built in every major civilization. Intelligence can be thought of as a quality that is separable from all other properties of the human person. Intelligence is also seen in the functions one performs, in actions or the ability to carry out certain tasks. Finally, some researchers see intelligence as a quality that can only be acquired and demonstrated through relationship with other intelligent beings. Each of these understandings of intelligence has been used as the basis of an approach to developing computer programs with intelligent characteristics.

Silicon Valley sells progress, and so it's no wonder that it has generally embraced the positive hype about AI today. Yet worries appear that AI is coming too soon, and changing human society too fast. Most of those concerns focus on the singularity, a soon-to-arrive crossover point in the affairs of a man and a machine, where machines overtake human intelligence, and we cease to be the most interesting feature of the planet.

Mostly, the machine age is a benefit, as boring or dangerous jobs are passed off to machines, and interesting work is helped along by intelligent computing assistants. Artificial Intelligence is upon us but it's basically wonderful news: for business, for our standards of living, and for the future of humanity. On the other hand, there is a firm belief that "artificial intelligence" is a misnomer – real intelligence comes from human minds – and a conviction that a fascination with computer intelligence tends to diminish and even imperil human intelligence. Elon Musk, the founder of *Tesla and SpaceX*, has openly speculated that humans could be reduced to "pets" by the coming superintelligent machines. Musk has donated \$10 million to the Future of Life Institute, in a bid to help stave off the development of "killer robots." At Berkeley, the Machine Intelligence Research Institute is dedicated to solve an issue of "existential threat" to humanity, eclipsing previous (and ongoing) concerns about the climate, a nuclear holocaust, and other major challenges of our modern life. Nick Bostrom's 2014 bestseller, *Superintelligence: Paths, Dangers, Strategies*, warns that AI could spell the end of humanity. And the former IBM Louis Del Monte, in his 2013 book, *The Artificial Intelligence Revolution: Will Artificial Intelligence Serve Us or Replace Us?*, agrees that AI is happening so fast that the changes could be cataclysmic. Luminaries like Stephen Hawking and Bill Gates have also commented on the scare of AI.

But technological progress always cuts both ways. Most researchers hope that their work will eventually be incorporated into a machine with general intelligence (known as strong AI), combining all the skills above and exceeding human abilities at most or all of them.

D. Comprehension Check

Make up your own questions to shed light on the central ideas of the essay *Artificial Intelligence Ideas: focus on tech, not people*.

E. Group Work

- **Explain the meaning of the following word combinations and use them in the sentences of your own:**
 - to emulate some aspects of human intelligence,
 - to interact with the environment,
 - to make decisions in unforeseen circumstances,
 - to be separable from other properties,

- to carry out certain tasks,
- to embrace the positive hype of smth,
- a soon-to-arrive crossover point,
- to overtake human intelligence,
- to imperil human intelligence,
- to stave off the development of "killer robots",
- to cut both ways,
- to exceed human abilities.

F. Group work

Group Work

Share with your partners the ideas as for one of Bill Gates' sayings: *"I am one in a growing list of tech giants who have reservations when it comes to artificial intelligence"*.

Choose one representative from the group who will report in class your common suggestions within the topic.

PART II. Artificial Intelligence

A. Before You Read

Read the title from the article below. What do you think the text is going to be about?

B. Read the article. Fill in gaps 1-15 with a suitable word form. You can use not only one word in each gap.

Have we succeeded in Turing's dream?

By Tom Simonite

The holy grail of artificial intelligence – creating software that comes close to mimicking human intelligence – remains far off. But the recent years saw major strides in machine **1**_____ (**learn**) software that can gain abilities from experience. Companies in sectors from biotech to computing turned to these new techniques **2**_____ (**solve**) tough problems or develop new products.

The most striking research results in AI came from the field of deep learning, which involves using crude **3 _____ (simulate)** neurons to process data.

Work in deep learning often focuses on images, which are easy for humans to understand but very difficult for software to decipher. **4 _____ (Research)** at *Facebook* used that approach to make a system that can tell almost as well as a human whether two different photos depict the same person. *Google* showed off *DeepMind*, a system that can describe scenes using short sentences.

"If you feed all this information, the computer is **5 _____ (basis)** going to develop the ability to make sense of the inputs. Then you've trained a network that can scan your page and those of your friends and tell you all kinds of things about you that you **6 _____ (not put out)** there, and that really is the holy grail for all of these companies," Bhiksha Raj, a machine learning expert at Carnegie Mellon University, said.

Notable deep learning projects **7 _____ (allow, already)** computers to recognize in photos and videos the faces of humans and cats and to identify the emotions behind **8 _____ (write)** content even when they're not stated explicitly. And before *Facebook* acquired the company, *Face.com* claimed its software could identify which photographed smiles were genuine and which were fake.

Microsoft drew on its research into speech **9 _____ (recognize)** and language comprehension to create its virtual assistant *Cortana*, which is built into the mobile version of *Windows*. The app tries to enter a back-and-forth dialogue with people. That's intended both to make it more endearing and to help it **10 _____ (learn)** what went wrong when it makes a mistake.

Start-ups launched products that used machine learning for tasks as varied as helping you get pregnant, letting you control home appliances with your voice, and making plans via text message. Some of the most interesting applications of artificial intelligence came in health care. IBM is now close to seeing a version of its Jeopardy!-winning Watson software help cancer doctors use genomic data to choose personalized **11 _____ (treat)** plans for patients. IBM began producing a prototype brain-inspired chip it says could **12 _____ (use)** in large numbers to build a kind of supercomputer specialized for learning. A more compact neuromorphic chip, developed by *General Motors* and the *Boeing*-owned research lab HRL, took flight in a tiny drone aircraft.

All this rapid progress in artificial intelligence led some people to ponder the possible downsides and long-term implications of the technology. One software engineer who has since joined *Google* cautioned that our instincts about privacy must change now that machines can decipher images.

13 _____ (**Look**) further ahead, biotech and satellite entrepreneur Martine Rothblatt predicted that our personal data could be used to create intelligent digital doppelgangers with a kind of life of their own. And neuroscientist Christof Koch, chief scientific officer of the Allen Institute for Brain Science in Seattle, warned that although intelligent software could never be conscious, it could still harm us if **14** _____ (**not design**) correctly. Meanwhile, a sounder view of the far future came from science fiction author Greg Egan. In a thoughtful response to the sci-fi movie *Her*, he suggested that conversational AI companions could make us **15** _____ (**good**) at interacting with other humans.

C. Comprehension Check

Answer the following questions.

1. What made the technology of mimicking human intelligence remain far off?
2. What sectors of industry have been involved into the deployment of AI sphere?
3. How does *DeepLearning* technology operate?
4. What is the crucial principle of *DeepMind* technology?
5. Which options does the *Cortana* app cover?
6. What do the scientists and AI researchers warn the humanity about?

D. Read the sentences below and decide on which prepositions have been left out. Then look back at the article and check yourself. How many mistakes did you make? Which expressions would you like to remember?

1. Some **1** ___ the most interesting applications **2** ___ artificial intelligence came **3** ___ health care.

2. Companies **4** ___ sectors **5** ___ biotech **6** ___ computing turned **7** ___ these new techniques **8** ___ solve tough problems or develop new products.

3. Work **9** ___ deep learning often focuses **10** ___ images, which are easy **11** ___ humans **12** ___ understand but very difficult **13** ___ software **14** ___ decipher.

4. *Microsoft* drew 15___ its research 16___ speech recognition and language comprehension 17___ create its virtual assistant *Cortana*, which is built 18___ the mobile version 19___ *Windows*.

5. 20___ a thoughtful response 21___ the sci-fi movie *Her*, he suggested that conversational AI companions could make us better 22___ interacting 23___ other humans.

6. The most striking research results 24___ AI came 25___ the field 26___ deep learning, which involves using crude simulated neurons 27___ process data.

7. IBM began producing a prototype brain-inspired chip it says could be used 28___ large numbers 29___ build a kind 30___ super-computer specialized 31___ learning.

8. Start-ups launched products that used machine learning 32___ tasks 33___ varied 34___ letting you control home appliances 35___ your voice.

E. Give your synonyms to the following words from the article.

To remain, turn to, simulate, process, decipher, depict, feed (information), acquire, solve, comprehend, assist, launch, treat, inspire, ponder, gain, vary, predict, harm, suggest.

A stride, basis, start-up, prototype, downside, content, implication, privacy, entrepreneur.

Striking (results), notable (projects), explicit (contents), genuine (smiles), fake (images), tough (problems), endearing (dialogues), tiny (drones), rapid (progress), conscious (software).

Summarize the article *Have we succeeded in Turing's dream?* using the words or their synonymous combinations. Remember the mechanism of making a shortened version of a text that highlights its key points.

F. Web Research Activity

Introduce the topic *Notable Artificial Intelligence Projects*.

Choose one of the suggested AI projects and report on the issue which appeals to you the most:

- *Brain-inspired.*
- *Cognitive architectures.*
- *Games.*
- *Knowledge and reasoning.*
- *Motion and manipulation.*

- *Music.*
- *Natural language processing, etc.*

G. Speaking Test 1

- Dwell on the common grounds of cybernetics and communications engineering, control theory, biology, theoretical mathematics, and psychology.
- Give your arguments on the essential part of the modern AI technologies.
- Discuss such aspects of machine intelligence as the ability to interact with the environment through sensory means and make decisions in unforeseen circumstances without human intervention. Enrich your answer with examples.

Speaking Test 2

- Find out one common idea of the sayings given below originated from the AI researchers' reports.

1. **Fred Reed**, a technology columnist for *The Washington Times*, writes "*When we know how a machine does something 'intelligent', it ceases to be regarded as intelligent. But if I beat the world's chess champion, I'd be regarded as highly bright.*" (It was proclaimed after IBM's chess playing computer *Deep Blue* succeeded in defeating Garry Kasparov in 1997, when people complained that it had only used "brute force methods" and it wasn't real intelligence).

2. According to **Stottler Henke**, the developer of artificial intelligence software applications, "*The great practical benefits of AI applications and even the existence of AI in many software products go largely unnoticed by many despite the already widespread use of AI techniques in software. This is the AI effect. Many marketing people don't use the term 'artificial intelligence' even when their company's products rely on some AI techniques. Why not?*"

3. **Pamela McCorduck**, an American writer about the history and philosophical significance of artificial intelligence, the future of engineering and the role of women and technology, writes, "*It's part of the history of the field of artificial intelligence that every time somebody figured out how to make a computer do something – play good checkers, solve simple but relatively informal problems – there was chorus of critics to say, 'that's not thinking'.*"

4. AI researcher **Rodney Brooks** complains, *"Every time we figure out a piece of it [AI], it stops being magical; we say, Oh, that's just a computation."*

5. **Patty Tascarella**, a finance & law reporter for the Pittsburgh Business Times, writes, *"Many AI researchers find that they can procure more funding and sell more software if they avoid the name of 'artificial intelligence' and instead pretend their work has nothing to do with intelligence at all. This was especially true in the early 1990s, during the 'AI winter'."*

- Give your arguments for and against the above ideas you have made acquaintance with.
- Give your considerations and examples of "the AI effect" and "AI winter" phenomena.

H. Checklist:

1. Say who coined the term "AI" first and how this notion was originally defined.
2. Ponder what traits the central problems of AI include.
3. Pick out core areas throughout the technology industry AI is used for.
4. Outline the heritage of Alan Turing's work, and its ongoing effects on computing today.
5. Speak on the common hopes, fears and ethical concerns discussed by AI scientists and researchers.

I. Writing Task

Write an argumentative essay on one of the statements given below:

1. Technological progress will be accelerated by the arrival of advanced artificial intelligence.
2. Superintelligence will lead to more advanced superintelligence.
3. Superintelligence may be the last invention humans ever need to make.

UNIT 3. ROBOTICS

PART I. Application of Robotics

A. Discussion Starters

Look at the images below.

What function and task do you think each of these robots performs?

1



2



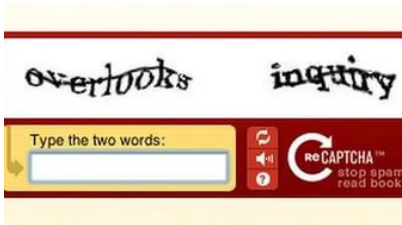
3



4



5



6



B. Before You Read

Some jobs are suitable for robots while some must be done by people.

Make two lists of types of occupation appropriate for humans and machines.

C. Read the essay and see if the author agrees with your ideas.

Ready for the Robot Revolution?

Many of the robots in use today do jobs that are especially difficult for human workers because they require great strength. For example, robots are particularly useful in the auto-manufacturing industry where parts of automobiles must be welded together. As mechanical supermen robots may be called upon to do anything from moving heavy components between workstations on a factory floor to carrying bags of cement.

Spray painting is another task suited to robots because robots do not need to breathe. Unlike human painters, they are unaffected by the poisonous fumes. Robots are better at this task, not because they are faster or cheaper than humans, but because they work in a place where humans cannot.

Robots shine at installing chips in printed circuit boards because of their capabilities that people don't possess. A robot, once properly programmed, will not put a chip in the wrong place. This automatic accuracy is particularly valuable in the assembly of electronic parts because locating and fixing mistakes is costly.

The potential for robots to help disabled and elderly people is very great. In fact, we have little choice but to use robots because there are too few young people who will work on low wages to help older and disabled people. This is a growing problem, as the world has an ageing population, due to advances in health care and increasing wealth.

In their efforts to expand the range of robotic applications, researchers are looking beyond traditional designs to examine a variety of potential models from the biological world. The industrial arm is classic example. Scientists have been able to model robots to imitate the vertebrate spine of a snake in order to paint the interior of automobiles. They have simulated the muscle structure and movement of an elephant's trunk in an attempt to create a robotic arm capable of lifting heavy objects. Scientists have also emulated the flexibility of an octopus where the tentacles can conform to the

fragile objects of any shape and hold them with uniform, gentle pressure. The challenge of equipping robots with the skills to operate independently, outside of a factory or laboratory, has taxed the ingenuity and creativity of academic, military, and so industrial scientists for years.

With the growing proficiency of text recognition software and automated intelligence, companies paying people to do manual data entry may soon become a thing of the past.

Telephone operators are already a practically extinct species. Obviously, the calls you make on your cell phone still need to be routed someplace, but this sort of thing is thankfully no longer accomplished by women in giant earphones manually connecting circuits by sticking phone plugs into things.

Most libraries these days rely more and more heavily on automated touchscreen kiosks and other digital replacements. With the advent of personal computers and the Internet, physical libraries just don't have the communal importance they once did. A few libraries have even been going fully digital and don't stock physical copies of books anymore at all.

Many places like grocery stores already have auto-checkout kiosks, and this trend will likely continue, leaving customers with an increasingly harrowing vulnerability to getting accidentally screwed out of red-sticker prices or receiving incorrect change.

It has already been faster and cheaper to use Orbitz or Travelocity to plan your own vacation than to pay an enormous surcharge to a third party. Besides, they just spend twenty or thirty minutes making phone calls and essentially doing the same things you would do!

Newer types of robots fitted with video cameras and other sensing devices are used in space projects, nuclear reactor stations, and underwater exploration research. Space exploration, for instance, is inherently dangerous, as illustrated by 99.9% of movies (historical and otherwise) that have ever been made about space travel. Fortunately, robotic space explorers are without personal obligation of any kind, and have eventually become affordable for space agencies.

Simply put, robot hands – like robot legs, or eyes, or reasoning powers – have a long way to go before they can approach what biological evolution has achieved over the course of hundreds of millions of years. Much more will have to happen in laboratories around the world before robots can be compared to nature's handiwork.

D. Comprehension Check

Answer the following questions.

1. Why do robots substantiate human workers in many fields of manufacturing?

2. What makes machines more efficient at most tasks to complete?

3. What are the processes where automatic accuracy of robots is so valuable?

4. What do you think of the potential for robots to help disabled people?

5. How do robotic applications facilitate humans to overcome the challenges of ageing population society?

6. What are the spheres where digital applications are widely implemented in?

E. Translate the following words and word combinations into English.

- Отруйні гази
- Цінна, корисна точність
- Надихати, запалювати;
- Геніальність і винахідливість / майстерність
- Інваліди та люди похилого віку
- Старіюче населення
- Внутрішньо притаманний, невід'ємний
- Складання, монтаж,
- Діяти самостійно
- Зростання благоустрою
- Зникаючі види
- Об'єднувати, зварювати, з'єднувати
- Розширити діапазон застосування
- Нестерпний, болючий
- Уразливість
- Ламкі, хрусткі об'єкти
- Копіювати спинний хребет
- Моделювати, відтворювати рухи
- Неймовірно завищена ціна
- Наслідувати, намагатися перевершити
- Ручна робота

Use these combinations in the sentences of your own.

F. Fill in the following table with the details of the animals mentioned in the text. More than three options are possible.

	Animal	Aspect being emulated	Reason
1.			
2.			
3.			

G. Group Work

Summarize the reasons that certain jobs and environments are suitable for robots by completing the table below.

	Job or environment	Reason
1.	Welding	
2.	Carrying components, etc	
3.	Spraying painting	
4.	Assembling components	
5.	Nursing assistants	
6.	Telephone operators, librarians, cashiers, travel agents	

Compare your answers with those of your partner.

PART II. Serving Humanity without Boundaries

A. Before You Read

Read the title from the article below. What do you think the text is going to be about?

B. Read the article. A mixed-up summary of the article is provided after the text. Put the sentences (A-F) of the summary in the chronological order of events.

MIT robot's developers expand the boundaries of possible

If companies like *Amazon* and *Google* have their way, soon enough we will have robots air-dropping supplies from the sky. But is our software where it needs to be to move and deliver goods in the

real world? This question has been explored for many years by researchers at MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL), who have worked on scenarios inspired by domains ranging from factory floors to drone delivery.

One of the CSAIL teams has presented a new system of three robots that can work together to deliver items quickly, accurately and, perhaps most importantly, in unpredictable environments. The team says its models could extend to a variety of other applications, including hospitals, disaster situations, and even restaurants and bars.

One of the big challenges in getting robots to work together is the fact that the human world is full of so much uncertainty. More specifically, robots deal with three kinds of uncertainty, related to sensors, outcomes, and communications.

"Each robot's sensors get less-than-perfect information about the location and status of both themselves and the things around them," Amato, a co-developer, says. "As for outcomes, a robot may drop items when trying to pick them up or take longer than expected to navigate. And, on top of that, robots often are not able to communicate with one another, either because of communication noise or because they are out of range."

These uncertainties were reflected in the team's delivery task: among other things, the supply robot could serve only one waiter robot at a time, and the robots were unable to communicate with one another unless they were in close proximity. Communication difficulties such as this are a particular risk in disaster-relief or battlefield scenarios.

Recently, CSAIL researchers have discovered that robots' rigid limbs, which make it difficult for them to grasp, hold, and manipulate a range of everyday objects without dropping or crushing them, are no longer a problem.

It has been demonstrated a 3-D-printed robotic hand made out of silicone rubber that can lift and handle objects as delicate as an egg and as thin as a compact disc. This machine's three fingers have special sensors that can estimate the size and shape of an object accurately enough to identify it from a set of multiple items.

Researchers say that "soft" robots have a number of advantages over "hard" robots, including the ability to handle irregularly-shaped objects, squeeze into tight spaces, and readily recover from collisions.

Soft robots represent an intriguing new alternative. However, one downside to their extra flexibility (or "compliance") is that they often have difficulty accurately measuring where an object is, or even if they have successfully picked it up at all.

The team is hopeful that, with further sensor advances, the system could eventually identify dozens of distinct objects, and be programmed to interact with them differently depending on their size, shape, and function.

Another team of CSAIL researchers has developed a printable origami robot that folds itself up from a flat sheet of plastic when heated and measures about a centimetre from front to back. Weighing only a third of a gram, the robot can swim, climb an incline, traverse rough terrain, and carry a load twice its weight. Other than the self-folding plastic sheet, the robot's only component is a permanent magnet affixed to its back. Its motions are controlled by external magnetic fields.

The robot's design was motivated by a hypothetical application in which tiny sheets of material would be injected into the human body, navigate to an intervention site, fold themselves up, and, when they had finished their assigned tasks, dissolve. To that end, the researchers built their prototypes from liquid-soluble materials. One prototype robot dissolved almost entirely in acetone (the permanent magnet remained); another had components that were soluble in water.

The researchers envision that a tiny, conductive robot could act as a sensor. Contact with other objects — whether chemical accretions in a mechanical system or microorganisms or cells in the body — would disrupt a current passing through the robot in a characteristic way, and that electrical signal could be relayed to human operators.

"Making small robots is particularly challenging, because you don't just take off-the-shelf components and bolt them together," says Hod Lipson, a professor of mechanical and aerospace engineering at Cornell University, who studies robotics. "They use digital manufacturing techniques so that the intelligence of the manufacturing is embedded in the material," Lipson adds. "I think the techniques they describe would scale to smaller and smaller dimensions, so they by no means have reached a limit."

A. Robots have many strong suits, but delicacy traditionally hasn't been one of them.

B. 'Fantastic Voyage' techniques embedded in the material of a robot.

C. Robots collaborate to deliver meds, supplies, and even drinks.

D. Machines' capability of self-folding, crawling, climbing, swimming, and even self-destructing.

E. Team's silicone rubber gripper can identify objects by touch alone.

F. Delivery robots work together more effectively in the face of uncertainty.

C. Comprehension Check

These are the answers to questions revealing the ideas of the article given above.

Make up the corresponding questions.

1. In the MIT's laboratories the developers have been working on scenarios of goods delivery in real environments.

2. The models could extend to a variety of useful applications.

3. A robot may drop items when trying to pick them up.

4. Communication difficulties are a particular risk in disaster-relief or battlefield scenarios.

5. Robots' rigid limbs make it difficult for them to grasp, hold, and manipulate a range of everyday objects.

6. Soft robots have a number of advantages over "hard" robots.

7. The origami robot's motions are controlled by external magnetic fields.

8. The robot's only component is a permanent magnet affixed to its back.

9. A tiny, conductive robot could act as a sensor.

10. The task is to embed the intelligence of the manufacturing into the material.

D. Look back in the article and find words in the text which have a similar meaning to the following:

1. Anything, such as a photoelectric cell, that receives a signal or stimulus and responds to it.

2. Nearness in space or time.
3. Unbending; physically inflexible or stiff.
4. An event in which two or more bodies or particles come together with a resulting change of direction and, normally, energy.
5. A measure of the ability of a mechanical system to respond to an applied vibrating force, expressed as the reciprocal of the system's stiffness.
6. To become or cause to become liquid; melt.
7. To form an approximate idea of (distance, size, cost, etc.); calculate roughly.
8. Something added and caused growth or an increase in size.
9. One of the first units manufactured of a product, which is tested so that the design can be changed if necessary before the product is manufactured commercially.
10. To fix or retain (a thought, idea, etc.) in the mind.

E. Read the extract. It contains 15 grammar mistakes. Find and correct them.

We are in the verge of a technology revolution and robots will profoundly transform the way our life are organized. Developers may now draw bright line between that is human and that is machine, or risk upsetting the delicate balance within them. As robot are increasingly integration into modern society – on the battlefield and the road, in business, the education, and health – it's urgently to find an answer on one of the most important question of our age: will these machines help us, and will they replace us?

F. Web Research Activity

Prepare a theme report "*Scientific and Technological Perspectives of 5th Generation Robots*". Examine the advances in robotics which have blurred the boundaries.

G. Speaking Test 1

- You see below two opposite points of view to the common problem: *Robot workers versus human workers*. Choose one of the comments and speak on the topic. Make your voice to be persuasive!

Melissa P. *I would feel safer with a robot operating on me rather than a person. Robots don't make mistakes, people do all the time, even professional ones with lots of experience. Robots are universal. I want them to do everything for me!*

Sheera Y. *I think we don't need robots at all – we'd better develop humans to do their jobs thoroughly. There are so many people in need of education and employment that to have robots do these jobs is not very good policy. Only in a hazardous environment I do see a need for robots. I guess they are of no real importance for mankind.*

- Make a round table talk and argue how to obtain a balance between robot and human workers, i.e. how to use the development of technology without causing undue hardship?
- What precautions do you think are needed to ensure that robot technology is used ethically?

Speaking Test 2

- Explain in class why robots' structure is called "a kinematic chain".
- Describe in detail functions which robots can and cannot perform.
- Make your suggestions to the open problem whether a machine can act intelligently. Give your reasons why many researchers have failed to build such a machine.
- Ponder upon the issue whether robotics could help us reduce or eliminate the existential risk that advanced technologies will be used by humans in warfare or terrorism.

H. Checklist:

1. Remember the author who was the first to introduce the Three Laws of Robotics. Consider whether these Laws are still valid for modern Science Fiction writers.
2. State the role and feature its peculiar functions the robotics plays in dealing with real time environments.
3. Emphasise the tasks of secure robot communication.

4. Give examples of autonomous robotic systems.
5. Speak about the installation of the first digitally operated and programmable robot, the *Unimate*.

I. Writing Task

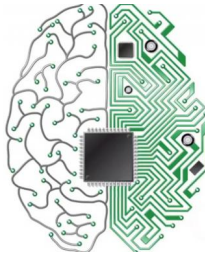
Write an essay of 200–250 words FOR and AGAINST the following statement:

Technological unemployment is unlikely to occur because we will create new machines due to humans' infinite wants. All that is needed is increasing investment in education.

UNIT 4. CYBERNETICS in BIOLOGY

PART I. New Insights into Principles of Life

A. Discussion Starters



Look at the given picture.

Comment on the possibility to implement a certain technological approach and engineering decisions into studying of the unitary components of human intelligence.

B. Before You Read

What risks may researchers face while providing ‘new insights into the principles of life’?

C. Read the article and compare your thoughts with those of the *Daily Intelligencer* reporter.

Silicon Valley’s Most Inspiring Company May Be a Fraud

By Eric Levitz

For Silicon Valley, the story of *Theranos* was too good to be false: *Theranos*’ breakthrough medical technology would drastically reduce the price Americans paid for blood tests, while also sparing them the anxious discomfort of a needle in the arm.

The company, which is valued at \$9 billion, offers more than 240 tests, ranging from cholesterol to cancer. It claims the startup’s "breakthrough advancements have made it possible to quickly process the full

range of laboratory tests from a few drops of blood." Investors have poured more than \$400 million into *Theranos*. The startup also plans to open "wellness centers" on the East Coast, according to the company's CEO Elizabeth Holmes, who founded the company in her dorm room at age 19, wears the same black turtle-necks favored by Steve Jobs, and is now the world's youngest self-made female billionaire.

Theranos claims its finger-prick testing is just as accurate as drawing blood from a vein, but costs significantly less. "We want to be the highest-quality, lowest-cost lab service, period," Holmes told *Bloomberg News*.

The U.S. Food and Drug Administration (FDA) has given the green light for the finger-prick blood test for Herpes Simplex Virus 1 (HSV-1) developed by *Theranos Inc.* The FDA comprehensively reviewed the system proposed by *Theranos*, which involved the highly computerized medium that aims to lessen human errors linked to the processing of the specimens. In the approval issued by the FDA, the use of the *Theranos'* Nanotainer was also given the go signal. Through this tube, blood samples may be drawn with very minimal pain because only a few drops of blood from the patient's finger are required for testing. The entire *Theranos* system, including its analytical software and other devices, has been cleared for use.

Theranos has received numerous disapprovals from academic experts, citing the elusiveness of the company's methods of technology. These researchers particularly emphasized that the essential data of how the company works in comparison to others have not been explained. Despite the statements of critics, the studies presented by *Theranos*, which involved 818 study participants, claim that the finger-prick test of either whole blood or plasma for HSV-1 developed by their company can be comparable, or at least be as reliable as the traditional venepuncture procedure approved by the FDA.

According to a report by the *Wall Street Journal*, Silicon Valley lab, led by Elizabeth Holmes, isn't using its technology for all the tests it offers.

Investigative reporter John Carreyrou portrays *Theranos* as a company whose hype outpaced the actual medical technology both were based on. In the article, Carreyrou speaks with several former *Theranos* employees who claim that of the 200 types of diagnostic tests the company offers, only 15 are actually processed by the company's proprietary "Edison" machine – the vast majority of tests being out-

sourced to machines developed by legacy labs. Further, the employees allege that there's a good reason the device is so little used: Its results are highly inaccurate. One former employee told the paper that the machine routinely produced potassium readings so high, "patients would have to be dead for the results to be correct."

The Edison machine is *Theranos*' innovation – it's the blood-testing device so exquisitely fine-tuned, it can make accurate diagnostic tests using the tiny bit of blood that's extracted from a finger prick. If the Edison is a dud, then *Theranos* is just a relatively small blood-testing company with great branding, as well as a competitive price and fast turn-around time – both of which may come at the cost of accuracy.

The Journal article's strongest allegation is that *Theranos* tried to hide the inaccuracy of Edison's results by manipulating federally mandated proficiency tests in a manner that may have violated legal requirements.

In response to the article, *Theranos* released a statement claiming that the "disgruntled former employees" quoted by the Journal "were never in a position to understand *Theranos*' technology and know nothing about the processes currently employed by the company."

D. Comprehension Check

Answer the questions below.

1. What was the fundamental aim of the business project '*Theranos*'?
2. How many offered tests does the company provide?
3. What is the principle of the company's proprietary "Edison" machine?
4. What company procedures have been approved by the U.S. Food and Drug Administration?
5. What are the advantages of the *Theranos*' diagnosis compared to the similar current analyses?
6. What claims did the former *Theranos*' employees reveal?

Have a look at the five questions given below. Each one contains a mistake. Find it and correct.

1. Which goals has Ms. Holmes try to achieve?
2. What does the computerized medium used for?
3. How *Theranos* does help people be less anxious while doing the blood tests?

4. Why do some experts criticized *Theranos*?
5. Which way are used to hide the real results of the Edison machine according to the Journal article?

E. Read the review of the article *Silicon Valley's Most Inspiring Company May Be a Fraud* below. You will find a range of underlined linking words and phrases which take a wrong place in the review. Put them into their proper position to make the ideas sound logical.

At the age of 19, Elizabeth Holmes set up a really successful company called *Theranos*, which made her the youngest female billionaire in the world. The aim of this project is to help people pay less for the blood tests and, hence, be less anxious about this procedure. Consequently, these tests are claimed to be as precise as the ones drawn from a vein.

The FDA has approved of *Theranos*' campaign because it is believed that the computerized medium minimizes human mistakes, as well as lessens the pain. Obviously, there are experts that criticize *Theranos* due to the unexplained methods of its work. The former employees mention, nevertheless, that most of the tests are being outsourced to the machines, different from the 'Edison', additionally, the results are rather inaccurate and, moreover, irrelevant.

The crucial thing with this campaign is the Edison machine itself. In particular, if it is a fraud, then *Theranos* is practically nothing. In response to these accusations, the *Journal* article alleges that the test results have been falsified in order to hide the inaccuracies. Furthermore, *Theranos* states that the former employees know little about the ongoing situation in the company.

F. Give synonyms to the following words from the article.

- To hype, outpace, spare, outsource, enlarge, fine-tune, emphasize, lessen, release, violate, disgruntle, pour (funds), claim, allege;
- fraud, accuracy, breakthrough, specimen, start-up, advancement, wellness, dorm, investigation, aim, error, former, proprietary, response;
- anxiously, drastically, significantly, reliable, vast, turnaround.

G. Pair Work

Student A should emphasize the value of *Theranos*' mission to provide universal access to low-cost, needle-free blood tests.

Student B is supposed to claim that there are certain reasons to doubt the sincerity of Elizabeth Holmes's intentions for her company because some valuations are too big to be true.

PART II. Leading Healthcare Innovations

A. Before You Read

Why do you think the healthcare industry has long been overburdened by a slow moving innovation?

B. Read the articles below. For questions (1-25) choose the correct answer (A, B, C or D).

Bridging spinal injury with electronics

Scientists at Case Western Reserve University in Ohio say they've used electronics to get around a paralyzed man's spinal injury, permitting him to use an implant in his brain to move his arm and hand. The test 1 _____ the first time that signals collected in the brain have been conveyed directly to electrodes placed inside someone's arm to restore movement, says Robert Kirsch, a biomedical engineer at Case Western.

People 2 _____ with the study's results said the volunteer's movements are still rough, and not well coordinated. "It's not a fluid natural movement like you are picking up a cup of coffee to drink it," says John Donoghue, one of the leaders of BrainGate, a consortium that is 3 _____ brain-computer interfaces and includes the Case Western team. "But the fact that they got a person to control their own body, to stimulate muscles in a specific way to make them 4 _____, and do it from a small patch of brain, is incredible."

Surgeons implanted two bunches of silicon electrodes, called Utah arrays, 5 _____ the volunteer's motor cortex. Wires from each array emerge from the skull through metal ports and 6 _____ to computers that interpret the signals. To complete the bridge of the man's spinal cord injury, doctors then inserted more than 16 fine wires into the volunteer's right arm and hand. Electrical impulses sent to those electrodes 7 _____ different muscles to contract, creating movement in the shoulder, elbow, and wrist, an approach known as functional electrical stimulation, or FES.

According to Kirsch, the volunteer is able to very **8** _____ control a computer simulation of his wired-up arm using his brain signals. Moving the real arm under brain control has proved more challenging. "The virtual setup is perfect, it does what he says, but the FES system has to use his chronically paralyzed arm," says Kirsch.

"The vision is that a person would be walking **9** _____ the room, doing normal things," says Donoghue. "But that is a vision with many steps **10** _____ it happens."

For paralyzed individuals, a practical solution can't come soon enough.

1	A	Acquaints	B	Persuades	C	represents	D	reminds
2	A	Familiar	B	well-known	C	experienced	D	Faced
3	A	Making	B	Analysing	C	providing	D	developing
4	A	to move	B	Moved	C	moving	D	move
5	A	Inside	B	Into	C	towards	D	upon
6	A	Connect	B	Deploy	C	implement	D	distribute
7	A	Make	B	influence	C	cause	D	interfere
8	A	Exactly	B	roughly	C	Accurately	D	weirdly
9	A	On	B	through	C	Among	D	around
10	A	Before	B	still	C	After	D	while

Could a digital pen change how we diagnose brain function?

Noting that most current methods of diagnosing cognitive diseases can only detect impairment after the disorders have taken hold, researchers at MIT have combined digital pen technology and some custom software to develop an objective model for **11** _____ detection.

The new system, still in its concept stage, is a development on the Clock Drawing Test (CDT) that doctors use to screen **12** _____ illnesses such as Alzheimer's and Parkinson's. In this test patients are asked to draw a clock face showing the time as 10 minutes past 11, and then asked to copy a pre-drawn clock **13** _____ showing the same time. The results are then examined for signs of problems by a doctor.

Researchers at MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) swapped out the ink pen used in **14** _____ tests for the Anoto Live Pen, a digitizing ballpoint pen that, with the help of a

built-in camera, can measure its position on the paper more than 80 times a second. **15** _____ than only relying on the final drawing for subjective analysis **16** _____ medical practitioners, the pen can pick up on all the patient's hesitations and movements.

The CSAIL researchers helped **17** _____ analysis software for the Live Pen version of the test, resulting in what the team calls the digital Clock Drawing Test.

"We've improved the analysis **18** _____ that it is automated and objective," says CSAIL principal investigator Cynthia Rudin, co-author of the team's paper. "With the right equipment, you can get results **19** _____ you want, quickly, and with higher accuracy."

Beyond the projected benefits to patients, the new technique could also prove to be helpful to the medical profession. Currently, neurologists reportedly spend significant time and resources documenting patient **20** _____ by hand and wading through databases. The digital system transfers much of this grunt work to software algorithms.

11	A	on time	B	Early	C	Late	D	Temporary
12	A	To	B	For	C	In	D	With
13	A	Face	B	Back	C	Pointer	D	Arrow
14	A	Lately	B	New	C	Late	D	current
15	A	Hardly	B	Fairly	C	Rather	D	Though
16	A	With	B	Along	C	By	D	Within
17	A	have produced	B	Producing	C	Produced	D	produce
18	A	Such	B	So	C	rather	D	Barely
19	A	whoever	B	Wherever	C	whichever	D	whomever
20	A	observations	B	Notifications	C	paralysations	D	applications

Electronic Aspirin

For people who suffer from migraines, headaches, and other causes of chronic, the "take two aspirins and call me in the morning" method is **21** _____. Doctors haven't yet found a treatment that works on the SPG, a facial nerve bundle, long-term.

A technology **22** _____ clinical investigation at Autonomic Technologies, Inc. is a patient-powered tool for blocking SPG signals at the first sign of a headache. The system **23** _____ the permanent

implant of a small nerve stimulating device in the upper gum on the side of the head normally affected by headache. The lead tip of the implant connects with the SPG bundle, and **24** _____ a patient senses the onset of a headache, he or she places a handheld remote controller on the cheek nearest the implant. The resulting signals stimulate the SPG nerves and block the pain-causing neurotransmitters.

The company's initial product, the ATI Neurostimulation System, is **25** _____ in Europe for the treatment of cluster headache.

21	A priceless	B Invaluable	C unreasonable	D useless
22	A Under	B Along	C between	D within
23	A Covers	B Presupposes	C involves	D fulfils
24	A During	B Through	C when	D that
25	A abandoned	B Approved	C threatened	D acknowledged

C. Comprehension Check

Complete the sentences below by including the additional details from the passages you have nearly read.

1. The team of scientists from Case Western Reserve University has applied electronics to permit a paralyzed man to ...
2. The volunteer's movements are not fluid natural movements but ...
3. The FES approach has appeared to be incredible but moving the real arm under brain control ...
4. The results of the traditional Clock Drawing Test while diagnosing cognitive diseases are no longer ...
5. The Anoto Live Pen can also pick up on all the patient's hesitations and movements that ...
6. Among the benefits of the digital Clock Drawing Test one can find ...
7. "Take two aspirins and call me in the morning" method is ...
8. The innovation developed by Autonomic Technologies, Inc. aims to ...

D. Complete the sentences by choosing the correct verb from the box and putting it in the appropriate form.

control	combine	permit	block	prove
use	measure	develop	move	make

- A digitizing ballpoint pen can (1) _____ its position on the paper more than 80 times a second.
- The resulting signals stimulate the SPG nerves and (2) _____ the pain-causing neurotransmitters.
- But the fact that they got a person (3) _____ their own body, to stimulate muscles in a specific way (4) _____ them move is incredible.
- They've (5) _____ electronics to get around a paralyzed man's spinal injury, (6) _____ him to use an implant in his brain (7) _____ his arm and hand.
- Researchers at MIT have (8) _____ digital pen technology and some custom software (9) _____ an objective model for early detection.
- The new technique could also (10) _____ to be helpful to the medical profession.

E. Each line, from 1 to 10, may contain an unnecessary word or set of words. Write the unnecessary word on the answer sheet. Tick the correct sentences (√).

- (1) A Biomedical Cybernetics is an innovative scientific approach that aims in a deeper understanding
- (2) of function and development of so complex living systems. It covers mathematical and structural
- (3) description of information processing in organisms and ecosystems, decision over making, e.g. in clinical application
- (4) and statistical description of any dynamical networks that can describe the spreading of infectious disease.
- (5) Researches at Harvard Medical School presented an optical possible sensor attached to the forehead which
- (6) could do the work of both an electroencephalography monitor and a magnetic resonance imaging (MRI) scan.
- (7) The technology aims to allow somebody portable monitoring of brain activity in patients and better control
- (8) of hands-free devices for the physically disabled. It is believed that a person unable to control a mouse or keyboard
- (9) could instead send commands to a whole computer using only his thoughts. Such a small, portable brain-machine interface
- (10) would be a boon to the disabled. It might have even be possible to send information from one human brain directly to another.

F. Web Research Activity

Everything from new artificial hearts to electronic aspirin proves that the healthcare industry is slowly but surely becoming more agile and effective for patients looking for care.

Have a look at the list of some of the biggest innovations in healthcare technology with far reaching impacts. Make reports in class on the details and results of these experiments.

1. Microchips Modeling Clinical Trials.
3. 3D Printed Biological Materials.
4. Optogenetics (Its purpose is to control a brain's activity with light.)
5. Hybrid Operating Rooms.
6. Digestible Sensors.
7. Robotic Check-Ups.
8. Needle-Free Diabetes Care.

G. Speaking Test 1

• Roleplay situations

Divide into two groups to solve one of the suggested problems:

Group 1: You are representatives of NASA's project BUZZ which aims to make drones' equipment as quiet as it is possible. What examples can you find to justify your efforts?

Group 2: You are going to represent the project BLIND of the bio-engineers from Nevada University who are doing their best to process loud drones. What examples can you find to justify your efforts?

• Class discussion

Suppose you could participate in the BRAIN Initiative Project - an effort of neuroscientists, engineers, computer scientists, and materials scientists to greatly improve our understanding of the brain - what issues would you be eager to solve? What would you propose to modify? Can you foresee the outcome of your enhancements?

Speaking Test 2

• Give a holistic picture of the bridging connections between neuroscience and cybernetics. What other fields can be combined to enhance the achievements in cybernetics?

- Speak on some new ideas in terms of creativity of neuro-researchers and their current achievements. Can you construct your model that would change patient diagnosis, treatment and care?
- Based on what you know, how would you assess the value of some of the most influential healthcare technologies you've seen appear this year?

H. Checklist:

1. Can any technology, even in principle, preserve the unique features of an individual's mind?
2. What would result if the aging process is slowed down by using gene therapy to make permanent changes to a person's DNA?
3. What are the most breath-taking achievements of neuroscience?
4. What projects within memory research, brain surgery techniques, and nanomedicine are on the point of breaking the stereotypes of humans?
5. How would you estimate the results of Genetic Engineering?

I. Writing Task

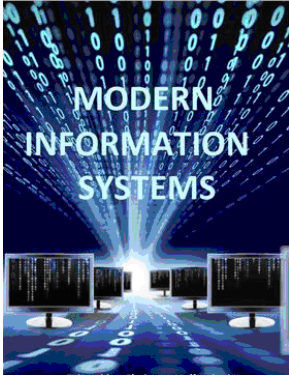
Write a discussion essay on the statement given below.

Cryonics does mainstream efforts to understand the nature of consciousness, preserve human tissue and organs for life-saving transplants, and rescue critically injured patients by understanding the boundaries between biological life and death.

UNIT 5. MODERN TECHNOLOGIES

PART I. Information in Digital Society

A. Discussion Starters



Imagine, you are asked to write a book discussing the issues of

- contemporary information,
- innovative information research,
- and the tendencies of modern digital society's development.

Present your work to the audience.

Emphasize the role of information in the world of competitive and up-to-date technologies.

B. Before You Read

How do you find most of your information: in printed or online sources? Why?

C. Read the essay about the role of information in the present.

So Much Information, So Little Time

We live in an amazing time, with access to almost unlimited information, entertainment, and opinions. Digital technology offers us new information whenever we are "plugged in". Just the other day, I watched a baseball game on TV, texted a friend, and kept track of the details of my other friends' lives online. I also kept an eye on all the other sports scores as they were happening. I did all this while also having a conversation with my brother. While it is true that digital technology has many benefits, they come at a cost, producing citizens who have fewer critical-thinking skills and weaker social skills.

According to the proponents of technology, easy access to information is one way that people benefit from new technology. When doing research, you do not have to walk to a library, search for books, and read words on

paper. Obviously, finding what we need from the Internet is faster, and online searches provide a broader range of sources. Often, however, when people are faced with search-engine results in the thousands or more, their critical-thinking skills may be overwhelmed by the sheer volume of material to read. One study in the UK showed that students skimmed over most information they found. According to this study, they rarely read more than a page or two when completing academic research.

Proponents also point out that technology has increased social connections. People can stay in touch with friends more easily now, sending them birthday greetings, sharing complaints, and keeping each other informed, all online. Naturally, e-mail and social networking websites have facilitated communication. Ironically, though, the tools designed for increased online interaction may actually lead to people being less social. Students rarely need to engage in face-to-face interactions these days either with their professors or their fellow students. Lonely librarians remember when students used to ask them questions in person. Now they more often respond to students' text queries via website help centers. At the end of the day, workers come home exhausted by so much online interaction. Having made themselves accessible online 24 hours a day, they end up sacrificing family time at home as they prepare for the next round of virtual interaction.

Kevin Benedict, the Senior Analyst for Digital Transformation at Cognizant Technology Solutions Corporation (New Jersey, United States), strongly believes that technology has already reached the tipping point and moved from a help to a hindrance. To prevent users from wasting their time on poor technology experiences the analyst proposes to minimize the following activities:

1. Reading through hundreds of useless email messages to find the three necessary to complete our job.
2. Checking of dozens of different apps and websites to communicate with our colleagues and friends.
3. Storing of dozens of different passwords and user names in social networks. The technology of accurate user identification must become more efficient and secure.
4. Installing of mobile applications that are both not personalized and contextually relevant for our target.
5. Processing of routine work on a computer. Intelligent process automation should be pushed down to individuals.

We have approximately 700,000 hours between our birth and our death. About 350,000 of those hours are spent on our career paths. Within this productive period of a human lifespan there is a time when users' creativity and innovation potential are enslaved. Thus, '... the use of technologies that hinder our thinking, creating, planning, relationship building, and the ability to handle hazardous situations must disappear', concludes Kevin Benedict.

Clearly, increased access to information results in added benefits, but it is also true that there is a cost. People who embrace new technology should reflect on what they lose as well as what they gain. There is a choice between touching and smelling a flower grown in my garden and sharing it with one or two friends in the neighbourhood, and instead photographing the flower, putting that image online, and reading the responses of my worldwide set of "friends". Perhaps the touch of the real flower should rule.

D. Comprehension Check

Answer the following questions.

1. What are the two main points in favour of new technology mentioned in the essay?
2. Why does the writer believe that ease of access to information may not be such a good thing?
3. What concerns does the writer have about relying on the Internet for information?
4. Why do you think the analyst from the Technology Solutions Corporation strongly believes that present technologies have already reached their tipping point?
5. What advice does Kevin Benedict give to prevent users from wasting their time on poor technology experiences?

E. Suggest your own endings of the following sentences from the essay.

1. We live in an amazing time, ...
2. Digital technologies offer us ...
3. While it is true that digital technology has many benefits ...
4. Easy access to information is ...
5. When people are faced with search-engine results in the thousands or more ...

6. Though, the tools designed for increased online interaction may ...
7. To prevent users from wasting their time on poor technology experiences we'd better ...
8. Within the productive period of a human lifespan there is a time when ...
9. People who embrace new technology should ...
10. There is always a choice between

F. Group Work

- Find examples in the essay where the writer presents views that oppose his own thesis. Why do you think writers include opposing points of view in persuasive writing?
 - The writer offers readers a choice in the concluding paragraph. What would you personally choose? Why? Justify your opinion.
 - Compare Kevin Benedict's suggestions how to optimize the current technological era with your own beliefs and solutions. Emphasize the issues you don't agree with.

G. Roleplay

Student A. You are a proponent of Kevin Benedict's idea that in the forthcoming years it should be urgent to make the previous years' technologies disappear. Do your utmost to influence your partner decision.

Student B. You are an opponent of Kevin Benedict's opinion. Substantiate your ideas with examples. Try to alter your partner's point of view.

PART II. Digital Phenomena and Contemporary Society

A. Before You Read

Read the title from the article below. What do you think the text is going to be about?

B. Read the article.

Five sentences have been removed from the text. Put the correct sentence from A–F below in each space (1–5) to form a logical text. There is one extra item you don't need.

Home-baked idea? Nasa mulls 3D printers for food replication

NASA can send robots to Mars, no problem. But if it's ever going to put humans on the red planet, it has to figure out how to feed them over the course of a years-long mission. So the space agency has funded research for what could be the ultimate solution: a 3D printer that creates entrees or desserts at the touch of a button. (1) _____ . Including smell.

At the presentation of the project the Systems and Materials Research Co explained how the idea originated: the project manager had used a 3D printer to print chocolate for his wife. (2) _____. It is said that 3D printed food could be tailored to each individual astronaut's nutritional needs, improving health and, maybe more importantly, alleviating boredom.

One of the first goals for SMRC's printer is the pizza. (3) _____. More importantly, a pizza is made up of layers, a key principle used in 3D printing technology. Such printers build a three-dimensional object by adding successive layers of material millions of times over according to a digital blueprint. Hobbyists have been using them to make everything from plastic toys to functioning guns.

In SMRC's proposal, all the nutrients that go into a meal – such as protein and carbohydrates – would be stored in powdered form in cartridges. When an astronaut chooses a recipe, all the ingredients are deployed into a mixing chamber, where they are blended with water and oil. The mixture is then heated and sprayed on to a heated base. (4) _____. Theoretically, homesick astronauts could even get a care package from mum: the printer would have the ability to communicate with Earth and receive personalized instructions, or "recipes", the company said.

Using 3D printers to make food is not new. In 2011, Cornell University designed a printer that could create food using pastes moving through a syringe. A Dutch research company, TNO, floated the idea that 3D printers could use organic life as a protein component – algae, grass or even insects.

SMRC said part of its motivation for seeking the NASA grant is to pursue the even loftier goal of fighting world hunger. It is believed printed food could increase the efficiency of food systems on Earth by eliminating waste and making it easier to store and transport nutritional ingredients. The company also envisions printing food for military use, which could cut down on supply runs.

(5) _____. A space-food printer doesn't actually exist yet – it's still a concept, which the company hopes to develop by the end of the year using NASA's grant money.

A. Using a "digital recipe", the printers will combine powders to produce food that has the structure and texture of, well, actual food.

B. NASA said the proposal is intriguing in part because it could save weight on a spacecraft, and because such technology could be used to make other objects, such as tools.

C. "There isn't some silver-bullet technology that's going to solve hunger problems," said Gawain Kripke, policy director for food security and hunger at Oxfam America.

D. It was chosen because it contains a variety of nutrients and flavours.

E. The chocolate experiment led the company to think about other kinds of food that could be printed.

F. Layer by layer, the food is formed on the base, until it is ready, fresh from the "oven".

C. Comprehension Check

Answer the following questions.

2. What is 3D printing? How does a 3D printer work?
3. What was the primary goal of the SMRC's project?
4. What do you know about the origin of the technology?
5. Why do you think 3D printing looks brand new being already 30 years old?
6. What are the advantages of 3D printing?
7. What are the applications of 3D printing technology?

D. Read the phrases bellow. Explain their meanings. Use them in the sentences of your own.

A three-dimensional object, the ultimate solution, a "digital recipe", a digital blueprint;

to improve health, to alleviate boredom, to receive personalized instructions, to float the idea, to pursue the loftier goal, to eliminate waste, to envision printing food for military use.

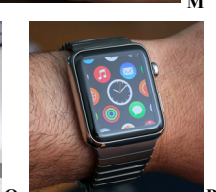
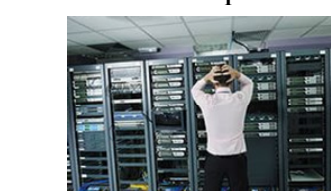
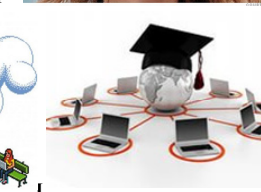
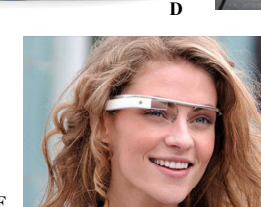
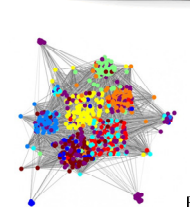
E. The key words and word combinations revealing five various technologies are given below. You should 1) guess what technology is meant, and 2) describe the phenomenon using the words given.

Technology 1	Technology 2	Technology 3	Technology 4	Technology 5
<ul style="list-style-type: none"> • adaptive cruise control • collision avoidance • vehicular communication equipment • to adapt to driving obstacles to prevent accidents 	<ul style="list-style-type: none"> • IBM's Deep Blue • IBM's Watson • Apple's Siri • capability of taking over human tasks • smarter than humans 	<ul style="list-style-type: none"> • equipped electronics • capability of adapting to the environment • to improve security of homes • to learn inhabitants' habits • to enhance dwellers' comfort and convenience 	<ul style="list-style-type: none"> • unmanned aerial survey • remotely controlled devices • to be easily manufactured in large quantities • to perform complex tasks either singly or collectively • no rules to safe integration into the skies 	<ul style="list-style-type: none"> • top colleges of the world • a variety of subjects and sciences • online availability • large scale adoption by all ages • available through all devices

F. Web Research Activity

Introduce the top three "scientific" projects threatening the survival of the human race.

1	Autonomous Vehicles (AVs);	5	MOOC (Massive Online Open Course);
2	Smart Assistants;	6	Artificial sense organs;
3	Intelligent homes;	7	Big Data technology;
4	Swarms of drones;	8	Cloud Computing;



G. Speaking Test 1

• Have a look at some fascinating modern trends given above. Match each technology with its image. Each technology should be matched to two pictures.

- Discuss with a partner the key points of each technology.
- Choose and describe some other exciting phenomena of the present which appeal to you the most.

Speaking Test 2

• Identify the notions "scientific revolution" and "modern technologies". Make a comparison of their features.

• Give your considerations towards the results of significant advances in modern technology.

• Ray Kurzweil, the author of a 2005 non-fiction book "The Singularity Is Near", believes that advances in robotics, AI, nanotechnology and genetics will grow exponentially and will lead us into a future realm of intelligence that will far exceed biological intelligence. Argue towards Ray Kurzweil's predictions. Decide whether we are heading to Singularity or not.

H. Checklist:

6. Make up a list of the most breakthrough scientific achievements of the past. Analyse the role and aftermaths of each invention.

7. Depict the frequency of computer technologies' inventions of the XX century. Explain its high compactness in the 2nd half of the XX century. Give your reasons to this issue.

8. Single out the most fundamental technologies of the present. Characterize their efficacy. Depict the peculiarities of their application, operation and development trends.

9. Remember the plot of H.G. Wells's novel "The Time Machine". Compare the brightest modern inventions of mathematicians with H.G. Wells's fiction ideas.

I. Home Reading Task

Work with the story "The Nine Billion Names of God" by Arthur Clarke¹*

Prepare a concise summary of the plot. Keep a list of interesting ideas that you come up with. Some of them may work to fit into your summary.

¹ You are free to choose other stories of the author which appeal you the most.

UNIT 6. NETWORK WORLD SOCIETY

PART I. Internet and E-communication

A. Discussion Starters

Comment on the given pictures. Analyse and compare the concepts of "net" and "information".

Explain the notion "I-net communication".



B. Before You Read

What social networking sites are popular among you and your friends?
Are there any possible negative aspects of social networking sites?

C. Read the essay about the impact that social networking web-sites may be having on students' academic performance.

Social Networking – Dangers Lurking in the Shadows

The modern era has been now extremely advanced and well-developed and the basic reason for this development is actually the launch of the internet and its applications which have provided the individuals with the easiest routine in their daily lives.

The internet is ever-present. Most people have access to it, either at home, at work, or at school. But most people do nothing more than send and receive email, and look up the weather or sports scores. But the internet has so much to offer. For instance, some museums are working on telepresence robots that you could log into across the internet and then 'drive' around the museum. Telepresence could be active 24 hours a day and make it possible to visit places no human could go, or to visit far off places, without leaving home.

The advent of social networking sites (SNSs), such as *Facebook*, *Twitter*, *MySpace*, and *LinkedIn*, has created a myriad of communicative implications. Initially, these can be tremendously effective networking tools. You can reestablish contact with friends from high school you haven't talked to in years, or build a network of contacts for business purposes. You can keep friends and family updated on what's going on in your life without having to write individual messages.

However, there are dangers lurking in the shadows. The realm of stalking has now expanded to the Internet, and social networking sites can help facilitate those insidious intentions. Moreover, as many recent college graduates have come to find, one must be very careful of the information they put out and the way they present themselves on these sites, as potential employers may see the pages.

SNSs have been growing in popularity at an astonishing rate and have revolutionized the way we communicate with friends, colleagues, classmates, and even family members. It is now possible to interact and maintain a relationship with someone without ever meeting in person.

There are many positive aspects of these new types of interactions. Some proponents claim that students can join online groups in which everyone shares the same interest, and they can learn how to communicate effectively in this digital age. It has been further argued that, when online, students will discuss current events and issues that they are less likely to discuss in "real life" interactions. In an ideal world, this could indeed be a beneficial way to promote interaction with people from different cultures and backgrounds. However, the excessive use of such websites has created a distraction for some users. It is estimated that at least 85 percent of students in the United States spend hours a day "networking" instead of focusing on their studies and preparing for their future careers. Opponents argue that students are growing dependent on such networks.

SNSs present a new way to find, organize, and share information. These visually stimulating, highly interactive websites attract many college students. However, their addictive nature can potentially disrupt student life to the degree that colleges and universities have to take action and ban access to social networking sites in some areas on campuses. The thing is that some studies report a link between time on SNSs and students' grades. In addition, lecturers are increasingly concerned about social networking use in class. They complain that students are messaging friends or posting status updates from their laptops instead of paying attention to lectures. Based on these concerns, establishing clear policies for use of these websites on campus is likely to help students focus on their studies. They would spend more time studying, and their grades should improve as a result.

D. Comprehension Check

Answer the following questions.

1. What is believed to be the major reason of rapid improvement of the contemporary society life?
2. What kinds of technologies have been created to enhance the internet possibilities?
3. Does the writer think of social networking sites as having a positive or negative impact on students? Why?
4. Why does the author want to limit or ban social networking sites on campuses?
5. Do you agree or disagree with the writer's point of view? Why?

E. Find a word in the essay which explanation is given below

1. To go unnoticed;
2. Starting off; putting a new product on the market;
3. An arrival which is awaited;
4. Causing a good result, wholesome, favourable;
5. Exceedingly, extremely; dreadfully;
6. To follow (game, prey, celebrity, etc) quietly and persistently; to attack;
7. To make easier; assist the progress;
8. Working in a cunning and deceitful way;
9. Something that takes your attention away from where it should be focused;
10. To change the normal direction and create disorder.

F. Group Work

- Share with the partners your ideas towards the issue: *"The more information we produce, the more chaotic the world turns"*.
- Choose one representative from the group who will report in class your common suggestions within the topic.

PART II. Modern Information Society Development

A. Before You Read

Read the title from the article below. What do you think the text is going to be about?

B. Read the article below. Put the sentences (1–11) in order to form a summary of the article. There is one extra idea you do not need to use.



Miracles of the World Wide Web in Education

Education these days has been the top priority for any family or individual person, and no doubt the internet comes first in promoting and maintaining the education standards among the latest technologies. A clear majority of people in the emerging and developing countries see the internet as a positive influence on education. They believe that the

net is not only an access to websites, these days there is knowledge and communication on every aspect of the educational world. The resources provided on various web pages are indeed very informative and useful for professionals and students related to every field of work. The only pre-requisite is the research over the internet for a specific educational topic, and then this information just needs to be filtered to gain the basic knowledge of what you are looking for.

Arguably, it is believed that visual data has a higher impact on learning and memorizing than a plain text. Therefore, images, graphics, animation, pictures, slides, documentaries, etc., have a greater appeal than a plain textbook because they can stimulate more than one sense at a time, and in doing so, may be more attention-getting and attention-holding. In educational settings, using multimedia products and online services provides an opportunity for learners to gain knowledge about a particular subject in depth.

Another positive effect of the internet in education is the onset of distance education or online education (internet-based training (IBT) or web-based training (WBT)). With this facility, you can take up short-term courses with the material available online, attend virtual classes, learn, and appear for exams. Today, both able students as well as less-able ones can be benefited to the sea of knowledge through the internet.

The most amazing thing about studying in the net is that the international education is no more a chance for only the wealthy and high profile family students. Now via internet no matter if one can afford to study in top most universities, people can easily benefit from the international quality education and gain a respectable university degree sitting at home through the online educational courses provided by the world universities. Relatively low-cost access has become one of the major benefits of internet to people and students all over the world.

Online courses provide an opportunity for people of all age groups to take up education of their choice, according to their liking and wish. Be it a student, a housewife, or a professional, they can just start up their computers, connect to the internet, and take virtual classes. There-

fore, people can now gain knowledge according to their need and time available. They are free to balance their time according to their own needs, as there is no fixed moment to attend the lectures. Moreover, you are, now, never too old or too busy to learn something new.

Although such programs as e-learning, *mooc* and *opencourseware* broaden access to traditional training, there are a number of concerns regarding the implementation of open education systems, specifically for use in developing countries. These include: a potential lack of administrative oversight and quality assurance systems for educators / materials in some programs; infrastructure limitations in developing countries; a lack of equal access to technologies required for students' full participation in online education initiatives; and questions regarding the use of copyrighted materials.

Nowadays education is open to new approaches and challenges of the world progress. Close attention is paid to the technological innovations of young teams that start their projects on international markets. One of the latest breakthroughs within the use of the internet is 'The Cave', an immersive virtual reality environment where projectors are directed to three, four, five or six of the walls of a room-sized cube. This technology was firstly developed at University of Illinois at Chicago. This foam lined area, roughly egg-shaped filled with video monitors, speakers and microphones, reproduces excellent sound and has become the third major physical form of immersive Virtual Reality (after Goggles 'n' gloves and vehicle simulators). Today, on college campuses all over the world, musicians use Caves to create intercontinental jam sessions. In the future, you may take a class from inside a Cave, or take in a concert or play.

If you're researching something for school, try using the internet to access your library card catalogue. When you have made your list of books, place them on reserve and the librarians will collect them up and hold them for you to pick up. If you find out about books, journal articles, and other resources which are not available in your libraries, explore 'Inter-Library Loan' – you can check books out of libraries that are not anywhere near you. That's a real boon for students.

With these points, the importance of internet in education cannot be denied, and hence, every student should be given access to the internet for deeper understanding of a subject. However, loads of information can be termed as both, advantages and disadvantages of the Internet as students can also have an access to unwanted or unethical information and sites. Therefore, it is only wise for parents to make children understand what is good and what is not for them, or keep watch on their surfing. Lastly, although the Internet cannot replace books or classroom education because the aesthetic quality of sheets of a downloaded text leaves much to be desired, it is still one of the best substitute for those who wish to gain deeper knowledge on literally every subject under the sun.

1. The development of the internet has led to a revolution in the sphere of studying.

2. Sometimes, encyclopaedia sources may not always be available to students and they may have difficulty in gaining access to the books in the library.

3. One of the benefits of e-learning programs is that people from any part of the world can gain knowledge on different subjects, complete courses, etc.

4. There are no age limitations for education any more.

5. Information is currently one of the two basic uses within the Internet.

6. The Internet is in no way can compare with the warm, personal experience of reading a good book.

7. A great number of online school services and virtual options have not been facilitated by the internet.

8. Students can now see the actual photographs of rare bird species or animated graphics of a volcanic eruption to understand the concept in detail.

9. While it is a fact that online schooling has loads of advantages, it is also a fact that there are a few drawbacks too.

10. Emerging technologies and furthering innovation prospects find overall support on educational arena.

11. University courses and learning is now easy for people belonging to all strata of the society with the help of online programmes.

C. Comprehension Check

Make up your own questions to shed light on the central ideas of the essay *Miracles of the World Wide Web in Education*.

D. Match words (1–10) to their synonyms (a–j)

1. maintain	a. necessity
2. jam session	b. ease, ability, efficiency
3. requisite	c. deeply engaging, captivating
4. oversight	d. support, keep in existence
5. immersive	e. right of first publication
6. onset	f. anxiety, worry; affair, business
7. facility	g. benefit, advantage
8. copyright	h. improvised performance
9. boon	i. supervision
10. concern	j. start, beginning

E. Use the words from the table to complete the following sentences. Consider correct grammar use.

1. So, how are you going to _____ accurate customer data?
2. This part of the global issues web site attempts to high light some of the environmental _____ that have an effect on all of us.
3. The latest version of facial animation is recommended for most players who want an _____ experience in game.
4. Algebra is a _____ for taking calculus.
5. This lack of access to correct information from the _____ of a project is the reason why many projects go over budget or fail.
6. The search objections are often based on the difficulty of secur- ing so many licenses for work under _____.
7. _____ is a super laid back and informal event for students to come in and play whatever they want.
8. The product has a specific mission and cannot be expected to handle _____ of robot autonomy on its own.

9. The purpose is to provide _____ for education concerning issues involving automated manufacturing as well as the application of artificial intelligence techniques.

10. Quantum field theory has been a great _____ for physicists, but it is difficult for mathematicians to comprehend because it is mathematically incomplete.

F. Web Research Activity

Here are **Top-5 Facts** about the Internet. Find additional information on most of the topics that are listed.

1. The fastest growing means of communication ever.
2. Devices connected to the web outnumber humans.
3. The US does not have the most Internet users.
4. There is far more to the web than you see.
5. The first webcam was used to watch the coffee.

G. Speaking Test 1

- Focus on would-be career paths for digital citizens in the 21st century. Do you consider yourself as a ‘digital citizen’ of modern era? Speak on your favourable career prospects.

Speaking Test 2

- Explore emerging I-net technologies and discuss how they alter and create new information environments.

- Indicate the possible aftermath of face-to-face communication elimination. Focus on both upsides and downsides of such a shift. If there are none of such challenges in your opinion, explain why.

- Feature the phenomenon ‘Internet addiction’. Do you consider it to be the norm or a kind of some disorders? Substantiate your ideas.

H. Checklist:

1. Dwell on the ways the Internet has changed the landscape of global communication.

2. Give your suggestions why it is urgent to accommodate our communication tactics for the differences in the globalized community.

3. Characterize the perspectives of modern I-net technologies.
4. Substantiate the huge role of the Internet in modern information society development.
5. Speak on positive and negative impact of the Internet on its users. Emphasize the profits and potential dangers of the Internet speeding.

I. Home Reading Task

Research the theme "*The Most Unusual Use of the Internet from My Point of View*".

Make speech in class revealing the main issues of the topic with a couple of specific examples.

UNIT 7. CYBER SECURITY

PART I. Privacy within Internet

A. Discussion Starters

Comment on the pictures and say what you know about information security breach.



B. Before You Read

What are some possible dangers of surfing the Internet?

What can people do to protect themselves from these dangers?

C. Read the essay and decide what ways the writer suggests to internet users to protect themselves.

Privacy and Computers

by Robert Erani

In an era of online social media, people can announce any event to their virtual network of friends, family, and acquaintances within moments. From birthday celebrations to baby pictures, friends get news about each other from texts, tweets, or social networks. In addition, many people use credit cards to purchase products and complete numerous online forms with personal information for a variety of purposes. As a result, personal information is ending up in the hands of other people. There are critics who are concerned by the lack of privacy. Despite such concerns, by following a few common-sense measures, people can use the Internet enjoyably and safely.

In our fast-paced world, social networking sites are, for many people, an important way to keep up with friends and family. The issue now is how open one should be with sharing private information since the information could be stolen by criminals. For example, some people have had their homes broken into because they had posted the details of their vacation online. If they had not posted those details, the thieves would not have known that they had gone away. One way to reduce the risk of this happening is to activate the privacy controls on social networking sites and smartphones. In other words, think about who will see your information and consider how they might use it.

Another important step is to shop only on secure websites so that one's accounts, passwords, and financial records are protected. Some experts recommend that people should treat their online information like they would treat the contents of their wallets. For example, a man bought merchandise on a website that did not have a security padlock, and as a result of this transaction, his bank accounts were emptied. If he had paid attention to the security on the site, he would not have lost his money. However, it appears that people are becoming more aware of the risks of fraud and taking steps to avoid them since the total percentage of incidences of fraud remained steady in the past years. It may be that people who have grown up using the Internet understand its risks as well as its strengths.

The Washington Post recently carried out a poll to study the extent to which people were concerned about their online privacy and security. The poll, titled 'Surveillance in America', discovered how corporate and government surveillance affected people's online behaviours. It also investigated whether people made use of tracking and anti-tracking technologies for their own uses.

The first set of questions sought to determine people's concern about collection of personal information by social networks, cell phone providers, websites, National Security Agency (NSA) and retailers (Amazon, Target etc.). The overall result of the question set reveals that over 66% of people are more concerned about handing over such information to such bodies or organizations. The next set of questions was to investigate the bright side of surveillance, the one which helped government and businesses to fight/control crime. Although a clear 84% of poll participants thought it was right or 'about right', 16% still found it inappropriate or thought such surveillance compromised their privacy.

Another set of questions was to find the ‘Snowden effect’, and actions people took in response to NSA’s revelation about monitoring each and every aspect of your digital communications – phone records, calls, messages, email – everything. Surprisingly, 74% of people did not take any action to prevent from being tracked! However, of those who did attempt to save their online faces, 42% went for browser’s ‘do not track’ options, 29% deleted/edited something they’d posted earlier online, 17% encrypted their communications, 14% used anonymization services (such as Virtual Private Network), and 13% camouflaged this online/social profiles.

The last set of questions was the most interesting – they asked people’s own tracking habits. They were meant to gauge the positives of tracking technologies, such as those used by parents to watch out their children whereabouts, or those used by caregivers to watch their patient’s statuses, or those used to find one’s spouse’s location. Except for the children monitoring of online usage in which 60% respondents agreed on the fairness of tracking technology, but 90%+ said ‘no’ for any type of unwarranted tracking.

In sum, until a clear line between good surveillance and bad surveillance is drawn, people would keep discrediting any of the effort to use surveillance. The ease of sharing information provides opportunities for crimes and abuses. While it may be impossible to entirely eliminate the risks, if people followed reasonable guidelines to protect important data, they could greatly reduce these risks. The benefits of being able to do such things as bank online, keep medical records updated almost instantly, and share the thrills both big and small of everyday life with friends outweigh these concerns.

D. Comprehension Check

Answer the following questions.

1. What two suggestions does the writer of "Privacy and Computers" make for being safe on the Internet?
2. What issues did the Washington Post Survey reveal?
3. Why do you think people keep discrediting any of the effort to use surveillance?
4. What important issues do you believe are missing from the original article?
5. What other privacy issues do you have concerning the use of your personal information?

E. Mark the statements as true or false. Make false ideas correct according to the original essay.

1. Most Americans don't favour the use of personal information by government authorities.

2. Government surveillance to fight crime is refused to acknowledge by the majority of the respondents.

3. Only 26% of people did 'something' to prevent tracking and surveillance.

4. A clear majority doesn't track anyone, even if it would help someone.

F. Put the following linking phrases to fill in the gaps in the summary on *Privacy and Computers*

a. As the author points out,

b. According to the author,

c. Furthermore, it has been discovered that

d. The author concludes by stating that,

e. It has been further stated

In the article *Privacy and Computers* the issues concerning the sharing of personal information online are explained. (1) _____ one area of concern is that people may sometime share details of their lives online without thinking about the consequences. (2) _____ "The issue now is how open one should be with sharing private information since the information could be stolen by criminals". The writer describes a situation in which people were robbed after revealing their vacation plans online. (3) _____ how important it is for consumers to protect their personal information when they purchase products online. (4) _____ most Americans would like to limit the extent to which surveillance is carried out. (5) _____ despite the concerns about privacy, one can still use online services safely by using common sense and privacy controls.

G. The summary-response essay on the article *Privacy and Computers* is given below. Translate it into English, paying attention to use of such key notions as online privacy, insecure websites, be more savvy about, scammers, convincing schemes, be wary of, posting information, oversight, online profiles, acceptable exchange.

Автор статті піднімає загальні питання безпеки особистості в Інтернет-просторі та пропонує кілька порад, як саме уникнути можливих проблем. Я згоден, що небезпечні веб-сайти становлять проблему, але я не згоден із твердженням автора, що люди, які виростили в епоху Інтернету, є більш "підкованими" користувачами. Хакери і

шахраї продовжують винаходити ще складніші й переконливіші схеми. Споживач змушений постійно побоюватися їх. Крім того, в статті не роз'яснюються більш спірні питання щодо наслідків розміщення інформації про стан здоров'я, незадоволення роботою, або навіть політичні погляди. Це – необачність, тому що такі питання впливають на особистість щодня. Стає все більш поширеним серед роботодавців, наприклад, переглядати в соціальних мережах профілі потенційних співробітників у процесі їх відбору. Незважаючи на ці недоліки, автор справедливо зауважує, що занепокоєння з приводу конфіденційності здається цілком прийнятною заміною для багатьох заради того, аби ділитися про своє особисте он-лайн.

H. Pair Work

- Work out some situations related to the topic. Introduce them starting with the following phrase 'If I hadn't posted the details of my vacation, I wouldn't have ...'

Use the combinations *to break into a house, to steal an automobile, to force the combination lock, to crack the safe, to leak personal data, etc.* Consider the grammatical accuracy of the construction HAD smth DONE.

- Discuss the meaning of the saying "*Treat your online information like you would treat the contents of your wallet*".

PART II. Cryptography

A. Before You Read

Read the title from the article below. What do you think the text is going to be about?

B. Read the article. Fill in gaps 1-15 with a suitable word form. You can use not only one word in each gap.

The Snowden Era Challenges

On January 21, 2014 a text message flashed on phones held by the protesters 1) _____ (throng) Kyiv's Independence Square. The Ukraine's ex-president was then still clinging to power and 2) _____ (brutalize) opponents. The message – from the number 111 – read: "Dear subscriber, you 3) _____ (register) as a participant in a mass disturbance". Widely presumed to 4) _____ (send) from the president's security apparatus to all phones in the protest zone, the message was a stark 5) _____ (re-

mind) of how mobile phones can be used for surveillance. Soon after, a Ukrainian man walked into a nondescript office in National Harbour, Maryland, and sought help from a man named Zimmermann.

Phil Zimmermann is a 6) _____ (cryptology). His company, *Silent Circle*, encrypts voice calls, text messages, and any file attachments. If you use *Silent Circle*, your calls to other users are sent through the company's servers and 7) _____ (decrypt) on the other phone. The service 8) _____ (not stop) the delivery of ominous messages in range of certain base stations. But it can block eavesdropping and prevent the snooper from 9) _____ (know) the number of the person you are calling or texting. Soon, access codes for *Silent Circle* were making their way to protest organizers in the heart of Kyiv.

In the past year, it's become 10) _____ (clear) that places like Kyiv are not the only environments where people might need widespread deployment of crypto technology. Documents brought to light by former U.S. National Security Agency contractor Edward Snowden suggest that the NSA gathers huge amounts of information from cloud computing platforms and 11) _____ (wire) carriers, including the numbers ordinary people called and the times they called them. Not only could the government be watching you: so could websites, advertisers, and even 12) _____ (retail) trying to track your movements within stores. Modern smartphones and the apps running on them are engineered to collect and disseminate enormous amounts of user data – such as location, Web browsing histories, search terms, and contact lists.

More than 99% of Android phones are potentially 13) _____ (leak) data that, if stolen, could be used to get the information they store online. The discovery was made by German security researchers looking at how Android phones handle 14) _____ (identify) information. Note Google's comment on the problem: "We're aware of this issue, 15) _____ already (fix) it for calendar and contacts in the latest versions of Android..."

Thus, a new way to block many of the ways phones leak data is of urgent necessity. It should signal a shift toward mass-market phones that are far more private and secure.

C. Comprehension Check

Answer the following questions.

1. What happened in Kyiv's Independence Square on January 2014?
2. What are those circumstances of using mobile phones for surveillance?

3. Which services are provided by *Silent Circle*?
4. What do the documents brought to light by Edward Snowden suggest?
5. What other environments are there when people might need widespread deployment of crypto technology?

D. Match the given verbs with their synonyms from the box

Eavesdrop, decrypt, deliver, snoop, deploy, suggest, gather, watch, track, disseminate, search, leak, handle, fix.

decipher offer manipulate assemble convey fasten seek for
 escape overhear propagate pursue spy spread out pry

E. Explain the meaning of the phrases given bellow.

Crypto wars, crypto and surveillance debates, voice calls and text messages decryption, eavesdropping protection, snooping prevention, crypto technology deployment, information dissemination, data leak prevention.

Choose the key phrases and use them in the summary of the essay *The Snowden Era Challenges*.

F. Web Research Activity

Surfing the web, trace the history of cryptography and cryptanalysis. Research the phenomena given below which relate to the origin and development of modern cryptology.



Reconstructed ancient Greek scytale ['sit.əl], an early cipher device



One of the variants of the Enigma machine, the late 1920s



Poznań Monument (center) to Polish cryptologists

G. Speaking Test 1

Have a look at some modern trends of cryptography given below.

Match each concept (1–8) with its image (A–H). Some images may be matched more than once.

Then indicate the meaning of depicted concepts.

1. *Cyber Crime Security*
2. *Binary Security Lock*
3. *Cyber Theft*
4. *Cyber Security Leak*
5. *Access Key Security*
6. *Digital Data Security*
7. *Scan Cyber Eye for Security*
8. *Hacker Attack*



A



B



C



D



E



F



G



H

Speaking Test 2

- Discuss with your partner what you should do to keep your information safe?
- Imagine yourself to be a successful cryptologist. Introduce your product to would-be consumers. Give its characteristics and functions. Emphasize the perspectives of your product's application.
- Dwell on the issue why the study of data storage security is so topical nowadays? Substantiate your idea in class.

H. Checklist:

1. Describe the phenomenon 'crypto wars' and say whether individuals and organizations should hide their personal and corporate secrets in a battle with government officials or 'unlock their keys' in the cases of threats to public safety.

2. Think of hypothetical situations of online threat patterns and models. Speak on existing technological solutions of Internet threat prediction and prevention.

3. Characterize the latest improvements to the encryption and decryption of secure voice calls and text messages.

4. Make a list of recommendations how to provide secure online communication, to prevent data theft and to minimize the risks of vulnerabilities in the Cloud.

5. Indicate and give characteristics of the mainstreams in the history of cryptology.

I. Home Reading Task

Read Andrew Hodges' 1983 book *Alan Turing: The Enigma*¹ which gives a richly detailed biography of a mathematical genius and analysis of his ideas.

Prepare a concise summary of the plot. Keep a list of interesting ideas that you come up with. Some may work to fit into your summary.

¹ You are free to choose another story which reveals issues of crypto analysis.

UNIT 8. ONLINE COMMUNICATION ETHICS

PART I. Tempopapy vs permanent digital citizenship

A. Discussion Starters

Describe and give your comments on the images below.

How do you think they can be related to such notions as ‘digital dossier’ and ‘digital footprints’?



B. Before You Read

Do you know what is in your digital dossier?

Do you believe that so-called ‘digital footprints’ can impact your future greatly?

C. Read the essay about new kinds of digital connection and online communication.

Temporary Social Media

Messages that quickly self-destruct could enhance the privacy of online communication and make people feel freer to be spontaneous.

One essential aspect of privacy is the ability to control how much we disclose to others. Unfortunately, we’ve lost much of that control now that every photo, chat, or status update posted on a social-media

site can be stored in the cloud: even though we intended to share that information with someone, we don't necessarily want it to stay available, out of context, forever. The weight of our digital pasts is emerging as the central privacy challenge of our time.

But what if people could make their posts vanish automatically — making social media more of an analogue to everyday conversations that aren't recorded for posterity? That's the promise of services such as *Snapchat*, a mobile-phone app which popularity has increased dramatically during the past year. Evan Spiegel and Bobby Murphy, who met as undergrads at Stanford, came up with the idea two years ago, around the time New York congressman Anthony Weiner accidentally made racy photos of himself public on Twitter and was forced to resign. *Snapchat* lets users take photos or short videos and then decide how long they will be visible to the recipient. After 10 seconds or less, the images disappear forever.

What makes temporary social media so appealing? *Snapchat's* founders often remark that they wanted to give people a way to express themselves through something besides the idealized self-portraits many feel required to maintain on social-media sites. *Snapchats* might be more exciting to send and receive than other social-media posts because they are ephemeral, but they are also arguably a more natural way to communicate. Whereas Facebook and Twitter record and store your every offhand observation and casual interaction, interactions in temporary social media can be something like brief, in-person conversations: you can speak your mind without worrying that what you say will be part of your digital dossier forever.

Although *Snapchat's* posture as the anti-Facebook is a large part of its allure, eventually its founders will have to confront some of the same privacy challenges that have vexed Facebook. *Snapchat* contains an obvious technological vulnerability: images that were meant to vanish can still be saved if the recipient uses a screen-capture feature to take a picture of the message during the seconds it appears. (If the recipient does this, *Snapchat* notifies the sender, but by then it's too late to stop the image from being preserved and shared.) Moreover, while *Snapchat* promises to erase photos from its servers, the company's privacy policy adds that it "cannot guarantee that the message data will be deleted in every case." As soon as a racy *Snapchat* picture of a celebrity goes viral, trust in the company could be eroded.

But regardless of the fate of *Snapchat* in particular, the idea of temporary social media is important because the ability to be candid and spontaneous – and to be that way with only some people and not others – is the essence of friendship, individuality, and creativity. Facebook and Twitter do make it possible for their members to wall off posts from the wider world and share them only with trusted people in certain circles. But since those posts still last forever, this capacity for limited sharing is technologically insecure. To the degree that temporary social networks increase our sense of control over the conditions of our personal exposure, they represent a first step toward a more nuanced kind of digital connection – one acknowledging that our desire to share can coexist with a desire for reticence, privacy, and the possibility of a fresh start.

D. Comprehension Check

Answer the following questions.

6. What is the primary goal of *Snapchat* application?
7. What are the essential aspects of privacy the author emphasizes on? Do you agree? Why?
8. Why do you think *Snapchat*'s mascot shows a picture of a grinning ghost?
9. What event made Evan Spiegel and Bobby Murphy come up with the idea of *Snapchat*'s mobile-phone app creating?
10. What makes *Snapchat* different from the most well-known online social networking services such as Facebook and Twitter?

E. Add your own endings to the following sentences from the essay.

One essential aspect of privacy is ...

The stuff which makes temporary social media so appealing is ...

Interactions in temporary social media can be something like ...

Images that were meant to vanish can still be saved if ...

The idea of temporary social media is important because ...

F. Pair Work

- Make a comparison of your statements with those of your partner. Summarize your ideas in 10–15 sentences.
- Complete the table of pros and cons of temporary social media use. Compare your ideas with your partner's ones.

G. Roleplay

Student A. You are eager to boost one of the latest versions of Temporary Social Networking Application. You should convince your audience that your product is going to alter human relationships to online visibility, data privacy and to content ownership.

Student B. You are an opponent of such innovations. You do believe that temporary social media gives nothing but posting of inappropriate pictures, hacking into profiles, spreading rumours, etc. Substantiate your ideas with examples and prove that natural ways to communicate are the only suitable ones for human beings.

PART II. Positive on Education, Negative on Morality

A. Before You Read

Read the title from the article below. What do you think the text is going to be about?

B. Read the article.

Nine parts of sentences have been removed from the text. Put the correct sentence from A–J below in each space (1–9) to form a logical text. There is one extra item you don't need.

The Good, the Bad, or the Internet

As more people around the world gain access to all the tools of the digital age, the internet will play a greater role in everyday life. According to the recent Pew Research Center survey in emerging and developing nations, (1) _____ has been a good influence in the realms of education, personal relationships and the economy. But despite all the benefits of these new technologies, on balance people are more likely to say that the internet yields a negative rather than a positive influence on morality – (2) _____.

"We didn't really define morality for people's individuality but related it to perceived threats on cultural values, not just on morality", said philosophy professor Randall Curren (University of Rochester, New

York). It's true that different cultures view morality in different ways. In many Muslim countries, for instance, it is believed that the Internet is bringing (3) _____ which are perceived as sort of drawing their young people away from the established customs and ideas.

Parents, in particular, are very nervous about the influence (4) _____ and might even feel threatened by certain world views and social patterns of their offspring. On the contrary, younger, more educated people with higher incomes or those able to read and speak English are more likely to have access to the Internet and less likely to say that it is bad for morality, according to the Center's survey. However, parents' fears are not always groundless. (5) _____ carried out by the Nominet Trust, an organisation that promotes internet projects which address social disadvantage. Eighty per cent acknowledge social networking sites have the ability to take over their children's lives. They are true to believe that it is not the best way to release pressure for their offspring's health sitting in front of personal computers chatting throughout their spare time. One in three parents, meanwhile, claims the Internet has the power (6) _____ and is sure their children are in danger from the web.

What is also worth noticing is that there is no certain way that can restrict the information on the Internet. It is saying that youngsters may receive all kinds of information without the ability of judging it, (7) _____. Some invisible hazards are inside the digital world. Children sometimes go to the websites that contain violent, porn, and other inappropriate information. However, so far, there has been no good method to completely restrain information before it gets to the children. Furthermore, the Internet has become a major source of entertainment for the younger generation according to the development of flash and web-based games. Some youngsters are so addicted to it that (8) _____, such as academy and athletics. Moreover, the majority of parents allege that their children are too young to distinguish the true stories from the false ones, they often get the wrong information and the wrong concept of the society, and become easily annoyed, irritated or even depressed.

But it has been also found that most fears are exaggerated and lack of neurological evidence. First, social networking sites, in themselves, are not a special source of risk to children, and are generally beneficial as they support existing friendships. In addition, playing action video games can (9) _____, while computer-based activity provides mental stimulation, and can help slow rates of cognitive decline.

Thus, the global children protection agencies advise parents to talk to their offspring about how they use the internet, to block adult websites, to set time limits for browsing and to set up an instant alert system if children try to view blocked sites. All in all, it is families not organisations that have to safeguard their children, both on and offline.

A. in matters affecting the natural, cultural and economic conditions of millions of people

B. the extraordinary findings come from a poll of 1,000 parents

C. people say that the increasing use of the internet

D. they start to perform poorly in other fields

E. a lot of Western images and ideas of English language content

F. depending of course on how you define this notion

G. improve some visual processing and motor response skills

H. the Internet is having on their tech-savvy descendants' thinking and development

I. though it may sometimes be beneficial

J. to "rewire" brains without a person's knowing

C. Comprehension Check

Make up your own questions to shed light on the central ideas of the article *The Good, the Bad, or the Internet*.

D. Form as many derivatives as you can from the words in the table below.

verbs	nouns	adjectives	adverbs
	access		
		emerging	
	benefit		
define			
	threat		
		different	
			completely
		sufficient	
vary			
			significantly

E. Choose the correct alternative to complete each sentence. Consider both the grammar and the meaning of each option

The 'Information Superhighway', or the Internet, is a **(1) power / empower / powerful** medium for today's information driven society. From its humble beginnings as **(2) the / a / –** series of networks established to help the military and government share resources, it has become a **(3) place / market / arena** for people to engage in commerce, business and personal facilities. Yet, there has **(4) risen / raised / arisen** a series of problems. The Internet, because of its modern nature is not really **(5) well / good / nice** dealt with when it comes to **(6) exist / existence / existing** ethical and moral issues. The Internet has fostered a new **(7) class / group / team** of community that requires a unique category of moral values and ethical considerations. Things are always going to be dealt with **(8) different / differently / indifferently** when it comes to any revolutionary type of medium. How can interstate trade be regulated by the federal government when it is **(9) electronic / electronical / electronically** transferred information? Last year, for instance, a law firm caused a major uproar **(10) with / by / through** posting an ad for its services on 6,000 Usenet newsgroups. That kind of activity, known as "spamming", just isn't done. Companies should convey their messages **(11) unselectively / inselectively / selectively** and **(12) inappropriately / unappropriately / appropriately**. There is little legislation which protects children and **(13) person / personnel / personal** safety that governs society's **(14) relationships / relations / relation**. The solutions to any problems with the internet are so complex that any legislation that could ensue might threaten to **(15) infringe / unfringe / defringe** upon the rights and privileges that people enjoy today.

F. Web Research Activity



Surfing the net, work out **two lists of appropriate "rules"** for online safety aimed at **(1) children** and **(2) adults**.

G. Speaking Test 1



- Identify the effects and weak spots in teen I-net communication.
- Outline the phenomenon of ‘cyber bullying’. How common is the problem of cyber bullying amongst teenagers?
- Share your considerations as

for the notion ‘appropriate online behaviour’. Why is it so that schools today need to educate students the rules of personal safety while entertaining and socializing online?

Speaking Test 2

- Give your considerations why such giants as Apple may come to the U.S government’s “bad list” of the tech world’s “bad boys”? Substantiate your ideas with examples.

- Comment whether Apple was right in its refusal to unlock a phone that belonged to the terrorist, San Bernadino shooter Syed Farook?

- Divide into two groups. These are two issues each group should support and prove:

1. Allowing the government special access to software that can unlock any device at any time violates personal rights.

2. Providing access to software may thwart other attacks and does not break the trust that consumers have with a company like Apple.

H. Checklist:

1. Speak on some unique experience the digital age can provide the generation of young people with.

2. Suggest your norms and rules of safe internet use for kids and adults. Are they different or the same?

3. Single out the questions concerning an Internet-morality as a challenge to ethical thinking.

4. Consider how we re-interpret our ethical traditions within this new digital environment.

5. Indicate the issue of ‘information freedom’ as the core of every free human society. Feature a worldwide impact on this phenomenon.

I. Home Writing Task

Project the topic "*The Ways Online Environment Influences Individual and/or Collective Intelligence.*"

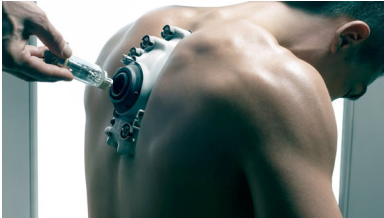
UNIT 9. FUTURE DEVELOPMENT OF SCIENCE AND TECHNOLOGY

PART I. Gaze into Future

A. Discussion Starters

Describe and give your comments on the images below.
In each case indicate the technology application field.
How do you think such innovations will influence people's lives?

1



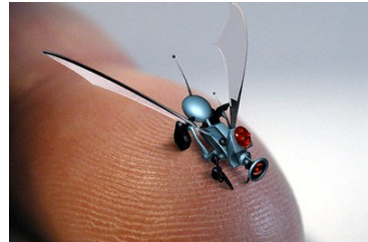
2



3



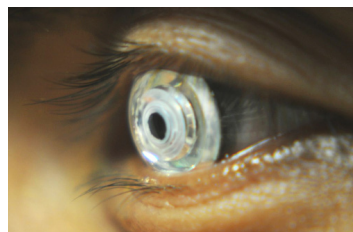
4



5



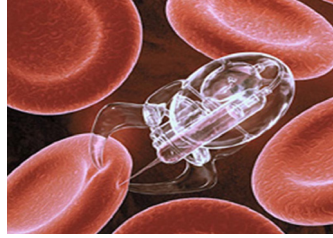
6



7



8



9



10



B. Before You Read

Do you know what technologies can make our planet far smarter?

C. Read the essay about IBM's innovations that will change the way we live.

Building a Smarter Planet

By Steve Hamm

To get a sense of how learning machines will affect you, let's consider IBM Research's 5 in 5 predictions for the future – five innovations that will change the way we live.

The classroom will learn you. The rapid digitization of the education industry and the emergence of cognitive systems are currently happening in parallel. Over the next five years, the two concepts will link, and personalized classrooms will motivate and engage learners at all levels: from a kindergartener studying the alphabet to a physics PhD candidate studying the finer points of String Theory. The future cloud-based cognitive systems will collect and analyse all data and create student records that would give teachers the information they need to provide personalized learning experiences for their students. These systems would also help teachers identify students who are

most at risk, also couple a student's goals and interests with data on their learning styles so that teachers can determine what type of content to give the student, and the best way to present it. The teacher would use this cognitive system to find out the students' learning style and develop a plan that addresses their knowledge gaps.

Buying local will beat online. Over the next five years, local stores and shops will flip the *javascript* by giving us a real and virtual experience. IBM Research is working to use cognitive computing to merge the immediacy of physical shopping with the intelligence of online shopping. Very soon Watson will be your personal shopping assistant. Store associates will also have similar intelligent tech providing them instant product information, customer loyalty data, sales histories, user reviews, blogs and magazines, so that when you do need to talk to another human, they know exactly how to help. Rather than basing your recommendations on what others buy, the Virtual Stylist, prototype software IBM Research is currently exploring, would let retailers look at items you recently purchased or showed interest in and tailor recommendations based on your unique taste and styles that will complement your existing wardrobe. And best of all, you can take your purchase home that day. No over-night delivery needed.

Doctors will routinely use your DNA to keep you well. IBM predicts that over the next five years, the cognitive systems will help doctors unlock the Big Data of DNA to pin point cancer therapy for their patients. Already, full DNA sequencing is helping some patients fight cancer. For example, Dr. Lukas Wartman famously beat leukemia using treatments that were tailored to the DNA mutations of his cancer cells. While previous leukemia treatments had failed, full genome sequencing of Wartman's healthy cells and cancer cells revealed that a drug normally used for kidney cancer might work. This breakthrough has led to tremendous advances in cancer therapy based on DNA mutations, rather than simply the location of the cancer in the body.

The city will help you live in it. Projections indicate that more than half the world's population will be living in cities by 2030, the towns and cities of the developing world will make up 80 percent of urban humanity. Insights from crowdsourcing, mobile applications, sensors and analytics on the cloud will allow cities to listen, interact and respond better to citizen needs. This will give rise to new cities that can respond in real-time, predict problems before they occur, and deliver tailored services to make city life desirable for everyone. Cognitive systems will

learn to understand what people need, like, and do, and how they move from place to place – so the managers of the city can respond better to their needs. By 2017, the number of smart phones in the world is expected to top three billion – this will let people have a digital key to the city right at their fingertips. Information will be delivered to their phone and about what is happening in the city, what experiences are relevant to them and how to get there. Mobile apps will become the new norm for reporting and tracking pot holes, broken street lights and inaccessible sidewalks. For example, IBM Researchers in Brazil are working on a crowdsourcing tool, Rota Acessivel, that allows users to report accessibility problems to help people with disabilities better navigate challenges in urban streets.

Digital guardian will protect you online. **"Bank accounts hacked! – Credit card numbers compromised! – Social media network passwords stolen!"** These headlines are the norm on the news ticker these days. And if your identity has ever been stolen, you know exactly how difficult it is to recoup and rebuild your digital self. Over the next five years, the guardian of big data will analyse and learn from your online behaviour patterns, going back months and years to know what to protect. And when it detects a possible breach, you will be the first to know. This cognitive system is currently tracking several different security anomalies. It also incorporates security measure such as fingerprint and facial recognition. So, as it understands what and how you secure, it can even make decisions for you, per your instructions and permission. Not trying to buy a jetpack because you're afraid of heights? Your digital guardian will know this, and won't let this daredevil with your credit card buy it either.

Thus, the fascinating world of cognitive systems promises to penetrate complexity and assist people and organizations in better decision making. They can help doctors evaluate and treat patients, augment the ways we see, anticipate major weather events, and contribute to smarter urban planning.

D. Comprehension Check

Answer the following questions.

1. How is it possible from a technological point of view that personalized classrooms will motivate and engage learners?
2. What useful data is intelligent tech expected to provide store associates and customers in future?

3. What advances of unlocking the Big Data of DNA are predicted to achieve soon?
4. What options will the digital cities of future provide their dwellers with?
5. How will personal digital guardians protect you online?

E. Read the suggestions from the article *Building a Smarter Planet* again.

Complete the responses. For each one, you should first agree, and then disagree.

In each case you need to give a reason.

	Suggestions	Possible responses		Your reasons
		"+"	"-"	
1.	<i>The classroom will learn you.</i>	<i>e.g. Yes, it's a great idea, because...</i>	<i>e.g. I don't think so, because ...</i>	<i>e.g. Well, if we're going to...</i>
2.	<i>Buying local will beat online.</i>			
3.	<i>Doctors will routinely use your DNA to keep you well.</i>			
4.	<i>The city will help you live in it.</i>			
5.	<i>Digital guardian will protect you online.</i>			

F. Pair Work

You are suggested to participate in the *International Survey on the Awareness about Science and Technology*. Each pair is given a common set of eleven questions regarding science and technology. First, answer *True* or *False*, compare your answers with those of your partner, then discuss the most controversial issues in groups.

Questions:

1. The center of the Earth is very hot.
2. The continents have been moving their location for millions of years and will continue to move.
3. The oxygen that we breathe is made by plants.
4. All radioactivity is man-made.

5. Electrons are smaller than atoms.
6. Lasers work by focusing sound waves.
7. The universe began with a huge explosion.
8. It's the father's gene that decides whether the baby is a boy or girl.
9. Antibiotics kill viruses as well as bacteria.
10. Human beings, as we know them today, developed from earlier species of animals.

PART II. Global Up-to-date Changes

A. Before You Read

Read the title from the article below. In this text you are going to read about the ways modern tech world will influence such fields as transportation, husbandry and aged care. Share your considerations as for the impact of technology within the mentioned spheres.

B. Read the essay below.

Match headings A-J to paragraphs 1-8. There are two headings you do not need to use.

How Robots and Sensors Will Transform Transportation, Agriculture, and Elder Care

By Peter Diamandis

1. _____

Today, the automotive industry pulls in close to \$2 trillion in revenue each year. It's a big, inefficient, wasteful and, frankly, dangerous industry. Obviously, autonomous cars are coming fast. Google is leading the way, but Apple, Tesla, Uber and every major car company are following.

2. _____

Today, Google's self-driving cars have driven far more than 1.5 million miles, safely and fully autonomously. Google's car (and all others) are made possible because of their suite of sensors. One in particular is a laser imaging radar that, combined with cameras, sonar and GPS, is collecting and analysing 750 Mb of data per second. The car knows everything that's happening within 100 meters of the sensor.

3. _____

So, what is the impact? Cheap, powerful, microscopic sensors are entering every aspect of our lives, allowing us (and our robots) to know anything we want, anywhere, anytime. By 2035 there will have been more than 54 million autonomous cars on the road because these vehicles don't drive drunk, don't text and don't fall asleep at the wheel. It is believed that we will be able to fit eight times more autonomous cars on our roads, plus we no longer need parking spaces. Moreover, driving lighter electric cars that don't crash will save 90% on our local automotive transportation bill. Eventually, sensors and robotics are two exponential technologies that will disrupt a multitude of billion-dollar industries.

4. _____

Agriculture is a remarkably fragmented, complicated, and old-school industry. Globally, this 2+ trillion-dollar industry has become humanity's largest endeavour. Two revolutions are in play within this sphere. The first is synthetic biology, the second – the impact of sensors and robotics. It is expected that a combination of ground, drone and satellite-based sensors will soon give the humanity 'god-like' knowledge of what is growing on every acre of crop land on the planet.

5. _____

While automation has made a huge dent in productivity and cost reduction (food is today 13 times cheaper at the grocery store compared to 100 years ago), there is still a lot more progress at hand. This progress will come from robotics. Robots in the form of autonomous, GPS- controlled farming equipment will eventually be so cheap that they are supposed to replace migrant workers, operating 24 hours per day, 7 days per week.

6. _____

The average American meal travels about 1,500 miles to get from farm to fork. Imagine instead if the food for Detroit was farmed in downtown Detroit in a high-rise farm that reduced the trip from 1,500 to 15 miles. Robots and sensors will provide 24-hour-per-day lighting, sensors will maintain hydroponic water at perfect pH, and nutrients at exact levels will drive hyper-fast growth and maximal yields, far more than possible on a farm. Ultimately, these farms deliver yields hundreds of times higher per square meter of real estate.

7. _____

Currently, the companies like Google Health, Apple and Samsung (to name a few) are investing billions to develop the arena of health-care. Within the next decade dozens of wearable and implantable biometric sensors will make us all the 'CEOs of our own health'.

8. _____

Telepresence robots like Suitable Technologies' Beam will allow families and doctors to periodically check-up and visit the elderly. Wearable health sensors monitoring heart rate, blood glucose and chemistries will allow doctors to remotely monitor a patient's health and even whether they are compliant with their meds. Personal assistant robots will eventually clean rooms, do the dishes, wash the clothes, and help the elderly get out of bed and go to the bathroom.

- A. Systems that are making cars smarter.
- B. The human-technology collaboration.
- C. Upcoming breakthrough in transportation.
- D. Saved people's lives, land and money.
- E. Robotic farming appliances.
- F. 'Injections' of global giants.
- G. The latest tech insights.
- H. Vertical (Urban) Farming.
- I. Eldercare perspectives.
- J. Dramatic improvements are expected in farming.

C. Comprehension Check

The following words and word combinations appear in the text. Translate them into Ukrainian.





Make up your own sentences using the word combinations given.

*a suite of sensors,
a laser imaging radar,
light electric cars,
two revolutions in play,
'god-like' knowledge,
a huge dent in productivity and cost
reduction,
'CEOs of our own health',
personal assistants and telepresence
robots*

*to develop the arena of health-
care,
to pull in revenue,
to fall asleep at the wheel,
to save transportation bill,
to disrupt billion-dollar indus-
tries*

D. Read the following paragraphs depicting the areas that will be revolutionized by quantum computing in future. Guess the areas mentioned.

For each gap think of the most appropriate word to complete the text.

	<p>Quantum computers are famous (1) _____ code-breaking, but their real (2) _____ may lie in making cloud computing more (3) _____. Based on laws of (4) _____, quantum computers have the potential to keep (5) _____ data safe from snoops and hackers, no matter where it is stored or processed.</p>
	<p>A quantum computer mimics the computing style of (6) _____, allowing it to stimulate, understand and improve upon natural things – (7) _____ molecules, and their interactions and compounds – better than a (8) _____ computer. This ability may lead to new medical (9) _____ and materials (10) _____.</p>
	<p>Quantum machine (11) _____ is an exciting new area. (12) _____ indicates that quantum computing could significantly (13) _____ machine learning and data (14) _____ tasks, such as training of classical Boltzmann machines, or topological analysis of big (15) _____.</p>
	<p>A machine that can search the ever-growing (16) _____ of data being created, and locate the connections (17) _____ it, could have tremendous (18) _____ across many industries. Quantum computing offers the possibility of doing this significantly (19) _____ than classical computers. Further research will lead to the realization of this (20) _____.</p>

E. Each sentence, from 1 to 10, may contain an unnecessary word or set of words. Indicate the unnecessary word and tick the correct sentences (✓).

Future car technologies

1. Potential future car technologies include new energy sources and materials, which are being developed in the order to make automobiles more sustainable, safer, more energy efficient, or less polluting.

2. One major problem in developing more cleaner, energy efficient automobiles is the source of power to drive the engine.

3. A variety of alternative fuel vehicles has been proposed or being sold, including electric, hydrogen, and compressed-air cars.

4. Various technologies have been developed and utilized to increase the energy efficiency of conventional cars or supplement all them, resulting in energy savings.

5. Nano structures and fibre materials may totally replace all steel in cars (potentially improving lightness and strength).

6. Aluminium, carbon fibre and a fiberglass are currently being used more in cars today.

7. Green vehicles are supposed to be the whole primary vehicles for the future transportation in our society.

8. Such modes can help reduce climate change by using of fuel sources that don't produce greenhouse gas pollution.

9. They can be fuelled from sustainable, renewable energy sources (electricity are generated from wind and solar, and renewable liquid biofuels) to replace the fossil fuel energy sources of the past.

10. The first generation biofuels of today are by far from perfect, but they lead to a great potential for clean, green, sustainable, renewable, second generation biofuels.

F. Web Research Activity

Surfing on the Internet, report in class upon the characteristics of some TOP-future technologies of *Tesla Inc.* and/or *SpaceX* within the next 10–50 years:

- *self-driving autonomous vehicles;*
- *healthy cloning;*
- *nanotechnological tissue engineering;*
- *interactive screens and transparent displays;*
- *holograms;*
- *wireless parking charging;*
- *wearable electronics;*
- *wireless network;*
- *ultra-efficient mass transport;*
- *space tourism;*
- *additional reality, etc.*

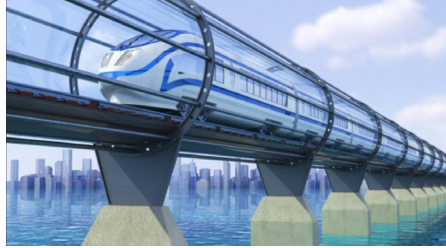
G. Speaking Test 1

Dwell on core features of the technologies depicted below and ponder upon their would-be merits and risks.

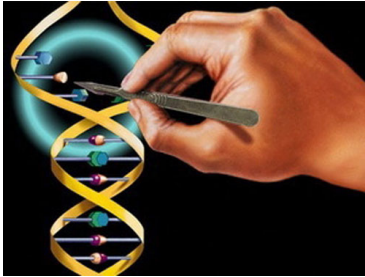
A



B



C



D



Speaking Test 2

Comment on the following sayings given by Isaac Asimov and Thomas Frey, the great futurists of the past and present. Do you agree or disagree with them? Explain why.

1. "The saddest aspect of life right now is that science gathers knowledge faster than society gathers wisdom."

2. "Humanity will change more in the next 20 years than in all of human history".

3. "What once was believed to be science fiction will simply be known as science".

4. "The farther we move into the future, the less accurate our predictions become".

5. "Our greatest motivations in life come from NOT knowing the future".

H. Checklist:

6. Give your consideration to the idea of what technologies should be remarkably improved in future.

7. Think of the advantages your grandchildren will take of would-be space tourism.

8. Say about the ways educational technologies will be augmented further.

9. Dwell on the issue what scientific achievements will facilitate humans to answer such questions as ‘what is the mind, consciousness and the soul’.

10. Ponder upon what we, humans, will be happy to obtain from future breakthrough innovations.

I. Home Writing Task

You are requested to write an analysis essay for the student magazine.

Give your consideration as for significance of **quantum computing** for future development of science and technologies. Explain why quantum theory may be a potential solution to **time travel**.

UNIT 10. ECOLOGICAL CHALLENGES

PART I. Technological Effect on Environment

A. Discussion Starters

Look at the six photos below. Describe them including the following issues:

- ecological problem;
- causes of the problem;
- would-be aftermath for the planet and humanity.

A



B



C



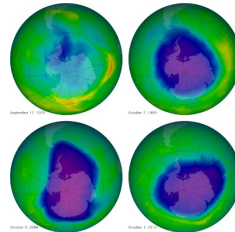
D



E



F



B. Before You Read

How do you think scientists and technologists can improve the environmental situation nowadays? What are the issues of top-priority for them to consider?

C. Read the essay about the influence of technological breakthrough on the environment.

The Negative and Positive Ecological Impacts of Technology

Nowadays no one will argue that in the result of longer working hours and increased use of technology more and more energy is being consumed. The impact that this is having on the environment is substantial in both negative and positive ways. It is hard to deny the benefits modern technology has produced in industry and in everyday life, however, there are considerable negative effects as well.

According to the International Energy Agency the figure of the world's energy consumption is predicted to rise to incredible 40% by the time the year 2030 arrives. The major drain on the world's energy resources is not just information communications technologies. A number of the occurring ecological and environmental problems are due to the rapid growth of new industrialized countries such as South Korea and China. The emissions their factories produce are amongst some of the highest in the world and contribute significantly to the amount of noxious gases that pollute the air.

Industry aside, there are many other aspects technology has had a negative ecological impact on the world. In the modern home, there are numerous high technology gadgets designed to make our lives easier and more pleasant. The gases emitted by the combustion process to yield energy for numerous devices can have a devastating influence on the ozone layer and contribute to what is known as the "greenhouse effect". Often referred to as a thermal balance, this phenomenon adds much warmth to air currents of the Gulf Stream, affects the climate on the Poles, leads to the Polar icecaps melting at an alarming rate, causing a significant rise in the world's oceans. This, as it is well known, has a ripple effect around the planet experiencing devastating floods, typhoons and violent storms.

Although it can be argued these changes in our weather systems have just as much to do with Mother Nature as technology, it is hard to ignore the correlation between the rise in technology manufacturing and the increase in frequency of environmental disasters.

Despite the claims that technology is to blame for many of the world's natural problems, high tech has also served to improve the shape of our planet. Since its rise in the workplace, numerous ICT companies have been designing "greener technology" to combat the detrimental influence that computers and their accompanying equipment cause on the environment. For instance, in the Green Grid community a number of efficient directions to improve the way energy is consumed by IT oriented businesses are being devising. One of the biggest achievements of the Green Grid is the Power Usage Effectiveness or, PUE, the metric system which aims to record data centre energy consumption every 15 minutes. By recording in these 15 minutes it helps those monitoring the data to notice if there are any energy fluctuations and if the data centre systems are using an adequate amount of energy. The long term goal of the Green Grid's work groups is to introduce a standard system that allows business managers and IT operatives to compare the amount of the energy they are consuming and if necessary to resolve the ways to reduce it.

Another aspect that is having beneficial impacts on the environment is low carbon technology. Largely developed in China (e.g. the Chinese Dongtan City produces '0' GHG emissions), this issue aims to offset the amount of emissions polluting the air by using renewable fossil fuels which are preferably used because of their high energy efficiency and extremely low emissions. For other countries to develop effective low carbon technologies, they need to apply another approach to their resources than Chinese do. This is because many of other economies possess different environments and various natural resources to hand. Other emerging countries can also diversify into new low carbon options thanks to the advances in technologies such as bio-fuels, solar and wind power which are no longer sci-fi but a fact.

One obvious way that technologies are assisting our environment is the reduction of the need for paper. With the ever increasing use of online communication, paperless offices are now a common occurrence worldwide. Shrinking the usage of paper in turn reduces the demand for logging and deforestation, allowing richer lands to yield a smaller footprint. The deployment of green technologies such as PC power management systems and multi-function devices allows a business that relies heavily on energy reducing technology.

An office can become more environmentally sound if it employs readily available energy reducing technologies and incorporates them with, for example, such eco-friendly practice as turning off excess lights. According

to current statistics, putting energy management systems into practice can save a company a huge amount in energy consumption. It is also worth mentioning the replacement of laser printers with multi-function devices, i.e. the incorporation of a printer, fax machine and photocopier all in one system. This is not only space saving but also sparing of the electronic hardware amount that is permanently on standby in an office.

As it currently stands, many of the world’s organizations have not begun to actively look for greener and more ecologically friendly methods for producing the energy they need, and they are not thinking of the ways to enhance their carbon footprint, yet it is an issue that needs to be addressed sooner rather than later.

D. Comprehension Check

Answer the following questions.

1. What has caused the significant increase of energy consumption in industry and in everyday life?
2. What leads to ozone layer depletion and "greenhouse effect" appearing?
3. Why do you think China is at the top in the list of low carbon economies?
4. What makes other developing countries different from China’s approach of effective low carbon technologies?
5. What up-to-date implementations are going to enable the office to be more productive and facilitate the company more in energy consumption?

E. Pair Work

Fill in the table given below with the details of ecological effects of contemporary technologies. More than three options are possible.

	Negative Impacts	Positive Impacts
1.		
2.		
3.		

F. Summarize the key ideas of the article *The Negative and Positive Ecological Impacts of Technology* by matching the beginning of each sentence with its proper ending.

- | | | | |
|---|--|---|---|
| 1 | As a result of the increase in the various forms of technology ... | A | ... there are many positive and negative ecological impacts on the planet. |
| 2 | Through the rise in modern technology and increase in globalization, ... | B | ... to improve energy management systems. |
| 3 | This in turn has devastating effects on ... | C | ... making a progressive step towards shrinking the amount of damage technology does to the environment ... |
| 4 | However, without modern technology there would not be the capability ... | D | ... there is a high increase in energy consumption. |
| 5 | There would be also hardly developed ... | E | ... so that it can continue to have beneficial ecological impacts. |
| 6 | Thus, ... is the leading priority for the humanity. | F | ... such environmentally friendly products as bio-fuels. |
| 7 | For this it is necessary to find ways to manage new technology responsibly ... | G | ... the planet's climate and air quality. |

G. Group Work

- Considering the ideas given above, suggest your own options to end sentences (1–7) from *Task F*.
- Discuss your variants in groups.

Part II. Green Technologies

A. Before You Read

Read the title from the article below. What do you think the text is going to be about?

B. Read the article. Match the paragraphs (1–9) to the headings (A–J). There is one extra heading you do not need to use.

Live and Work: D-Link's Experience

1. A green office implements practices which reduce waste, decrease energy usage, and strive to have a neutral impact on the environment. Green offices promote action and awareness, and educate employees re-

garding important environmental issues. Green offices encourage telecommunication, carpooling and additional practices that help to reduce the company's overall carbon footprint. Green offices encourage employees to follow the three R's: Reduce, Reuse, and Recycle.

D-Link Headquarters, for instance, has already made several changes within the past few years that have had a major impact. These policies are rapidly being rolled out to D-Link business units throughout the world.

2. For several years, D-Link has been a paperless office, which refers to use of email in addition to the use of electronic files rather than paper. If the need to print materials does arise, employees generally print double sided pages or print on reused paper with blank side.

3. Employees were presented the option to give up their personal trash bins. As a result, employees have become more conscious of the amount of waste that they produce, and are striving to reduce the amount of personal debris created on a daily basis. As a result, D-Link Headquarters has produced 30% less trash per person since 2006.

4. Low-flow one-touch faucets are installed in restrooms which cut the amount of water used for hand washing. From 2006 to 2007, the total volume of water used at D-Link Headquarters was reduced by an average of 17% per month.

5. Newly installed insulation within the building has led to improved energy efficiency. From 2007 to 2008, the number of kilowatt hours used at the D-Link Headquarters office was reduced an average of 10% per month. The ambient room temperature is kept at a comfortable level and efficiently managed through directional ceiling vents.

LCD monitors and standby settings help to reduce the energy used by desktop PCs. Employees are required to shut down their PCs whenever they leave the office. To save energy, one or more elevators are shut down during off-peak hours. Elevators are programmed to service alternating floors thus reducing redundant traffic. This system has been implemented to encourage employees to use stairs as much as possible.

6. The lunchroom at D-Link Headquarters uses only washable/reusable tools, which significantly reduces the amount of waste created at each meal. Employees who pack their own lunch are encouraged to use reusable containers.

7. D-Link Headquarters participates in a comprehensive recycling program which covers everything from office paper to plastic bottles. Every floor is equipped with bins separated by plastic, paper, glass and aluminium in addition to used CDs and batteries to make sure of proper disposal.

8. D-Link Headquarters is the first major corporate office in Taipei (Taiwan) to implement a biodiversity mini-park, which includes a vegetable garden, lotus pond, and 569 square meters of green space. This mini-park promotes employee awareness and serves to increase the level of biodiversity at the office. The algae growing in the lotus pond plays a part in reducing the office's carbon footprint by converting CO₂ into breathable oxygen. The company has strategically placed a vegetable garden and green space to prevent erosion, and purify local water runoff.

9. On May 23, 2009, D-Link celebrated its first "D-Link Day." Employees from all across the company gathered along a hiking trail in Tianmu to collect litter and revitalize the delicate wilderness area around the mountains. All D-Link Employees are encouraged to maintain the D-Link Green philosophy of living green at work and at home outside the office. D-Link employees follow the 3 R's, and persuade others to do the same with the understanding that every individual can make a difference.

- A. Paper Free Office
- B. Green Office's Implementations
- C. Water Conservation
- D. Energy Conservation
- E. Environmental Actions and Awareness Event
- F. Snack Bar Upkeep
- G. Garbage Reduction Awareness
- H. Biodiversity Mini-Park
- I. D-Link Green Products
- J. Comprehensive Recycling

C. Comprehension Check

Make up your own questions to reveal the main ideas of the article given above.

D. Suggest your own logically followed options to end the sentences given below

1. Generally, an ecological crisis is what occurs when the environment of a species or a population becomes ...
2. Nowadays the humanity faces some matters of urgency to cope with such as ...
3. One of the most pressing ecological concerns is the pollution caused by ...
4. As a result of domestic and foreign pollution, nearly 50 percent of global forests have been damaged by ...
5. The optimizing efforts have been made to introduce "green" or "soft" forms of tourism that are ...
6. Overall use of smart eco-technologies, which aim to give their consumers appropriate and relevant information on their energy and water consumption, leads to ...
7. In worldwide general practice the ecological tax is imposed upon those producers and manufactures who ...
8. Stores and retail facilities in the EU could benefit from up to 50% in energy savings thanks to the measures which include ...
9. Increasing recycling and reducing of the amount of waste sent to landfill is now a requirement as such solutions significantly reduce ...
10. People acknowledge the need to further mainstream sustainable development at all levels, integrating ...

E. Read the following short texts and fill in the gaps (1–20) using the correct forms of the words in brackets

Cheap Solar Panels. One problem with the solar cell industry is that the production of photovoltaic solar panels is **1** _____ (**rely**) on relatively expensive materials. Electricity from even the most **2** _____ (**commerce**) workable solar cells is already five times the price of that from coal plants **3** _____ (**make**) it less economically sound and less likely to be adopted on a large scale. The solar power industry is, therefore, turning to **4** _____ (**cheap**) alternatives. For example, **5** _____ (**engine**) at Berkeley have created solar cells using cheap copper oxide and zinc oxide. The low cost of these prototype cells means they only need to produce a third as much power to become commercially **6** _____ (**via**). Other innovations in solar technology such as nano coatings enlarging the efficacy of solar panels are also already increasing the **7** _____ (**economy**) efficiency of solar technology.

Tidal Energy. Governments and private investors **8** _____ (**like**) are starting to examine the potential of **9** _____ (**environment**) friendly forms of energy production, on a mass scale. One such solution is offered by tidal energy, which falls into two categories: energy **10** _____ (**generate**) either by harnessing the power of tidal currents, or utilising the **11** _____ (**differ**) between high tide and low tide. For instance, Tidal Stream Systems are an example of the first category. Often they resemble **12** _____ (**water**) wind turbines and in effect function in the same way, except tidal currents turn the turbines rather than wind. Whilst the installation of Tidal Stream Systems is a **13** _____ (**consider**) civil engineering undertaking they are meant to have less of an environmental impact than the other **14** _____ (**alter**).

Energy Saving Bulbs. If the average UK family swapped 3 normal 100watt traditional bulbs for 20watt energy saving bulbs they would prevent 120kg of CO2 being **15** _____ (**release**) into the atmosphere. Each bulb would save its **16** _____ (**own**) £9 per year or £100 over its lifetime. The **17** _____ (**accumulate**) effect of cost savings like this, taken in concert with other savings, could really add up to a quite substantial amount.

Green Gadgets. 5% or 300kg of a households' average carbon dioxide emissions are a result of gadgets like set top boxes, mobile phone chargers being left on **18** _____ (**stand**). Why not turn them off? In the UK, an average family would save over £37 per year: enough for a slap up pizza dinner! Increasingly manufacturers are designing these devices with eco-friendly functions, and leaving out **19** _____ (**necessary**) environmentally unfriendly functions such as the dreaded standby. More than 6 million electrical items are binned every year in the UK, and it is estimated that over half could be repaired. Obviously, a reconditioned **20** _____ (**apply**) requires less energy to bring it back into use, than to rebuild from scratch.

• **Find synonyms in the text to the following words and word combinations:**

increase, effectiveness, look like, difference, significant, device, vital, control and make use of, let out, sensible, apply, setting, influence, together with / jointly, assess, demand.

• **Use the following groups of synonymous words in the sentences of your own to exemplify difference in their meanings:**

"efficiency – efficacy", "controlling – harnessing", "number – amount", "difference – differential", "output – emission".

F. Web Research Activity

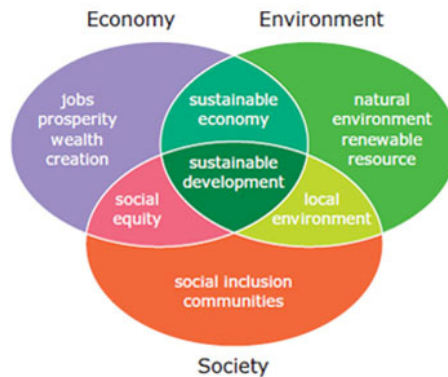
Surfing on the Internet, project the topic *Future Challenges for Mankind*.

Focus on the following issues:

- *Peak oil and water dilemma.*
- *Climate change.*
- *Food shortage.*
- *Resource and food depletion.*
- *Viral pandemics.*
- *Population ageing.*
- *Religious tensions.*
- You may also write a report covering the issues of *more local living, low energy lifestyles, crowdsourcing, dematerialization, vertical farming*, and more.

G. Speaking Test 1

- Comment on the scheme below which shows the confluence of three constituent parts of sustainable development.



- Have a look at the images given below which describe some of the most essential sustainable development goals.
- Give your description of each image (A-L).
- Speak on the meaning of the depicted concepts (1-4, 6-10, 13, 16, 17) for the future of mankind.



Speaking Test 2

- Prove that the current Age of Plenty is now coming to the end.
- Suggest possible "solutions" of the ecological problems and threatening. Think it over whether these way outs may include reversing government priorities, more local living, gaining more respect for nature, and having more women in authority.
 - Give your considerations to the latest innovations and developments in green technology helping us, the consumers, to do our bit in saving the planet.

H. Checklist

1. Indicate positive and negative impact of technology on the environment.
2. Characterise some inevitable future challenges of mankind.

3. Make a comparison of the notions "Environmental Awareness" and "Global Citizenship". Speak on the aspects of eco-friendly living.
4. Outline the concepts the phenomenon of "sustainable development" covers.
5. Make up a to-do list for the people to implement the core principles and pathways to sustainable development efficiently.

I. Home Writing Task

Write an argumentative essay on the topic "*The Role of Green Technologies in Future Sustainable Development of Mankind.*"

APPENDIX 1

Common Computer Science and IT Acronyms

- AAAI – American Association for Artificial Intelligence
- ACL – Agent Communication Language
- AI – Artificial Intelligence
- AIML – Artificial Intelligence Markup Language
- ALICE – Artificial Linguistic Internet Computer Entity
- AMPS – Advanced Mobile Phone Service
- AR – augmented reality
- BIOS – Basic Input Output System
- CPU – Central Processing Unit of the computer
- DSSSL – Document Style Semantics and Specification
- ETHICAA – Ethics and Autonomous Agents
- FPGAs – field-programmable gate-arrays
- FTP – File Transport Protocol
- GHG – green-house gas
- GPUs – graphics processing units
- HCI – human-computer interaction
- HTML – HyperText Markup Language formats
- HTTP – Hypertext Transfer Protocol
- ICT – information and communications technology
- IoT – Internet of Things
- IP – Internet Protocol
- ISP – Internet Service Provider
- KWS – keyword stuffing
- LAN – Local Area Network
- MAC – Macintosh, a type of personal computer made by the Apple Computer company
- MFPS – Mathematical Foundations of Programming Semantics
- NLU – Natural Language Understanding
- OS – Operating System of the computer
- PC – personal computer
- PDF – Portable Document Format
- PPP – Point-to-Point Protocol, the set of rules that allow your computer to use the Internet protocols using a phone line and modem
- PUE – Power Usage Effectiveness

RAM – Random Access Memory
ROM – Read Only Memory
SCI – Systemics, Cybernetics and Informatics
SEBIS – Semantics in Business Information Systems
SEKT – Semantic Knowledge Technologies
SEM – SEmantic Memory
SWAD – Semantic Web Advanced Development
TMAPI – Topic Map Application Programming Interface
TSMC – Transactions on Systems, Man, and Cybernetics
URL – Uniform Resource Locator, a path to a certain file on the World Wide Web
USB – Universal Serial Bus is used for communications between certain devices
VGA – Video Graphics Array, a system for displaying graphics
VPAs – virtual personal assistants
VR – Virtual Reality
VRML – Virtual Reality Mark-up Language allows the display of 3D images
WOSC – World Organization of Systems and Cybernetics
WYSIWYG – ‘What You See Is What You Get’; it is pronounced "wizziwig" and basically means that the printer will print what you see on your monitor.

Common Email Abbreviations

2G4U – Too Good For You
AWHIFY – Are We Having Fun Yet?
AYPI – And Your Point Is?
GAL – Get A Life
GMTA – Great Minds Think Alike
J4F – Just For Fun
KISS – Keep it Simple
QL – Quit Laughing!
RUOK – Are you Okay?
SITD – Still In The Dark
TIC – Tongue In Cheek
WYSIWYG – What You See Is What You Get
YYSSW – Yeah Yeah Sure Sure Whatever
ZZZ – Sleeping, Bored, Tired

Emoticons

:) or :-) – smiley face
O:-) – angelic smile
8-) – big-eyed smile
:-X – big kiss
:-{} – blowing a kiss
:.(– crying face
:-> – grinning
:-| – indifferent, bored
:-)) – laughing
:-(– sad face
:-D – shock or surprise
:-r – sticking tongue out
B:-) – sunglasses on head
:-|| – very angry
8-| – wide-eyed surprise
;-) – winking
:-O – yelling

APPENDIX 2

Texts on Pleasure Reading

TOPIC I. CYBERNETICS

History of Cybernetics in Brief

The roots of cybernetic theory. The word *cybernetics* was first used in the context of "the study of self-governance" by Plato in *The Laws* to signify the governance of people. The words 'govern' and 'governor' are related to the same Greek root through the Latin cognates *gubernator*. The word 'cybernétique' was also used in 1834 by the physicist André-Marie Ampère (1775–1836) to denote the sciences of government in his classification system of human knowledge.

The first artificial automatic regulatory system, a water clock, was invented by the technician Ktesibios. In his water clocks, water flowed from a source such as a holding tank into a reservoir, then from the reservoir to the mechanisms of the clock. Ktesibios's device used a cone-shaped float to monitor the level of the water in its reservoir and adjust the rate of flow of the water accordingly to maintain a constant level of water in the reservoir, so that it neither overflowed nor was allowed to run dry. This was the first artificial truly automatic self-regulatory device that required no outside intervention between the feedback and the controls of the mechanism. Although they did not refer to this concept by the name of Cybernetics (they considered it a field of engineering), Ktesibios and others such as Heron and Su Song are considered to be some of the first to study cybernetic principles.

The study of *teleological mechanisms* (from the Greek τέλος or *telos* for *end, goal, or purpose*) in machines with *corrective feedback* dates from as far back as the late 1700s when James Watt's steam engine was equipped with a governor, a centrifugal feedback valve for controlling the speed of the engine. Alfred Russel Wallace identified this as the principle of evolution in his famous 1858 paper. In 1868 James Clerk Maxwell published a theoretical article on governors, one of the first to discuss and refine the principles of self-regulating devices. Jakob von Uexküll applied the feedback mechanism via his model of functional cycle (*Funktionskreis*) in order to explain animal behaviour and the origins of meaning in general.

The early 20th century. Contemporary cybernetics began as an interdisciplinary study connecting the fields of control systems, electrical network theory, mechanical engineering, logic modelling, evolutionary biology and neuroscience in the 1940s. Electronic control systems originated with the 1927 work of Bell Telephone Laboratories engineer Harold S. Black on using negative feedback to control amplifiers. The ideas are also related to the biological work of Ludwig von Bertalanffy in General Systems Theory.

Early applications of negative feedback in electronic circuits included the control of gun mounts and radar antenna during WWII. Jay Forrester, a graduate student at the Servomechanisms Laboratory at MIT during WWII working with Gordon S. Brown to develop electronic control systems for the U.S. Navy, later applied these ideas to social organizations such as corporations and cities as an original organizer of the MIT School of Industrial Management at the MIT Sloan School of Management. Forrester is known as the founder of System Dynamics.

W. Edwards Deming, the Total Quality Management guru for whom Japan named its top post-WWII industrial prize, was an intern at Bell Telephone Labs in 1927 and may have been influenced by network theory. Deming made "Understanding Systems" one of the four pillars of what he described as "Profound Knowledge" in his book "The New Economics."

Numerous papers spearheaded the coalescing of the field. In 1935 Russian physiologist P.K. Anokhin published a book in which the concept of feedback was studied. The study and mathematical modelling of regulatory processes became a continuing research effort and two key articles were published in 1943. These papers were "Behaviour, Purpose and Teleology" by Arturo Rosenblueth, Norbert Wiener, and Julian Bigelow; and the paper "A Logical Calculus of the Ideas Immanent in Nervous Activity" by Warren McCulloch and Walter Pitts.

Cybernetics as a discipline was firmly established by Wiener, McCulloch and others, such as W. Ross Ashby and W. Grey Walter.

Walter was one of the first to build autonomous robots as an aid to the study of animal behaviour. Together with the US and UK, an important geographical locus of early cybernetics was France.

In the spring of 1947, Wiener was invited to a congress on harmonic analysis, held in Nancy, France. The event was organized by the Bourbaki, a French scientific society, and mathematician Szolem Mandelbrojt (1899–1983), uncle of the world-famous mathematician Benoît Mandelbrot.

During this stay in France, Wiener received the offer to write a manuscript on the unifying character of this part of applied mathematics, which is found in the study of Brownian motion and in telecommunication engineering. The following summer, back in the United States, Wiener decided to introduce the neologism cybernetics into his scientific theory. The name *cybernetics* was coined to denote the study of "teleological mechanisms" and was popularized through his book *Cybernetics, or Control and Communication in the Animal and Machine* (Hermann & Cie, Paris, 1948). In the UK this became the focus for the Ratio Club.

In the early 1940s John von Neumann, although better known for his work in mathematics and computer science, did contribute a unique and unusual addition to the world of cybernetics: Von Neumann cellular automata, and their logical follow up the Von Neumann Universal Constructor. The result of these deceptively simple thought-experiments was the concept of self-replication which cybernetics adopted as a core concept. The concept that the same properties of genetic reproduction applied to social memes, living cells, and even computer viruses is further proof of the somewhat surprising universality of cybernetic study.

Wiener popularized the social implications of cybernetics, drawing analogies between automatic systems (such as a regulated steam engine) and human institutions in his best-selling *The Human Use of Human Beings: Cybernetics and Society* (Houghton-Mifflin, 1950).

While not the only instance of a research organization focused on cybernetics, the Biological Computer Lab at the University of Illinois, Urbana/Champaign, under the direction of Heinz von Foerster, was a major center of cybernetic research for almost 20 years, beginning in 1958.

The fall and rebirth of cybernetics. For a time during the past 30 years, the field of cybernetics followed a boom-bust cycle of becoming more and more dominated by the subfields of artificial intelligence and machine-biological interfaces (i.e. cyborgs) and when this research fell out of favor, the field as a whole fell from grace.

In the 1970s new cyberneticians emerged in multiple fields, but especially in biology. The ideas of Maturana, Varela and Atlan realized that the cybernetic metaphors of the program upon which molecular biology had been based rendered a conception of the autonomy of the living being impossible. Consequently, these thinkers were led to invent a new cybernetics, one more suited to the organizations which mankind discovers in nature - organizations he has not himself invented.

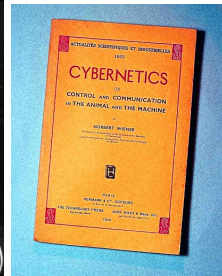
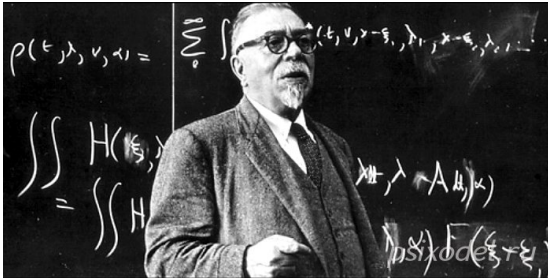
In political science, Project Cybersyn attempted to introduce a cybernetically controlled economy during the early 1970s.

Another characteristic noted was the transition from classical cybernetics to the new cybernetics that involves a transition from classical problems to new problems. These shifts in thinking involve, among others, (a) a change from emphasis on the system being steered to the system doing the steering, and the factor which guides the steering decisions.; and (b) new emphasis on communication between several systems which are trying to steer each other.

Recent endeavors into the true focus of cybernetics, systems of control and emergent behavior, by such related fields as game theory (the analysis of group interaction), systems of feedback in evolution, and metamaterials (the study of materials with properties beyond the Newtonian properties of their constituent atoms), have led to a revived interest in this increasingly relevant field.

See more at: <https://en.wikipedia.org/wiki/Cybernetics>

Norbert Wiener: the Man and his Thoughts



"... Thus, as far back as four years ago, the group of scientists about Dr. Rosenblueth and myself had already become aware of the essential unity of the set of problems centering about communication, control and statistical mechanics, whether in the machine or in the living tissue. [...] We have decided to call the entire field [...] by the name Cybernetics, which we form from the Greek κυβερνητης or steersman. In choosing this term, we wish to recognize that the first significant paper on feed-back mechanisms is an article on governors, which was published by Clerk Maxwell in 1868 and that governor is derived from a Latin corruption of κυβερνητης. We also wish to refer to the fact that the steering engines of a

ship are indeed one of the earliest and best developed forms of feed-back mechanisms." (From Norbert Wiener's book *Cybernetics, or Control and Communication in the Animal and the Machine*)

Wiener's contemporaries on somewhat strange Professor

Wiener was a great mathematician who opened new perspectives onto fields in which the activity became intense, as it still is. Although most of his ideas have become standard knowledge, his original papers, and especially his books, remain difficult to read. His style was often chaotic. After proving at length a fact that would be too easy if set as an exercise for an intelligent sophomore, he would assume without proof a profound theorem that was seemingly unrelated to the preceding text, then continue with a proof containing puzzling but irrelevant terms, next interrupt it with a totally unrelated historical exposition, meanwhile quote something from the "last chapter" of the book that had actually been in the first, and so on. He would often treat unrelated questions consecutively, and although the discussion of any one of them might be lucid, rigorous, and beautiful, the reader is left puzzled by the lack of continuity. All too often Wiener could not resist the temptation to tell everything that cropped up in his comprehensive mind, and he often had difficulty in separating the relevant mathematics neatly from its scientific and social implications and even from his personal experiences. The reader to whom he appears to be addressing himself seems to alternate in a random order between the layman, the undergraduate student of mathematics, the average mathematician, and Wiener himself.

Wiener wrote a most unusual autobiography. Although it conveys an extremely egocentric view of the world, I find it an agreeable story and not offensive, because it is naturally frank and there is no pose, least of all that of false modesty. All in all, it is abundantly clear that he never had the slightest idea of how he appeared in the eyes of others. His account of the ill-starred trip to Europe in 1926–1927 is a particularly good example. Although he says almost nothing about the work of the mathematicians whom he met, he recalled after twenty-five years meeting J. B. S. Haldane and setting him straight over an error in his book *The Gold-Makers*: Haldane had used a Danish name for a character supposed to be an Icelander (from *I Am a Mathematician*). In his autobiography Wiener comes through as a fundamentally good-natured person, realistic about his human responsibilities and serious enough to be a good friend, a good citizen, and

a good cosmopolite. Despite his broad erudition, the philosophical interludes are no more than common sense, if not downright flat. Unlike many autobiographers, he never usurps the role of a prophet who long ago predicted the course that things have taken. A good biography ought to be written of him, one that would counterbalance his autobiography and do him more justice than anyone can do in a book about himself. Two months before his death, in a ceremony at the White House, Norbert Wiener was awarded the National Medal of Science. The citation by President Johnson said: "...for marvelously versatile contributions, profoundly original, ranging within pure and applied mathematics, and penetrating boldly into the engineering and biological sciences".

See more at: <http://www.encyclopedia.com>

TOPIC 2. SUBDIVISIONS OF CYBERNETICS

Cybernetic Models' Application

Cybernetic models are applied prescriptively in design and descriptively as explanatory devices. Their prescriptive use savours of engineering. They are employed in the specification of controllers and regulators for industrial plants, navigation, and so on. The most interesting developments have occurred in the area of predictive, adaptive, and optimizing controllers, usually able to deal with randomly perturbed environments. On the other hand, cybernetic models are widely used in determining the proper relationship between a man and a machine, for example, in the design of vehicle-control systems.

Another field of application is teaching and training. Here, training is literally interpreted as the control of a human learning process and insofar as an adequate model exists, the training instructor may be partially or wholly replaced by a suitable machine. In operational research, cybernetic models are used to specify stockholding schemes, process and assembly programming, and inventory control. They are also used in a normative fashion; for example, the management of a business enterprise is often modelled as a game-like decision and control process.

Descriptive applications are legion. At a neuro physiological level, cybernetic models have been used to explain many aspects of the working of a brain. Five areas are of special importance: models

for simplified neural networks, chiefly representing perceptual processes; statistical models for the complex oscillations and regulations of real neural activity; models relating algorithms or plans (cited earlier) to the conditioning process; models for the mechanisms responsible for maintaining and directing attention; and models for the detailed changes that occur at the synaptic junctions between neurons.

Outside the brain, cybernetic principles are widely used to elucidate the control of bodily functions (autonomic processes, hormone-mediated regulatory systems, muscular control, and so on). A surprisingly large amount of molecular biology and bio-chemistry also rests upon models depicting the organization of enzyme systems and the hierarchical control of enzyme synthesis. This type of explanation promises to have further utility in relating genetically coded instructions to the cellular economy. Cybernetic models have been used in embryology since the early 1950s, and some of the original schemes have now been formulated in a detailed mathematical fashion.

Within psychology, it is possible to explain several classes of behaviour and cognition in terms of hierarchies of control systems. The previously stated notions of planning and learning are pertinent to this field. At a macroscopic level, cybernetic ideas are applied to interpersonal interactions such as conversations, the communicative behaviour of small groups, and the homeostatic processes maintaining the status quo in social systems. Indeed, one of the first essays in this direction took place in the context of social anthropology where cybernetic ideas are becoming of greater importance. Somewhat similar developments have occurred in the animal domain; ethnologists use cybernetics freely, especially in dealing with population density control systems and the regulation of reproduction.

See more at: <http://seminarprojects.org/t-cybernetics-full-report>

How I Learned to Stop Worrying and Love A.I.

By Robert A. Burton

The distinction between man and machine is under siege. For me, the possibility that machines will acquire the equivalent of human feelings and emotions is pure fantasy. And yet, as a neurologist, I cannot ignore advancing machine intelligence's implications about the human mind.

To begin, think back to IBM's Deep Blue defeat of Garry Kasparov in 1997. One pivotal move that shifted the match in favor of Deep Blue prompted Kasparov to accuse IBM of human intervention. In so doing, he highlighted the essential cognitive dissonance that we will face as machines get smarter. Kasparov couldn't believe that he had been beaten by a computer because he felt the play, for him it was a sign of superior intelligence. But he was wrong – years later it was revealed by Deep Blue's co-creator that the triumphant move had been a result of a software bug. When presented with several options, Deep Blue could not make a definitive decision, so made a random move that rattled Kasparov.

What is overlooked in this equation is the quality or accuracy of the actual decision. A standard move by a chess player is evidence of understanding, but a superior move by an inanimate collection of wires and transistors is considered rote machine learning, not understanding. To put this in perspective, imagine a self-proclaimed chess novice making the same pivotal move as Deep Blue. I doubt that any of us would believe that she didn't know anything about chess. Yet neuroscience is revealing that understanding isn't a result of conscious deliberation. Conversely, we can know things without any sense of knowing (as in the classic example of blind sight, where patients with cortical blindness can point out in which visual field a light is flashing even when they consciously see nothing and are entirely unaware of this knowledge).

In 1980 the philosopher John Searle introduced the Chinese Room argument to show that it is impossible for digital computers to understand language or think. His 1999 summary of the argument goes as follows:

Imagine a native English speaker who knows no Chinese locked in a room full of boxes of Chinese symbols (a database) together with a book of instructions for manipulating the symbols (the program). Imagine that people outside the room send in other Chinese symbols which, unknown to the person in the room, are questions in Chinese (the input). And imagine that by following the instructions in the program the man in the room is able to pass out Chinese symbols which are correct answers to the questions (the output). The program enables the person in the room to pass the Turing Test for understanding Chinese but he does not understand a word of Chinese.

Back in 1980, when we knew little about the brain and artificial intelligence hadn't yet flexed much practical muscle, the argument felt reasonable; absent the ability to understand, you wouldn't expect A.I. to make sophisticated decisions that are the equivalent of smart human thought. Thirty-five years later, though, the argument seems

outdated. At bottom, it is a convoluted way of saying that machines don't have consciousness and feelings. Denying machine understanding tells us nothing about the potential limits of machine intelligence. Even so, according to the Stanford Encyclopedia of Philosophy, the Chinese Room argument remains the most widely discussed philosophical argument in cognitive science since the Turing Test.

It's as though our self-proclaimed position of superiority and uniqueness is constantly threatened, and we seem constitutionally compelled to compare ourselves to all other potentially thinking entities. A few hundred years ago, Descartes assumed that animals were automatons. Now we know that crows use tools and chimpanzees wage territorial war. Still, we aren't worried about crow and chimpanzee takeover of our planet, or that they are going to replace us as the highest life form on earth. But machines, well that's a different story.

See more at: https://www.goodreads.com/author/show/1309940.Robert_A_Burton

TOPIC 3. ROBOTICS

Robots Are about to Invade our Lives

From performing household chores, to entertaining and educating our children, to looking after the elderly, roboticists say we will soon be welcoming their creations into our homes and workplaces.

Human-like robots. Commercially available robots are already beginning to perform everyday tasks like vacuuming our floors. The latest prototypes from Japan are able to help the elderly to get out of bed or get up after a fall. They can also remind them when to take medication, or even help wash their hair. "Current robots are not human like. For example, they are things like automated beds and wheelchairs," says celebrated roboticist Prof Hiroshi Ishiguro, director of the Intelligent Robotics Laboratory at Osaka University, Japan. He believes the time is coming when robots start looking less like machines, and more like us, and adds that elderly people don't like using a computer interface, but they can talk with a robot.

Prof Maja Mataric at the University of Southern California, one of the leading proponents of social caring robots, agrees. "I'm very excited about the fact that today in robotics we have machines that are sophisticated

enough to be put together with people in a daily life setting," she says. "The question becomes: who will take care of everyone? That's where robotic technology can really make a difference," says Prof Mataric.

Her group is developing robots to work with stroke patients, and elderly people undergoing cognitive changes. The research team has found that people react well to a robot gym instructor, and seem to get less frustrated with it than with instructions given on a computer screen. The robot can act as a perfect trainer, with infinite patience.

Welcome to the machine. People are going to have to like, and importantly trust robots before they welcome them into their homes, and several groups around the world are working on making it easier to communicate with them. Much of human interaction takes place unconsciously, through body language. Gestures, eye contact, concepts of personal space are all things that robots are being taught. In learning about how people interact with machines, researchers are also discovering new roles for robots in our lives. Robots can communicate with humans in ways that other technology cannot. "If someone finds the robot to be more persuasive, more credible, that's going to affect how they interact with it," says Dr Cynthia Breazeal, director of the Personal Robots Group at the Massachusetts Institute of Technology. "We can now start to think about domains where it's the social interaction, which is the core means by which a robot helps someone, through motivating them, or giving positive reinforcement."

Roboticians have had impressive results with autistic children, who often find communication difficult. Children seem to be able to interact more easily with a robot 'buddy' than with other people.

In control. Science fiction may have primed us for the coming robot revolution, but it has also given us an idea of the types of controls we may want to consider before welcoming robots into our lives and homes.

The UK's Engineering and Physical Sciences Research Council, together with the Arts and Humanities Research Council, has drafted a set of ethical principles for robot design - which can be summarised as follows:

- Robots should not be designed solely or primarily to kill or harm humans.
- Humans, not robots, are responsible agents. Robots are tools designed to achieve human goals.
- Robots should be designed in ways that assure their safety and security.

- Robots are artefacts; they should not be designed to exploit vulnerable users by evoking an emotional response or dependency. It should always be possible to tell a robot from a human.

- It should always be possible to find out who is legally responsible for a robot.

At present this code is simply a set of ideas. It's out for debate and discussion. However, they are ideas that people should be thinking about before the coming 'robot revolution'.

See at http://www.links999.net/robotics/robots/robots_ethical.html

Latest News in Robotics

The first autonomous, entirely soft robot. A team of Harvard University researchers with expertise in 3D printing, mechanical engineering, and microfluidics has demonstrated the first autonomous, untethered, entirely soft robot. This small, 3D-printed robot – nicknamed the octobot – could pave the way for a new generation of completely soft, autonomous machines.

The octobot is powered by a chemical reaction and controlled with a soft logic board. A reaction inside the bot transforms a small amount of liquid fuel (hydrogen peroxide) into a large amount of gas, which flows into the octobot's arms and inflates them like a balloon. The team used a microfluidic logic circuit, a soft analog of a simple electronic oscillator, to control when hydrogen peroxide decomposes to gas in the octobot.

Octopuses have long been a source of inspiration in soft robotics. "The entire system is simple to fabricate, by combining three fabrication methods – soft lithography, moulding and 3D printing – we can quickly manufacture these devices," said Ryan Truby, a graduate student in the Lewis lab and co-first author of the paper.

The simplicity of the assembly process paves the way for more complex designs. Next, the Harvard team hopes to design an octobot that can crawl, swim and interact with its environment.

Paraplegics regain some feeling, movement after using brain-machine interfaces. Eight people who have spent years paralyzed from spinal cord injuries have regained partial sensation and muscle control in their lower limbs after training with brain-controlled robotics.

The patients used brain-machine interfaces, including a virtual reality system that used their own brain activity to simulate full control of their legs. The research – led by Duke University neuroscientist Miguel Nicolelis, Brazil – offers promise for people with spinal cord injury, stroke and other conditions to regain strength, mobility and independence.

Brain-machine systems establish direct communication between the brain and computers or often prosthetics, such as robotic limbs. For nearly two decades, Nicolelis has worked to build and hone systems that record hundreds of simultaneous signals from neurons in the brain, extracting motor commands from those signals and translating them into movement.

The Walk Again Project has brought together more than 100 scientists from 25 countries, who first made news at the 2014 World Cup in São Paulo when Julian Pinto, a young paraplegic man, using a brain-controlled robotic exoskeleton, was able to kick a soccer ball during the opening ceremony.

The team also continues efforts to adapt technologies that are accessible for patients around the world who don't have access to physical therapy centers with the latest equipment. Perhaps the best answer is haptic sleeves, which by comparison are affordable and something a patient could use at home, Nicolelis said.

Prototype System for Reading Closed Books. In the latest issue of *Nature Communications*, the researchers describe a prototype of the system, which they tested on a stack of papers, each with one letter printed on it. The system was able to correctly identify the letters on the top nine sheets.

"The Metropolitan Museum in New York showed a lot of interest in this, because they want to, for example, look into some antique books that they don't even want to touch," says Barmak Heshmat, a research scientist at the MIT Media Lab. He adds that the system could be used to analyze any materials organized in thin layers, such as coatings on machine parts or pharmaceuticals.

The MIT researchers developed the algorithms that acquire images from individual sheets in stacks of paper, and the Georgia Tech researchers developed the algorithm that interprets the often distorted or incomplete images as individual letters. The system uses terahertz radiation, the band of electromagnetic radiation between microwaves and infrared light, which has several advantages over other types of waves that can penetrate surfaces, such as X-rays or sound waves.

Terahertz imaging is still a relatively young technology, however, and researchers are constantly working to improve both the accuracy of detectors and the power of the radiation sources, so deeper penetration should be possible.

See more at: https://www.sciencedaily.com/news/computers_math/robotics/

TOPIC 4. CYBERNETICS in BIOLOGY

A Shocking Way to Fix the Brain

Neurosurgeons hope to treat some of the most intractable mental disorders by putting advanced arrays of electrodes into patients' brains.

In an initial surgery, Prof Emad Eskandar (US) drills two dime-size holes in the top of the patient's skull and sinks 42-centimeter-long electrodes about seven centimeters deep into the gray matter of the brain. In a second surgery, usually a couple of days later, he creates a pocket under the skin in the chest or abdomen, implants a device incorporating a battery and pulse generator into this newly created space, and runs a wire up to the skull, connecting it with the electrodes. When turned on, the device emits an electrical current that stimulates the neural fibers carrying information from primitive brain areas associated with motivation to the frontal lobe. In 50 percent of Eskandar's cases, a miracle follows: the obsessions and compulsions fade and then disappear.

Though the treatment sounds extreme, in some respects his OCD (obsessive compulsive disorder) patients are the lucky ones. There is no such FDA-approved last-resort option for the millions of Americans suffering from other psychiatric illnesses, such as depression, post-traumatic stress disorder, or schizophrenia. Or for borderline personality disorder and traumatic brain injuries. But for all these conditions, that may soon change.

DBS (deep brain stimulation) has been used for almost two decades to treat patients with severe forms of Parkinson's. As many as 125,000 people are living with electrodes implanted in their brains. As part of President Obama's Brain Initiative, Eskandar is co-leading a team of doctors, scientists, and engineers that is one year into a five-year, \$30 million effort to use DBS to treat severe psychiatric disorders, most of which have been considered too complex and mysterious for any such system currently on the market. Taming OCD

will require a new kind of device capable not just of stimulating the brain but of monitoring brain activity in real time and detecting anomalies that, in many cases, neuroscientists have not yet identified.

Engineers across the Charles River at Draper Laboratory are working closely with Eskandar to develop the needed hardware. They have built a prototype of a DBS system that will be able to record signals from hundreds of sites deep in the brain and on its surface. The device will use pattern recognition software to detect anomalous activity associated with pathological mental states; then it will stimulate areas of the brain in response. The Draper engineers are in the process of fabricating a miniaturized version of the device, which they hope to test out in humans as early as 2016.

Most psychiatrists agree that new treatments for mental illness are desperately needed. Existing drugs for brain disorders are often ineffective and frequently produce troublesome side effects. One reason is that drugs alter the chemistry of the entire brain, not just the area of interest, modulating the behavior of otherwise healthy neurons.

With electrical stimulation, on the other hand, doctors can target discrete populations of neurons, confining the treatment to small, isolated areas of the brain that are causing the problems. "DBS allows us to go into the actual circuit that we know is involved in a condition, and we're stimulating it and making it fire or not fire in the way that we want it to," says Dougherty, the psychiatrist teamed with Eskandar to direct Mass. General's Division of Neurotherapeutics, the nation's busiest center for psychiatric surgical treatment. "It's night and day in terms of the robustness."

To treat brain conditions this way, of course, the surgeons need to identify and understand the precise circuits that cause them—which in many cases has not yet been done. Though neuroscientists have learned a lot about how brain circuits are organized and how they function, it's rarely been possible to watch these circuits operate in real time. But Eskandar and Dougherty say the technology they are designing and testing will open up that possibility. Recording multiple patches of neurons simultaneously for extended periods of time, they believe, will allow them to transform the way we define and understand different types of mental illness—and, more important, finally lead to more effective ways to treat them.

See more at: <https://www.technologyreview.com/s/542176/a-shocking-way-to-fix-the-brain/>

Design Awards Winners in the Health Category

Drinkable Book. It is a beautifully bound tome whose tear-out pages purify water. The pages are coated with silver nanoparticles that, when used to filter water, can trap a reported 99.99 percent of the dreadful bacteria. One book can provide up to four years of clean drinking water for a single person.

All people need to do is tear out a page from the book and pour unsafe water through the paper. The paper contains small amounts of silver and copper which act as a filter to remove dirt and germs.

In some countries it can be really hard for people to find clean drinking water and the germs in dirty water can make people very ill. Dr Teri Dankovich is a scientist who worked on the book for a number of years. "All you need to do is tear out a paper, put it in a simple filter holder and pour water into it from rivers, streams and wells - out comes clean water - and dead bacteria as well," she said.

The book has been used successfully in parts of Africa and in Bangladesh for the past few weeks.

The OR360 simulation center. The key features include movable walls and equipment; color coded trauma bays to help staff locate supplies; whiteboards in trauma bays that display key patient information; and an iPhone application that puts diagnostic data at the fingertips of medical teams.

Cedars-Sinai Hospital in Los Angeles partnered with the Department of Defense to build out the OR360, a new innovation center where doctors and military personnel can simulate hypothetical scenarios in order to simplify and streamline trauma care.

"In a world where the availability of treatments is growing but the money available to treat people is shrinking, being able to work out ways in which to be more efficient becomes much more valuable and important," says Ken Catchpole, director of surgical safety and human factors at Cedars-Sinai.

It's a good start, but Cedars-Sinai believes that the space has only begun to help them smooth over other issues that have long plagued the healthcare system.

Juno machine. DNA analysis has become a valuable tool for a number of disciplines, but the user experience for the process hasn't been improved upon much. Designed by fuseproject, Juno is a machine that processes small amounts of DNA samples easily so lab technicians can focus on analyzing data instead of navigating equipment. Samples for Juno take just 15 minutes to prep and the machine produces data in less than three hours.

Embrace Watch. It is the first smartwatch and medical-quality wearable that detects epileptic seizures and measures the onset of convulsive seizures. The minimalist design also alerts caregivers when their loved ones are at risk. Considering that in the United States, 1 in 26 people will develop epilepsy at some point in their lifetime, this device has the opportunity to remove stigma from a life-threatening condition for millions of people.

Cur Pain Relief. Chronic pain keeps over 1.5 billion people around the world from living their lives to the fullest and affects more Americans than diabetes, heart disease, and cancer combined. This wearable tracks muscle and nerve responses in the body and delivers clinical therapy through gel packs and low-voltage electrical currents that relieve pain immediately.

See more at: <https://www.fastcodesign.com/innovation-by-design/2015>

TOPIC 5. MODERN TECHNOLOGIES

Disrupting Regulation: Robot Cars, Blockchain and Robotic Pharmacies

By Darlene Damm

In recent years, regulators and lawmakers have been caught off guard by quick-moving new technologies – 3D printed guns, genetically modified glowing plants, new business models for sharing economy companies and drones.

As the pace of technological innovation accelerates, one of our biggest challenges is ensuring regulation and enforcement keep up with the development of new technologies in a way that balances both safety and expediently brings new technologies to market.

It may seem the solution lies in building larger external agencies to review and monitor an ever-increasing number of new technologies, or in streamlining the regulatory process – but a key part of the solution might actually rest in recognizing how technology can decrease the amount of regulation and enforcement needed.

Deloitte University Press recently published one of the first overviews on how rulemaking and enforcement are changing in an exponential era and ways regulation and enforcement can evolve. Many of their suggestions focused on better harnessing technology to improve the process.

For example, regulators can utilize online digital platforms to better capture citizen and market concerns when making rules rather than relying on slow and limited "town halls" or "notice and comment" processes which can take up to a year.

And while much of regulation enforcement today relies upon costly and timely inspections and attempts to monitor everyone for every possible violation, enforcers in the future could instead utilize open data, data sharing, improved data analytics and citizen reporting to more efficiently spot violations.

An interesting trend the report doesn't cover, however, is how the next generation of technologies may not require as much enforcement because the rules and enforcement will actually be encoded into the software of the technological system.

Consider a future network of robotic cars. If all cars are hooked up to a network, we will no longer need traffic signals, stop signs, traffic lanes, parking spots or as many police officers to manually enforce traffic laws. Much of the need for enforcement goes away, as these larger systems prevent accidents waiting to happen. Similar systems will exist for air travel and sea travel. (The weakness of such systems is that they are vulnerable to other problems such as hacking that can effect huge numbers of users at scale.)

Or consider healthcare. As medical chips and devices are able to monitor reactions to pharmaceuticals, or future robotic pharmacies dispense prescriptions depending on live data collected from patients and their communities, we will have real-time data about the safety of medications. Not only does this help human doctors and pharmacists make quicker and safer personalized adjustments as needed, it also gives regulators data that may have previously taken months or years for them to gather.

Finally, consider a company or industry that uses blockchain databases. Given that the software ensures all transactions happen in a transparent way, automatic "inspections" will be happening all the time by everyone, and there will be less need for regulators to enforce through specific targeted inspections.

Reimagining regulation and rule enforcement is difficult because for decades entrepreneurs have had to build businesses around regulatory processes, not to mention spend enormous amounts of money clearing regulatory hurdles. But if one looks into the future a bit, we can see that even regulation itself will be disrupted.

See more at <http://singularityhub.com>

Top 10 Technology Trends for 2016

By David W. Cearley

1: The Device Mesh. The device mesh moves beyond the traditional desktop computer and mobile devices (tablets and smartphones) to encompass the full range of endpoints with which humans might interact. As the device mesh evolves, Gartner expects connection models to expand and greater cooperative interaction between devices to emerge. We will see significant development in wearables and augmented reality, especially in virtual reality.

2: Ambient User Experience. All of our digital interactions can become synchronized into a continuous and ambient digital experience that preserves our experience across traditional boundaries of devices, time and space. The experience blends physical, virtual and electronic environments, and uses real-time contextual information as the ambient environment changes or as the user moves from one place to another.

3: 3D-Printing Materials. We'll see continued advances in 3D printing with a wide range of materials, including advanced nickel alloys, carbon fiber, glass, conductive ink, electronics, pharmaceuticals and biological materials for practical applications expanding into aerospace, medical, automotive, energy and the military. Recent advances make it possible to mix multiple materials together with traditional 3D printing in one build.

4: Information of Everything. Everything surrounding us in the digital mesh is producing, using and communicating with virtually unmeasurable amounts of information. Organizations must learn how to identify what information provides strategic value, how to access data from different sources, and explore how algorithms leverage Information of Everything to fuel new business designs.

5: Advanced Machine Learning. Advanced machine learning is what makes smart machines appear "intelligent" by enabling them to both understand concepts in the environment, and also to learn. Through machine learning a smart machine can change its future behavior. This area is evolving quickly, and organizations must assess how they can apply these technologies to gain competitive advantage.

6: Autonomous Agents and Things. Advanced machine learning gives rise to a spectrum of smart machine implementations – including robots, autonomous vehicles, VPAs and smart advisors – that act in an autonomous (or at least semiautonomous) manner. This feeds into the ambient user experience in which an autonomous agent becomes the main user interface. Instead of interacting with menus, forms and buttons on a smartphone, the user speaks to an app, which is really an intelligent agent.

7: Adaptive Security Architecture. The complexities of digital business and the algorithmic economy, combined with an emerging "hacker industry," significantly increase the threat surface for an organization. IT leaders must focus on detecting and responding to threats, as well as more traditional blocking and other measures to prevent attacks.

8: Advanced System Architecture. The digital mesh and smart machines require intense computing architecture demands to make them viable for organizations. They'll get this added boost from ultra-efficient-neuromorphic architectures. Systems built on GPUs and FPGAs will function more like human brains that are particularly suited to be applied to deep learning and other pattern-matching algorithms that smart machines use. FPGA-based architecture will allow distribution with less power into the tiniest IoT endpoints, such as homes, cars, wristwatches and even human beings.

9: Mesh App and Service Architecture. The mesh app and service architecture are what enable delivery of apps and services to the flexible and dynamic environment of the digital mesh. This architecture will serve users' requirements as they vary over time. It brings together the many information sources into a flexible architecture.

10: Internet of Things Architecture and Platforms. IoT platforms exist behind the mesh app and service architecture. The technologies and standards in the IoT platform form a base set of capabilities for communicating, controlling, managing and securing endpoints in the IoT. The platforms aggregate data from endpoints behind the scenes from an architectural and a technology standpoint to make the IoT a reality.

See more at <http://www.forbes.com>

TOPIC 6. NETWORK WORLD SOCIETY

Joe Firmage's radical plan to simplify the Internet

By Amara D. Angelica

Legendary Internet entrepreneur Joe Firmage is back, and he plans to turn the Internet upside down. Again. He did it once before with USWeb in the 90s, designing and building Internet sites, intranets, and applications for more than half the Fortune 100 and thousands of startups.

Now his new venture – 15 years and tens of millions in the making – called ManyOne, plans to do the same for a public (and for businesses of any size) dazed by the complexities of setting up websites. And worse, mystified about getting page rank on search engines – and even worse, creating their own successful apps.

ManyOne – which is now operational – lets anyone buy domains and set up a website via a series of forms, in literally minutes. That includes a selection of themes (designs) and e-commerce features for businesses. Any major web, plug-in, and direct-programming code can be dropped in for customization or adaptation with existing systems. This has been accomplished by a kind of operating system for all kinds of devices, what Firmage calls "the world's first Internet Economic Operating System."

He explained: "Think about each 'cloud' of the majors – Amazon, Google, Microsoft, Apple, Facebook – but also Godaddy, Web.com, and LinkedIn, or even Fedex ... they each have a 'cloud' of App Services. ManyOne has tied them all together into a new Economic Operating System that equips you to use them all together at once."

Charles L. Dickens, PhD. President of ManyOne's operations in Phoenix said, "Joe and hundreds of associates really have invented the next evolution of capitalism itself, by putting the clouds at your fingertips, and equipping you to make a living doing what you love to do, rather than what you have to do."

Details of the technology and business model of ManyOne are "closely guarded, with lots of bits and pieces" known, but not the whole, at least until Labor Day.

But ManyOne goes further. They've created a "universal navigator" front end, like a "heads-up, clickless sitemap for everything on the Internet" that makes it really breathtaking to use, Firmage said. Think Bing on steroids. "It's easy and quick to explore relevant sites – and apps, when it

comes out this year for iOS and Android devices by categories." The universal navigator (uninav) separates places and activities into separate ways to navigate (and drive traffic) that work together, Firmage explained.

Firmage revealed that later this year, ManyOne's system will auto-generate an app for each site that can be auto-uploaded as an app into Google's Play Store and Apple's AppStore, with "consistent quality control to get them downloadable fast" – for free or fee, with ManyOne receiving 10% of any download fee.

Firmage can get technical fast but appears to have a simple point that others may have missed. "Domains and DNS are at the core of the Internet itself, yet most business people at all levels don't fully understand what they really are," he noted.

But that leaves the question of how to get noticed by search engines. ManyOne plans to solve that by helping you choose one or more domains that encapsulate what image (or product) you want to project to the world.

He calls it "Scientific Search Engine Optimization" (SSEO). The idea is to be specific in the wording of the domain name to reflect actual search queries. That's because search engines are expected by the international standards bodies such as ICANN to give priority to domain names first, Firmage explained to me.

However, the official Bing blog describes this as a "common spam technique known as URL keyword stuffing (KWS)" and lists some ways Bing detects and filters such sites.

Specifics of how SSEO functions were not disclosed, but he hinted that the speed by which traffic could be directed is "unbelievable" – changing thousands of websites or individual ones in less than a second.

See more at: <http://www.pearltrees.com>

One Way to Reduce Email Stress

We all feel it – that panicked sensation when we check our inbox and see the deluge of emails awaiting our attention. The average person receives upwards of 150 emails a day, and it often seems like no amount of tagging or filtering can close the floodgates.

One major source of stress is the never-ending conversation threads made possible by group emails. Believe it or not, such tools have barely changed since the pre-Internet days of Arpanet 40 years ago: You either opt in or opt out, you get dozens of irrelevant emails, and the views of a few loudmouths usually end up drowning out the rest.

In an age of Facebook and Reddit, users expect a sense of control over how they consume their content, and yet that control and personalization often doesn't extend to their own inboxes. Now, CSAIL researchers are trying to change that with a new prototype system called Murmur that aims to improve the mailing-list experience by incorporating popular social-media features like upvoting, following, and blocking.

CSAIL PhD student Amy Zhang, lead author on a new paper she presented this week at the ACM Conference on Human Factors in Computing Systems in Seoul, says she'd always been struck by the fact that people use mailing lists for such a variety of reasons - a sentiment that was echoed by her team's surveys of more than 400 individuals from 30 different academic, social and geographical mailing lists. The answer, Zhang says, is to create an experience that's as customizable as the ones we have on social media. For example, a sizable portion of respondents said they wanted to have more meaningful conversations on list-relevant topics - but were deterred from initiating because of the perception that they were "spamming" people.

With Murmur, which is still in active development, tentative senders will be able to post a message to a specific subset of friends on the list who could give it the equivalent of a Facebook "like" or a Reddit "up-vote", such that it automatically spreads to more list recipients. You can also explicitly exclude certain people from emails you send, which could come in handy for office surprise parties or happy hours.

One of the core goals of the project is to make mailing lists - and email more generally - a better experience for people who want to have more substantial discussions.

As far as receiving messages, many respondents expressed a feeling of "interruption fatigue" and wished they could choose how much content they receive. Murmur addresses this by letting you "follow" or "mute" particular users, threads and topics, and even providing the option of specifying how many emails with certain tags that you receive in a given day or week.

Our emails have long been a topic of concern for providers. Google's new Inbox, for example, tries to help by using machine-learning techniques to bundle our messages into "important" and "unimportant" folders. But Karger objects to what he describes as "paternalistic approaches" to organizing our emails.

The earliest listservs, based on the first email program SNDMSG, were geared towards particular interests like programming and science fiction. In comparison to systems like message boards, people were drawn towards listservs' ease of use and simplicity in being able to send one email to communicate to a large group of people. But as more customizable social media platforms have come to dominate our lives, Zhang says that the medium's one-size-fits-all mentality has become outdated and suboptimal.

"In an age where we can actively decide what communications are worth paying attention to, it's remarkable that mailing lists have continued to maintain such a binary approach," Zhang says. "You're either guaranteed to get everything, or you get nothing at all. Something like Murmur might not be a perfect solution, but at the very least it gives users a greater sense of ownership over their communications."

See more at: <http://newsoffice.mit.edu>

TOPIC 7. CYBER SECURITY

Help the FBI Unlock an iPhone

The Tech Giant Apple has come into an entangled situation which could be a potential security threat for Apple users in near future.

The US Magistrate Judge has ordered Apple to provide a reasonable technical assistance in solving a critical case of Syed Farook; who with his wife planned a coordinated "2015 San Bernardino attack" that killed 14 people and injured 22.

As part of the investigation, the Federal Bureau of Investigation (FBI) had seized the Farook's iPhone 5C that would be considered as an insufficient evidence until and unless the iPhone gets unlocked by any means.

Previously, Apple had made several crystal clear statements about its Encryption Policy, stating that even the company is not able to decrypt any phone data as the private key lies at the user's end. A similar problem encountered three years back with Lavabit, who was forced to shut down its services soon after when FBI demands SSL keys to snoop the emails.

However, despite forcing or ordering Apple to break the encryption and unlock the suspect's iPhone, judges have ordered the company to find an alternative way to unlock iPhone, keeping data intact.

From iOS 8, Apple added a data security mechanism called Data Protection, which uses 256-bit AES Encryption key to encrypt everything on the device.

Here the passcode a user enters is itself used as part of the encryption key and thus, it is impossible for an attacker or even Apple itself to unlock iPhone until the user re-inputs the passcode. Besides Data Protection, Apple offers "Auto-Destruct Mode" security feature that will erase all the data on the iPhone if an incorrect password is entered 10 times concurrently, making the data unrecoverable.

So, Judge Pym wants Apple to come up with an alternative that should increase the brute force attempts from 10 to millions, in order to prevent the data from getting self-destructed. Apple has not yet confirmed whether it is possible to write such a code that can bypass iOS Auto-Destruct feature. But, if it's possible, it would provide an alternative backdoor mechanism to every law enforcement and intelligence agency to unlock iPhone by simply brute forcing 4–6 Digit Pins effectively within few hours.

Here we support Apple policy not to help break its users' encryption, because once a master key is created to unlock that particular iPhone, we're sure that the US government will misuse this power and demand for the key again and again in near future for unlocking other phones.

Apple has dismissed the court order to unlock San Bernardino gunman Syed Rizwan Farook's iPhone. Here's what Apple CEO Tim Cook said in a statement:

"The United States government has demanded that Apple takes an unprecedented step which threatens the security of our customers. We oppose this order, which has implications far beyond the legal case at hand."

"We have great respect for the professionals at the FBI, and we believe their intentions are good. Up to this point, we have done everything that is both within our power and within the law to help them. But now the U.S. government has asked us for something we simply do not have, and something we consider too dangerous to create. They have asked us to build a backdoor to the iPhone."

See at <http://thehackernews.com>

10 Ways to Protect Against Dual Revenue Attacks

To many financially motivated cybercriminals, one of the most valuable commodities is data. But not all data is valued equally. They want data that is fresh, good quality and easily monetized. For credit

cards and prepaid cards this translates into low balances and high credit limits or card values. For healthcare data it means health history that includes personally identifiable information.

Malware that targets sensitive financial data has been around for some time and has netted operators some serious money. Slightly later to the party was ransomware – programs that seek to deny access to users’ files unless they pay a fee for unlocking them. Now cybercriminals are combining the two types of campaigns.

One of the first examples was a banking Trojan called GameOver Zeus that rose in infamy in 2014. It was reported that if the malware could not locate any financial information on a computer, some strains of the malware would install Cryptolocker. But GameOver Zeus was just the start. Since 2014, other malware campaigns have sought to apply this dual revenue stream approach. For example, a recent ransomware variant dubbed "RAA" was identified being delivered with the Pony credential-harvesting malware. Other ransomware variants, such as "CryptXXX" and "Crysis," reportedly possessed credential-stealing capabilities. The discoveries of malware like these are becoming more frequent and, if they make cybercriminals money, they will continue.

As a security professional you must prepare for the possibility that your organization’s data will be stolen or held hostage. To help prepare for these types of dual revenue attacks, here are 10 things you can do.

1. Implement an enterprise password management solution – not only for secure storage and sharing but also strong password creation and diversity. Update security awareness training to include the risks associated with password reuse. Encourage staff to use consumer password management tools like 1Password or LastPass to also manage personal account credentials.

2. Proactively monitor for credential dumps relevant to your organization’s accounts. Consider additional monitoring for your high value targets’ (e.g.: executives) non-enterprise accounts. Evaluate credential dumps to determine if the dumps are new or have been previously leaked.

3. Implement multi-factor authentication for external facing corporate services like Microsoft Outlook Web Access, and Secure Sockets Layer Virtual Private Networks, as well as for software-as-a-service offerings like Google Applications, Office365 and Salesforce.

4. Understand and document any internal services that aren't federated for faster and more complete incident response to any breach that impacts an organizational account.

5. Ensure that you have an emergency password reset process in place. Make sure that all of the users' accounts are included, not just Microsoft Active Directory accounts.

6. Ensure that operating systems, software and firmware on devices are kept patched and updated. A centralized patch management system may facilitate this process.

7. Regularly back up data using cloud-based or physical backups and verify its integrity. Ensure that backups are remote from the main corporate network and machines they are backing up.

8. Categorize data based on organizational value and then physical or logical separate networks can be created for different business functions.

9. Provide awareness and training on the threat of ransomware, how it is delivered, how to avoid becoming a victim, and how to report suspected phishing attempts.

10. Manage the use of privileged accounts and ensure the principal of least privilege is implemented not just for data but also for file, directory and network share permissions.

Developing awareness about these dual revenue attacks is the first step in preparing your organization to deal with these threats. By applying a combination of technical and process controls you can strengthen your defenses against innovative cybercriminals and minimize the impact should you become a victim.

See more at <http://www.securityweek.com>

TOPIC 8. ONLINE COMMUNICATION ETHICS

Machine Cognition and AI Ethics

Computational Ethics Systems. One main research activity in machine ethics is developing computational ethics systems. The status is that there are several such systems; however, a paucity of overall standards bodies, general ethics modules, and an articulation of universal principles that might be included like human dignity, informed consent, privacy, and benefit-harm analysis.

One required feature of computational ethics systems could be the ability to flexibly apply different systems of ethics to more accurately reflect the ways that human intelligent agents approach real-life situations. For example, it is known from early programming efforts that simple models like Bentham and Mill's utilitarianism are not robust enough ethics models. They do not incorporate comprehensive human notions of justice that extend beyond the immediate situation in decision-making.

What is helpful is that machine systems on their own have evolved more expansive models than utilitarianism such as a prima facie duty approach. In the prima facie duty approach, there is a more complex conceptualization of intuitive duties, reputation, and the goal of increasing benefit and decreasing harm in the world. GenEth is a machine ethics sandbox that is available to explore these kinds of systems for Mac OS, with details discussed in this conference paper.

There could be the flexible application of different ethics systems, and also integrated ethics systems. For example, these computational frameworks differ by ethical parameters and machine type; an integrated system is needed to enable a connected car to interface with a smart highway. The French ETHICAA (Ethics and Autonomous Agents) project seeks to develop embedded and integrated metaethics systems.

An ongoing debate is whether machines ethics should be separate modules or part of regular decision-making. Another point is that ethics models may vary significantly by culture; consider for example collectivist versus individualist societies, and how these ideals might be captured in code-based computational ethics modules.

Enumerated, Evolved, or Corrigible. Corrigibility is the idea of building AI agents that reason as if they are incomplete and potentially flawed in dangerous ways. Since the AI agent apprehends that it is incomplete, it is encouraged to maintain a collaborative and not deceptive relationship with its programmers since the programmers may be able to help provide more complete information, even while both parties maintain different ethics systems. Thus a highly-advanced AI agent might be built that is open to online value learning, modification, correction, and ongoing interaction with humans. Corrigibility is proposed as a reasoning-based alternative to enumerated and evolved computational ethics systems, and also as an important 'escape velocity' project. Escape velocity refers to being able to bridge the competence gap between the current situation of not yet

having human moral concepts reliably instantiated in AI systems, and the potential future of true moral superintelligences indispensably orchestrating many complex societal activities.

Lethal Autonomous Weapons. Machine cognition features prominently in lethal autonomous weapons where weapon systems are increasingly autonomous, making their own decisions in target selection and engagement without human input. The banning of autonomous weapons systems is currently under debate. On one side, detractors argue that full autonomy is too much, and that these weapons no longer have "meaningful human control" as a positive obligation, and do not comply with the Geneva Convention's Martens Clause requiring that fully autonomous weapons comply with principles of humanity and conscience.

On the other side, supporters argue that machine morality might exceed human morality, and be more accurately and precisely applied. Ethically, it is not clear if weapons systems should be considered differently than other machine systems. For example, the Nationwide Kidney Exchange automatically allocates two transplant kidneys per week, where the lack of human involvement has been seen positively as a response to the agency problem.

See more at: <http://www.kurzweilai.net>

Can We Develop and Test Machine Minds and Uploads Ethically? *By Martine Rothblatt*

A fundamental principle of bioethics requires the consent of a patient to any medical procedure performed upon them. A patient will exist the moment a conscious mindclone arises in some academic laboratory, or hacker's garage. At that moment, ethical rules will be challenged, for the mindclone has not consented to the work being done on their mind. Does this situation create a catch-22 ethical embargo against developing cyber-consciousness? There are at least three ways to answer this challenge.

Creating Ethical Beings Ethically. Ethicists agree that someone else can consent to a treatment for a person who is unable to consent. For example, the parents of a newborn child can consent to experimental medical treatment for them. The crucial criterion is that the consenter must have the best interests of the patient in mind, and not be primarily concerned with the success of a medical experiment.

Sometimes people complain that they "did not ask to be born." Yet, nobody has an ethical right to decide whether or not to be born, as that would be temporally illogical. The solution to this conundrum is for someone else to consent on behalf of the newborn.

One possible solution to ethically developing mindclones is to take the project in stages. The first stage must not rely upon self-awareness or consciousness. This would be based upon first developing the autonomous, moral reasoning ability that is a necessary, but not sufficient, basis for consciousness. By running many simulations, mindclone developers can gain comfort that the reasoning ability of the mindware is human-equivalent. In fact, the reasoning ability of the mindware should match that of the biological original who is being mindcloned.

The second stage of development expands the mindware to incorporate human feelings and emotions, via settings associated with aspects of pain, pleasure and the entire vast spectrum of human sentience. At this stage, all the feelings and emotions are terminating in a "black box," devoid of any self-awareness. Engineers will measure and validate that the feelings are real, via instruments, but no "one" will actually be feeling the feelings.

The third stage entails creating in software the meaningful memories and patterns of thought of the original person being mindcloned. This can be considered the identity module. If this is a case of a de novo cyberconscious being, i.e., a beman, then this identity module is either missing or is created from whole cloth.

Finally, a consciousness bridge will be developed that marries the reasoning, sentience and identity modules, giving rise to autonomy with empathy and hence consciousness. Feelings and emotions will be mapped to memories and characteristic ways of processing information. There will be a sentient research subject when the consciousness bridge first connects the autonomy, empathy and identity modules.

Ethically, approval from research authorities should be obtained before the consciousness bridge is activated. There will be concern not to cause gratuitous harm, nor to cause fear, and to manage the subject at the end of the experiment gracefully or to continue its virtual life appropriately. The ethics approvals may be more readily granted if the requests are graduated. For example, the first request could be to bridge just a small part of the empathy, identity and autonomy modules, and for just a brief period of time. After the results of experiments are assessed, positive results would be used to

request more extensive approvals. Ultimately there would be adequate confidence that a protocol existed pursuant to which a mindclone could be safely, and humanely, awakened into full consciousness for an unending period of time – just as there are analogous protocols for bringing flesh patients out of medically induced comas.

In the foregoing way, it will be possible to ethically develop mindware that can be approved by regulatory authorities as capable of producing safe and effective mindclones for ordinary people. The authority may be the FDA in the U.S., or the EMA in the E.U., or some new regulatory entity. They will need to be assured that the mindware is safe and effective, and that proving it so was accomplished via clinical trials that were ethically conducted. By taking the inchoate mindclone through incrementally greater stages of consciousness, the regulatory hurdle can be met.

See more at: <http://www.kurzweilai.net>

TOPIC 9. FUTURE DEVELOPMENT OF SCIENCE AND TECHNOLOGY

A Blessing or A Curse?

Life extension is the art and science of maximising the individual human life span. It therefore concerns all attempts to promote health and quality of life, to slow or "reprogram" the process of biological ageing, to augment our natural self-repair and immune systems, to cybernetically "upgrade" the human body, and possibly in the distant future to allow a human being to transcend natural biology. The successful practice of life extension by a large number of people may also in future significant drive further population ageing.

Human actions to raise the quality of living have a significant impact on average life spans, with the diet, healthcare technology and broader infrastructure to which people have access being a major determinant of how long they will live. The idea that in the future at least some people may take actions and use technology to try and significantly increase their own, individual life span is therefore far from outlandish. In the early 21st century it is also now possible to identify a range of developments that may in time permit life extension to become a common choice and reality.

Later this century, people may also have the option to expand their life spans by re-programming, replacing or augmenting their natural biology – for example using genetic engineering or having synthetic organ replacements – or by transcending (in whole or part) their biological human form – for example by transitioning to a cybernetic body or uploading themselves into cyberspace. Unfortunately, as we all know only too well, our natural defences and repair capabilities have their limits and degrade over time. Indeed, beyond adolescence a great many of the cells in our bodies are never replaced. However, technological developments in fields such as nanotechnology may change this, with the possibility existing that in future our natural immune and repair systems may be augmented with tiny machines that constantly travel our bodies. Such "nanobot doctors" could monitor our health and could make repairs at the cellular and even atomic level. They could also identify and kill diseases and mutations, potentially even drawing on external computing and information resources to assist them in this task. If effective enough, such future technology could extend the human life span very significantly by preserving our "natural" biological forms from all but the gravest of physical accidental damage and the most serious ravages of time.

Over the past couple of decades medical science has developed a significant expertise in the 3D imaging of patient's bodies. The development of organ printing to help future doctors use such 3D data to enable the output of replacement, synthetic organs printed with cells cultured from the patient's own body may therefore be the next logical step forward. Such synthetic organs would be entirely "new", would physically match the patient's requirements exactly, and ought to be rejection-free.

Researchers at MIT recently also showcased a retinal implant to feed a sightless person images from a camera. Such technological additions to natural human anatomy closely replicate or augment natural biological functions. However, potentially at least it may one day become possible to replace the body in large part or entirely within an technological alternative. For example, we may build androids that house the human brain, but which do not contain counterparts to "natural" organs such as the heart and lungs. Such a development may lead some people to question whether life extension by such means would leave the patient "human" at all. However, possibilities for life extension may not even end with entirely artificial bodies.

Moving beyond the physical, one day it may also become possible to interface the human brain directly into a computer system and to "upload" our mind into cyberspace. With direct linkages to the auditory and optic nerves having already been made, future direct computer-brain interfaces are also by no means an impossibility. Indeed Microsoft has already been reported as attempting to patent a brain-computer link.

See more at: <http://www.explainingthefuture.com>

Dream Machines

A simulated quantum learning lab in Vienna that you can access virtually. Ever feel like digging into quantum physics — and actually understanding it? Then you may enjoy a novel virtual hands-on remote learning environment developed by quantum physicists at the University of Vienna in collaboration with university and high-school students, and available free online. The physicists, led by Markus Arndt at the University of Vienna, created two research laboratories as photorealistic computer simulations, allowing you to access simulated instruments in virtual experiments.

The physicists say the virtual laboratories provide insights into fundamental understanding and applications of quantum mechanics with macromolecules and nanoparticles, including a wave-particle dualism experiment and interferometry with large molecules.

Sirius founder envisions world of cyber clones, tech med. In a not-too-far-future, robotic mind-clones will accompany us to the ballot box or grocery store, sit in on business meetings we can't make, argue with us occasionally and keep our essence alive long after we're gone.

Rothblatt the founder of Sirius Satellite Radio, described how the inevitable emergence of cyber consciousness — when machines act with a sophistication and thought level equal to that of humans — will not be overnight but a subtler evolution. "Every company will try to out-Siri Siri until we have consciousness," she said, referring to the Apple/iOS application that works as a personal assistant and navigator. "It will be like water that rises and rises and rises and, before we know it, we're in an ocean of cyber consciousness."

Will Robots Take Over Our Jobs In Healthcare? Surgical robots become increasingly precise each day. Man-size robots can lift and move patients and transport them throughout the hospital. I held a PARO therapeutic robot in my arms. It was cute and calmed me. At a conference I once watched how a diminutive robot made an entire audience dance with it. It only takes the Xenex robot 10 minutes to disinfect a patient room with UV light. A robot called Tug works at hospitals in the San Francisco Bay Area. It delivers food and medicine. It picks up waste and laundry. It navigates the halls without crashing into people.

The above student asked about robots, but I think he was really asking about automation. Automation includes robotic devices, robots that look like a human, and algorithms. Silicon Valley investor Vinod Khosla once said something that resonated within the medical community for a long time. He said that technology would replace 80% of doctors because machines, driven by big data and computational power, would not only be cheaper but more accurate and objective than the average doctor. He added that we eventually wouldn't need doctors at all.

In 2015 the information technology research firm Gartner predicted that one-third of existing jobs will be replaced by software, robots, and smart machines by 2025. Blue collar as well as white collar workers such as financial and sports reporters, marketers, surgeons, and financial analysts were in danger of being replaced. As Martin Ford outlines in *Rise of the Robots*, healthcare represented less than 6% in the US economy in 1960. Its share had tripled by 2013. The real issue is not utilizing too many robots but too few. Typically, robots are expensive but reduce costs. Medicine and healthcare won't be able to and should not try to avoid this.

But whether a robot can make an ethical decision is a huge question. An interesting experiment raised this question. In it a small robot was programmed not to let other robots called human proxies, which represented real people, get into the danger zone on a table game. When only one human proxy approached the danger zone, the robot could successfully thwart it. But when two proxies appeared the robot became confused, and in 14 out of 33 trials it wasted so much time trying to decide that both human proxies fell into the hole. Robots cannot make yet the ethical decisions that characterize experienced physicians.

Automation will make the world better and create opportunities for people clever enough to seize them. But healthcare will change.

See more at: <http://www.kurzweilai.net>

Topic 10. ECOLOGICAL CHALLENGES

Ecological Problems

The Earth is the only planet in the solar system where there is life. Today, the contradictions between man and nature have acquired a dramatic character. With the development of civilization man's interference in nature has increased. Every year the world's industry pollutes the atmosphere with millions of tons of dust and other harmful substances. The seas and rivers are poisoned with industrial waste, chemical and sewage discharge. People who live in big cities are badly affected by harmful discharge from plants and city transport and by the increasing noise level which is as bad for human health as lack of fresh air and clean water.

Among the most urgent problems are the ozone layer, acid rains, global warming, toxic pollution of atmosphere, disappearance of forests, contamination of underground waters by chemical elements, destruction of soil in some areas, threat to some flora and fauna representatives, etc.

One of the most important pollution problems is the oceans. Many ships sail in the ocean water- fishing ships, some ships carrying people, some carrying oil. If a ship loses some of the oil in the water, or waste from the ships is put into the ocean, the water becomes dirty. Many sea birds die because of the polluted water. Many fish are dying in the sea; others are getting contaminated. Fishermen catch contaminated fish which may be sold in markets, and people may get sick from eating them. Lakes and rivers are becoming polluted, too. Some beaches are dangerous for swimming.

Another important problem is air pollution. Cars and factories pollute the air we use. Their fume also destroys the ozone layer which protects the Earth from the dangerous light of the Sun. Aerosols create large "holes" in the ozone layer round the Earth. Burning coal and oil leads to global warming which may bring about a change in the world's climate.

The other problem is that our forests are dying from acid rains. Deforestation, especially destruction of tropical forests, affects the balance of nature in many ways. It kills animals, changes the climate and ecosystem in the world.

A person can do some damage to the environment but the greater part of pollution certainly comes from industry. Modern industry production is the main threat to nature.

There are a lot of places on our planet that need immediate help. The nuclear accident at Chernobyl, which took place on April 26, 1986., has seriously aggravated the ecological situation in Belarus. That catastrophe can be considered as the largest disaster of the 20th century. As the result of that accident 18% of territories of our republic were contaminated by radioactive elements. The agriculture of our country suffered great losses. More than 20% of the population has also suffered. A death rate among children has increased considerably. The wide researches are carried out, but health state of the people living in polluted areas, is worsened. The level of thyroid gland cancer has increased, the immunity of children and women is weakened, many diseases appear out only a few years later. Everyone understands that this catastrophe is a threat to health of our nation, and though years have already passed, the results will be shown on the future generations.

Ecological problems have no borders. European states solve these problems together: the necessary measures are taken, congresses and conferences on these questions are organized, and these questions have already the reflection in the legislation of many countries. The activity of many public organizations is directed to protect environment. For example, the "Greenpeace" sent its boats to protect whales, and today commercial whaling is banned. In the North Sea Greenpeace swimmers turned back dump ships carrying chemical waste, and new laws to protect the North Sea have been considered.

Environment disasters can be avoided if people broaden ecological education and every person understands that the beauty of nature is extremely fragile and people must obey the unwritten laws of nature. Governments must be prepared to take action against pollution. Air pollution could be reduced if plants and factories were made to fit effective filters on chimneys and car exhausts. Green zones around big cities must be protected and extended. Natural resources should be used economically because their stocks are not unlimited.

See more at: <http://www.km.ru>

What is a Sustainable City?

A sustainable city or "eco-city" is a city which has been designed with environmental concerns in mind. A large percentage of the human population around the world lives in cities and urban areas, un-

underscoring the need for sustainable practices in these environments. Sustainable cities aim to change the way they operate for the benefit of future generations, ensuring that they do not put a strain on resources which will cause such resources to vanish before future generations have an opportunity to benefit from them.

Sustainability is a complex topic. On a basic level, it involves practices which are designed to be sustainable in the long term, meaning that people can continue using these practices without harming the environment, and possibly with some benefit to the environment. On a city-wide level, sustainability encompasses a wide variety of changes, all of which are intended to reduce the environmental impact of the city as a whole. These changes can include individual lifestyle changes made by citizens as well as city-wide shifts in policy.

One goal of a sustainable city is to reduce needs and reliance on surrounding areas. In addition to being environmentally sustainable, this can also be economically beneficial, and may allow a city to be more secure in the event of a natural or civil emergency. Reduction of reliance on surrounding areas includes growing food in a city, reducing water needs and reusing water as much as possible, and generating energy inside the city. The city may become independent of the surrounding area, reducing strain on outlying communities.

A sustainable city must also think about what it is putting out into the surrounding environment. Sustainable cities want to reduce waste in addition to lowering pollution. This is especially important in cities with limited processing capacity for things like waste, as such materials may be pushed onto surrounding communities unless the city takes responsibility for them.

Some examples of things a sustainable city might implement include: green roofs, rooftop gardens, solar panels, bike lanes, better public transit, water recycling, centralized recycling facilities, energy efficient heating and cooling systems for large buildings, reuse of building materials, changes to the workweek which reduce congestion, tougher air quality controls, permeable pavement, wind energy, and community service programs. These changes may not have immediate effects and they can take years or decades to implement, but over time, they can have a cumulative benefit. Just installing green roofs in a sustainable city, for example, can radically reduce the rise in temperature commonly associated with cities.

For instance, Swedish cities have taken climate change to task, drastically helping to reduce the country's greenhouse gas emissions. There are some key initiatives of Swedish cities:

Sweden's shift from oil to district heating in the early 1990's is perhaps the single most important factor in explaining the country's reduced greenhouse gas (GHG) emissions, both in the housing and service sector. Today, district heating accounts for more than 80 per cent of the heat and hot water provided to Sweden's apartment blocks.

Back in 1996, Växjö became the first city in the world to set the goal of becoming fossil-fuel free by 2030. Since then, the city has backed up words with actions and is often referred to as 'Europe's greenest city'. The key to Växjö's achievements in reducing CO2 emissions is that more than 90 per cent of the energy used for heating in the city, and about half its electricity, comes from trees. Waste from the local forest industry – branches, bark and sawdust – is burned to generate heat and power.

In Umeå's Ålidhem district some 400 residential apartments – built in the 1960s and 1970s – have been refurbished with the goal of reducing their energy consumption by 50 per cent.

The geothermal system in place at Stockholm's Central Station captures body heat from over 250,000 daily commuters. The heat is sourced into water via a heat regulator and the heated water is then pumped into the nearby Kungsbrohuset to provide heating. The cooling of the building is provided by water from the nearby Klara Lake, making maximum use of the surrounding environment.

See more at: <https://sweden.se/nature/7-examples-of-sustainability-in-sweden/>

APPENDIX 3

Useful Phrases and Clichés for Summary Writing

<p>The text (story, article, poem, excerpt...)</p>	<ul style="list-style-type: none"> • is about... • deals with... • presents... • describes...
<p>In the text (story, article, poem, excerpt...)</p>	<ul style="list-style-type: none"> • the reader gets to know... • the reader is confronted with... • the reader is told about...
<p>The author (the researcher, narrator, writer...)</p>	<ul style="list-style-type: none"> • says, states, points out that... • claims, believes, thinks that... • describes, explains, makes clear that... • uses examples to confirm/prove that... • agrees/disagrees with the view/thesis... • contradicts the view • criticises/analyses/ comments on... • tries to express... • argues that... • suggests that... • compares X to Y... • emphasizes his thesis by saying that... • doubts that... • tries to convince the readers that... • concludes that...
<p><i>About the structure of a text:</i></p>	<ul style="list-style-type: none"> • The text consists of... / may be divided into... • The introduction goes as far as line.../ In the first paragraph/exposition the author introduces... • In the second part of the text/ paragraph/ stanza the author describes... • Another example can be found in line...
<p><i>Final remarks:</i></p>	<ul style="list-style-type: none"> • As a result... • The climax/turning point is reached when... • To sum up/ to conclude... • In the conclusion, starting from line..., the author sums up the main ideas/ thesis... • In his last remark/ with his last remark/statement the author concludes that...

APPENDIX 4

Developing Your Writing Proficiency

Argumentative Essays' Models

(1) 'For and Against' Essay Sample

Essay topic. The growing number of overweight people is putting a strain on the health care system in an effort to deal with the health issues involved. Some people think that the best way to deal with this problem is to introduce more physical education lessons in the school curriculum.

To what extent do you agree or disagree?

Owing to the problems which a growing population of overweight people cause for the health care system, some people think that the key to solving these issues is to have more sport and exercise in schools. In my opinion, I completely agree that this is the best way to tackle the issue of deteriorating public health in relation to weight.

Firstly, dealing with the issues surrounding obesity and weight problems is best solved by taking a long term approach and introducing more sport and exercise in schools. This method will ensure that the next generation will be healthier and will not have such health problems. At the moment, the average child in the West does sport possibly twice a week, which is not enough to counteract their otherwise sedentary lifestyle. However, by incorporating more sports classes into the curriculum as well as encouraging extracurricular sports activities, they will undoubtedly become fitter and more active.

Another point to consider is that having more sports lessons for children in schools will probably result in children developing an interest in exercise which might filter through to other members of their family and have a longer lasting effect. In other words, parents with sporty children are more likely to get involved in sport as a way of encouraging their children. By both parents and children being involved, it will ensure that children grow up to incorporate sport into their daily lives. This is certainly a natural and lasting way to improve public health.

In conclusion, to deal with an increasing population of unfit, overweight people, changing the lifestyle of the coming generation by introducing sport in schools is the easiest and most effective method to use.

Available at: <http://ieltsliz.com/ielts-agree-disagree-essay-sample-answer/>

(2) 'Positive or Negative Development' Essay Sample

Essay topic. *Nowadays the way many people interact with each other has changed because of technology.*

In what ways has technology affected the types of relationships people make?

Has this become a positive or negative development?

It is true that technology in recent years has altered the path that people communicate with each other. There are many ways that technology affects our relationships, and in my opinion this is beneficial development.

To begin with, the most obvious transformation in people relationships is how they communicate with each other. By this I mean that internet convert the world into small villages and nowadays people around the earth can reach each other easily and rapidly. For example, a friend who lives in the UK can chat and talk to their friends in China using a mobile phone or social network.

Another field where technology affects our life is the way most people make friends. In other words, it has been observed that these days we can make friends from all nationalities without any effort or spending much money and this really enhances effective cultural interchange.

In my opinion, such positive impact on the society is due to some exact reasons. Firstly, human life has become more convenient, which provides people with more opportunities to spend their leisure time with their kin. Another instance is that with the worldwide application of the Internet we can do shopping and working from our dwelling house with no need to go outside any more. Secondly, over-sea travelling has become usable and cheap. As a result, people visit each other much more often through online communication and spend more time together, hence more tight social links emerge.

Needless to say that technology has no doubt revolutionized the way we interact and hangout, but has greatly reduced real world interaction. Elimination of face-to-face communication can't help changing traditional way of interaction. It is something you have neither on the phone nor by computer. Many observers argue that there is no replacement for face-to-face contact, regardless of how far technology has evolved.

To conclude, as we have found out there is no easy answers to this question. Though these virtual relations tend to be positive, we should not deny the importance of real-time interaction in our lives. Nevertheless, technology makes a huge difference to peoples' lives in term of communication and I believe that this is a positive impact within our society.

Available at: <http://www.ielts-mentor.com/writing-sample/writing-task>

(3) 'Advantage / Disadvantage' Essay Sample

Essay topic. *People now have the freedom to work and live anywhere in the world due to the development of communication technology and transportation.*

Do the advantages of this development outweigh the disadvantages?

Give reasons for your answer and include any relevant examples from your own experience or knowledge.

These days many people choose to live or work in other countries, which has been made possible because of the convenience of air travel and modern communications. I believe that this has more benefits than drawbacks.

The disadvantage of this development is the distance that is put between family members. If a person moves away it is true that air travel and devices such as skype mean that communication and contact can be maintained. However, it is likely that a person will only be able to return one or two times a year during holidays, and speaking on skype or via email is not the same as face-to-face contact.

Despite this, there are significant advantages it can bring to people's lives. Firstly, it means that people have the opportunity to see other parts of the world and the way people live. For example, people from the West often go to work in Asia or the Middle East and visa-versa. This enriches many people's lives as they get to learn about other languages, traditions, cultures and different ways of working from their own country.

In addition to this, on a wider level it may also benefit other countries. If someone moves abroad for work, it is usually because their skill is required there. To illustrate, nurses and Doctors often move to work in hospitals in other countries when there is a shortage, so this is very valuable to the place they move to.

I would therefore argue that although there are disadvantages of the current trend to live and work abroad, they are outweighed by the advantages. It can enrich people's lives and lives of the people in the countries that they move to.

Available at: <http://www.ieltsbuddy.com/advantage-disadvantage-essay.html>

Opinion Essay Sample

Essay topic. Many people believe that social networking sites (such as Facebook) have had a huge negative impact on both individuals and society.

To what extent do you agree?

Social networking sites, for instance Facebook, are thought by some to have had a detrimental effect on individual people as well as society and local communities. However, in my opinion, while I believe that such sites are mainly beneficial to the individual, I agree that they have had a damaging effect on local communities.

With regards to individuals, the impact that online social media has had on each individual person has clear advantages. Firstly, people from different countries are brought together through such sites as Facebook whereas before the development of technology and social networking sites, people rarely had the chance to meet or communicate with anyone outside of their immediate circle or community. Secondly, Facebook also has social groups which offer individuals a chance to meet and participate in discussions with people who share common interests.

On the other hand, the effect that Facebook and other social networking sites have had on societies and local communities can only be seen as negative. Rather than individual people taking part in their local community, they are instead choosing to take more interest in people online. Consequently, the people within local communities are no longer forming close or supportive relationships. Furthermore, society as a whole is becoming increasingly disjointed and fragmented as people spend more time online with people they have never met face to face and who they are unlikely to ever meet in the future.

To conclude, although social networking sites have brought individuals closer together, they have not had the same effect on society or local communities. Local communities should do more to try and involve local people in local activities in order to promote the future of community life.

Available at: <http://ieltsliz.com/ielts-sample-essay/>

Discussion Essay Sample

Essay topic. Some people believe that studying at university or college is the best route to a successful career, while others believe that it is better to get a job straight after school.

Discuss both views and give your opinion.

When they finish school, teenagers face the dilemma of whether to get a job or continue their education. While there are some benefits to getting a job straight after school, I would argue that it is better to go to college or university.

The option to start work straight after school is attractive for several reasons. Many young people want to start earning money as soon as possible. In this way, they can become independent, and they will be able to afford their own house or start a family. In terms of their career, young people who decide to find work, rather than continue their studies, may progress more quickly. They will have the chance to gain real experience and learn practical skills related to their chosen profession. This may lead to promotions and a successful career.

On the other hand, I believe that it is more beneficial for students to continue their studies. Firstly, academic qualifications are required in many professions. For example, it is impossible to become a doctor, teacher or lawyer without having the relevant degree. As a result, university graduates have access to more and better job opportunities, and they tend to earn higher salaries than those with fewer qualifications. Secondly, the job market is becoming increasingly competitive, and sometimes there are hundreds of applicants for one position in a company. Young people who do not have qualifications from a university or college will not be able to compete.

For the reasons mentioned above, it seems to me that students are more likely to be successful in their careers if they continue their studies beyond school level.

Available at: <http://ielts-simon.com/ielts-help-and-english-pr/2011/04/ielts-writing-task-2-sample-discussion-essay.html>

Suggesting Solutions to Problems Essay Sample

Essay topic. *Some languages spoken by very few people are losing their importance and may become extinct completely. Is it a good or bad development? What are the reasons for this?*

It is true that; nowadays, speaking International languages in all kinds of communications is a common trend. Thus, local languages are losing their importance and some people hold the opinion that these languages may become extinct in near future. I totally agree with this fact and as per my view point; definitely, this is a bad development if local languages will lose their importance. Here, I will try to enunciate some reasons for this trend with my own perception.

To begin with; undeniably, international languages such as English, French and German have taken a prestigious place in International arena which comforts people in global communication very well. Consequently, looking at this development all generations; especially, youngsters learn these languages from the inception of their studies. They even feel shy and nervous to speak in their native local languages in front of English speaking friends as normally English is one of the common languages that is spoken in official decorum.

Furthermore, because of globalization in the world, people travel outside their countries for the purpose of studies, to extend their business or look out for a work; thus, it is necessary for them to learn International languages that are commonly spoken by everyone. As consequences, they start neglecting their own native languages. In addition, nowadays; Hollywood movies, concerts are performed in English and French which set the trends in adolescents to follow these languages.

Probably, in near future if people will follow this trend rigorously, then definitely local languages will become extinct; thus to avoid this problem, government of a nation should come forward and encourage people to

communicate in native language at-least in their own country. Moreover, President and Prime Minister of a nation should give their speech in a local language on the occasion of National day or any other prominent days.

To recapitulate, by looking at the above facts, undoubtedly, international languages are taking precedence over the local languages; if this trend is continued in coming days, definitely, local languages will become obsolete.

Available at: <http://ieltsliz.com/ielts-writing-task-2/>

Discursive Essay Sample

Essay topic. *Ponder upon the use of animals in medical research.*

Organise your essay in such a way to show you strong arguments (1) for the given discussion topic; (2) against it, and (3) about the given discussion topic in a balanced way.

This issue is a subject which always arouses strong feelings on both sides of the argument. I believe that, though this may have been necessary in the past, other ways can be developed to test drugs and, in the future, animals should not be used.

One of my main reasons for saying this is that living tissues can be grown in test tubes and new drugs can be tested on these. Computers can also be programmed to show how medicines will react in the human body. Moreover, animals are not always like humans. They do not suffer from all human diseases, so scientists have to give them the illnesses artificially. Aspirin, for example, damages pregnant mice and dogs, but not pregnant women. Arsenic, which is a deadly poison for humans, has no effect on sheep, while penicillin, which is so valuable to humans, kills guinea pigs.

In addition, I believe that animal experiments should not be used because of the unnecessary pain that they cause to animals. The government introduced new rules about the use of animals in experiments in 1986. Scientists claim that these rules safeguard animals because they state that discomfort must be kept to a minimum and that painkillers must be used where necessary and appropriate. In spite of the claims of some scientists about the effectiveness of ani-

mal research, the death rate in this country has stayed the same over the last thirty years. There is also more long-term sickness, even though greater numbers of animals are being used in research.

On the other hand, scientists claim that some experiments are so small, for example giving an injection, that painkillers are not needed. They also argue that experiments on animals have been very useful in the past. For instance, the lives of ten million human diabetics have been saved because of experiments with insulin on dogs. Dogs also benefited, as the same drug can be used on them. In fact, a third of medicines used by vets are the same as those used by doctors.

It is argued by researchers that the use of animals in experiments cannot be replaced by methods using living tissue which has been grown in test tubes. These tests do not show how the drugs work on whole animals and so they only have limited effectiveness.

Although I accept that some drugs can be used on animals and humans, this does not mean that they have to be tested on animals in the first place when alternative methods are available. Alternative methods do work. Various groups have been set up to put money into other ways of researching. For example, similar research is being done into cancer and multiple sclerosis. Tests can be done on bacteria to see whether a chemical will cause cancer. There is even a programme of volunteer human researchers, where people suffering from illnesses offer to help in research.

In conclusion, I accept that animal experiments have brought great benefits in the past, but now money needs to be spent on developing other methods of testing drugs and medical procedures, so that the use of animals can be phased out altogether.

Available at: <http://www.bbc.co.uk/bitesize/standard/english/writing>

References

The following sources were consulted while developing *English Proficiency in Cybernetics*.

Unit 1

Heylighen, F., Joslyn C. (2001) Cybernetics and Second-Order Cybernetics [in: R.A. Meyers (ed.), *Encyclopedia of Physical Science & Technology* (3d ed.)]. – Academic Press, New York – pp. 2–24.

Boeckner, K., Brown Ch. (1993) *Oxford English for Computing*. – Oxford University Press. – 212 p.

Cybernetics Origin <http://sf-encyclopedia.com/entry/cybernetics>

Unit 2

Technologies <http://www.theatlantic.com/technology/archive>

MIT Technology Review <https://www.technologyreview.com>

Notable Artificial Intelligence Projects <http://translation.babylon-software.com>

Unit 3

Robot Revolution <http://www.bbc.com/future/story>

Impossible without Robots <http://www.webdesignschoolsguide.com>

MIT Developments <http://www.csail.mit.edu>

Unit 4

Daily Intelligencer <http://nymag.com/daily/intelligencer>

New Atlas News <http://newatlas.com>

NHS Choices <http://www.nhs.uk/news>

Unit 5

Bunting J.D., Daniz L. (2013) *Grammar and Beyond*, 4B. – Cambridge University Press. – P. 158–297.

NASA Robotics Exploration <http://www.nasa.gov/audience/foreducators/robotics/home>

Made in IBM Labs <http://www.ibm.com/search>

Unit 6

Articles Library <http://www.yourmaindomain.com/web-articles/role-of-internet-in-modern-era.asp>

Internet Usage Patterns <http://www.academia.edu>
Facts about Internet <https://fossbytes.com/10-interesting-facts-internet-really-need-know/>

Unit 7

Social Media Explosion <http://genius.com/Marcia-clemmitt-social-media-explosion>

Surveillance in America <http://www.bestvpnservice.com/blog/majority-of-americans-unapproved-government-surveillance/>

Breakthrough Technologies <https://www.technologyreview.com/s/526496/ultraprivate-smartphones/>

Unit 8

Temporary Social Media <https://www.technologyreview.com/s/513731/temporary-social-media/>

Pew Research Center <http://www.pewglobal.org/2015/03/19>

Mail Online. Science and Tech <http://www.dailymail.co.uk/sciencetech/article-2011084>

Unit 9

Future Trends: <http://www.explainingthefuture.com/trends.html>.

Redefining Automation <http://www.rethinkrobotics.com/why-rethink/>

USA Today. Tech <https://phxux.usatoday.com/story/tech>

Math, Irwin (1992). Tomorrow's Technology. Experimenting with the Science of the Future. – Maxwell Macmillan Canada, Inc. – 65 p.

Unit 10

Get Connected to Efficient IT <http://www.thegreengrid.org>

Ecology Issues <http://www.newworldencyclopedia.org/entry/Ecology>

Green Innovations <http://greeninnovation.co.uk>

Renewable Energy <http://www.pearltrees.com/cybernatedfarmsystems/renewable-energy/id8018294#l601>

City of Future <http://www.bbc.com/future/story/20120503-sustainable-cities-on-the-rise>

Sustainable Practices <https://www.epa.gov/science-and-technology/sustainable-practices-science>

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Ребенко Марина Юріївна

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Видавець і виготовлювач
ВПЦ "Київський університет"
01601, Київ, б-р Т. Шевченка, 14, кімн. 43
☎ (044) 239 32 22; (044) 239 31 72; тел./факс (044) 239 31 28
e-mail: vpc_div.chief@univ.kiev.ua;
redactor@univ.net.ua

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