

# Special English for Computer Science

Teaching aid

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**BEFEKTETÉS A JÖVŐBE**



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## UNIT 1 TYPES OF COMPUTERS

### 1.1. Vocabulary — Types of computers

Fill in the blanks with words from the box below. If there is more than one blank in a passage, the same words must be used in each blank. The first one is done for you as an example.

embedded computers, mainframe computers/servers, notebooks, portable computers, smart cards, high performance computers, tablet, personal computers

1. \_\_\_\_\_ are the fastest, and most expensive computers. They are used for scientific applications. The aerospace, car, chemical, electronics industries use them. HCP is used for weather forecasting and seismic analysis. They can be found in several research centres and universities.
2. \_\_\_\_\_ are the most widely used type of computer in medium and large companies. They require a special environment that includes a cooling system, an air filtration system and a protected power source. \_\_\_\_\_ are able to support several hundred users simultaneously at remote terminals. They cost considerably less than supercomputers but they are slower.
3. \_\_\_\_\_ appeared in the early 1970's. They have a central processor, called the microprocessor, which is a single chip. The most common type is a desktop computer - a non-portable personal computer that fits on the top of a desk.
4. For people on the move portable computers were developed in the 1990's. The first \_\_\_\_\_ weighed 28 pounds. Before long, miniaturisation enabled creation of the laptop computer, a more compact unit weighing 10 to 12 pounds. At first these computers were underpowered and did not have adequate storage. Today, new models offer as much processing power and storage as many desktop computers.
5. \_\_\_\_\_ are portable computers that are small enough to fit into an average sized briefcase.
6. \_\_\_\_\_ look like ordinary credit cards but they include a microprocessor and memory chips. They were developed in France in the 1970's. They are used to pay highway tolls, to pay bills, and to purchase merchandise.
7. Perhaps you have not realized that you have several computers at home. These computers are called \_\_\_\_\_. They are built into special-purpose devices such as video game consoles, microwave ovens, DVD players, wristwatches and alarm clocks. Today cars use tiny computers to control functions of their engines.
8. A \_\_\_\_\_ computer: a very thin, portable computer, usually battery-powered, having a touchscreen as the primary interface and input device and lacking a physical keyboard and lid (Glendinning & McEvan, 2014).

#### Glossary

aerospace (n)	the technology involved in making aircraft
research (n)	careful study in order to discover facts
fit into (v)	to be the right size to go somewhere
underpowered (adj)	not provided with enough power
reduce (v)	to make it smaller in size, quantity, number, degree, price

schedule (n)	a programme of work to be done
purchase (v)	to buy sth
merchandise (n)	goods for sale

## 1.2. Reading comprehension — Smart watches

Read the following article and answer the questions

Hf

A businessman carrying a bag and a briefcase is hurrying down a Chicago street, looking at his watch. This is an ordinary event except that his watch is giving him a traffic report instead of the time. An accident has occurred on the main route to the airport and the watch displays alternate routes. When the man touches a corner of the watch face he brings up his daily schedule. When he rotates a tiny wheel on the watch he displays the Flights Home option and sends this information by email to his secretary in St. Louis.

A few blocks later, the watch vibrates, indicating that a new email has arrived from his son. It says, "Don't forget my Chicago Cubs cap." He also has a message from his secretary who has reserved a seat for him on the 12:20 p.m. flight and has rescheduled his afternoon meeting with the marketing director to 4:00 p.m. He sends a message to his wife's cell phone by speaking into his watch, "Flight delay. Can't pick up Rob after baseball." At the airport newsstand, the watch vibrates again, this time with a text message saying that his son will get a ride home with a friend.

IBM research team developed this new communication device. Over a period of nearly four years they have seen this idea turn into a reality. The IBM Linux watch is a complete computer system that runs Linux, displays X11 graphics, and has wireless connectivity. There are two versions of the watch, one with an organic light-emitting diode (OLED) display, and the other with a liquid crystal display (LCD). The watch fits in a case that looks like a slightly unusual timepiece, with a somewhat odd shape and an extraordinarily brilliant face.

The watch interface has a touch screen with symbols in each of the four corners for different options. The top left is for the start menu, the bottom left, for Web browsing, the top right, for setting alarms, and the bottom right for a list of phone numbers. The dial on the top right lets users navigate between applications (Pothitos, 2016).

1. What is unusual about this watch?
2. Why does the businessman need to use an alternative route to the airport?
3. Where does the businessman have to take his son in the afternoon?
4. On which flight did his secretary reserve a seat for him?
5. When does he have to meet the marketing director?
6. What are the advantages of the new Linux watch?
7. Why does he send a voice message to his wife?
8. How does his son get home from the match?
9. What are the differences between the two versions of the watch?
10. Describe the watch interface.
11. How can the user access the start menu?

## UNIT 2 COMPUTER HARDWARE AND THE PERIPHERALS

## 2.1. Vocabulary — CPU

Read the following text. Fill in the gaps with the correct word

computation executed features instructions memory operations processor

Computers are electronic machines that people use to process information. Computers can perform five different arithmetic operations<sup>1</sup> and make three kinds of decisions. The word "computer" comes from computation<sup>2</sup> which suggests mathematics. It is an electronic device with a memory that performs many different tasks that are executed<sup>3</sup> with the help of stored instructions. Computers are incapable of thinking. They carry out programmed instructions<sup>4</sup>, accept data that is input, process information, and output results. The main part of a computer is called a processor<sup>5</sup> or central processing unit (CPU). John von Neumann summarised the main features<sup>6</sup> of a computer: it uses digital technology, it contains a processor and memory<sup>7</sup>, and accepts input and outputs results, memory is used to store programs and data, and it is electronic. Computers are based on these principles today. <https://techterms.com/definition/cpu>

## 2.2. Reading and speaking — CPU

Summarize the main ideas of the text.

The CPU coordinates all the activities of the various components of a computer. It determines which operations should be carried out and in what order. It can retrieve information from memory. It can store processed information in the memory unit. Its main parts are the control unit (CU) and the arithmetic-logic unit (ALU). The CU transmits coordinating control signals and commands. It directs the sequence of step-by-step operations of the system. It selects instructions and data from the memory and interprets program instructions. It controls the flow between the main storage unit and the ALU. The ALU is the part of a computer where the actual arithmetic operations of addition, subtraction, multiplication, and division are carried out. The ALU uses binary arithmetic. Binary means "consisting of two things"; a binary number is made up of 0s and 1s. The binary number system is the only system the computer understands. It enables the computer to perform logical operations such as making comparisons or selecting information. <https://techterms.com/definition/cpu>

## 2.3. Speaking — Discussion

- Name five ways computers are involved in people's lives nowadays.
- In what ways are computers used in economy?
- ~~What are the advantages and disadvantages of using computers?~~
- How can information stored in computers be misused?
- What kinds of computer crimes can you describe?

Corporate life  
Logistics

5 Communication  
Entertainment

Education  
Banking → accounting transfer  
Science

The CPU is the main processing unit of any common hardware architecture. It is responsible for carrying out

arithmetic operations

It consists of 2 main parts, the arithmetic-logic unit and the control unit.

f. What is the connection between unemployment and computers?

## 2.4. Use of English - Motherboard

Fill in the gaps with the given words.

cooling memory motherboard hard drive sound cards video cards

- a. The \_\_\_\_\_ 1. is the main printed circuit board that holds the CPU and memory.
- b. The CPU is the heart of a computer where the processing is done. Nowadays CPUs reach speeds of 4000MHz.
- c. There are two types of main or primary \_\_\_\_\_ 2. , random access memory (RAM) and read only memory (ROM). RAM is temporary whereas ROM is permanent. Information stored in RAM is lost when a computer loses power. Information stored in ROM remains in storage indefinitely. DDR RAM is common today.
- d. CPUs produce a lot of heat when operating and require a \_\_\_\_\_ 3. fan for safe operation. Overheating can damage components. Nowadays the motherboard chipset, the video card, RAM and hard drives also require cooling.
- e. In order to display graphics in three dimensions, computers require \_\_\_\_\_ 4. Today there are video cards with up to 256 MB RAM or more. Some also have TV tuners that enable television shows to be displayed on a monitor.
- f. Multimedia computers with \_\_\_\_\_ 5. became available decades ago. Nowadays their sound quality is excellent and they can be used with a home theatre system.

The main magnetic storage device in a computer is a \_\_\_\_\_ 6. Early hard drives were big and slow. Nowadays they are much smaller and faster and have greater storage capacity (200 GB or more). <https://techterms.com/definition/cpu>

## 2.5. Reading and writing — CPU

Complete the following sentences.

- Computers are incapable of ...
- The heart of a computer is called the ...
- The tasks of the CPU are ...
- The main parts of the CPU are ...
- The CU transmits ...
- The arithmetic-logic unit is where ...
- Two types of memory are ...

### Glossary

process (v)	to perform a series of operations on something in a computer
arithmetic (adj)	a branch of mathematics that deals with the adding, multiplying, etc numbers in sums.
device (n)	a thing adopted for a particular purpose
perform (v)	to do something, to work or function
execute (v)	to do or perform what one is asked to do



coordinate ( <i>v</i> )	to make things, people, parts etc function together efficiently and in an organised way.
operation ( <i>n</i> )	an act performed by a machine
retrieve ( <i>v</i> )	to find or extract stored information
transmit ( <i>v</i> )	to produce a signal by electronic means

## 2.6. Vocabulary – Input and output devices

audio, CPU, bar code readers, scanning device, input device, joystick, keyboard, mouse, monitor, output device, plotter, printed output, robot, 3D printing

- (a) A/an \_\_\_\_\_ is used to enter information into the computer.
- (b) A/an \_\_\_\_\_ does not only have alphabetical and numeric keys. Unique keys are included that are designed to perform specific tasks. These special keys are called function keys, directional keys and special-purpose keys such as Del, Enter, or Esc.
- (c) A/an \_\_\_\_\_ is a palm-size device with a ball built into the bottom. When you move the \_\_\_\_\_ over a smooth surface, the ball rolls and the pointer on the display screen, known as a cursor, moves in the same direction.
- (d) A/an \_\_\_\_\_ has a gearshift-like lever that is used to move the cursor on the screen. A button on the top selects options. In industry and manufacturing they are used to control robots.
- (e) A/an \_\_\_\_\_ eliminates keying in data by copying the data - text, pictures, graphics and even handwriting - directly from a document into a computer.
- (f) A/n \_\_\_\_\_ can read bar codes that are printed on product packaging.
- (g) The \_\_\_\_\_ coordinates all the activities of the various components of a computer. It determines which operations should be carried out and in what order. It can retrieve information from memory and can store the results for later use.
- (h) A/an \_\_\_\_\_ enables you to see the results of what the computer has processed. Output can be “soft copy” or “hard copy”. Soft copy is magnetically stored on a disk which is helpful when writing a document, playing a game, or accessing the latest news. Hard copy is physical such as a printed page.
- (i) Output to a/an \_\_\_\_\_ is soft copy. It works in a similar way that a television screen works. The image you see on the screen is created by a configuration of dots. These dots, picture elements, or pixels combine to form images. The more pixels, the better the resolution. A/an \_\_\_\_\_ can be either monochrome or colour. There are cathode-ray monitors and flat-screen monitors such as LCD and TFT.
- (j) \_\_\_\_\_ output is another type of soft copy. It enables you to listen to or compose music on a computer.
- (k) \_\_\_\_\_ containing text or graphics is a form of hard copy. There are different printers used to print. Two types of nonimpact printers are inkjet printers and laser printers. Inkjet printers squirt ink on paper from jets. Laser printers use heat to burn a special powder on paper.
- (l) A/an \_\_\_\_\_ is generally used to print graphic output; it can draw maps and produce artwork.

- (m) A/an \_\_\_\_\_ moves according to instructions received from a computer. They usually consist of a single arm that can perform one or more programmed tasks.
- (n) \_\_\_\_\_ or additive manufacturing is a process of making three dimensional solid objects from a digital file. In an additive process an object is created by laying down successive layers of material until the object is created. Each of these layers can be seen as a thinly sliced cross-section of the object (Glendinning & McEvan, 2014).

## 2.7. Reading and writing — Input and output devices

- Finish the following sentences.
- Shop assistants use ...
- CDs and DVDs have become obsolete because ....
- Companies use plotters to...
- Students must switch on a camera because .....
- Laser printers are better than inkjet printers ....
- The difference between headsets and headphones is that ...

## Glossary

unique ( <i>adj</i> )	unlike anything else being the only one of this type
task ( <i>n</i> )	a piece of work that has to be done
smooth ( <i>adj</i> )	having an even surface, opposite of rough
roll ( <i>n</i> )	to turn over and over and move in a particular direction
gear shift ( <i>n</i> )	a handle used to change the setting of a vehicle's gear mechanism
lever ( <i>n</i> )	a handle used to operate or control machinery

## 2.8. Definitions

What are the following definitions for?

EXAMPLE:

An input device that scans parallel lines printed on products and converts these codes into a number on the screen. b..... barcode

11. To recognize someone and be able to say who they are; understand exactly what it is. i.....

12. A short period when the electricity supply to a building or a district is stopped. b.....

13. An area on the computer screen that drops down for selecting what you want to do in a particular program. s.....-d..... m.....

14. A conversation about something; a website, where people can express and exchange ideas on a particular subject. discussion. f.....

15. The amount of something that can be put in a container, the amount of information that can be stored on a computer disk. c.....

16. An occasion when a machine (printer, photocopier) doesn't work because paper prevents its parts from moving. p. .... j....

17. Information explaining how to use or do something. i .....

18. Sequence of computer program instructions for a certain task. f.....

19. Electronic system that records and stores spoken messages from people. v.....

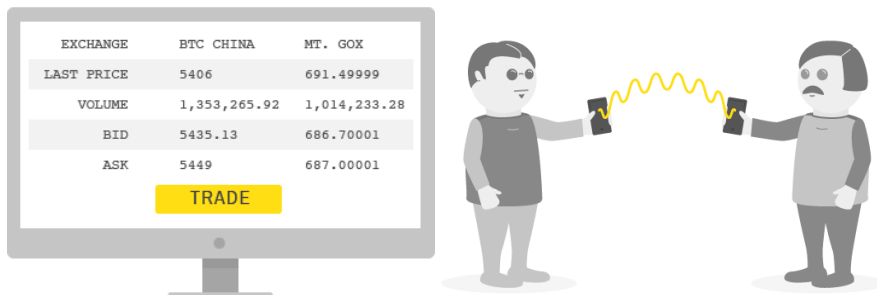
## UNIT 3 MODERN TECHNOLOGY

### 3.1. Vocabulary — Bitcoin

Read the text and answer the questions.

The definition of bitcoin — Bitcoin is a new currency that was created in 2009 by an unknown person using the alias Satoshi Nakamoto. Transactions are made with no middle men – meaning, no banks! There are no transaction fees and no need to give your real name. More merchants are beginning to accept them: You can buy webhosting services, pizza or even manicures. Bitcoins can be used to buy merchandise anonymously. In addition, international payments are easy and cheap because bitcoins are not tied to any country or subject to regulation. Small businesses may like them because there are no credit card fees. Some people just buy bitcoins as an investment, hoping that they'll go up in value.

Acquiring Bitcoins — Buy bitcoin on an the Exchange. Several marketplaces called “bitcoin exchanges” allow people to buy or sell bitcoins using different currencies. Mt. Gox is the largest bitcoin exchange.



Transfers — People can send bitcoins to each other using mobile apps or their computers. It's similar to sending cash digitally.

Mining — People compete to “mine” bitcoins using computers to solve complex math puzzles. This is how bitcoins are created. Currently, a winner is rewarded with 25 bitcoins roughly every 10 minutes.

Owning Bitcoins — Bitcoins are stored in a “digital wallet,” which exists either in the cloud or on a user's computer. The wallet is a kind of virtual bank account that allows users to send or receive bitcoins, pay for goods or save their money. Unlike bank accounts, bitcoin wallets are not insured by the FDIC. Wallet in cloud: Servers have been hacked. Companies have fled with clients' Bitcoins. Wallet on computer: You can accidentally delete them. Viruses could destroy them.

Anonymity — Though each bitcoin transaction is recorded in a public log, names of buyers and sellers are never revealed – only their wallet IDs. While that keeps bitcoin users' transactions private, it also lets them buy or sell anything without easily tracing it back to them. That's why it has become the currency of choice for people online buying drugs or other illicit activities.

Future in question — No one knows what will become of bitcoin. It is mostly unregulated, but that could change. Governments are concerned about taxation and their lack of control over the currency (Yellin et al., 2009).

What is Bitcoin? When was it created? Who created it? What can you buy for bitcoins?

Why do merchants like bitcoins?

Why can buying bitcoins be a good investment?

What is Mt. Gox?

How can people transfer bitcoins?

What does mining bitcoins mean?

Where do you keep bitcoins? What problems arise with the storage of bitcoins?

How do sellers and buyers stay anonymous?

What will be the future of bitcoin?

### **3.2. Reading comprehension. - NextFest**

Read the following article and answer the questions.

Flying cars, transparent cloaks, technology which can read minds and games played by brain waves - not long ago these inventions existed only in films, but by now they have become reality.

Thousands of visitors can see what future technology offers at NextFest, an expo in San Francisco organised by the technology magazine, *Wired*. According to Chris Anderson, these inventions will change the way people live, work and play in the future. The 110 exhibitors were chosen from 2,500 research and development projects at universities and corporations worldwide.

Some inventions exhibited here show a new way of thinking. Others take an existing project and turn it on its head, such as the computer game *Brainball*. It measures your alpha waves and the person who is the most relaxed can push the ball to the other side and win. Co-inventor, Thomas Broome, of Sweden's Interactive Institute, says that it's anti-game.

A gleaming car which would look good in a Hollywood film set is one of the most popular attractions. The flying car is the brainchild of Paul Moller, who has spent \$200 million on his invention. It needs 35 feet to take off, but thanks to its 770 hp engine it can climb at 6,400 feet a minute and reach speeds of 365mph. Mr Moller says that in 10 years, 25 % of the American population will have access to the Skycar, and in 25 years, 90% of people will be using it. The only problem with the vehicle is that it is very expensive. The initial cost is about \$500,000 – but with a fuel consumption of 20 miles per gallon, it's almost eco-friendly compared to gas-guzzling four-wheel drives.

At Nextfest visitors can see fabrics, which the wearer can change by downloading patterns from the Internet, and outfits which monitor health and well-being. On the catwalk, a model walks past in a biometric bodysuit which monitors vital signs, prepares medicine and administers it to the wearer.

On the battlefield, an invisibility cloak could be just the ticket. Straight out of a Harry Potter adventure, the cloak is covered with tiny, light-reflective beads. It appears to be transparent as it's fitted with cameras which project what is in front of the wearer onto the back of the cloak, and vice versa. The material can also cover objects so it could be used to help pilots see through the floor of the cockpit at a runway below.

Brain fingerprinting reads minds by measuring brain waves. The inventor, Dr Lawrence Farwell, states: "We need something that is humane, not harmful to the people who are being tested. Brain fingerprinting provides a scientific solution to a very difficult problem, and that is the determination of who is a terrorist and who is not, who has committed a specific crime and who hasn't.

Another hit is Asimo, a humanoid robot, which can walk, turn, climb up and down stairs – even dance. Its maker, Honda, believes it will be useful for the bedridden, elderly, blind

and disabled. Asimo was designed to be cute and friendly- looking, because the inventors believe that people will like the robot if it's familiar to them. Although the show was a success, people will still have to wait for a long time to see these inventions in shops or to use them in every day life (Shiels, 2004).

Answer the questions.

- (a) Where is the expo held?
- (b) How many exhibitors did the organisers choose?
- (c) Why is Brainball different from other computer games?
- (d) How much money has Paul Moller spent on the Skycar?
- (e) Why can the Skycar be called almost eco-friendly?
- (f) What percentage of the American population will have access to the Skycar in 25 years?
- (g) What benefits do new fabrics and outfits offer? (a, b, c)
- (h) How does invisibility cloak work?
- (i) Why might brain fingerprinting be useful in detecting crimes?
- j). Name three groups of people for whom Asimo can be helpful. (a, b, c)

### Glossary

invisibility <i>n</i>	that cannot be seen
cloak <i>n</i>	a type of coat that has no sleeves
transparent <i>adj</i>	allowing light to pass through so that objects behind can be seen clearly
guzzle <i>v</i>	to eat, drink quickly and in large amounts
consumption <i>n</i>	using up of food, energy
hp <i>abbr</i>	horse power
gallon (US) <i>n</i>	3.8 litres
mile <i>n</i>	1.6 kilometres
foot/feet <i>n</i>	30.48 centimetres
gleaming <i>v</i>	shining
brainchild <i>n</i>	an invention
fabric <i>n</i>	a type of cloth, woven material
outfit <i>n</i>	clothes worn together as a set
pattern <i>n</i>	arrangements of lines, shapes and colours
monitor <i>v</i>	to watch, check something
vital <i>adj</i>	essential to life
just the ticket <i>idm</i>	exactly what is needed
light-reflective <i>adj</i>	to show the light on the surface of something as a mirror
fitted <i>adj</i>	equipped
project <i>v</i>	to cause the light to fall on a surface
cockpit <i>n</i>	enclosed area in an airplane where the pilot sits
runway <i>n</i>	a hard surface along which aircraft take off and land
fingerprint <i>n</i>	the mark of a finger
commit <i>v</i>	to do something illegal
bedridden <i>adj</i>	having to stay in bed

### 3.3. Use of English — Smart fridge

Fill in the gap with the given words. 25 words are given, but you have to choose only 20. You can use one word once only.

after, amount, automatically, automatical, before, chores, cut down, delivery, deliver, depending, depend, designed, design, eaten, every, expert, fancy, fridge, maneuver, people, recipes, self-cleaning, shelf, technology, which

Scientists at the University of Central Lancashire and online supermarket Ocado in Britain, have \_\_\_\_\_ 1. the 'fridge of the future,' which tells you what to cook with your leftovers and \_\_\_\_\_ 2. re-orders fresh food based on your needs, reports SiFy News. Not only is it a \_\_\_\_\_ 3. refrigerator,' it will scan the shelves to see what is available, plan meals, automatically place supermarket home \_\_\_\_\_ 4. orders and monitor gasses released by degrading foods and move them (based on use-by dates) to the front shelves. Researchers also hope it will \_\_\_\_\_ 5. on wasted food and offer \_\_\_\_\_ 6. (tailored to different countries, cuisines and seasons \_\_\_\_\_ 7. on whether people want to whip up something Italian or \_\_\_\_\_ 8. a curry. With the British (and Americans as well) putting in 36 million hours \_\_\_\_\_ 9. year of free overtime - leaving little time for household \_\_\_\_\_ 10, the \_\_\_\_\_ 11. could help save precious time during hectic modern-day lives, the Daily Mail reports.

The smart fridge uses 'nano-articulated technology' \_\_\_\_\_ 12. surfaces, \_\_\_\_\_ 13. although smooth to touch, they will have millions of independently controlled micro-tiles to \_\_\_\_\_ 14. products that need to be \_\_\_\_\_ 15. soon to the fridge's front. Built into the door, ultrasound-scanning \_\_\_\_\_ 16. allows the fridge to 'swipe and capture' the food on a plate \_\_\_\_\_ 17. and after mealtime, meaning it can assess what type and \_\_\_\_\_ 18. of food is wasted. Simon Somerville, a future forecasting \_\_\_\_\_ 19. from the University of Central Lancashire, said that \_\_\_\_\_ 20. feeling lazy could use the proposed fridge to whip up a recipe for them.

If you want one, you'll have to wait awhile. No word on when it will be available.

<https://www.dailymail.co.uk/sciencetech/article-1341190/Revealed-The-hi-tech-fridge-future-tell-dinner.html>

### 3.4. Reading Skills — Future inventions

Answer the questions after each invention.

#### Cyborg Beetle

Advances in microelectronics is making yesterday's science fiction into tomorrow's future inventions. Scientists at the University of California have implanted beetles with miniaturized electronics that allows the insects to be controlled. Research presented at a conference in Italy demonstrated a new technology for creating "cyborg insects". The flying beetles receive wireless signals from a mobile transmitter that controls the insect. Varying impulses trigger

an appropriate response from the beetle so that it flies according to its handler. The insect can be made to take-off, land, hover, or follow a given flight path. Previous research concentrated on moths but giant flower beetles were easier to operate and could carry larger payloads because of their size. Further advances with nanobots and miniaturization will allow heat sensors and cameras to be embedded into the bugs. The insect could then be used for surveillance or search and rescue missions (Ackerman, 2017).

How are these beetles controlled?

What is the aim of the experiment?

Do you consider this experiment ethically justified?

### Electrical clothing

One of the future inventions that could greatly impact our lives are nanoribbons. Rubber films developed by engineers at Princeton University could power mobile devices and other electronic devices. The silicone sheets are embedded with ceramic nanoribbons (piezoelectric ribbons) that generate electricity when flexed, converting mechanical energy to electrical energy. Materials made of this material, such as shoes, would harvest electrical energy created from walking and power everything from an ipod to a pacemaker. The nanoribbon strips are so narrow that 100 strips fit side-by-side in a space of a millimetre. The strips are then embedded into clear sheets of silicone rubber to create a chip. These sheets could be woven into fabric and placed against any moving area on the body to create electricity. For example, a vest made from this material could take advantage of breathing motions to generate energy. Nanoribbons are highly efficient in converting about 80% of mechanical power into electricity (Blanche, 2014).

How does electrical clothing work?

Where can this invention be used?

### Needle-less injection

This future invention is a device for delivering medication and vaccinations through the skin. As an alternative to injecting a needle, micro-poration is a painless method of transferring medication (intraepidermal) into the body using laser technology. A handheld laser creates micro pores in the epidermis of the skin for the transfer of molecules. It has a familiar comparison to the "needle-less" device used by Dr. "Bones" McCoy on Star Trek. The popular sci-fi series has inspired more than a few new inventions including the "laser" and the cell phone. This new micro-poration technology is painless to use and requires no supervision to administer. The interfaced controls regulate the dosage (Ravi et al., 2015)

How does needless injection work?

Which science fiction film inspired the invention?

### T-Shirt Gadgets

Scientists at Stanford University are developing future inventions using e-Textiles. This new class of flexible, stretchable and lightweight clothing would function as rechargeable batteries. Cotton and polyester fabrics are dyed with an ink made from carbon nanotubes, which are electrically conductive carbon fibers that are 1/50,000th the width of a human hair. The electronic properties of the fabric are maintained even when the clothing is washed. Researchers believe that the e-Textiles will eventually allow us to use our clothing as gadgets - talking to a friend through our shirt sleeve or surfing the web on a pant leg (Mondal, 2018).

What advantages do T-shirt gadgets offer?

Where can these T-shirt gadgets be useful?

### Tissue regeneration

The University of Pittsburgh's McGowan Institute for Regenerative Medicine will join a consortium of 30 institutes in regenerative research. One of the future inventions in health care may be the development of a spray gun for regenerating skin tissue. The Armed Forces Institute of Regenerative Medicine (AFIRM), recently established by the U.S. Department of Defense, is funding research into the regrowth of bones, muscles, tendons, nerves and blood vessels. Last year, a pathologist at the McGowan Institute regrew the severed fingertips of two patients in their mid sixties. Existing scar tissue was removed by an enzyme. Scarring inhibits regrowth, however cells derived from pig bladders can override the scarring process and attract cells and proteins needed for growth.

Another researcher with Wayne Forest University, is developing an inkjet device with cartridges containing tissue cells with growth factors. The device would dispense layers of tissue onto deep flesh wounds for healing and regrowth. For surface wounds, a hand-held sprayer is in development, which sprays immature skin cells (called keratinocytes) onto the skin. Clinical trials with burn victims have been promising. The advantages of this technology compared to "grafting" is that it eliminates patchwork scarring and uses less skin. "Conventional methods cannot return people to the way they were before" says biochemist Alan Russell, but it's within the grasp of science (Gurtner et al., 2016).

What parts of the body can be regrown?

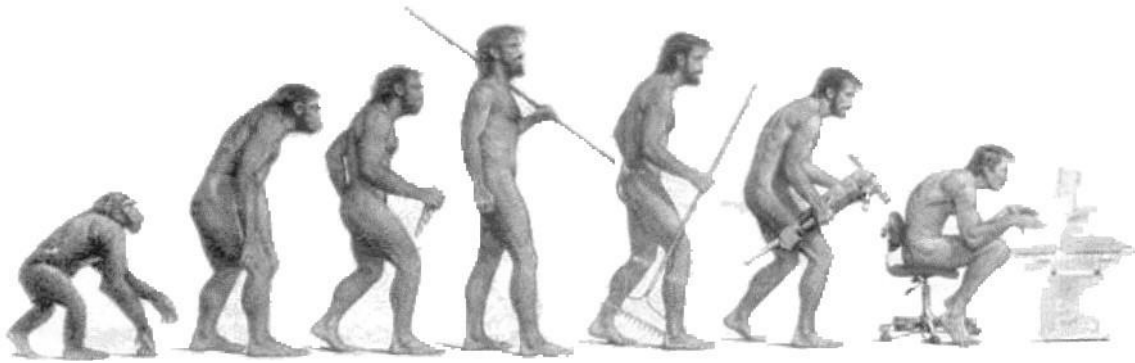
How did the scientists help two patients at McGowan institute?

How does the inkjet device with cartridges work?

What is the main advantage of this technology?



## UNIT 4 HISTORY OF COMPUTERS



### 4.1. Use of English — History of computers

Choose a word from the box to replace a number in the following passage. There are 25 words given, but you need to use only 20.

and, as, at, being, beads, company, first, for, greatly, late, in, invented, on, of, so, solve, than, that, the (2x), was, were, who, which, vacuum

It has always been difficult for people to remember numbers (1) they have used objects to help them. In ancient times, people used their fingers (2) calculating. This is, in fact, why we still count in tens and multiple of tens.

More than five thousand years ago (3) abacus, the first counting machine (4) invented. An abacus has two columns of beads. To make calculations the (5) are moved toward the centre divider. The Japanese modified the abacus. This model is known (6) a soraban. They are still being used in some parts of the world.

During the 17<sup>th</sup> and 18<sup>th</sup> century J. Napier (7) a device consisting of bars or strips of bone on which numbers were printed. His invention was called "Napier's bones". The first real calculating machine was produced (8) 1820 as a result of experiments carried out by several people. It could add, subtract, divide and multiply accurately. In 1830 Charles Babbage, a British mathematician, designed a machine called the "Analytical Engine". This machine was an attempt to eliminate (9) human element altogether, except for entering the necessary information which the computer could use to (10) the problem. Babbage never finished his work, but many of his ideas were used in the design of modern computers.

In the (11) 1800's, Herman Hollerith, an American inventor, developed the first machine capable (12) processing data read from punched cards. The Hollerith system was used to process data from the 1890 census which was completed in one-quarter of the time it took to process the data from the 1880 census. Hollerith organized a (13) to manufacture and sell his system. This company later became known as the International Business Machines Corporation (IBM).

In 1930 the (14) analogue computer was built in America. During World War II the first digital computer was developed (15) Harvard University. It was the first machine that combined memory and processing functions (16) it could calculate the solutions for long lists of mathematical problems quickly. Eckert and Mauchly built the first digital computer; it contained (17) tubes. A significant advancement in computers came in 1947 when John von Neumann developed the idea to store instructions for the computer in its memory.

Since 1960 computers have used transistors instead of vacuum tubes (18) makes them run faster (19) their predecessors. These are called second generation computers. Since 1965 computers have used tiny little circuits called microchips. Since then integrated circuits have become progressively smaller and are now (20) reduced in size. Computers are becoming smaller and smaller because of microminiaturization.

<https://www.britannica.com/technology/computer/History-of-computing>

### Glossary

bead ( <i>n</i> )	a small piece of usually hard material with a hole through it
indicate ( <i>v</i> )	to show something
adapt ( <i>v</i> )	to modify
invent ( <i>v</i> )	to make or design something which hasn't existed before
develop ( <i>v</i> )	to grow or to cause something to grow gradually
combine ( <i>v</i> )	to do two or more things at the same time
	to join or make things join together
figure out ( <i>v</i> )	to understand something by thinking about it
significant ( <i>adj</i> )	important

### 4.2. Vocabulary practice - synonyms

Give a synonym for each of the following terms.

calculate <i>v</i>	_____
machine <i>n</i>	_____
may <i>m. v</i>	_____
capable of <i>v</i>	_____
manufacture <i>v</i>	_____
be controlled <i>v.</i>	_____
accurately <i>adv.</i>	_____
provide <i>v.</i>	_____

### 4.3. Writing skills

Fill in the following table using the information from the passage .

	Date	Inventor's name	Special Features
Abacus		_____	
Napier's bones			
The Analytical Engine			
Punched card			

#### 4.4. Reading comprehension — John von Neumann

Read the following text.

John von Neumann

The famous mathematician John Louis von Neumann (1903-1957) was born in Budapest, Austro-Hungarian Empire. Von Neumann was an important figure in computer science. The use of memory in digital computers to store both sequences of instructions and data was a breakthrough to which von Neumann made major contributions. In 1945, while consulting for the Moore School of Electrical Engineering on the EDVAC project, von Neumann wrote an incomplete set of notes, titled the First Draft of a Report on the EDVAC. This widely distributed paper laid the foundations of a computer architecture in which the data and the program are both stored in the computer's memory in the same address space, which will be described later as von Neumann Architecture. This architecture became the de facto standard for a long time and is still used today. Von Neumann also created the field of cellular automata without the aid of computers, constructing the first self-replicating automata with pencil and graph paper. The concept of a universal constructor was fleshed out in his posthumous work Theory of Self Reproducing Automata. In 1956 von Neumann wrote his book The Computer and the Brain, in which discusses how the brain can be viewed as a computing machine. The book is speculative in nature, but discusses several important differences between brains and computers of his day, as well as suggesting directions for future research. Memory is one of the central themes in his book (Poundstone, 2021).

What is the significance of the following data in the text? 1945, EDVAC, Neumann architecture, 1956, The Computer and the Brain

#### 4.5. Reading skills – History of the Internet

Read the text and answer the questions.

Some thirty years ago, the RAND Corporation, America's most important Cold War think-tank, faced a puzzling strategic problem. How could the US authorities successfully communicate after a nuclear war? Post-nuclear America would need a network to link city to city, state to state, and base to base. However, no matter how thoroughly that network was sheltered or protected, its switches and wiring would always be vulnerable to the impact of atomic bombs.

That was the reason why RAND decided that the network should not be dependent on a central location. The principles were simple. All the nodes on the network would be equal in status to all other nodes; each node would have the ability to originate, pass and receive messages. The messages would be divided into packets and each packet would be separately addressed. Each packet would be sent from some specified source node, and arrive at some other specified destination node. It simply would not matter if large parts of the network were destroyed; the packets would still end up in the proper place.

This concept was first made in public in 1964. In the 1960s the Pentagon's Advanced Research Projects Agency decided to finance a larger, more ambitious project in the US. The nodes of the network were to be high-speed supercomputers (or what passed for supercomputers at the time). In the fall 1969, the first such node was installed in UCLA. By December 1969, there were four nodes on the network, which was named ARPANET after

its Pentagon sponsor. The four computers could transfer data on dedicated high-speed transmission lines. By the second year of operation, however, an odd fact became clear. ARPANET's users had changed the computer-sharing network into a dedicated, high-speed, federally subsidized post-office. The main traffic on ARPANET was not long-distance computing. Instead, it was news and personal messages. Researchers were using ARPANET to collaborate on projects and to exchange notes on work. Throughout the seventies, ARPA's network grew quickly because its decentralized structure made expansion easy. In 1983, ARPANET changed its name; its military segment broke off, and became MILNET. ARPA's original standard for communication was known as Network Control Protocol (NCP) but as time passed and the technique advanced, NCP was replaced by a higher-level, more sophisticated standard known as TCP/IP. Transmission Control Protocol (TCP) converts messages into streams of packets at the source and then assembles them back into messages at the destination point. Internet Protocol (IP) handles the addressing and makes sure that packets are routed across multiple standards.

As the seventies and eighties advanced, many different social groups could afford to buy powerful computers, the use of TCP/IP became common, and other networks joined the Internet. Since the software called TCP/IP was public domain, and the basic technology was decentralized and rather anarchic by its very nature, it was difficult to stop anybody from joining this branching complex of networks. This ever-growing network came to be known as the Internet in 1992 (Leiner et al., 2009).

- a. What kind of strategic problem did the RAND Corporation face?
- b. What were the network principles that RAND intended to create?
- c. Why did they decide that the network would not have a central location?
- d. What did people use ARPA for in most cases? (Give 2 reasons)
- e. Describe the technology used to communicate. (Give 4 points)
- f. When was the name ARPANET changed into MILNET?
- g. What did this change mean?
- h. When did people start to call the network the Internet?
- i. How can the growing popularity of the Internet be explained?
- j. What were the consequences of TCP/IP being public domain software?

**UNIT 5 PROGRAMMING****5.1. Reading comprehension – Programming skills**

Read the following text and answer the questions.

Programming fosters creativity, reasoning, and problem solving. The programmer gets the opportunity to create something from nothing, use logic to turn programming constructs into a form that a computer can run, and, when things don't work quite as well as expected, use problem solving to figure out what has gone wrong. Programming is a fun, sometimes xx Introduction challenging (and occasionally frustrating) activity, and the skills learned from it can be useful both in school and at work . . . even if your career has nothing to do with computers. And, if nothing else, programming is a great way to spend an afternoon when the weather outside is dreary.

Python is an easy-to-learn programming language that has some really useful features for a beginning programmer. The code is quite easy to read when compared to other programming languages, and it has an interactive shell into which you can enter your programs and see them run. In addition to its simple language structure and an interactive shell with which to experiment, Python has some features that greatly augment the learning process and allow you to put together simple animations for creating your own games. One is the turtle module, inspired by Turtle graphics (used by the Logo programming language back in the 1960s) and designed for educational use. Another is the tinker module, an interface for the Tk GUI toolkit, which provides a simple way to create programs with slightly more advanced graphics and animation.

Like anything you try for the first time, it's always best to start with the basics, so begin with the first chapters and resist the urge to skip ahead to the later chapters. No one can play an orchestral symphony the first time they pick up an instrument. Student pilots don't start flying a plane before they understand the basic controls. If you jump ahead too quickly, not only will the basic ideas not stick in your head, but you'll also find the content of the later chapters more complicated than it actually is. As you go through this book, try each of the examples, so you can see how they work. There are also programming puzzles at the end of most chapters for you to try, which will help improve your programming skills. Remember that the better you understand the basics, the easier it will be to understand more complicated ideas later on. When you find something frustrating or too challenging, here are some things that I find helpful: 1. Break a problem down into smaller pieces. Try to understand what a small piece of code is doing, or think about only a small part of a difficult idea (focus on a small piece of code rather than trying to understand the whole thing at once). 2. If that still doesn't help, sometimes it's best to just leave it alone for a while. Sleep on it, and come back to it another day. This is a good way to solve many problems, and it can be particularly helpful for computer programmers (Briggs, 2012).

Why is it worth learning computer programming? (Give at least three answers.)

Why is it worth learning Python?

How to Learn to Code?

How to Learn to Code? Why is it important to learn the basics and be patient?

How does the author suggest using this book?

What programming languages do you find the most useful?

## 5.2. Vocabulary — Programming

- |                     |   |
|---------------------|---|
| 1. parameter        | a. It is a synonym for argument.  |
| 2. algorithm        | b. It is a step-by-step procedure to achieve a specific goal. Can be implemented with code.   |
| 3. object           | c. It is a mistake in a program   |
| 4. bug              | d. It is an abstract data type created by a developer. It can include multiple properties and methods. In most programming languages, they are defined as classes.                  |
| 5. variable         | e. It is the grammatical rules of a programming language. It determines whether code is written correctly or incorrectly, and is enforced by the compiler or interpreter.           |
| 6. integer          | f. It is designed using objects   |
| 7. compiler         | g. It is the act of putting a value into a variable.  |
| 8. assignment       | h. It is a program that converts code into an executable, and checks that the syntax is correct   |
| 9. interpreter      | i. It is a program that runs code. For languages that are not compiled, the source code is run directly by an interpreter.  |
| 10. syntax          | j. It is a named container for a single value. They are not values themselves; they are merely containers for values. Putting a value into a variable is referred to as assignment. |
| 11. object-oriented | k. It is a type of value that represents whole numbers. For fractional numbers, see float.  |

## 5.3. Reading skills — Top programming languages.

The 2017 Top Programming Languages By STEPHEN CASS

It's summertime here at *IEEE Spectrum*, and that means it's time for our fourth interactive ranking the top programming languages. As with all attempts to rank the usage of different languages, we have to rely on various proxies for popularity. In our case, this means having data journalist John Smith mine and combine 12 metrics from 10 carefully chosen online sources to rank 48 languages. But where we really differ from other rankings is that our interactive allows you choose how those metrics are weighted when they are combined, letting you personalize the rankings to your needs. We have a few preset weightings—a default setting that's designed with the typical *Spectrum* reader in mind, as well as settings that emphasize emerging languages, what employers are looking for, and what's hot in open source. You can also filter out industry sectors that don't interest you or create a completely customized ranking and make a comparison with a previous year. So what are the Top Ten Languages for the typical *Spectrum* reader?

Python has continued its upward trajectory from last year and jumped two places to the No. 1 slot, though the top four—Python, C, Java and C++ —all remain very close in popularity. Indeed, in Diakopoulos's analysis of what the underlying metrics have to say about the languages currently in demand by recruiting companies, C comes out ahead of Python by a good margin. C# has reentered the top five, taking back the place it lost to R last year. Ruby has fallen all the way down to 12th position, but in doing so it has given Apple's Swift the chance to join Google's Go in the Top Ten. This is impressive, as Swift debuted on the rankings just two years ago. However, for the second year in a row, no new

languages have entered the rankings. We seem to have entered a period of consolidation in coding as programmers digest the tools created to cater to the explosion of cloud, mobile, and big data applications. Speaking of stabilized programming tools and languages, it's worth noting Fortran's continued presence right in the middle of the rankings (sitting still in 28th place), along with Lisp in 35th place and Cobol hanging in at 40th. Looking at the preset weighting option for open source projects, where we might expect a bias toward newer projects versus decades-old legacy systems, we see that HTML has entered the Top Ten there, rising from 11th place to 8th. (This is a great moment for us to reiterate our response to the complaint of some in years past of "HTML isn't a *programming* language, it's just markup." At *Spectrum*, we have a very pragmatic view about what is, and isn't, a recognizable programming language. HTML is used by coders to instruct computers to do things, so we include it.

Finally, one last technical detail: We've made some tweaks under the hood to improve the robustness of the results, especially for less popular languages where the signals in the metrics are weaker and so more prone to statistical noise. So that users who look at historical data can make consistent comparisons, we've recalculated the previous year's rankings with the new system (Cass, 2017).

1. Which journal has published the ranking?
2. How were the programmes ranked?
3. How many languages were ranked?
4. Who made the ranking?
5. What criteria can be used for assessing programmes? (Mention 3 criteria)
6. Which languages have moved forward?
7. Have any new languages appeared?
8. Which language occupies the 28th place?
9. Why is HTML regarded to be a programming language in the article?
10. How did they try to allow users to make consistent comparisons?

#### 5.4. Vocabulary — Definitions

Answer with one word.

1. Two pieces of computer equipment or software can be used together. C ...
3. The part inside a computer that stores information it needs to work. H ...
4. A fault in a computer system or programme . B ....
5. A point on a computer network where a message can be created or received. N ....
6. A piece of equipment that allows you to connect a computer to the internet. M ...
7. The legal right to have control over the work of a writer, artist etc. C ....
8. Junk that you get through the mail . S ....
9. A page setup, when it is longer in width than in height. L ...
10. A powerful computer that has a lot of computers connected to it. M ...

#### 5.5. Reading and Speaking — Programming skills

What Do I Need to Know to Program a Computer?

Read the following text. Name the five most important features of a good programmer. Discuss in pairs.

If you're the type who finds the idea of making a program (such as a video game) more exciting than actually using it, you already have everything you need to program a computer. If you want to learn computer programming, you need a healthy dose of the following three qualities:

**Desire:** If you want something badly enough, you tend to get it (although you may serve time in prison afterward if you do something illegal to get it). If you have the desire to learn how to program a computer, your desire helps you learn programming, no matter what obstacles may get in your way.

**Curiosity:** A healthy dose of curiosity can encourage you to experiment and continue learning about programming long after you finish reading this book. With curiosity behind you, learning to program seems less a chore and more fun. And as long as you're having fun, you tend to learn and retain more information than does someone without any curiosity whatsoever (such as your boss).

**Imagination:** Computer programming is a skill, but imagination can give your skill direction and guidance. A mediocre programmer with lots of imagination always creates more interesting and useful programs than a great programmer with no imagination. If you don't know what to do with your programming skill, your talent goes to waste without imagination prodding you onward.

Desire, curiosity, and imagination are three crucial ingredients that every programmer needs. If you possess these qualities, you can worry about trivial details such as learning a specific programming language (such as C++), studying advanced math, or attending a university where you can buy a college degree that you can just as easily make with your computer and a desktop publishing program instead. Learning to program a computer may (initially) seem an impossible task, but don't worry. Computer programming is relatively simple to understand; everything just tends to fall apart after you try to put a program into actual use. (Abraham et al., 2017).



## UNIT 6 NETWORKS

### 6.1. Vocabulary — Networks

#### *Reading and writing*

Choose a word from the box to replace the numbers in the following passage. Write the word in the table at the end of the passage.

administrator, cables, cafeterias, changed, connected, connectivity, e-mail, growing include networks, peripheral, requirement, simultaneously, solutions, streaming

Wireless technology has helped to simplify networking by enabling multiple computer users to (1) share resources in a home or business without additional or intrusive wiring. These resources might (2) a broadband Internet connection, network printers, data files, and even (3) audio and video. This kind of resource sharing has become more prevalent as computer users have (4) their habits from using single, stand-alone computers to working on (5) with multiple computers, each with potentially different operating systems and varying (6) hardware. U.S. Robotics wireless networking products offer a variety of (7) to seamlessly integrate computers, peripherals, and data. Every room in a wireless home or office can be (8) to the network, so adding more users and (9) a network can be as simple as installing a new wireless network adapter. A wireless network is the ideal solution for a network (10) in many respects. No longer is it a (11) that every workstation and conference room be wired up to hubs and switches with (12) in hard-to-reach areas. Wireless networking allows for impromptu meetings in (13), hallways, courtyards, or wherever inspiration strikes while providing real-time LAN (14) for business applications such as sending an (15), working on spreadsheets on shared drives, and conducting market research <https://support.usr.com/download/whitepapers/wireless-wp.pdf>.

### 6.2. Vocabulary — the Internet

Choose a word from the box to replace the numbers in the following passage. Write the word in the table at the end of the passage.

accessed deliberately, hypermedia, information highway, Internet Protocols, linking modem, netiquette, packet, router, server, several, special, uncontrollable, web site

The Internet is a national (1) switching network, sometimes referred to as the (2). It is the largest computer network in the world. It began in 1969 as a government-sponsored research network for the Department of Defence in the US. Scientists working on it developed the (3) (IP). These are standards that enable users to exchange data across the Internet.

As it was (4) designed with no central control, anyone could join. This leads to its (5) growth as well as to its becoming a source of unlimited resources. The Internet can be (6) with a PC and a router or by direct Internet access. The Internet can be accessed using (7) software such as Microsoft Explorer.

The World Wide Web (WWW) is a worldwide (8) system. By clicking on an underlined word, you can access data from another (9) or another computer on the Internet. If you want to allow others to access computer you can create your own (10) and connect it to an online server. (11) is a collection of unwritten rules developed to enhance the quality of communication on the Internet.

If you have wireless Internet access at home, you probably have a little box called a (12) that plugs into your telephone socket. This kind of router is a bit like a sophisticated (13) it's a standalone computer whose job is to relay connections to and from the Internet. At home, you might use a router to connect (14) computers to the Internet at once. In other words, the router does two jobs: it creates a wireless computer network, (15) all your computers together, and it also gives all your machines a shared gateway to the Internet (Russell, 2013)

### 6.3. Reading Skills — Internet marketing

Read the following text and answer the questions.

On the web we are constantly being bombarded with information - so much in fact that people can be overwhelmed when they go online. Some analysts have reported that over the holiday season many people choose not to shop online, not only because of their fears about security and privacy, but also because of their confusion. There is so much information, competition and choice on the Internet that everything seems to be one great mass of the same kinds of things.

Research shows that the marketplace is becoming more and more fragmented. With TV for example, the number of channels has skyrocketed to include numerous speciality channels. Nowadays people simply have too much choice and many of them end up feeling lost as a result. However, with the help of standard search engines, surfers can find information, sites and resources that meet their specific needs. If you want to buy something through the Internet, you must provide some personal information. After you have chosen the right website, you will have to register. Once you are registered you can place an order. A representative of the company may contact you to finalize the details of the order and the delivery date.

Why are people overwhelmed when they go online?

Why are some people still afraid to shop online?

Why do people feel lost when they have to choose?

What are the pros and cons of the Internet shopping?

### 6.4. Use of English — Google

Fill in the gap with the given words. 20 words are given, but you have to choose only 15. You can use one word once only.

be, been, company, float, floated, from, growth, much, organized, pleased, released, risen, than, then, valued, value, was, were, who, years
--

The internet search engine Google has \_\_\_\_\_ 1. its first set of results since the company \_\_\_\_\_ 2. on the stock market two months ago. Shares in the firm have \_\_\_\_\_ 3. seventy percent since the offering. This report is \_\_\_\_\_ 4. Louise Cooper: Sales for the three months to September more \_\_\_\_\_ 5. doubled from last year to eight hundred and five million dollars. That \_\_\_\_\_ 6. better than most analysts had expected. The \_\_\_\_\_ 7. was due to the fees Google collects from web search advertising.

Investors will be \_\_\_\_\_ 8. with these figures and delighted with the share price performance. Only two months ago, there was \_\_\_\_\_ 9. criticism of the way the founders, Sergey Brin and Larry Page, \_\_\_\_\_ 10. the floatation and interacted with Wall Street. But shareholders \_\_\_\_\_ 11. believed in their vision have now

\_\_\_\_\_ 12. rewarded. The six-year-old company is \_\_\_\_\_ 13. at around forty billion dollars. Given the amount of sales and profits Google produces, the \_\_\_\_\_ 14. is highly valued. This shows investors are assuming many \_\_\_\_\_ 15. of strong growth. Wall Street could still be disappointed if Google fails to live up to those high expectations.

### *Glossary*

bombard (v)	to attack somebody with constant questions etc.
fragment (v)	to break or make something break into small pieces
skyrocket (v)	to rise to a very high level
fix (v)	to arrange, organize something, to decide a price, a date definitely
deliver (v)	to take the goods to the places they are addressed to
fail (v)	(here) to not to do something

## **6.5. Reading Skills — Smart home**

Read the text and answer the questions

Residents of a new housing development in Virginia will be able to monitor their homes and control lighting, heating, and security systems from any Web browser as part of an offering developed by IBM and several partners, IBM announced on Monday. “As wireless networks advance, the system could even allow police in a patrol car to watch a burglar in the house via a Web camera as they speed to the scene after receiving an automatic alarm”, said Eugene Cox of IBM. Homes in the development will be equipped with gateways that handle Internet connectivity, security, and home automation. Developer Commonwealth Builders will join with service providers to offer Internet access, security and fire response services. Residents will be able to keep up to date with community news and events via a personal Web portal as well as monitor their homes.

One example of using a smart home feature might be that of a resident who just drove to work checking a Web camera at home to find out whether or not the garage door had been closed. If it was open the resident could close it remotely using the same Web portal, according to IBM (Culinane, 2016).

- a. What is IBM offering some residents in Virginia?
- b. How can this new invention be used for crime prevention?
- c. What exactly is included in the service?
- d. What was the example in the text that demonstrates the effectiveness of the service?
- e. Would you like to have a smart home? Give your reasons.
- f. What problems might result from this new invention?

## UNIT 7 COMPUTER SECURITY

### 7.1. Reading comprehension - How computer viruses work

A computer virus is an unwanted program that has entered a computer system without anyone knowing about it. It has two parts, which I will call the infector and the detonator. They have two different jobs. One of the features of a computer virus that differentiates it from other kinds of computer programs is that it replicates itself. This way it can spread via memory sticks transported from computer to computer or across a network to other computers. Once a virus has infected a computer, the detonator performs the virus's main work. Generally, that work is either to damage data on a disk, or to do something that interferes with the normal operation of the computer.

Many viruses have been spread through sharing pirated (illegally copied) games. This problem is easy to avoid - be honest and pay for games. If a PC is shared or is one to which the public has access, a virus-checking program should be used to scan the PC before letting it write data on a memory stick.

You should be aware how your computer can become infected. Sources of viruses are software that has already been infected, pirated games and emails. Information posted on the website of the Helsinki-based security company, Fsecure, explains how one particular virus is transmitted by email. The worm W32/Lirva spreads itself by retrieving email addresses from a variety of files stored on a computer's hard drive and then sending copies of itself to those addresses in the form of an e-mail attachment. The subject lines of an infected email may include "Avril Lavigne is the best." The virus is capable of spreading across computer networks by copying itself to shared folders on other computers or tricking users into downloading and opening the attachment (Gregory, 2004).

Finish the following sentences.

A computer virus is an unwanted programme ...

Virus has two main .....

Viruses differ from other programme because ....

Viruses spread through .....

Fsecure explains .....

### 7.2. Vocabulary — Viruses

Explain these words in English

- a. infector
- b. detonator
- c. interfere
- d. virus
- e. victim
- f. password
- g. vendor
- h. antivirus software
- i. pirated games
- j. fair and square

Give synonyms to following words: unwanted *adj*, enter *v*, feature *n*, via *prep*, be aware of *v*

### 7.3. Reading — Hackers

Read the text and answer the questions

The tool to launch a denial-of-service (DoS) attack, which has crippled large retail and news web sites this week, is one of the simplest and most common applications in an illicit hacker's toolbox. It works by preventing other users from accessing Internet services and sites by overwhelming the sites with more hits than they can handle. Some years ago it took good organizational skills to launch an effective DoS attack. Using one machine to flood another did not always work. Network managers and their monitoring software could tell when one machine sent a flood of data to their server and they could block that system as easily as a plumber tightens a leaky pipe.

However, hackers today are not so easily stopped. They know that if enough different machines from the entire Internet swamp a victim with data, administrators cannot block them all quickly enough to prevent a server from freezing or crashing. Hackers take advantage of freely available programs that they use to create distributed-denial-of-service (DDoS) attacks.

The earliest of these programs, named Smurf, took advantage of a loophole in the configuration of operating systems that allowed flooding a machine with "pings". The ping is a sort of network "Yoo-hoo" that is built into the infrastructure of the Internet. Malicious hackers could exploit any networks with this loophole by sending a massive amount of data to a target. Fortunately, network administrators fixed this problem soon after it was discovered.

Other methods for flooding networks have been developed over time. For example, SYN attacks by programming a computer to send hundreds of requests to a server on the Internet. In an ICMP Echo, or ping attack, the attacker sends large volumes of a common network probe to the victim. In all cases the results are the same; a server, unable to cope with the overload, ceases to function (Weisman, 2020).

- a. What is the goal of a DoS attack?
- b. How do network managers try to protect servers?
- c. How did the hackers react to the attempts to defend the servers?
- d. How does smurf work?
- e. How does a SYN attack work?

### 7.4. Vocabulary — Hackers

Explain the following words in English

- a. launch
- b. cripple
- c. plumber
- d. toolbox
- e. password
- f. malicious
- g. flood
- h. freeze

- i. cease
- j. leaky pipe

### 7.5. Discussion — Computer security

Discuss these questions

- a. What is meant by piracy?
- b. Is piracy typical only on the Internet?
- c. What is a copyright?
- d. Who is a hacker?
- e. What are the difficulties of computer security?

### 7.6. Use of English — Hackers

Choose a word from the box to replace the numbers in the following passage. Write the word in the table at the end of the passage.

There are 15 words and you will only need to choose 10.

affected, affect, a, an, breach, bleach, holes, hole, immediately, is own, to, this, were, who,

#### Hacker Steals Credit Card Data

A computer hacker breached the security of SalesGate and Other Web sites, stealing credit card numbers and posting them on the Internet. The company has confirmed that a hacker accessed their server. Not all accounts were (1). The staff has identified those that were and they notified those customers and the issuing bank (2) after confirmation of the security breach. It was announced that more information about the security (3) would be released at a future date.

According (4) the company's website, SalesGate has been popular for a long time. It is (5) online website used by small and large businesses to protect users' personal information. The breach is the work of a hacker (6) claims to have hit nearly a dozen e-commerce sites, stealing credit card numbers and posting them on his (7) website. The hacker, whose website (8) titled "Curador - The Saint Of E-Commerce", has posted some 6000 credit card numbers and claims to have more than 23,000 of them

Among other sites Curador hit were Feelgoodfall.com and Shoppingthailand. com. The website, paid for with a stolen credit card, was shut down (9) week. Some experts say that Curador is exploiting security (10) in Microsoft software that has not been fixed. Investigators in Canada, Thailand and the US are pursuing him.

#### Glossary

breach (n)	an opening or a gap made in a wall, barrier etc.
confirm (v)	to provide an evidence that a report is true
notify (v)	to inform somebody of something
release (v)	to allow information to be made known
immediately (adv)	at once

### 7.7. Reading and Speaking — Ransomware

Read the following text and share your experiences about this topic.

Ransomware is malicious code that is used by cybercriminals to launch data kidnapping and lockscreen attacks. The motive for ransomware attacks is monetary, and unlike other types of attacks, the victim is usually notified that an exploit has occurred and is given instructions for how to recover from the attack. Payment is often demanded in virtual currency to protect the criminal's identity.

Ransomware malware can be spread through malicious e-mail attachments, infected software apps, infected external storage devices and compromised websites. In a lockscreen attack, the malware may change the victim's login credentials for a computing device; in a data kidnapping attack, the malware may encrypt files on the infected device as well as other connected network devices.

Ransomware kits on the deep web have allowed cybercriminals with little or no technical background to purchase inexpensive ransomware-as-a-service (RaaS) programs and launch attacks with very little effort. Attackers may use one of several different approaches to extort digital currency from their victims. For example: The victim may receive a pop-up message or email warning that if the ransom is not paid by a certain date, the private key required to unlock the device or decrypt files will be destroyed. The victim may be duped into believing he is the subject of an official inquiry. After being informed that unlicensed software or illegal web content has been found on his computer, the victim is given instructions for how to pay an electronic fine. The attacker encrypts files on infected computed devices and makes money by selling a product that promises to help the victim unlock files and prevent future malware attacks.

To protect against ransomware attacks and other types of cyberextortion, experts urge users to backup computing devices on a regular basis and update software -- including anti-virus software -- on a regular basis. End users should beware of clicking on links in emails from strangers or opening email attachments and victims should do all they can to avoid paying ransoms. While ransomware attacks may be nearly impossible to stop, there are important data protection measures individuals and organizations can take to insure that damage is minimal and recovery is as quick as possible. Strategies include compartmentalizing authentication systems and domains, keeping up-to-date storage snapshots outside the main storage pool and enforcing hard limits on who can access data and when access is permitted (Corrigan, 2017).

Explain the significance of the following words in the text.

- ransomware
- malware
- lockscreen attack
- encrypt
- deep web
- cybercriminal
- data kidnapping attack

### 7.8. Vocabulary Practice

Fill in the right phrase.

- 1) \_\_\_\_\_ the link below to visit this website.
- 2) Select "options" from the \_\_\_\_\_ menu.
- 3) The printer didn't work well because I had forgotten to \_\_\_\_\_ it on!
- 4) I stuck a \_\_\_\_\_ of the email on the wall.
- 5) Close all programs before you \_\_\_\_\_ shut down your pc.
- 5) You can \_\_\_\_\_ your pictures in and email them to your friends.
- 6) Back up vital data on a \_\_\_\_\_ before there's a power cut and they get wiped out.
- 7) The pc sometimes takes ages \_\_\_\_\_ on when I turn it on.
- 8) You need a \_\_\_\_\_ if you want to log in.
- 9) A teenager succeeded in \_\_\_\_\_ the bank's main database.
- 10) I hope the laptop doesn't \_\_\_\_\_ again or I'll never finish my work.
- 11) \_\_\_\_\_ down the page till you get the item you want to.
- 12) \_\_\_\_\_ the password and go onto the Internet. (Is ""key in" a password the same?)



## 8. ADDITIONAL EXERCISES

### 8.1. E-waste

Fill in the gap with the given words. 20 words are given, but you have to choose only 15. You can use one word once only.

become, became, consumption, demand, discard, discarded, environment, evolve, evolves, e-waste, fraction, illegal, landfills, landfill, means, quality, qualify, recyclers, the, toxic,

The use of computers, televisions and other electronics continues to grow. As the \_\_\_\_\_ 1. increases and technology \_\_\_\_\_ 2., older electronics are replaced and the volume of electronic waste that is generated increases.

According to the EPA, over four billion pounds of e-waste was \_\_\_\_\_ 3. in the United States in 2005, accounting for between 2% and 4% of the municipal solid waste stream. As much as 87.5% of this was incinerated or dumped in \_\_\_\_\_ 4.. Only about 12.5% of the total was recycled.

E-waste contains \_\_\_\_\_ 5 materials such as lead, mercury, cadmium and brominated flame retardants. These materials are considered bio-accumulative, which \_\_\_\_\_ 6 they concentrate in fatty tissues where they can have severe, negative impacts on foetal development and on nursing infants.

In order to prevent harm to the \_\_\_\_\_ 7., several states including Washington, Oregon and California have enacted laws that make it \_\_\_\_\_ 8. to dispose of many types of e-waste in the garbage or landfill. Over 25 states have either enacted \_\_\_\_\_ 9. legislation or are considering laws that address this problem.

These laws have raised awareness and increased demand for computer and electronics recycling services around the country. Although it is still a small \_\_\_\_\_ 10. of the total generated, millions of pounds of e-waste are now recycled each year across the country. Some manufacturers and brand owners are working with \_\_\_\_\_ 11. or creating their own take-back programs to manage the disposal of the electronic products they produce and distribute.

Reduce, reuse, recycle has \_\_\_\_\_ 12. a common, environmental slogan. In the case of e-waste it also represents an important, easy-to-remember hierarchy of recycling benefits.

1. Reduce the \_\_\_\_\_ 13. of products that ultimately become e-waste by maintaining older equipment or purchasing higher \_\_\_\_\_ 14. products with a longer useful life.

2. Reuse products by selling them or donating them to others, especially computer re-use organizations, extending their useful life and keeping them out of \_\_\_\_\_ 15. wastestream.

3. Recycle your unwanted electronics with an environmentally responsible recycler who will either refurbish them for reuse, or break them down to commodity level where they can be used again as raw materials. (Leblanc, 2019).

### 8.2 Robots

Fill in the gap with the given words. 25 words are given, but you have to choose only 20. You can use one word once only.

Asimo, amazing, amaze, android, appearance, appear, assemble, assembling, created, create, , dinner, do, doors, engineers, help, market, preprogrammed, to, voices, watching, wearing, which, world, word would

Do you want a robot to cook your \_\_\_\_\_ 1, do your homework, clean your house, or get your groceries? Robots already \_\_\_\_\_ 2. a lot of the jobs that we humans don't want to do, can't do, or simply can't do as well as our robotic counterparts. In factories around the world, disembodied robot arms \_\_\_\_\_ 3.cars, delicately place candies into their boxes, and do all sorts of tedious jobs. There are even a handful of robots on the \_\_\_\_\_ 4. whose sole job is to vacuum the floor or mow your lawn. Many of us grew up \_\_\_\_\_ 5. robots on TV and in the movies: There was Rosie, the Jetsons' robot housekeeper; Data, the \_\_\_\_\_ 6. crewmember on "Star Trek: The Next Generation"; and of course, C3PO from "Star Wars." The robots being \_\_\_\_\_ 7. today aren't quite in the realm of Data or C3PO, but there have been some \_\_\_\_\_ 8. advances in their technology. Honda \_\_\_\_\_ 9. have been busy creating the Asimo robot for more than 20 years. In this article, we'll find out what makes Asimo the most advanced. The Honda Motor Company developed \_\_\_\_\_ 10., which stands for Advanced Step in Innovative Mobility, and is the most advanced humanoid robot in the world. According to the Asimo Web site, Asimo is the first humanoid robot in the \_\_\_\_\_ 11. that can walk independently and climb stairs. In addition to Asimo's ability to walk like we do, it can also understand \_\_\_\_\_ 12. gestures and spoken commands, recognize \_\_\_\_\_ 13. and faces and interface with IC Communication cards. Asimo has arms and hands so it can do things like turn on light switches, open \_\_\_\_\_, 14. carry objects, and push carts. Rather than building a robot that \_\_\_\_\_ 15. be another toy, Honda wanted to create a robot that would be a helper for people -- a robot to help around the house, \_\_\_\_\_ 16. the elderly, or help someone confined to a wheelchair or bed. Asimo is 4 feet 3 inches (1.3 meters) high, \_\_\_\_\_, 17. is just the right height to look eye to eye with someone seated in a chair. This allows Asimo \_\_\_\_\_ 18. do the jobs it was created to do without being too big and menacing. Often referred to as looking like a "kid \_\_\_\_\_ 19.aspacesuit," Asimo's friendly \_\_\_\_\_ 20.and nonthreatening size work well for the purposes Honda had in mind when creating it. <https://science.howstuffworks.com/asimo.htm>

### 8.3. Gita – the robot followed me

Read the text and answer the questions.

When I first met Gita the robot, it was a bit banged up. An accident in Central Park a day prior left a small jagged hole in its plastic frame, and only one wheel was lighting up as it should. Two hours later, the poor thing also busted its front camera sensor in a crash with my office glass door. But hey, that's all part of testing a prototype, right?

Gita is an extremely nimble cargo bot, designed to follow its owner for miles, carrying 40 pounds of stuff inside its 2-foot-tall body. It doesn't have the features you'd expect of a companion robot. There are no arms. It doesn't make small talk. There's not even a smiley face programmed into the screen to ease your trepidation over having a robot follow your every move. It has more in common with a scooter than a robot pet -- and with good reason. It's made by Piaggio, the Italian company behind the Vespa. There are currently four prototype Gita vehicles. There's nothing cooler than having your own rolling robot buddy

follow you around the city. That is, until you have to strap on this massive, blocky white belt over your coat to make it work. Camera sensors are packed into what looks like a Stormtrooper costume accessory. Data gathered by the belt syncs up with camera sensors surrounding Gita robot. That way, it can map out where I'm going, turn a corner to follow me, and not run into walls or people walking between us. But don't be too distracted by the belt. The creators say the final version won't require the owner to wear something so bulky. In fact, it could just be something small you clip to a pocket.

Gita has many tricks that my demo wasn't set up to show off. It can travel up to 22 miles per hour so it can keep up with someone running or riding a bike. It's able to stay close your side when you need to keep it on a tight leash -- such as when entering an elevator.

The company is also working on a mode to have it park outside a store and wait for you. If you're worried about someone rolling away with your Gita, it's cumbersome to move, weighing in at around 50 pounds. The door latch is locked by a fingerprint scanner. And alarms will go off if someone starts messing with your bot.

It also can map an area to memorize it for future trips, so it doesn't always need to follow someone to know where to go. For now, the team behind the Gita is shopping it around to different businesses to test it out in office and customer-service environments. Later this year, you could see Gita trailing nurses in hospitals, or assisting bellhops in hotels. It may be another two years before we can use Gita ourselves to carry our groceries home, lug those heavy college textbooks -- or better yet, follow you around a tailgate party as your personal beer cooler (Carey, 2017).

What happened to Gita in an accident?

How much cargo can Gita carry inside?

How tall is Gita?

Does Gita have limbs?

Which company produced Gita?

How many prototypes were made?

What speed can it reach?

How can the owner control Gita?

Why is it difficult to steal Gita? (2 reasons)

In which other areas will Gita be used in the future?

Discussion topic:

How much do you agree with the ideas of the following text?

Read the text and answer the questions.

#### **8.4. Is modern technology changing our brain?**

The human brain is most sensitive and could be under threat from the modern world. Electronic devices have an impact on the micro-cellular structure and the complex biochemistry of our brains. And that, in turn, affects our personality, our behaviour and our characteristics. In short, the modern world could well be altering our brains. There are many dangers that we should reflect up on. Have we stopped using our brains to think? Do we just use the Internet to gather information? I have seen mothers amuse babies by giving them an I-pad to play with. Already, it is pretty clear that the screen-based, two-dimensional world that so many teenagers — and a growing number of adults — choose to inhabit is producing

changes in behaviour. Attention spans are shorter; personal communication skills are reduced; and there is a marked reduction in the ability to think abstractly. This games-driven generation interprets the world through screen-shaped eyes. Many parents will notice how addictive some video games can be and how the young can waste the whole day gaming until their eyes are red and tired. We could be raising a hedonistic generation who live only in the thrill of the computer-generated moment, and are in distinct danger of detaching themselves from the real world. The brain is like any other muscle in the body and you need to exercise it and use it in lots of different ways to keep it growing, stimulated and healthy. Alzheimer's research has shown that there is some truth in the adage "use it or lose it." Chinese researchers have found that our grey matter— the part of the brain responsible for processing of speech, memory, motor control, emotion, sensory, and other information— is shrinking or atrophying. Constant Web use often replaces exercise, and face-to-face contact which can lead to loneliness, and depression. It is important as with all things in life to have balance. It is important that even after leaving school or college we go on learning new skills to keep our brains bright, sharp and active.

Children should be encouraged to use their brains in a variety of different areas such as sport, learning to play an instrument, mathematics, and writing. And to constantly stretch their brains by acquiring new skills. In a world where we are living ever-longer it is important not to take our brains for granted and to use them to become lifelong learners. Limits should be put on time spent on technology and you should control your time.

Meal times are important family time and all technology should be switched off. I hope this article will make you reflect on your use of technology and look at it as a tool in life that should be used wisely and in moderation; and that you should also intentionally make your brain work in other ways too (Carpenter, 2013).

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How do electronic devices change our brain?

Mention 3 harmful consequences of using digital tools at a young age?

What are the signs of game addiction parents notice?

How would you interpret the phrase referring to brain "use it or lose it."?

What part of our brain responsible for producing speech?

What harmful consequences does constant web using lead to?

What part of the brain is responsible for the ability to speak?

What can we do to keep our brain active?

### **8.5. The massive unintended consequences of self-driving cars**

Read the text and answer the questions.

One of the most interesting parts is that the garage in the lab was built for a past CEO of the firm Intel acquired in order to challenge for technology leadership in this space. The chief clearly didn't want his four-wheeled baby left out in the sun. However, car residual prices are collapsing, based on an alert that crossed my desk last week, and it struck me that we haven't considered much the secondary impacts of having self-driving cars, and the changes that will result from turning automobiles into four-wheeled elevators. I'll address that this week and close with my product of the week: an amazingly fun Windows 10 math teaching application that I wish I'd had when I was a kid.

**Self-Driving Cars** Many industry players are treating self-driving cars much like you would a feature such as cruise control: a nice-to-have option that will make driving much easier and safer. There are a lot of industries that will be impacted by this, though, both positively and negatively -- not the least of which is the car industry itself, which could find the majority of car companies either vastly changed or out of the market entirely.

#### Replacement Parts for Humans

This is perhaps the least obvious change, but with 35K deaths attributed to them each year in the U.S., car accidents have been a huge source of organs for those who need them. Self-driving cars will massively reduce those deaths to near zero, and that could result in a huge imbalance between those who need organs and the available supply. It could lead to a sharp price increase for organs and likely a huge increase in illegal harvesting, particularly in regions where this is already a problem.

Efforts to create a cloned alternative in the U.S. have been hampered by the religious right. That could result in a distinct and massive spike in illegal organ harvesting in the U.S., and a huge push for people who need them to go to countries that don't have these restrictions in order to save their lives. This is big enough that it could have a massive impact on which party is in power.

**Used Cars :** There recently have been reports that the used car market is beginning to collapse, which is having an adverse impact on car lease and car payment rates because residuals on cars appear to be dropping rapidly. The cause is thought to be Uber (though part of it could be a hot stock market which may be pushing some typical used car buyers to new cars). Uber plans to massively increase its service coverage once it can use autonomous cars.

This massive increase should reduce the demand for cars massively, on top of the massive reduction in demand for cars that can't do self-driving (which are expected to be banned in a few years on many roads). That means not only that there will be an increasing inability to resell cars that don't have self-driving capabilities, but also that large numbers of people will feel they don't need cars at all.

**New Cars:** If you think about it, fully self-driving cars are like rolling elevators, and in areas covered by services like Uber the cost will be very low and the availability very high. They come without insurance, without parking or fuel charges, and without the need to garage or pay for parking. The cost reduction for going to a service like Uber, which may provide subscription services -- a monthly fee for all you can ride -- should be massive. What that suggests is that the market for new cars should collapse in favor of Cars as a Service. Only the very rich will own cars, as a sign of status. I am surprised that the car companies aren't all joining Toyota in an IBM-like strategy to create cars that use an autonomous car approach called "Guardian Angel," which enhances the driver's capabilities but does not completely eliminate the driver like the Uber and Google approaches do. It's one possible way to preserve their market.

**Litigation/Insurance:** The massive reduction in accidents should eliminate much of the need for litigation, both civil and criminal. That change also will impact insurance. I've seen models that suggest car insurance revenues will decrease in the 90 percent range, largely because much of the risk will be mitigated. The need to have car insurance -- outside of firms

like Uber, which either will buy in volume or self-insure -- should evaporate. If most folks don't own cars, they won't need to insure them.

**Media Consumption:** Media consumption should increase dramatically, because folks who currently are driving to work and unable to consume visual media or read books during their commute will be able to do so. Many will choose to work either coming or going, but most likely will use at least some of the time to watch movies, play video games, or read books and magazines.

**Law Enforcement:** With the combination of cars with massive numbers of sensors (including cameras), centralized tracking, and near constant oversight, traffic cops should become redundant. Both on-car and in-street tracking systems will report folks who are misbehaving in real time, and folks who are behaving badly and overriding or not using self-driving will receive tickets in the mail or have law enforcement waiting for them at their next stop or home.

The need to put police on the roads should evaporate, except for extreme measures like catching terrorists or robbers. This need likely could be met with weaponized drones designed to eliminate the related threat from the air, and that could respond quickly from centralized depots.

**Automated On-Site Car Repair:** Given that many of these cars will be operating 24 hours a day and 7 days a week, the likelihood of an on-road failure will go up, needing a service that can repair the autonomous car where it failed. Much like support for other technology products is outsourced to firms specializing in that service, this too could lend itself to service companies that can span service providers, allowing higher economies of scale, better coverage and lower costs.

The easiest system would be an automated service that retrieved the car and delivered it to a regionalized repair depot. You wouldn't be abandoned -- a replacement car likely would pick you up long before the repair vehicle arrived. In fact, given an early warning, it likely would be dispatched before you were stuck.

**Wrapping Up:** Autonomous cars represent a massive game change for the car industry. The biggest driver is that this technology could save nearly one and a half million lives worldwide each year. Basically, the long-term plan is to change cars from what they are today into four-wheeled elevators. On the positive side, this will save a massive number of lives and free time up for folks to be more productive or enjoy media. However, it also will lead to massive reductions in industries that make their living off the older model. Self-driving cars are just one aspect of what many are calling "the second industrial revolution," and likely only the tip of the iceberg when it comes to the changes robotics and artificial intelligence are likely to bring (Enderle, 2017).

## **8.6. What is the future of technology in education?**

Read the text and answer the questions.

A couple of weeks ago I was asked what I thought the future of technology in education was. It is a really interesting question and one that I am required to think about all the time. By its very nature, technology changes at a fast pace and making it accessible to pupils, teachers and other stakeholders is an ongoing challenge. iPads and other mobile

technology are the 'now'. Although, they will play a part in the future, four years ago the iPad didn't even exist. We don't know what will be the current technology in another four. Perhaps it will be wearable devices such as Google Glass, although I suspect that tablets will still be used in education. The future is about access, anywhere learning and collaboration, both locally and globally. Teaching and learning is going to be social. Schools of the future could have a traditional cohort of students, as well as online only students who live across the country or even the world. Things are already starting to move this way with the emergence of massive open online courses (MOOCs).

For me the future of technology in education is the cloud. Technology can often be a barrier to teaching and learning. I think the cloud will go a long way to removing this barrier. Why? By removing the number of things that can go wrong. Schools, will only need one major thing to be prepared for the future. They will not need software installed, servers or local file storage. Schools will need a fast robust internet connection. Infrastructure is paramount to the future of technology in education. We don't know what the new 'in' device will be in the future. What we do know, is that it will need the cloud. Schools and other educational institutions will need to futureproof their infrastructure the best they can. If you want to start to use mobile technology in your school, whether it is an iPad program or a bring your own device (BYOD) program your connectivity must be fast and reliable. If the network is slow and things are not working properly students and teachers will not want to use the devices. Make the sure the infrastructure is there before the devices. Teachers can use the cloud to set, collect and grade work online. Students will have instant access to grades, comments and work via a computer, smartphone or tablet. Many schools are already doing this.

School classrooms are going to change. Thanks to the cloud and mobile devices, technology will be integrated into every part of school. In fact, it won't just be the classrooms that will change. Games fields, gyms and school trips will all change. Whether offsite or on site the school, teachers, students and support staff will all be connected. In my ideal world, all classrooms will be paperless. With the cloud, the world will be our classroom. E-learning will change teaching and learning. Students can learn from anywhere and teachers can teach from anywhere.

The cloud can also encourage independent learning. Teachers could adopt a flipped classroom approach more often. Students will take ownership of their own learning. Teachers can put resources for students online for students to use. These could be videos, documents, audio podcasts or interactive images. All of these resources can be accessed via a student's computer, smartphone or tablet. As long as they have an internet connection either via Wifi, 3G or 4G they are good to go. Rather than being 'taught' students can learn independently and in their own way. There is also a massive amount of resources online that students can find and use themselves, without the help of the teacher. This of course means the role of the teacher will change. Shared applications and documents on the cloud, such as Google Apps will allow for more social lessons. How often do students get an opportunity to collaborate productively using technology in the classroom? It isn't always easy. However, students working on documents together using Google Apps is easy. They could be in the same room or in different countries. These are all good skills for students to have. Of course, these collaborative tools are also very useful for teachers. I for one have worked on several

projects where these tools have let me work with people across the country. Some of which I have never met.

What we must remember is that when schools adopt new technology and services, they must be evaluated. This way, as a school, you know if they are successful and what improvements are needed. Staff will also need training, you can't expect staff to use new technology if they are not confident users or creators. Any initiative is doomed to failure without well trained, confident staff who can see how technology can support and benefit teaching and learning. Plenty of schools have already embraced this, but there's still a way to go to ensure all schools are ready for the future of technology. It is time for all schools to embrace the cloud (Britland, 2013).

What is the future? Is it the iPad?

Why will be access to Internet important in education?

What does the author say about the cloud?

What is the most important technical facility for schools to provide knowledge transfer?

How should the classrooms change?

How can cloud encourage independent learning?

What advantages can flipped classroom offer?

How will the role of the teacher change?

### **8.7. Robot nannies: Should gadgets raise your kids?**

These friendly helpers were the trend this year at the Consumer Electronics Show in Las Vegas. If you're a parent, you probably know how expensive hiring a nanny can be. To help out, companies are coming out with high-tech alternatives. At this year's Consumer Electronics Show in Las Vegas, Kuri, Aristotle, and other gadgets were on display.

Kuri is a roving robot that roams around the home to assist with tasks such as waking up the kids when it's time to get ready for school, telling bedtime stories, and singing the children's favorite songs. When parents are not home, they can view their children through the robot's built-in cameras, which they can monitor via a mobile app.

Aristotle, which I consider to be a baby monitor on steroids, is similar to the Amazon Echo digital assistant, only the voice-activation technology is designed to communicate with your child. For example, Aristotle automatically recognizes when a baby wakes up when it makes a sound and can soothe it to sleep with a lullaby or turn on a night-light. The device also can alert you when the supply of diapers is low. What's more, Aristotle can play games with toddlers, such as having them guess which animal noise it is making or the shape displayed on its screen. Those are just two of the dozens of robot helpers that appeared on the CES showroom floor.

But such devices beg the question of whether having technology help raise children is beneficial, or can it have unintended consequences? To provide some insight into this trend, *The Institute* interviewed IEEE Life Senior Member Jim Isaak, vice president of the IEEE Society on Social Implications of Technology. These technologies could be designed to help children develop independence and critical-thinking skills, as well as explore their own unique talents. And more likely than not, parents are going to use these devices to mirror their own intentions, such as having the device remind kids to practice the piano or help



them with their homework. Furthermore, the robot might notice that the child is particularly gifted at quantum mechanics, and notify the parents of her skills.

Of course, kids could also become so enthralled by their robots that they prefer interaction with them over their parents, and may find it more difficult to develop human connections. The children may even become dependent on the robot, especially since it will know them better than others could. These devices come with obvious hacking risks, such as people listening in or watching your child, whether a neighbour or a government agency. But some vulnerabilities are subtler than that. For example, a device like the Aristotle could potentially sell or promote products to young children, either explicitly or implicitly, when telling stories or making recommendations. It may also be difficult to wean children away from a robot as they get older. Children already have a difficult time giving up their favourite dolls, blankets, or even imaginary friends. What parents will do to disconnect their kids from their robot nannies is an open question.

It will be some time before human observation and judgment can be replaced by artificial intelligence. Robots cannot protect children from all possible dangerous situations. The potential to have a robot watch over a child raises ethical concerns as well. If a robot accidentally hurts a child, how will this be handled in court? Conversely, how should the robot respond if it witnesses child abuse in the home? Should it be programmed to call the authorities? These and many other questions have yet to be answered.

<https://robotic-fanatic.myshopify.com/blogs/news/robot-nannies-should-gadgets-raise-your-kids>

Who are Kuri and Aristotle?

What can robot nannies do?

As a parent, do you think bringing robot nannies into the home can be helpful?

What aspects of the technology should parents be wary of?

What are the advantages and disadvantages of robot nannies?

Will it be possible to replace nannies altogether with robots?

What are the advantages and disadvantages of robot nannies?

Will it be possible to replace nannies altogether with robots?

### **8.8. All eyes on Google's new 'smart' contact lenses**

Google “glucose” right now, and you’ll find a slew of results with Google itself in the header. This is because Google is getting into a new market: Diabetes. The company has just revealed a new method for monitoring glucose, in a classically Google-clever way: Smart contact lenses with tiny glucose-tracking technology will monitor wearers’ glucose levels not by measuring the sugar in their blood, but by tracking it in their tears.

“It doesn’t look like much, but it was a crazy amount of work to get everything so very small,” said Google researcher Brian Otis in a statement. The research, by the company that’s also brought us Glass and driverless cars, was kept under wraps until yesterday.

The contact lenses will monitor glucose with a tiny sensor once per second, and then transmit the data through a wireless transmitter. According to Otis, the sensor is the smallest ever made, and took years of affixing tiny wires to tiny electronics to produce it.

The blood sugar monitoring industry will reach \$16 billion this year, and the devices available now – whether needle-based or wristband-based – are not particularly convenient or comfortable for users. “Smart” blood sugar monitoring has been in the works for many years, but no one has revealed a reliable fix for the problem. Some academic institutions have also been working on glucose-monitoring contacts, but as Otis says, “You can take it to a certain level in an academic setting, but at Google we were given the latitude to invest in this project.”

The electronics in the contacts lie on the periphery, so don’t obstruct the wearer’s vision. To power the lenses, developers designed a method of pulling energy from surrounding radio frequency waves. The company is testing the possibility of adding a tiny LED light to indicate when the wearer’s glucose exceeds a certain level. Over 380 million people are affected by diabetes globally. Many have to prick their fingers up to 10 times per day to keep track of their blood sugar and adjust insulin accordingly. The concept could be a game-changer, for sure, but the details still have to be worked out. Among them will be how to actually calculate blood sugar from tear sugar, and how the technology might be affected under various weather conditions and various emotional conditions. And, of course, the FDA will have to approve it before it goes to market (Walton, 2014).

How can new contact lenses monitor glucose?

Why is it difficult to construct smart contact lenses?

How do smart contact lenses monitor glucose level?

How do the lenses show the wearer’s glucose level exceeds a certain level?

What details should the researchers work on?

Read the text and mention some points which can make this job attractive for young people.

### **8.9. Computer designers**

*Graphic designers*—or *graphic artists*—plan, analyze, and create visual solutions to communications problems. They find the most effective way to get messages across in print and electronic media using colour, type, illustration, photography, animation, and various print and layout techniques. Graphic designers develop the overall layout and production design of magazines, newspapers, journals, corporate reports, and other publications. They also produce promotional displays, packaging, and marketing brochures for products and services, design distinctive logos for products and businesses, and develop signs and signage systems—called environmental graphics—for business and government. An increasing number of graphic designers also develop material for Internet Web pages, interactive media, and multimedia projects. Graphic designers also may produce the credits that appear before and after television programs and movies.

The first step in developing a new design is to determine the needs of the client, the message the design should portray, and its appeal to customers or users. Graphic designers consider cognitive, cultural, physical, and social factors in planning and executing designs for the target audience. Designers gather relevant information by meeting with clients, creative or art directors, and by performing their own research. Identifying the needs of consumers is becoming increasingly important for graphic designers as they continue to develop corporate communication strategies in addition to creating designs and layouts.

Graphic designers prepare sketches or layouts—by hand or with the aid of a computer—to illustrate their vision for the design. They select colours, sound, artwork, photography, animation, style of type, and other visual elements for the design. Designers also select the size and arrangement of the different elements on the page or screen. They may create graphs and charts from data for use in publications, and they often consult with copywriters on any text that accompanies the design. Designers then present the completed design to their clients or art or creative director for approval. In printing and publishing firms, graphic designers also may assist the printers by selecting the type of paper and ink for the publication and reviewing the mock-up design for errors before final publication. Graphic designers use specialized computer software packages to help them create layouts and design elements and to program animated graphics.

Graphic designers sometimes supervise assistants who follow instructions to complete parts of the design process. Designers who run their own businesses also may devote a considerable time to developing new business contacts, choosing equipment, and performing administrative tasks, such as reviewing catalogues and ordering samples. The need for up-to-date computer and communications equipment is an ongoing consideration for graphic designers.

**Work environment.** Working conditions and places of employment vary. Graphic designers employed by large advertising, publishing, or design firms generally work regular hours in well-lighted and comfortable settings. Designers in smaller design consulting firms and those who freelance generally work on a contract, or job, basis. They frequently adjust their workday to suit their clients' schedules and deadlines. Consultants and self-employed designers tend to work longer hours and in smaller, more congested, environments.

Designers may work in their own offices or studios or in clients' offices. Designers who are paid by the assignment are under pressure to please existing clients and to find new ones to maintain a steady income. All designers sometimes face frustration when their designs are rejected or when their work is not as creative as they wish. Graphic designers may work evenings or weekends to meet production schedules, especially in the printing and publishing industries where deadlines are shorter and more frequent.

Graphic Designers - What They Do. <https://studentscholarships.org>

Mention five activities graphic designers do for their jobs.

What is the first step in developing a new design?

How can graphic designers be used at printing and publishing firms?

How can graphic designers assist the printers?

Where are graphic designers employed?

Why can be free lance graphic designers under pressure?

### **8.10. Glibc: Mega bug may hit thousands of devices**

A major computer security vulnerability has been discovered - with experts cautiously warning it could potentially affect hundreds of thousands of devices, apps and services. However, due to the nature of the bug, it is extremely difficult to know how serious the problem is. Google engineers, working with security engineers at Red Hat, have released a patch to fix the problem. It is now up to manufacturers, and the community behind the Linux operating system, to issue the patch to affected software and devices as soon as possible.

In a blog post explaining the discovery, Google's team detailed how a flaw in some commonly-used code could be exploited in a way that allows remote access to a devices - be it a computer, internet router, or other connected piece of equipment. The code can also be within many of the so-called "building blocks" of the web - programming languages such as PHP and Python are affected, as well as systems used when logging in to sites or accessing email. "But it's true there's a very real prospect that a sizable portion of internet-facing services are at risk for hackers to crash, or worse, run remote code to attack others." He said that while there is no publicly known attack code using the flaw, it's a "near certainty" hackers would try to exploit the weakness.

The bug is found in glibc - a open-source library of code that is widely used in internet-connected devices. One particular function is domain look-up. This happens when the devices converts a typical web domain, say bbc.com, and finds its corresponding IP address so it can access whatever website or service is needed. The domain look-up code in glibc contains a bug that could allow hackers to maliciously implant code within a device's memory. From here, attacks such as remote execution - controlling the device over the internet - could take place. However, Google said it is very hard to exploit the flaw although their engineers have worked out how. For obvious security reasons they are not making that public. The scale of the problem is difficult to determine because it is unclear how many devices and systems make use of the glibc code (Lee, 2016).

What did Google engineers do to help users to tackle the security problem?

Which operating system is affected?

How does the bug work?

Which programming languages are involved?

What is glibc? How can the bug affect is glibc?

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