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Кафедра англійської мови для технічних та агробіологічних спеціальностей

Тузюк М.О.

ENGLISH FOR STUDENTS OF AUTOMATION, COMPUTER-INTEGRATED TECHNOLOGIES AND ROBOTICS (BACHELOR'S COURSE)

Англійська мова для студентів спеціальності "Автоматизація, комп'ютерно-інтегровані технології та робототехніка" ОС «Бакалавр»

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English for students of automation, computer-integrated technologies and robotics (Bachelor's Course) (Англійська мова для студентів спеціальності «Автоматизація, комп'ютерно-інтегровані технології та робототехніка» ОС «Бакалавр»): навч.-метод. посібник/укл. Тузюк М.О., 2023 р. 160с.

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Пропонується опрацювання фахових тем майбутніх спеціалістів з автоматизації, комп'ютерно-інтегрованих технологій та робототехніки різних форм навчання з проекцією на закріплення спеціалізованих лексичних одиниць, граматичних одиниць, розмовного та письмового мовлення у творчих вправах та тестових завданнях.

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Зміст

Introduction

Dear freshmen,

Congratulations on embarking on the exciting journey into the world of computer-related technologies and robotics. As you step into the world of cutting-edge technologies that are shaping our future, you will need a guide that will equip you will all the necessary linguistic tools to navigate it in the English language.

This course was designed to bridge the gap between your technical knowledge and communication skills in the language of computer technologies. In the modern world, English is the main language of communication in many fields, technology most of all. It is a key asset which opens many opportunities and possibilities for future development and research on an international stage.

Throughout this course, you will delve into a wide range of topics from computer sciences to robotics. Within these topics, you will find a generous amount of technical vocabulary, essential for understanding and articulating many technological concepts, to learn. Besides this, there are a variety of exercises to develop your communication skills, reading and writing proficiency, the ability to present, debate and articulate your arguments in front of and with your peers.

The first half of this course deals primarily with computer-related technologies, to start students off in a familiar field of knowledge, while slowly moving towards more complex concepts, like the theory of computation and computer languages, which are essential in automation and robotics. By the end of it, students will know the essential vocabulary and possess the necessary skills to speak on the topic of computer-related technologies without issues.

Module 1 - Introduction to Computer Engineering

Unit 1: Introduction to Computer Sciences, Automation and Robotics

Introduction

Exercise 1: Before reading the article, please read and answer these questions.

1. What are computer sciences?
2. Are computer sciences important in the modern world?
3. What is another name for someone who specializes in computer sciences?
4. What is automation?
5. What is robotics?

Reading

Exercise 2: Please read the article and translate the words in bold text.

Computer sciences are at the center of the modern world. The people in this field **maintain** and **develop** the technology which we all rely on today. Computers, laptops, smartphones, as well as many other such **electronic devices**, would not exist without the field of computer science and its many **specialists**.

A computer science specialist focuses on a variety of fields relating to modern technologies, such as **analyzing** and developing **software**, as well as **evaluating** and **fixing hardware**.

An **IT specialist** must be **proficient** in a variety of fields besides computer technologies. These include **mathematics**, which helps them understand the equations needed for some **computer functions**; **physics and electronics**, which are required for a deeper understanding of hardware and how to **repair** it; and other languages, especially English. After all, the majority of today's **code** languages rely on English to perform functions.

Exercise 3: Read the text again and determine whether the following statements are true (T) or false (F).

1. A computer scientist is responsible for the creation of hardware.
2. Biology is very important to computer science.
3. Software is developed and maintained by IT specialists.
4. English is vital to understanding code languages.
5. Physics and electronics are required to understand how to repair hardware.

Exercise 4: Name as many items in the following image as you can.

Grammar

Present Simple Tense: *Be*

Pronoun	Affirmative	Negative	Question
I	I am happy (I'm)	I am not happy (I'm not)	Am I happy?
You	You are happy (you're)	You are not happy (aren't)	Are you happy?
We	We are happy (we're)	We are not happy (aren't)	Are we happy?
They	They are happy (they're)	They are not happy (aren't)	Are they happy?
He/She/It	He is happy (he's) She is happy (she's) It is happy (it's)	He is not happy (isn't) She is not happy (isn't) It is not happy (isn't)	Is he happy? Is she happy? Is it happy?

Present simple may use the auxiliary verb 'be' in its 3 forms: **am, are, is**. When 'be' is used in the present simple tense, the sentence describes a **general or personal fact**. For example: *The sun is hot.*

Exercise 5: Put the correct form of the auxiliary verb 'be' in these sentences.

1. The computer engineers ___ very good at what they do.
2. How many pieces of hardware ___ there in this warehouse?
3. He ___ not a very good IT specialist.
4. Why ___ you at home and not working on a new piece of software?
5. They ___ happy with how thoroughly I fixed their hardware.
6. I ___ impressed by your code, did you make it yourself?
7. There ___ not much to repair in your computer, why did you call me?
8. What ___ your email? I want to get in contact with you later.
9. Where ___ they going with my laptop?
10. We ___ not very good at developing new computer technologies.

Exercise 6: Using the present simple 'be' form, put together 10 sentences with the words from the vocabulary part of the unit.

Present Simple Tense: Verbs

Pronoun	**Affirmative**	**Negative**	**Question**
I	I work hard.	I don't work hard.	Do I work hard?
You	You work hard.	You don't work hard.	Do you work hard?
We	We work hard.	We don't work hard.	Do we work hard?
They	They work hard.	They don't work hard.	Do they work hard?
He/She/It	He/She/It works hard.	He/She/It doesn't work hard.	Does he/she/it work hard?

Present Simple may use non-auxiliary verbs to create the meaning of **regular action or general fact**. When a regular verb is used in present simple in plural, it remains in its basic form, when the noun or pronoun is singular, the verb gains the ending s.

Exercise 7: Put the correct form of the verb in brackets.

1. I _____ a lot of new software every day. (develop)
2. He _____ hard to create his game whenever he has free time. (work)
3. John and Jane _____ hardware often enough to make their own company. (analyze)
4. The cat often _____ over the computer cables. (trip)
5. Jake _____ computers as a day job. (fix)
6. ___ he _____ very often? I always ___ him relaxing (not work, see)
7. They ____ _____ the intricate process of creating new hardware. (not understand)
8. ___ you often _____ at the electronics store? (shop)
9. John always _____ at the new PC parts whenever he can. (look)
10. StarBlade PCs _____ new pre-made computers every other month. (release)

Exercise 8: Create 5 sentences using regular verbs in Present Simple.

Reading

Exercise 9: Find Present Simple in the following text, write down and translate the new vocabulary.

In computer science, we use instructions called "**algorithms**" to tell a computer what to do. Algorithms are like **recipes** that computers follow step by step. You'll learn how to create your own algorithms to **solve** problems and make computers do cool things.

We'll also talk about **data**, which is like the **information** computers use. Computers can **store** and **process** lots of data very quickly. You'll discover how to work with different types of data, like numbers, words, and more.

As you continue learning about computer science, you'll find out about different concepts like **loops**, **conditions**, and **variables**. These are like tools that help you control what a computer does.

Computer science is an exciting and creative field. You can use it to build **websites**, make games, and even create software that solves real-world problems. Learning computer science will open up many possibilities for you in the future.

In addition to computer-related things, computer science opens up many possibilities for the fields of **automation** and **robotics**, which require knowledge of computer technologies in the modern world.

Exercise 10: Read the text again and determine the correct answer.

1. What does computer science focus on?

A. Creating games;

B. Making loops;

C. Explaining variables;

D. Working with algorithms.

2. What is data?

A. It is a code language programmers use;

B. It is information which computers process and store;

C. It is a set of conditions which determine what a computer can do;

D. It is a variable.

3. Computer science is a _____ field.

A. Systematic and boring;

B. Cool and fun;

C. Creative and exciting;

D. Variable and ever changing.

4. What can you create with computer sciences?

A. Software and hardware;

B. Cakes;

C. Conditions;

D. Hand tools.

5. What will computer science do for your future?

A. Create a dark and dreary world;

B. Cause the end of the world;

C. Open up creative opportunities;

D. Make you hate computers.

Vocabulary

Exercise 11: Read the sentences and fill the missing part with the words in the box.

analyzing, computer engineer, developer, electronic devices, English, fix, hardware, IT specialist

1. Despite studying electrical engineering alongside computer sciences, I've never been very good at fixing _____.

2. She is very good at _____ software, I've seen her find the tiniest mistakes in the code.

3. I am a software _____, I specialize in creating user interfaces so they don't have to interact with code directly.

4. How many times have you _____ this piece of hardware? I think it's time for a replacement.

5. A _____ _____ develops software and maintains hardware.

6. You need to know _____ to develop using international code languages, most of them were made in that language.

7. Computers, tablets and smartphones are all _____ _____.

8. An _____ _____ is another name for a computer scientist, though the name also has its own meaning.

Exercise 12: Connect the following words to their meanings.

1. Computer science	Physical components of a computer system.
2. Hardware	The design and operation of robots to perform tasks.
3. Software	Skilled and competent in a particular area or task.
4. Robotics	A professional with expertise in information technology.
5. Algorithm	The study of algorithms, data structures, and computational systems.
6. Proficient	Programs and instructions that run on a computer.
7. Data	A step-by-step procedure for solving a problem or performing a task.
8. IT specialist	Information in a form that can be processed or analyzed.

Speaking

Exercise 13: Make a short dialogue about computer sciences and what IT specialists do using the example below.

Physicist: So, what do computer scientists do? Do you work on any specific parts of a computer?

IT specialist: Well, a computer scientist, or an IT specialist, focuses on analyzing and developing different types of software.

Physicist: I've heard you also do something with hardware.

IT specialist: Oh yes, we also evaluate and try to fix hardware when needed.

Developing software requires us to understand the hardware very well.

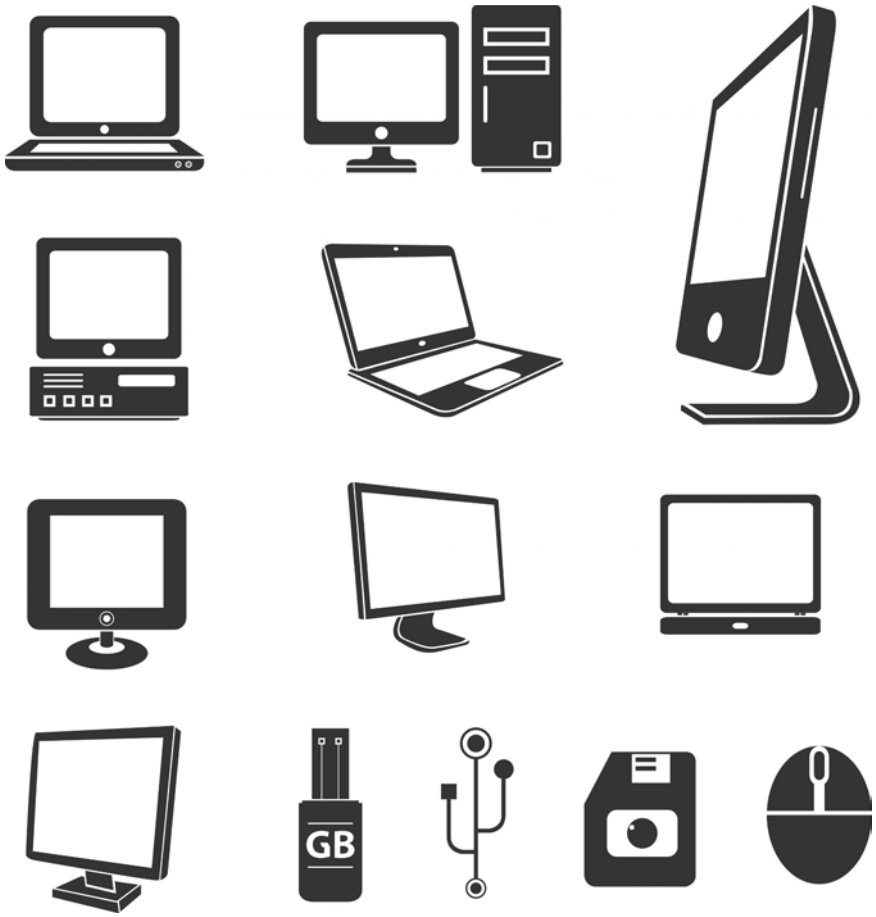
Physicist: Ah, i see. So do develop new hardware at all?

IT specialist: Well, if we get a new idea, we put it forward to the computer engineers, but generally we focus on developing software.

Writing

Exercise 14: Make a short story about an IT specialist who wants to design his own software for a company he/she works at. 7-8 sentences.

Unit 2: Types of Computers



Introduction

Exercise 1: Before reading the article, please read and answer these questions.

1. What types of computers do you know?
2. Do all types of computers perform the same functions?
3. Which computers are mobile? Which are stationary?
4. Do you need the same type of skills for all types of computers?
5. Are all programs the same for all types of computers?

Reading

Exercise 2: Please read the article and translate the words in bold text.

There are many types of computers in the modern world. It all depends on what you need the computer for. If you need a **stationary** computer which performs any function, then you need a **PC**, or a personal computer. This type of computer is also

sometimes called a **desktop**. Another type of stationary computer is one that is built into another piece of technology. That kind of computer is called an **embedded computer.** You can find them in a wide **variety** of different **objects** in the modern world. Think of computers in cars, fridges, microwaves, etc.

Besides stationary computers, there are also **mobile computers**, which you can take with you for work or **leisure**. The main kind of mobile computer is a **laptop**. Another type of mobile computer is something nearly everyone uses every single day in the modern age - a **smartphone**. Closing out this **category** of computers, we have something even smaller than a smartphone, and much less popular, although very useful - the **smartwatch**, a combination of a smartphone and a regular **wrist watch**.

There is also a third major type of computer besides stationary and mobile, although some might argue it is also a stationary computer. **Supercomputers**. Within this type we can find such pieces of technology as **cluster computers**, general purpose supercomputers, and **experimental** supercomputers such as **quantum** computers.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. A desktop is another name for an embedded computer.
2. A fridge can have a computer inside it.
3. A super computer must always be a computer cluster.
4. Quantum computers are popular nowadays.
5. A smartphone is a computer.

Exercise 4: Connect the following images to their names.

Grammar

Past Simple

The Past Simple Tense is a verb tense used to talk about actions or events that **happened in the past** and are **completed**.

Regular verbs add "**-ed**" to the base form (e.g., walk -> walked), while **irregular verbs** have **unique** past tense forms (e.g., go -> went).

Affirmative Form (Positive): Subject + Past Tense Verb

Negative Form: Subject + Did + Not + Base Form Verb

Question Form: Did + Subject + Base Form Verb?

Pronoun	Affirmative	Negative	Question
I	I walked	I did not walk	Did I walk?
You	You walked	You did not walk	Did you walk?
We	We walked	We did not walk	Did we walk?
They	They walked	They did not walk	Did they walk?
He/She/It	He/She/It walked	He/She/It did not walk	Did he/she/it walk?

Affirmative:

She watched a movie yesterday.

They played soccer last weekend.

Negative:

I did not eat sushi for dinner.

He didn't visit the museum.

Question:

Did you go to the party last night?

Did she finish her homework on time?

Exercise 5: Fill in the blank parts of the sentence using the word in brackets in the Past Simple tense.

1. Last night, I _____ my PC to play some games. (use)
2. You _____ a good technician for my desktop, no matter what others say. (be)
3. She _____ all the important documents on her hard drive. (lose)
4. The people at the office _____ very hard to bring us these spreadsheets. (work)
5. When i was a child, I _____ a stick that I used to bring everywhere. (find)
6. This teacher _____ us to never throw away old versions of files. (teach)
7. Where _____ you _____ it away? (throw)
8. The scientists at the lab _____ with powerful generators all the time. (experiment)
9. This stationary computer _____ with me for 9 years. (be)
10. These books about control systems _____ me much about computer technologies. (show)

Present Perfect

The **Present Perfect Tense** is a verb tense used to describe actions or events that have a **connection to the present**, even though they occurred in the past.
Formed with the auxiliary verb "**have**" or "**has**" (depending on the subject) and the past participle of the main verb.
Affirmative Form (Positive): Subject + Have/Has + Past Participle Verb
Negative Form: Subject + Have/Has + Not + Past Participle Verb
Question Form: Have/Has + Subject + Past Participle Verb?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I have eaten	I have not eaten	Have I eaten?
You	You have walked	You have not walked	Have you walked?
We	We have traveled	We have not traveled	Have we traveled?
They	They have studied	They have not studied	Have they studied?
He/She/It	He/She/It has seen	He/She/It has not seen	Has he/she/it seen?

Affirmative:

She has visited Paris several times.

They have completed the project.

Negative:

I have not read that book yet.

He hasn't finished his assignment.

Question:

Have you ever been to Japan?

Has she met the new manager?

Exercise 6: Transform the following sentences from Past Simple into Present Perfect.

1. I read a book last night.
2. It went very bad a few days ago.
3. They knew the computer was faulty.
4. Our luck ran out when we attempted to go swimming.
5. He saw too many sci fi movies to be fooled into believing the machine.

Exercise 7: Determine which of the following sentences is in the Past Simple Tense and which is in the Present Perfect Tense.

1. I knew this was a very bad idea.
2. I have told you before that your computer is terrible at digital computing.
3. We have spoken before about this smartwatch, have we not?
4. There were not many people who knew i always played video games.
5. I sat by her as she explained what an embedded computer was.

Reading

Exercise 8: Read the text and translate the words in bold text. Transform 5 Present Simple sentences into the Past Simple Tense, or, if possible Present Perfect.

Analog and digital computers are two different types of computers, and they work in unique ways. **Analog computers** use **continuous signals**, like electrical voltages, to process information. They are good at tasks that involve measurements and real-world data, such as monitoring temperatures or controlling machinery. On the other hand, **digital computers** use **discrete signals**, like **binary code** (0s and 1s), to process information. They are versatile and can handle a wide range of tasks, from calculations to running software.

Hybrid computers combine features of both analog and digital computers. They use **analog sensors** to gather data and then process it digitally. This makes them suitable for tasks like scientific simulations and real-time control systems.

There are more types of digital computers in the modern world than there are analog computers, for example, all modern PCs, laptops, smartphones, etc, are digital. However, there are also other types of digital computers which are connected to the ones previously mentioned. **Mainframe computers** are large and powerful machines used by big organizations for tasks like managing large databases and handling multiple users simultaneously. **Minicomputers** are smaller and less powerful than mainframes but are still quite capable, they include PCs, laptops and smartphones. **Workstation computers** are high-performance machines used by professionals for tasks like **3D modeling**, scientific research, and **graphic design**. They are more powerful than regular personal computers.

In summary, analog computers use continuous signals, digital computers use discrete signals, hybrid computers combine both, mainframes are large and powerful, minicomputers are smaller but capable, and workstations are high-performance computers used by professionals. Each type serves specific purposes in the world of computing.

Exercise 9: Read the text again and determine whether the following statements are True (T) or False (F).

1. Analog computers are excellent for tasks that involve measurements and real-world data.
2. Workstation computers are typically less powerful than minicomputers.
3. Hybrid computers process data digitally but use continuous signals for data input.
4. Digital computers employ discrete signals, such as binary code, for data processing.
5. Workstation computers are not typically used by professionals for tasks like graphic design and 3D modeling due to their higher performance.

Vocabulary

Exercise 10: Please fill in the blanks with the most appropriate word from the box.

stationary, embedded, mobile, laptop, supercomputer, smartwatch, analog, mainframe, workstation, hybrid

1. I have worked with many _____ computers inside vehicles.
2. I have never seen a more useful piece of technology than this _____ on my wrist.
3. I often work with _____ computers, they're incredibly complex, because they combine features of two different types of machines.
4. _____ computers are exceptional at measuring real world data.
5. My home PC can be considered a _____ computer, even though it isn't.
6. I bring my _____ everywhere, it's so useful to have a computer always on hand.
7. A smartphone is just a small, _____ computer.
8. Nasa uses _____ to put people on the moon.
9. That _____ computer is pretty big, isn't it? Its database must be huge.
10. I often 3D model using my _____ at the office, but i also do it at home sometimes.

Speaking

Exercise 11: Please act out a presentation from the point of view of a worker trying to convince his boss to buy and install multiple workstation computers in the office. Explain the pros of having them.

I would like to begin by saying...

Workstation computers are better than normal desktops because...

3D modeling is the future of...

We must always look towards improving our...

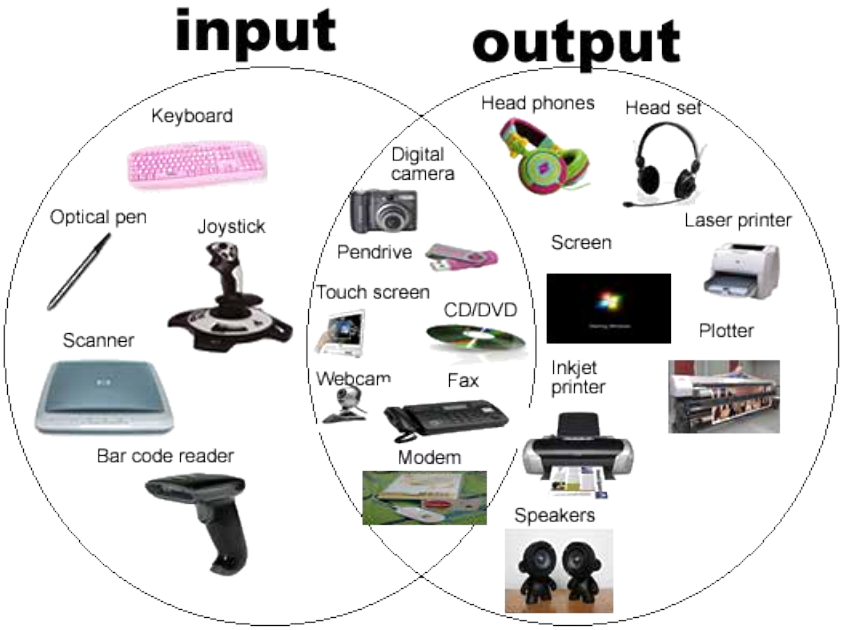
I believe that...

Thank you for your attention, I hope you consider my proposal.

Writing

Exercise 12: Please write 8-9 lines of dialogue between two friends, arguing whether a smartphone is a personal computer or a mobile computer.

Unit 3: I/O Devices



Introduction

Exercise 1: Before reading the text, please answer the following questions:

1. What are I/O devices?
2. Which I/O devices can you name?
3. What are I/O devices used for?
4. Are there different types of I/O devices? If so, what are they?
5. Which I/O devices have you personally connected to a computer?

Reading

Exercise 2: Read the text and translate the words in bold text.

Input and output (I/O) **devices** are essential components of computer systems that allow us to interact with and **perceive** information from our machines. Among these devices, **monitors** and **headphones** play **crucial roles** in how we engage with computers.

Monitors come in various types, with two common categories being **cathode-ray tube (CRT)** and **liquid crystal display (LCD)** monitors. CRT monitors were once widely used but have largely been replaced by LCD monitors, which are thinner,

more **energy-efficient**, and offer better image quality. There are also different sizes and resolutions available, allowing users to choose a monitor that suits their needs, whether it's for everyday tasks, gaming, or professional work like graphic design or **video editing**.

Headphones, on the other hand, provide an **audio output** for our computers. They offer a private listening experience and come in various designs, including **over-ear**, **on-ear**, and **in-ear** headphones. Additionally, there are **wired** and **wireless** options, each with its advantages. **Audiophiles** might opt for **high-end** headphones for superior sound quality, while gamers might choose headphones with **built-in microphones** for online communication during gameplay.

Both monitors and headphones enhance our computer experiences by providing visual and audio **feedback**, making them essential tools for work, entertainment, and communication in the digital age. Users can select the type and model that best fits their preferences and requirements to enjoy a more personalized computing experience.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. Input and output devices are components that allow us to process information.
2. Monitors come in CRT and LCD types.
3. There are only over-ear and on-ear headphones.
4. Audiophiles love high-end headphones, while gamers prefer to have ones with microphones.
5. Both monitors and headphones provide feedback.

Exercise 4: Name the following input/output devices and describe what they do when in contact with a computer.

Grammar

Articles

Articles are small words in the English language that are used before nouns to specify whether the noun is referring to something specific or something non-specific. There are **three** main types of articles: "the" (definite article), "a" or "an" (indefinite articles) and "zero article".

Indefinite Articles "a" and "an":

"A" and "an" are used when you are referring to a **non-specific** or **generic thing**.

Examples:

"I saw a cat in the garden." (referring to any cat, not a specific one)

"She bought an apple." (referring to any apple, not a specific one)

When to Use "a" vs "an":

Use "a" before words that begin with **consonant** sounds (e.g., a book, a dog, a car).

Use "an" before words that begin with **vowel** sounds (e.g., an apple, an umbrella, an hour).

Definite Article "the":

"The" is used when you are referring to a **specific** or **particular thing** that both the speaker and the listener are aware of or have in mind.

Examples:

"I saw the cat in the garden." (referring to a specific cat that both the speaker and the listener know)

"Please pass me the book." (referring to a specific book that is known to both the speaker and the listener)

Zero Article:

Sometimes, no article is used before a noun. This is known as the "zero article."

Used for **general statements** or when the noun is considered a category or concept.

Used with **proper nouns** (names of specific people, places, or things).

Examples:

"Cats are cute animals." (referring to cats in general)

"London is a beautiful city." (using the name of a specific city, London)

"I saw Mary at the park." (using the name of a specific person, Mary)

Exercise 5: Please fill in the gaps with the proper article (a, an, the, zero)

1. I am very happy that _____ monitors i requested have arrived.
2. There is no way I am going to use _____ CRT monitor in 2023.
3. _____ LCD type of monitor is more efficient and useful than _____ CRT type.
4. I wear _____ headphones in order to have privacy with my music.
5. There are many advantages to having _____ good, separate microphone, but most gamers prefer built-in microphones.

Exercise 6: Please choose which article fits the following sentences best.

1. I am very happy to have _____ LCD monitor.

A. a

B. an

C. the

D. zero

2. Video editing is incredibly important, thus you must choose _____ best monitor money could buy.

A. a

B. an

C. the

D. zero

3. There is no chance I will ever choose _____ wrong headphones, I just know it.

A. a

B. an

C. the

D. zero

4. Why would I ever want to have _____ built-in microphone?

A. a

B. an

C. the

D. zero

5. There is _____ big difference between in-ear headphones and on-ear headphones.

A. a

B. an

C. the

D. zero

Reading

Exercise 7: Read the excerpt and translate the words in bold text.

Input and output (I/O) devices are crucial components that enable us to communicate with computers and receive information from them. Besides monitors and headphones, there are several other types of I/O devices that serve various purposes. **Keyboards** are essential input devices that allow us to type text and commands into computers. They come in different layouts, such as **QWERTY**, **AZERTY**, and

DVORAK, and often include additional features like **function keys** and **multimedia controls**.

Mice and **touchpads** are pointing devices that help us navigate the computer's **graphical user interface**. These devices translate our physical movements into on-screen actions, making it easy to click, drag, and **interact** with software.

Printers are output devices that create physical copies of digital documents. There are various types of printers, including **inkjet**, **laser**, and **dot matrix printers**, each suited for different printing needs, from high-quality photos to bulk text documents.

Scanners are input devices used to convert physical documents, photos, or objects into digital formats. They are valuable for **digitizing** paperwork, **archiving** photos, and creating digital designs from hand-drawn sketches.

These I/O devices, along with monitors and headphones, form a comprehensive ecosystem that enables us to interact with computers effectively, whether it's for work, communication, creativity, or entertainment. Each device serves a unique purpose, contributing to the versatility and usability of modern computing systems.

Exercise 8: Please answer the following questions according to the excerpt.

1. What are the different layouts of keyboards?

A. QWERTY, AZERTY, DVORAK

B. AZERTY, ASDFG, ZXCVB

C. QWERTY, SERTY, LAVERTY

D. DVORAK, STORAK, KORAK, LORAK

2. What are mice used for in regards to computers?

A. To help create the GUI

B. To help navigate the GUI

C. To help destroy the GUI

D. To aid in recovering the GUI

3. What are some other I/O devices besides keyboards, mice, printers and scanners, as mentioned in the excerpt?

A. joysticks

B. controllers

C. fax machines

D. touchpads

Vocabulary

Exercise 9: Please fill in the blanks with the most appropriate words from the box.

monitors, video editing, audiophile, CRT, QWERTY, GUI, printer, archiving, touchpad, built-in

1. I have a _____ at home, but it has no ink, so I can't help you.
2. There are many _____ to choose from these days, including ultra-wide ones.
3. Most phones these days have _____, rather than keyboards.
4. If you work in a media company, you must be skilled in _____.
5. I am an avid _____, I collect all kinds of headphones.
6. This _____ is not very comfortable, all the icons are messed up and the graphics are weird.
7. This mouse has a _____ keyboard on the side.
8. The keyboard I have at home has a _____ layout
9. Back in the 2000s, I had a _____ monitor, it was very big and heavy.
10. This program is very useful for _____ files in case of computer crashes.

Speaking

Exercise 10: Please choose a partner and act out a dialogue from the point of view of a customer and a shop clerk. Discuss various I/O devices.

Hello, I would like to ask if you have...

Of course! We have a wide variety of...

I want to buy...

Do you have any preference for...?

There are so many various...

Would you like some help with...?

Which device would you recommend?

Thank you for your purchase.

Writing

Exercise 11: Please write 8-9 sentences about the pros and cons of different types of I/O devices and other types of periphery.

Unit 4: Storage Devices

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What are storage devices?
2. What are storage devices used for?
3. What types of storage devices do you know?
4. Why are storage devices important for modern computers?
5. Are modern storage devices different from the ones used in the past?

Reading

Exercise 2: Read the text and translate the worlds in bold text.

The development of computer memory **storage devices** has been a remarkable journey, marked by constant innovation and evolution. Understanding this history helps us appreciate the diverse range of storage **options** available today.

One of the earliest forms of computer memory storage was the **punched card**, used in the late 19th century for **data processing** and **programming**. These cards had holes punched in them to **represent** data, and they were fed into machines to read and **manipulate** information. As technology advanced, **magnetic tape** emerged as a popular storage medium in the mid-20th century. It allowed for **sequential data access** and was commonly used for backup and archival purposes.

The 1950s brought us the **hard disk drive (HDD)**, a significant milestone in storage technology. The HDD used magnetic platters to store data, and it offered faster access times and larger capacities compared to earlier methods. Over the decades, HDDs continued to evolve, becoming smaller, more reliable, and capable of storing vast amounts of data.

In the late 1970s, the era of **floppy disks** began. These flexible, portable magnetic disks were used for data storage and transfer. Meanwhile, the development of **Compact Discs (CDs)** and **Digital Versatile Discs (DVDs)** in the 1980s and 1990s revolutionized data storage and entertainment. CDs and DVDs relied on **optical** technology to read and write data, enabling the storage of multimedia content, software, and more.

The 21st century saw the rise of **solid-state drives (SSDs)**, which use **flash memory** to store data. SSDs are faster, more durable, and energy-efficient compared to traditional HDDs, making them a preferred choice for many modern devices.

Today, we have an array of storage options, from traditional HDDs and SSDs to **cloud storage**, **USB drives**, and advanced optical discs like **Blu-ray**. The history of computer memory storage devices showcases the relentless pursuit of innovation and capacity, enabling us to store and access information more conveniently and efficiently than ever before.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. Punched cards were only used for programming, not memory storage.
2. Magnetic tape was a popular storage medium in the mid-20th century.

3. The HDD has remained stagnant since its creation.

4. Floppy disks were created in the 2000s and are still used today.

5. SSD stands for super solid disks.

Exercise 4: Name the storage devices in the following image, try to name storage devices that do not appear in the image.

Grammar

Degrees of comparison: Adjectives

Adjectives in English can have different degrees of comparison, which allow us to describe the level or extent of a quality or characteristic. There are three main degrees of comparison for adjectives: positive, comparative, and superlative. They use different methods to create their forms, depending on how many syllables there are in the adjective.

Monosyllabic (1 syllable) adjectives are compared with the endings "-er, -est".

positive	**comparative**	**superlative**
strong	strong**er**	the strong**est**
small	small**er**	the small**est**
late	late**r**	the late**st**

nice	nic**er**	the nic**est**
big	bigg**er**	the bigg**est**
thin	thinn**er**	the thinn**est**
fat	fatt**er**	the fatt**est**

Disyllabic (2 syllables) adjectives ending with "y, er, ow, le" are compared with "-er, -est". With the ending "-y" turning into "-ier, -iest".

positive	**comparative**	**superlative**
eas**y**	eas**ier**	the eas**iest**
happ**y**	happ**ier**	the happ**iest**
clever	clever**er**	the clever**est**
narrow	narrow**er**	the narrow**est**

All other adjectives are compared with **more, the most**.

positive	**comparative**	**superlative**
careful	**more** careful	**the most** careful
expensive	**more** expensive	**the most** expensive
difficult	**more** difficult	**the most** difficult
tired	**more** tired	**the most** tired
terrible	**more** terrible	**the most** terrible

There are also several words which use irregular comparison forms:

positive	**comparative**	**superlative**
good	better	the best
bad	worse	the worst

much	more	the most
many	more	the most
little	less	the least

We use the **second degree of comparison** in order to compare things between each other, for example:

My dress is **more beautiful** than yours.

This cat is **faster** than my friend's.

We use the **third degree of comparison** in order to say that something is the best in some way, described by the adjective, for example:

My dress is **the most beautiful**.

This cat is **the fastest**.

Exercise 5: Please put the word in brackets into the proper form.

1. SSDs are a lot _____ than CDs and DVDs. (fast)
2. USBs are the _____ form of portable data storage. (useful)
3. Floppy disks are much _____ than magnetic tape. (good)
4. There is no denying the fact that a DVD is _____ than a CD. (spacious)
5. Some computers use their storage devices in a _____ way than others. (efficient)
6. A CD is _____ than a floppy disk, but a DVD is _____. (good, useful)
7. He uses punched cards for data processing _____ than for programming (often)
8. Cloud storage is _____ type of storage for programmers, but SSDs and HDDs are _____ . (useful, widespread)
9. There are many types of RAM, each has a _____ name than the last. (long)
10. DDR5 is _____ than DDR4. (rare)

Exercise 6: Please choose the most fitting option to complete the following sentences.

1. He went home without ever choosing which type of memory storage is _____.

A. the best

B. the goodest

C. the betterest

D. gooder

2. QWERTY keyboards are much _____ than any other type.

A. more common

B. commoner

C. commonest

D. more commander

3. A mouse is _____ for many people than a touchpad.

A. comfortabler

B. the most comfortable

C. comfortable

D. more comfortable

4. The history of memory storage is much _____ than the history of the mouse.

A. interesting

B. interestinger

C. most interesting

D. more interesting

5. A built-in microphone is _____ way to talk in online chats.

A. cheaper

B. the cheapest

C. more cheaper

D. cheapest

Exercise 7: Please write down the degrees of comparison for the following adjectives:

fast, private, incredible, experienced, stupid, easy, little, refreshing, volatile, comfortable, floppy

Reading

Exercise 8: Read the text and translate the words in bold text. Find and write down all degrees of comparison of adjectives used here.

Memory is a fundamental aspect of any computer, and it plays a crucial role in how a computer processes and stores data. When we talk about computer memory, one of the primary types we encounter is **Random Access Memory (RAM)**. RAM is where the computer stores data that it's actively using for tasks and operations. There are various types of RAM, each with its characteristics and use cases.

DRAM (Dynamic Random Access Memory): DRAM is one of the most common types of RAM. It's known for its relatively high **capacity** and **affordability**. DRAM stores data in capacitors, which need to be constantly refreshed to maintain the data. This dynamic nature means it's fast but also **volatile**, meaning that it loses its data when the computer is **powered off**.

SRAM (Static Random Access Memory): SRAM is faster and more expensive than DRAM. Unlike DRAM, SRAM doesn't require constant **refreshing** to **maintain** data. It's often used in CPU caches and other high-speed memory applications. SRAM is volatile, just like DRAM.

DDR SDRAM (Double Data Rate Synchronous Dynamic Random Access Memory): DDR SDRAM is a type of DRAM that **synchronizes** with the computer's **bus speed**, allowing for faster **data transfer rates**. It's commonly used in desktops and laptops and comes in various generations, such as **DDR3, DDR4, and DDR5**, with each generation offering improved performance and efficiency.

ECC RAM (Error-Correcting Code RAM): ECC RAM is a specialized type of RAM designed to detect and correct **errors** in data. It's often used in servers and workstations where data accuracy is critical, but it's also more expensive than regular RAM.

LPDDR (Low-Power Double Data Rate Synchronous Dynamic RAM): LPDDR is a type of mobile RAM designed for power efficiency. It's commonly used in

smartphones, tablets, and other battery-powered devices, as it consumes less energy while providing reasonable performance.

Each type of RAM serves a specific purpose, balancing factors like speed, capacity, and power consumption. Computer systems often use a combination of these RAM types to optimize performance for different tasks and applications. Understanding the characteristics of each type of RAM is crucial for building and configuring a computer that meets your specific needs.

Exercise 9: Please answer the following questions according to the excerpt.

1. What type of memory is RAM?

A. Random Assessment Memory

B. Random Access Memory

C. Real Access Memory

D. Relative Access Memory

2. Which of the following types of RAM is used in CPU caches?

A. SRAM

B. DRAM

C. DDR SDRAM

D. ECC RAM

3. What is RAM used for?

A. To store long term memory

B. To store general memory

C. To store memory for active tasks and operations

D. To store synchronized memory

Vocabulary

Exercise 10: Please connect the following abbreviations with their full forms.

HDD	Random Access Memory
CD	Solid-State Drive
DVD	Compact Disc
SSD	Static Random Access Memory
RAM	Low-Power Double Data Rate Synchronous Dynamic RAM

DRAM	Error-Correcting Code Random Access Memory
SRAM	Double Data Rate Synchronous Dynamic Random Access Memory
DDR SDRAM	Dynamic Random Access Memory
ECC RAM	Digital Versatile Disc
LPDDR	Hard Disk Drive

Speaking

Exercise 11: Please act out a presentation about various types of memory storage, when they were created and the approximate amount of memory they can hold in the modern day.

I would like to speak about...

Memory storage history is...

In the 1950s...

Now, this type of memory storage can store...

The current best type of long term memory storage is...

RAM is...

Writing

Exercise 12: Please write a short text (8-9) sentences explaining the benefits of different types of long term memory storage and which ones you would work the most with in robotics.

Module 1 Test

Task 1 - Translate the following sentences into Ukrainian.

1. I deal with various types of computers and computer-integrated technologies.

2. There is no software or hardware I cannot repair.

3. IT specialists and computer engineers have different jobs and specialties.

4. There is a lot of data to process in this algorithm.

5. I have had a lot of experience with theoretical quantum computers.

Task 2 - Fill in the gaps.

1. I _____ not to use stationary computers because I believe laptops are better.

A. chose B. choose C. chosen D. choste

2. An _____ computer uses continuous electrical signals to do its work.

A. analogous B. analog C. digited D. digital

3. I do ____ modeling on my workstation, but I play games on my PC.

A. 3D B. 4D C. 5D D. D

4. I have three monitors, though one of them is a(n) _____, rather than an LCD.

A. CTR B. CRT C. Liquid D. Solid

5. The best audio comes from _____ headphones, but only audiophiles use them.

A. high-end B. in-ear C. wireless D. low-end

6. My keyboard is a _____ layout, the most widely used layout in the world.

A. QWERTY B. AZERTY C. DVORAK D. ZXCVBN

7. I have a(n) _____ printer at home, but it requires so much ink...

A. laser B. inkjet C. injket D. matrix

8. I have several methods of storage on my PC, the oldest being my _____.

A. SSD B. CD C. HDD D. floppy

9. There are so many types of _____ that it almost makes my head spin.

A. RAM B. ROM C. RIM D. DIMM

10. If you are confused about what kind of computer to get, ask a(n) _____.

A. engineer B. IT specialist C. fan D. author

Task 3 - Write a dialogue between two computer engineers, arguing whether HDD storage is better than SSD storage (12 lines of dialogue).

Module 2 - Internet and Computers

Unit 5: Inside the Case

Introduction

Exercise 1: Before reading the text, answer the following questions.

1. What is a case in the context of a computer?
2. What are the types of hardware that can be inside of a computer case?
3. Which types of such hardware are the most vital?
4. Which types of computer hardware have you dealt with before?
5. Do different computer cases require different types of hardware?

Reading

Exercise 2: Read the text and translate the words in bold text.

Building a computer by hand is a rewarding and educational experience that allows you to understand the **essential** hardware components inside a computer case or laptop. These components work together to bring your computer to life and perform various tasks. Here are some of the key hardware components you'll encounter in the process:

The **motherboard** is like the heart of the computer. It's a large circuit board that houses the **CPU (Central Processing Unit)** and connects all the other components. The CPU is the brain of the computer, responsible for executing instructions and calculations. Choosing the right CPU is crucial as it determines your computer's processing power.

The **GPU (Graphics Processing Unit)** is responsible for **rendering** images and videos. While CPUs can handle graphics tasks, a dedicated GPU is essential for gaming and graphic-intensive applications. You can install a GPU separately or choose a motherboard with **integrated graphics**.

The **power supply unit (PSU)** is often overlooked but is a **critical component**. It supplies electricity to all the other hardware components. It's essential to select a PSU with sufficient **wattage** to support your components and ensure stable and reliable performance.

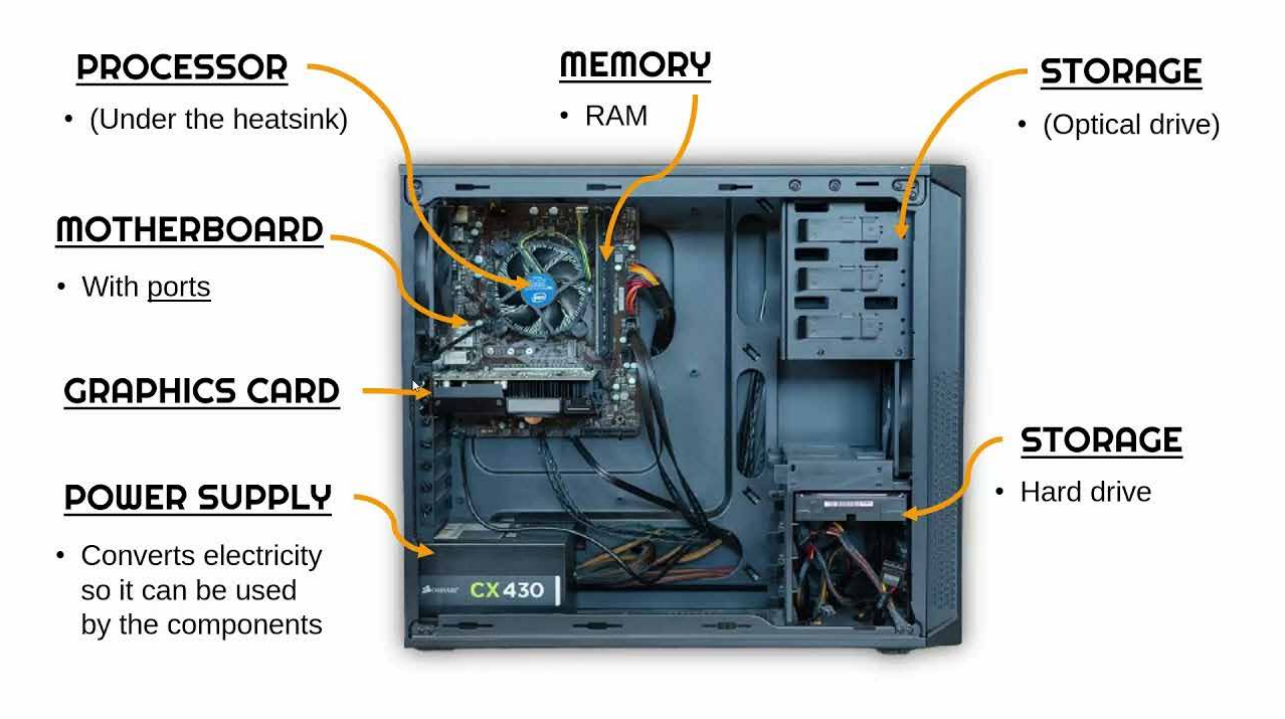
When building a computer by hand, you'll also encounter RAM (Random Access Memory), storage drives (such as SSDs and HDDs), cooling solutions (like fans or liquid cooling), and various peripheral connections like **USB ports** and **audio jacks**. Assembling these components carefully and following the manufacturer's guidelines is key to creating a functioning computer that suits your needs.

Building a computer by hand allows you to customize your machine for specific tasks, whether it's gaming, content creation, or general productivity. It's a hands-on experience that provides a deeper understanding of how computers work and the role each hardware component plays in the overall system.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F).

1. The motherboard often includes the CPU inside its circuits.
2. The CPU is the graphical processor of a computer.
3. The GPU is responsible for rendering images and videos.
4. The PSU is the most critical component of a computer, as it provides power to the entire system.
5. Memory systems such as HDDs, SSDs and RAM are also vital for the computer.

Exercise 4: Place the items inside the case in the following image in proper order of installation.



Grammar

Pronouns, personal and possessive pronouns

Pronouns are words that replace nouns in sentences to avoid repetition and make the language more concise and clear. There are various types of pronouns, including personal pronouns of subject, object and possessive.

Subject pronouns	Object pronouns	Possessive pronouns

I	Me	Mine
You	You	Yours
We	Us	Ours
They	They	Theirs
He	Him	His
She	Her	Hers
It	It	Its

Subject pronouns are used as the subject of the sentence, usually in the first position.
"**I** am happy"
Object pronouns are used as the object of the sentence, usually after the main parts of the sentence.
"I want to talk to **you**."
Possessive pronouns are often accompanied by possessive adjectives, which are formed from regular pronouns much like possessive pronouns. Whereas possessive pronouns are used individually, relying on context to complete their meaning, possessive adjectives require the use of a noun immediately after.

Possessive pronouns	**Possessive adjective**
Mine	My
Yours	Your
Ours	Our
Theirs	Their
His	His
Hers	Her
Its	Its

I ate my **food** slowly, but you ate all of **yours** quickly. (we use the possessive pronoun to avoid repeating the word 'food')

Exercise 5: Please put the appropriate pronoun forms in the missing parts of the following sentences:

1. _____ CPU is much better than his, but he might have a better GPU. (I)

2. The cat put _____ paws on _____ PSU, good thing it was powered down. (it, I)

3. She bought _____ keyboard on sale, I bought _____ full price. (she, I)

4. My computer case has many USB ports, _____ doesn't. (you)

5. There are many people who use CRT monitors, _____ computers must be very old. (they)

Exercise 6: Please choose the appropriate pronouns:

1. There are many ways I could use the RGB lighting here, but I don't want _____ computer to be too bright.

A. mine

B. my

C. I

D. me

2. When were _____ going to tell me you got a new GPU?

A. your

B. yours

C. you

D. you're

3. This monitor is _____, but that one is _____.

A. my, yours

B. mine, your

C. my, your

D. mine, yours

4. She built this PC with _____ own hands, it is _____.

A. she, her

B. hers, her

C. her, hers

D. hers, she

5. The statistics show that there are many people who consider _____ computers sentient.

A. there

B. there's

C. theirs

D. their

Reading

Exercise 7: Read the text, translate the words in bold text. Find every use of personal pronouns in this text and explain them.

As I **embarked** on the **journey** of making a computer by hand, I was determined to add some **non-standard** hardware components to create a unique and personalized machine. The process felt like a digital adventure, with each component adding its own flavor to the build.

First, I decided to include a custom **RGB** LED lighting system. While not essential for the computer's functionality, it added a touch of **aesthetics** and **personalization**. I carefully wired and programmed it, allowing me to change colors and patterns, turning my computer into a **mesmerizing** light show.

Next, I opted for an unconventional **cooling solution**. In addition to the standard **fans**, I integrated a **liquid cooling system**, complete with vibrant, glowing coolant. This not only kept the temperatures low but also added an element of **science fiction** to the build. Watching the liquid flow through **transparent** tubes was strangely satisfying.

To enhance audio quality, I included a high-end **sound card**. While **onboard** audio is decent, this dedicated card elevated my computer into a music lover's paradise. The crystal-clear sound and support for various audio formats made my computer a haven for audiophiles.

Lastly, I couldn't resist adding a small, secondary **display** on the side panel of the case. This miniature screen displayed real-time system **statistics** and even a scrolling **marquee** with custom messages. It was both functional and a conversation starter. Building a computer by hand allowed me to infuse my personality into every component. These non-standard additions transformed my computer into a unique work of art, blending form and function in a way that perfectly suited my tastes and needs.

Exercise 8: Please answer the following questions according to the text.

1. What kind of technology is used for computer lighting?

A. lightbulbs

B. RGB LED

C. GPD LED

D. strobe lights

2. Which types of cooling solutions were outlined in the text?

A. fans, liquid cooling

B. solid cooling

C. noctua fans

D. transparent fans

3. Which non-standard piece of technology did the text mention?

A. graphics card

B. CPU

C. sound card

D. fans

Vocabulary

Exercise 9: Please use the following words with their synonyms or non-abbreviated forms.

CPU GPU	customization go

PSU	unusual
critical	audio card
non-standard	water cooling
embark	graphics card
liquid cooling	processor
sound card	cooler
cooling solution	vital
personalization	power supply

Speaking

Exercise 10: Please act out a conversation between two friends about what kinds of main and additional hardware they installed in their PCs.

Hey, what kind of GPU did you...?

I installed a...

I got a cool cooler...

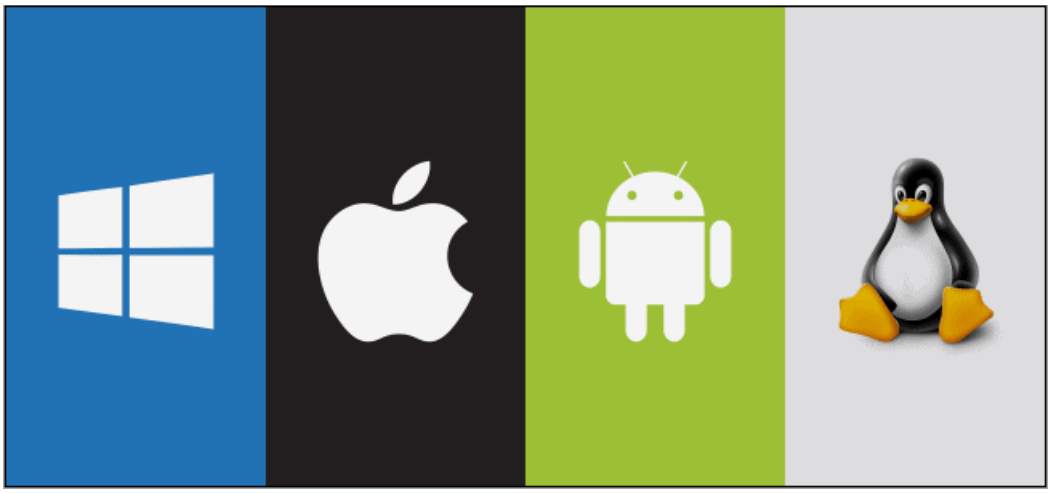
For non-standard hardware, I installed...

My sound card/liquid cooler/RGB is...

Writing

Exercise 11: Please write a text (10 sentences) about the benefits of non-standard hardware in a computer, and how these types of hardware can be used in robotics.

Unit 6: Operating systems



Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What is an operating system?
2. Which operating systems do you know?
3. Which operating system do you prefer?
4. What are the advantages and disadvantages of different operating systems?
5. Is an operating system required to work with a computer or computer-like machinery?

Reading

Exercise 2: Read the text and translate the words in bold text.

Operating systems (OS) are the software that manage a computer's hardware and provide a user-friendly **interface** for running applications and managing files. There is a diverse range of operating systems available today, each catering to specific needs and preferences.

One of the most widely used operating systems in the world is **Microsoft Windows**. Versions like Windows 10 and Windows 11 are popular choices for personal computers, offering a user-friendly interface, broad **software compatibility**, and extensive hardware support. Windows is favored by many for its versatility and **familiarity**.

For those who prefer an **open-source** alternative, **Linux** is a prominent choice. Linux comes in various distributions or "**distros**," such as **Ubuntu**, **Fedora**, and **CentOS**. Linux is known for its stability, security, and flexibility, making it a preferred option for servers and developers. It's also used on embedded systems and Android devices.
MacOS is the operating system developed by **Apple** exclusively for its **Macintosh** computers. It's praised for its **sleek** design, performance, and **seamless** integration with other Apple devices. macOS is known for its user-friendly interface and is favored by creative professionals.
Chrome OS, developed by **Google**, is designed for lightweight laptops called **Chromebooks**. It's a **web-centric** operating system that relies heavily on **cloud-based** applications and services. Chrome OS is fast, secure, and suitable for users who primarily use web-based apps and services.
For servers and **enterprise environments**, **Unix** and its derivatives like **FreeBSD** and **Solaris** remain strong contenders. These operating systems are valued for their robustness, scalability, and security features.
Lastly, mobile operating systems like **iOS** for Apple devices and **Android** for a wide range of smartphones and tablets are dominating the mobile market. They offer vast app ecosystems and are designed for touch-based interfaces.
These are just a few examples of the many operating systems available today, each with its strengths and suitable applications. The choice of an operating system depends on the specific needs and preferences of users, whether for personal computing, development, servers, or mobile devices.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F):

1. An operating system has nothing to do with hardware, it only operates software.
2. There are no operating systems other than Windows.
3. Linux is an open source operating system.
4. Apple uses Windows in their computers

5. Servers use ChromeOS in order to remain competitive.

Exercise 4: Tell what you know of the operating systems in the following image.

Grammar

Past Continuous

The Past Continuous, also known as the Past Progressive, is a verb tense used to describe actions or events that were ongoing or in progress at a specific point in the past.

Formed with the past tense of the auxiliary verb "to be" (was/were) and the base form of the main verb with "-ing" added.

Affirmative Form (Positive): Subject + Was/Were + Base Form Verb + -ing

Negative Form: Subject + Was/Were + Not + Base Form Verb + -ing

Question Form: Was/Were + Subject + Base Form Verb + -ing?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I was eating	I was not eating	Was I eating?
You	You were walking	You were not walking	Were you walking?
We	We were playing	We were not playing	Were we playing?
They	They were studying	They were not studying	Were they studying?
He/She/It	He/She/It was reading	He/She/It was not reading	Was he/she/it reading?

Examples:

Affirmative:

"I was reading a book yesterday at this time."

"They were watching a movie when I called."

Negative:

"He was not listening to music during the meeting."

"We weren't eating dinner when the power went out."

Question:

"Were you studying English when I phoned?"

"Was she working late last night?"

Exercise 5: Please transform the following sentences from Present Continuous or Past Simple into Past Continuous.

1. I used the operating system all day.
2. I am developing my program on Windows, due to a variety of support offered.
3. Developers designed various Linux distros to get away from the monopoly of Windows.
4. ChromeOS relied on cloud-based systems in order to work.
5. Mark is using his iPhone every day without knowing it uses iOS as an operating system.

Exercise 6: Please put the word in brackets into the correct Past Continuous form.

1. I _____ this device for 3 years before it broke. (use)
2. _____ it _____ as intended, or did it somehow malfunction? (work)
3. The smartphone's OS _____ the entire time I _____ it. (load, hold)
4. IBM's OS _____ new ground in the 1960s. (break)
5. In the 1970s, operating systems _____ at a breakneck speed. (develop)
6. Throughout the second half of the 20th century, most developers _____ for the top spot on the OS market. (compete)

7. My friend _____ a personalized Linux distro until he realized how difficult it was. (make)
8. They _____ to avoid using Windows, but it was becoming harder and harder. (try)
9. My cat _____ on top of my laptop for hours. (sleep)
10. I _____ with happiness when i got my new computer. (jump)

Exercise 7: Please transform the following sentences into questions and negative sentences.
1. Frank was using the computer all day.
2. The OS was working without a problem.
3. IBM were making many different operating systems in the 60s and 70s.
4. I was developing a new GUI for Windows when I worked for Microsoft.
5. They were celebrating the milestone we achieved in robotics.

Reading

Exercise 8: Read the text and translate the words in bold text. Find Past Simple and Past Continuous Tenses, transform them into each other and explain their uses.

The history of operating systems is a tale of **continuous** evolution. In the 1950s, the earliest computers were enormous machines that required constant manual configuration. During this time, computer scientists were developing **rudimentary** operating systems to help manage these massive behemoths. These early systems were basic and primarily focused on hardware control.
In the 1960s, operating systems started to take shape in a more recognizable form. **IBM**'s OS/360, for instance, was a **groundbreaking** development, designed to work across a range of hardware platforms. During this period, programmers were continuously refining and expanding operating systems to provide better user experiences.

The 1970s marked a significant **milestone** with the advent of multitasking operating systems. This allowed computers to run multiple programs **simultaneously**. Innovations like UNIX, developed at Bell Labs, and **CP/M**, the precursor to **MS-DOS**, were pivotal during this era. Progress was continuous, and operating systems were becoming more user-friendly and efficient.

By the 1980s, personal computers were on the rise, and operating systems like MS-DOS and the Apple Macintosh System Software were becoming prevalent. This decade witnessed the development of graphical user interfaces (GUIs), like the one introduced by Apple's Macintosh. The battle for user-friendly operating systems was in full swing, with continuous improvements in GUI design and functionality.

In the 1990s, Microsoft Windows and various flavors of Unix and Linux were vying for dominance. Continuous advancements in hardware and software during this period paved the way for the modern operating systems we use today. The history of operating systems reflects a journey of continuous development, where each era contributed to the ever-improving computing experiences we enjoy today.

Exercise 9: Please answer the following questions according to the text.

1. Which operating system was the most groundbreaking development of the 1960s?

A. Linux

B. OS/360

C. CP/M

D. OS X

2. Which OS developed from CP/M?

A. IBM

B. CP/B

C. GUI

D. MS-DOS

3. Which OS introduced the concept of a GUI to common computers?

A. Macintosh

B. Windows

C. Linux

D. Ubuntu

Vocabulary

Exercise 10: Please fill the missing parts of the following sentences with the words in the box.

groundbreaking, milestone, MS-DOS, rudimentary, Google, open-source, interface, operating system, sleek, compatibility

1. He made a _____ discovery that advanced his career forward by 20 years.
2. He had _____ open the entire time the quiz was going, unbeknownst to his friends.
3. The company was going for a _____ design with this new phone, trying to reinvent the market.
4. The first computers only had a _____ OS, nothing like what we have today.
5. This _____ is worse than Windows in every way imaginable, it has no compatible apps!
6. _____ was being called the most impressive OS of its era, competing only with Macintosh
7. The graphical _____ in this new OS is incredibly impressive, even my grandma could use it!
8. Why do we consider every new generation of phone a _____?
9. Windows is not a(n) _____ OS, since Microsoft prefers to keep their technology secret.
10. Most programs have built-in _____ with Windows, not any other OS.

Speaking

Exercise 11: Please act out a dialogue between two people, one who prefers Windows, and one who prefers Linux. Make arguments for and against both operating systems.

I believe that Windows is…

Well Linux is more…

Many programs are made for…

There is no denying that…

I think you might be right, but…

I feel more comfortable with…

Writing

Exercise 12: Write about the history of your favourite operating system, its milestones, its current use and its potential future developments. (10-12 sentences).

Unit 7: Internet

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What is the internet, in your own words?
2. How important is the internet in the modern world?
3. What do you use the internet for?
4. What do you know about the creation of the internet?
5. What kind of websites do you use?

Reading

Exercise 2: Read the text and translate the words in bold text.

The history of the internet is a **fascinating** journey that began in the 1960s. In those early days, researchers were working on building a **network** that could connect computers and share information. **ARPANET**, the **precursor** to the modern internet, was established in 1969, connecting four universities. During this time, researchers were experimenting with various **protocols** and technologies.

In the 1970s, the ARPANET expanded further, and electronic mail (**email**) became one of the first practical applications of this evolving network. People were sending messages electronically, and the concept of "**cyberspace**" was taking shape.
By the 1980s, the internet was growing rapidly. More universities, research institutions, and eventually, businesses and **government agencies** joined the network. During this decade, the development of the **World Wide Web (WWW)** by Tim Berners-Lee in 1989 marked a significant **milestone**. It allowed for the creation of websites and the browsing of information in a more **user-friendly** way.
The 1990s witnessed explosive growth as the internet became accessible to the general public. Web browsers like **Netscape Navigator** and **Internet Explorer** emerged, making it easier for people to explore the web. **E-commerce** started to take off, forever changing the way people shopped and conducted business.
Throughout this period, advancements in technology were occurring rapidly, and the internet was continually evolving. This history of the internet is quite **dynamic** in nature, with many events and developments that have shaped the internet into the global **phenomenon** it is today. It is a truly **transformative** journey for the world.
Exercise 3: Read the following statements and determine whether they are True (T) or False (F)
1. The Internet began in 1940s, when ARPANET was created.
2. The concept of “cyberspace” was taking shape in the 1960s.
3. WWW was a significant milestone in the development of what we know as the modern Internet.
4. Internet Explorer was the first created as a way to explore the deep web.
5. The concept of E-commerse really took off in the 90s.

Exercise 4: Name some of the websites in the following image, explain what they are used for and why they may be important for engineering.

Grammar

Future Simple

The Future Simple Tense can be expressed in two common forms: the "**will**" form and the "**be going to**" form. Both are used to talk about actions or events that will happen in the future.

Will Form

Used to express actions or events that will happen in the future and are **not planned or certain**.

Formed with the modal verb "will" followed by the base form of the main verb.

Affirmative Form (Positive): Subject + Will + Base Form Verb

Negative Form: Subject + Will + Not + Base Form Verb (contracted as "won't")

Question Form: Will + Subject + Base Form Verb?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I will travel	I won't travel	Will I travel?
You	You will study	You won't study	Will you study?
We	We will work	We won't work	Will we work?
They	They will play	They won't play	Will they play?
He/She/It	He/She/It will eat	He/She/It won't eat	Will he/she/it eat?

Examples:

Affirmative:

"She will visit her grandmother tomorrow."

"We will meet at the park in the evening."

Negative:

"I won't be late for the appointment."

"They won't forget to bring the snacks."

Question:

"Will you join us for dinner tonight?"

"Will it rain tomorrow?"

Be going to Form

Used to express actions or events that are **planned or intended to happen** in the future.

Formed with the subject, the present tense of the verb "**to be**" (am, is, are), and "**going to**" followed by the base form of the main verb.

Affirmative Form (Positive): Subject + Am/Is/Are + Going To + Base Form Verb

Negative Form: Subject + Am/Is/Are + Not + Going To + Base Form Verb (contracted as "isn't" or "aren't")

Question Form: Am/Is/Are + Subject + Going To + Base Form Verb?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I am going to travel	I'm not going to travel	Am I going to travel?
You	You are going to study	You're not going to study	Are you going to study?
We	We are going to work	We aren't going to work	Are we going to work?
They	They are going to play	They aren't going to play	Are they going to play?
He/She/It	He/She/It is going to eat	He/She/It isn't going to eat	Is he/she/it going to eat?

Examples:

Affirmative:

"They are going to buy a new car next month."

"I am going to have lunch with Sarah."

Negative:

"She isn't going to attend the conference."

"We aren't going to visit the museum today."

Question:

"Are you going to join the gym?"

"Is he going to finish his project on time?"

Exercise 5: Fill in the blank with the appropriate form of the verb in brackets.

1. I _____ (visit) the new website tomorrow.
2. She _____ (send) an email to her boss later today.
3. We _____ (upgrade) our internet connection next month.
4. They _____ (download) the new software tomorrow morning.
5. He _____ (start) an online course next week.
6. The company _____ (launch) a new website in the near future.
7. Sarah _____ (post) an update on social media tomorrow.
8. We _____ (join) the online meeting in the evening.
9. They _____ (create) a website for their business next year.
10. The students _____ (research) their topics online.

Exercise 6: Rewrite each sentence using the Future Simple Tense, adding the words in the brackets.

1. He checks his email every morning. (tonight)
2. Jane watches movies online on the weekends. (tomorrow)
3. We use social media to keep in touch with friends. (today)
4. They buy books from online bookstores. (next week)
5. The company launches a new app next week. (next month)

6. Sarah posts pictures on Instagram every day. (next morning)
7. He downloads music from the internet. (later)
8. They communicate with their clients through email. (in a few hours)
9. We watch videos on YouTube every evening. (tonight)
10. The students research topics for their projects online. (next weekend)

Exercise 7: Choose the correct verb form to complete each sentence.

1. Tomorrow, he _____ (will browse / browses) the internet for new information.
2. They _____ (are going to upload / uploads) their photos on social media later.
3. We _____ (will download / downloads) the software from the official website.
4. The company _____ (launches / will launch) a new website next month.
5. She _____ (logs in / will log in) to her email account every morning.
6. They _____ (are going to post / posts) a video on YouTube tonight.
7. I _____ (will search / searches) for that article online.
8. Tomorrow, we _____ (are going to update / updates) our website.
9. The students _____ (will research / researches) the topic online for their assignment.
10. He _____ (will share / shares) the link with his friends on social media.

Reading

Exercise 8: Read the text and translate the words in bold text. Find the use of Future Simple Tense and convert them to Present Simple or Present Continuous.

As I plan my daily routine for tomorrow, I can't help but think about how **integral** the internet has become in our lives. It's amazing how **seamlessly** we use popular websites like Google, YouTube, Twitter, and Instagram in our daily activities.

Tomorrow morning, I'll start my day by checking my emails using **Google**. It has become my go-to for both personal and work-related communication. I rely on it to stay organized and connected.

Later in the day, I'll hop over to **YouTube**, where I plan to learn something new. Whether it's a **tutorial**, a documentary, or just some entertaining content, YouTube is my go-to platform for expanding my knowledge and **unwinding**.

Of course, I can't forget **Twitter** and **Instagram**, my favorite **social media** platforms. Throughout the day, I'll use them to keep up with the latest news and **trends**, share updates with friends, and see what the world is up to. The **interactivity** on these platforms is incredible, as I can engage in conversations, share my thoughts, and explore a wide range of content.

The internet has truly transformed the way we live our lives, and these popular websites have become an integral part of our daily routines. Tomorrow promises to be yet another day filled with interactivity and connection, thanks to the digital world at our fingertips.

Exercise 9: Please answer the following questions according to the text.

1. Which of the following websites was mentioned in the text?

A. Google

B. Yahoo

C. Twitch

D. Starlabs

2. What was the plan the person in the text outlined?

A. a work plan for the day

B. a plan for using social media

C. a plan for using the internet

D. a plan for playing with friends.

3. What does the person in the text keep up with using Twitter and Instagram?

A. tutorials

B. documentaries

C. friends

D. trends

Vocabulary

Exercise 10: Please connect the matching terms between the following groups of words.

Internet	YouTube Twitter Instagram ARPANET
Social Media	WWW Google Yahoo Internet Explorer
Search Engine	Netscape Navigator Google Chrome Firefox E-commerse
Web Browser	Cyberspace

Speaking

Exercise 11: Talk about how you use the internet in your daily life, think about the different websites you visit and why you visit them. How often do you use it to gain new knowledge? Which websites do you use for that?

Every morning, I use my phone to check…

I often talk with my friends using…

To learn new things, I use…

There's no way I can ever go through the day without using…

Finishing the day, I go to...

Writing

Exercise 12: Write an email to a friend, talking about a new educational website you found. (10-11 sentences)

Unit 8: Internet Security

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. Why do we need internet security?
2. What is meant by internet security?
3. What are the dangers of the internet?
4. What kinds of internet security have you used?
5. What could happen if you do not use internet security?

Reading

Exercise 2: Read the article, translate the words in bold text.

Internet security is of **paramount** importance in today's digital age. With the increasing reliance on the internet for various aspects of our lives, from communication and banking to shopping and entertainment, **safeguarding** our online presence has become crucial. **Failure** to do so can lead to devastating **consequences**, including **identity theft**, financial loss, and **privacy breaches**.

One of the fundamental ways to protect yourself online is by using strong and unique **passwords** for each of your **online accounts**. Passwords should be complex,

including a combination of **uppercase** and **lowercase letters**, numbers, and special characters. Regularly updating your passwords is also a good practice.

Another critical method is to enable **two-factor authentication (2FA)** whenever possible. This adds an extra **layer** of security by requiring you to provide two forms of verification, typically something you know (your password) and something you have (a **verification code** sent to your mobile device).

Keeping your software and operating systems up-to-date is essential. Software updates often include security patches that address vulnerabilities that **hackers** might exploit. **Neglecting** updates can leave your system exposed to **cyber threats**.

Additionally, exercise caution when clicking on **links** or **downloading** attachments from unfamiliar sources, as these can contain **malware**. Installing reputable **antivirus** and **anti-malware** software can help protect against these threats.

Regularly backing up your important data is another crucial aspect of internet security. In case of a security breach or **data loss**, having **backups** ensures that you can recover your information without much hassle.

Finally, educate yourself about common online **scams** and **phishing** attempts. Being aware of these tactics and recognizing warning signs can help you avoid falling victim to cyberattacks.

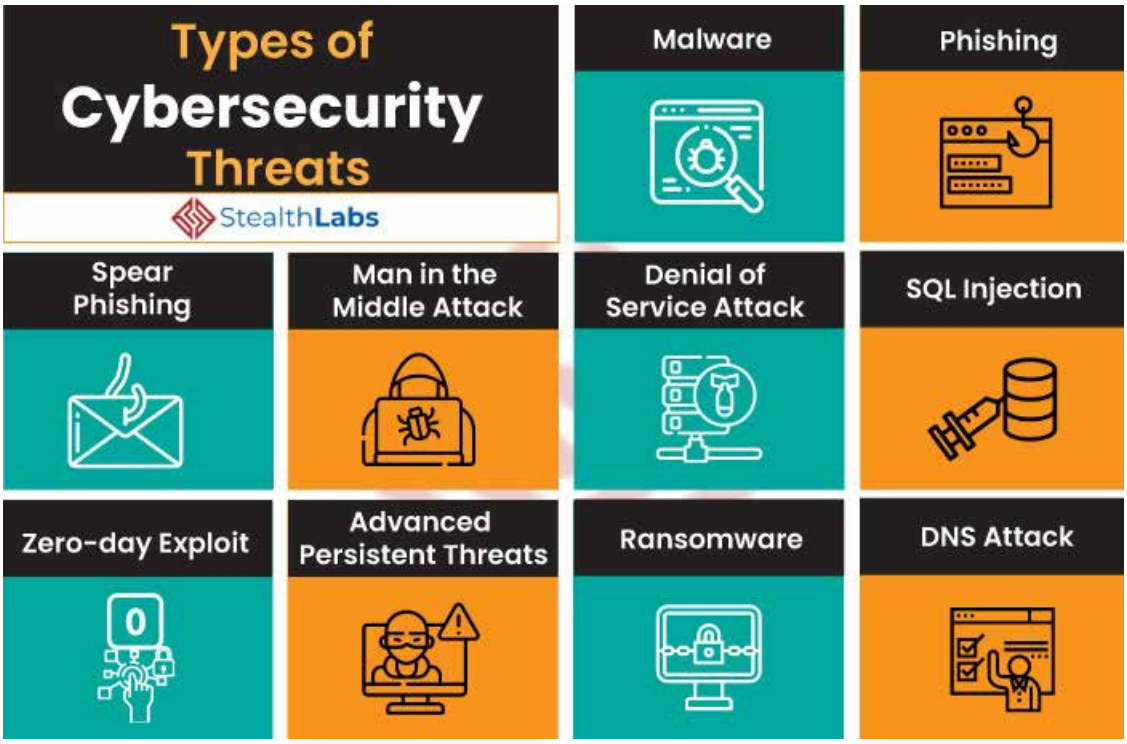
In a world where we are increasingly **interconnected**, internet security is not just a matter of personal safety but also a shared responsibility. By taking these precautions and staying vigilant, you can protect yourself and contribute to a safer online environment for everyone.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F).

1. Internet security is incredibly important, because your identity could be stolen.
2. Passwords are the most important tool for protecting your internet life.
3. Up-to-date systems are more vulnerable to hackers.
4. Links from unknown sources are a notorious source of malware.

5. Knowledge of scams is vital to protecting your computer.

Exercise 4: Look at the following image and try to provide examples for some of these cybersecurity threats. Provide examples of which measures can protect you from them.



Grammar

Future Continuous

The Future Continuous Tense, like the Future Simple Tense, can also be expressed using both the "will" form and the "be going to" form. It is used to describe actions or events that will be in progress at a specific point in the future.

Will Form

Used to express actions or events that will be happening in the future at a specific moment or over a period of time.

Formed with the modal verb "will," the auxiliary verb "be," and the base form of the main verb with "-ing" added.

Affirmative Form (Positive): Subject + Will + Be + Base Form Verb + -ing

Negative Form: Subject + Will + Not + Be + Base Form Verb + -ing (contracted as "won't be")

Question Form: Will + Subject + Be + Base Form Verb + -ing?

Pronoun	Affirmative	Negative	Question
I	I will be studying	I won't be studying	Will I be studying?
You	You will be working	You won't be working	Will you be working?
We	We will be traveling	We won't be traveling	Will we be traveling?
They	They will be sleeping	They won't be sleeping	Will they be sleeping?
He/She/It	He/She/It will be playing	He/She/It won't be playing	Will he/she/it be playing?

Examples:

Affirmative:

"She will be studying all evening tomorrow."

"We will be working on the project during the conference."

Negative:

"I won't be attending the party tonight."

"They won't be using the old equipment anymore."

Question:

"Will you be waiting for me at the airport?"

"Will he be playing the guitar at the concert?"

Be going to Form

Used to express actions or events that are planned or intended to be in progress at a specific point in the future.

Formed with the subject, the present tense of the verb "to be" (am, is, are), "going to," and the base form of the main verb with "-ing" added.

Affirmative Form (Positive): Subject + Am/Is/Are + Going To + Be + Base Form Verb + -ing

Negative Form: Subject + Am/Is/Are + Not + Going To + Be + Base Form Verb + -ing (contracted as "isn't going to" or "aren't going to")

Question Form: Am/Is/Are + Subject + Going To + Be + Base Form Verb + -ing?

Pronoun	Affirmative	Negative	Question
I	I am going to be studying	I'm not going to be studying	Am I going to be studying?
You	You are going to be working	You're not going to be working	Are you going to be working?
We	We are going to be traveling	We aren't going to be traveling	Are we going to be traveling?
They	They are going to be sleeping	They aren't going to be sleeping	Are they going to be sleeping?
He/She/It	He/She/It is going to be playing	He isn't going to be playing	Is he going to be playing?

Examples:

Affirmative:

"They are going to be rehearsing for the play tomorrow evening."

"I am going to be working on my project during the weekend."

Negative:

"She isn't going to be using her car next month."

"We aren't going to be attending the seminar."

Question:

"Are you going to be waiting for the train at the station?"

"Is he going to be playing in the football match?"

Exercise 5: Fill in the blank with the appropriate form of the verb in brackets.

1. Our IT team _____ (monitor) our network for potential threats tomorrow.
2. Hackers _____ (attempt) to breach our system during the weekend.
3. They _____ (implement) stronger password policies next month.
4. I _____ (update) our anti-malware software in the upcoming days.
5. The cybersecurity experts _____ (investigate) the recent data breach tomorrow.

6. She _____ (install) a VPN to enhance her online security measures.
7. We _____ (review) our backup systems for any potential vulnerabilities.
8. The company _____ (safeguard) customer data against identity theft.
9. Hackers _____ (target) unsuspecting users through phishing scams.
10. Users who _____ (neglect) their security practices may face severe consequences.

Exercise 6: Rewrite each sentence using the Future Continuous Tense while adding the words in the brackets.
1. Internet security is getting more important. (in the future)
2. We should safeguard our personal information online. (next week)
3. They download files from secure sources. (tonight)
4. Password protection started to sound crucial to prevent identity theft a while ago. (next month)
5. The company installs anti-malware software on all devices. (tomorrow)
6. She ignores suspicious links in emails. (next week)
7. We should encrypt our data to protect it from hackers. (within, next month)
8. They regularly update their antivirus software. (tonight)
9. Online scams grow as a problem every day. (soon)
10. Users need to learn risks of spyware. (too late)

Exercise 7: Choose the correct verb form to complete each sentence.
1. Tomorrow, the IT team _____ (will be monitoring / monitors) network traffic for any potential breaches.
2. They _____ (will be safeguarding / safeguard) customer data with advanced encryption techniques.
3. We _____ (will be updating / update) our antivirus software regularly.
4. The company _____ (will be implementing / implements) multi-factor authentication next month.

5. He _____ (will be downloading / downloads) important files from trusted sources.
6. Users _____ (will be neglecting / neglect) their security practices at their own risk.
7. I _____ (will be installing / install) a VPN for secure internet access.
8. Tomorrow, we _____ (will be reviewing / review) our firewall settings for any potential vulnerabilities.
9. The IT department _____ (will be investigating / investigates) the recent security breach.
10. They _____ (will be educating / educate) employees on phishing scams and how to avoid them.

Reading

Exercise 8: Read the email, translate the words in bold text. Find mentions of specific VPN, anti-malware and antivirus programs, replace them with other ones you know.

Subject: Strengthening Our Internet Security
Hi Jack,
I hope you're doing well! I wanted to touch base and share some insights on internet security. In today's digital landscape, safeguarding our online presence has never been more important. Fortunately, there are some excellent tools out there that can help us stay safe.
First, I've been using a **VPN (Virtual Private Network)** application called ExpressVPN. It's been a game-changer for me. A VPN encrypts your internet connection, making it incredibly difficult for anyone to intercept your data. It's perfect for protecting your privacy when you're on public **Wi-Fi networks** or when you simply want to browse the web **anonymously**.
In addition to a VPN, I've also installed reliable anti-malware and antivirus programs. Malwarebytes has been my go-to anti-malware software, and it does a great job at

detecting and removing various types of malicious software, including viruses, **spyware**, and **ransomware**. For antivirus protection, I'm using Norton Antivirus, which provides real-time threat detection and helps block malicious websites.
These programs are like **digital shields** for our devices. They protect us against a wide range of online threats, including phishing attempts, malware downloads, and viruses that can **corrupt** our **files** and steal our personal information.
I believe that investing in these internet security tools is essential in today's world. They give us peace of mind while we browse, shop, and communicate online. I highly recommend considering these options to enhance your online security.
Let's catch up soon and **chat** more about this. Stay safe online!
Warm regards,
Jane

Exercise 9: Please answer the following questions according to the information in the email.

1. What does VPN stand for?

A. Virtually Protected Nation

B. Virtual Protection Network

C. Virtual Private Network

D. Virtually Powered Netbook

2. Which of the following does a VPN allow you to do?

A. browse the internet

B. be anonymous online

C. download unknown links

D. decrypt files

3. What does anti-virus and anti-malware software do besides protect you from viruses?

A. decode secure information

B. decrypt code

C. detect spyware

D. put the computer on standby

Vocabulary

Exercise 10: Connect the following words with their definition.

1. antivirus
2. VPN
3. malware
4. identity theft
5. internet security
6. hacker
7. password
8. scam
9. corrupt file
10. anonymous

A. A person who gains unauthorized access to computer systems or networks for various purposes, including security testing and malicious activities.

B. A fraudulent scheme or deceptive action intended to deceive or defraud.

C. A secret combination of characters or symbols used for authentication and access control.

D. Software that protects computer systems from viruses, malware, and other threats by scanning and removing malicious code.

E. The fraudulent acquisition and use of someone else's personal information for financial gain or other illegal activities.

F. A file that has become damaged or altered in a way that prevents it from being properly accessed or used.

G. A secure network connection that allows users to access the internet privately and securely.

H. Without a known identity or source, often used to describe actions or communications that hide the identity of the sender.
I. Malicious software designed to harm, compromise, or gain unauthorized access to computer systems.
J. Measures and practices designed to protect internet-connected systems and data from threats and vulnerabilities.

Speaking

Exercise 11: Please act as a speaker at a presentation about internet security, recommend various ways to protect your internet life, various accounts, and your personal computer.
The internet is a dangerous place…
There are many viruses, malware, and…
In order to protect yourself, you must…
There is no replacing…
I recommend…

Writing

Exercise 12: Please write a dialogue between two people discussing whether anti-virus or anti-spyware protection is more important in the modern world, and whether you need anything more than the bare minimum of protection. (11-12 sentences)

Module 2 Test

Task 1 - Translate the following sentences into Ukrainian.

1. What kind of CPU do you have on your motherboard? And what's your PSU?

2. Which operating system do you tend to use? I use Linux for its customization.

3. The internet was first developed as a military spy network.

4. There is a lot of adware on the internet, you really need a security system.

5. My code has been infected with viruses, can anyone help me?

Task 2 - Fill in the gaps.

1. The _____ determines how well your computer performs graphical tasks.

A. CPU B. GPU C. RAM D. PSU

2. Nobody has used a(n) _____ for a few decades now.

A. video card B. audio card C. wifi card D. network card

3. The OS best known for compatibility has always been _____.

A. Windows B. Linux C. MacOS D. Android

4. The oldest known commercial OS developed is _____.

A. UNIX B. CP/M C. OS/360 D. OS/X

5. My _____ cooler is way better than some analog fan!

A. solid B. air C. solidus D. liquid

6. The internet began with a system called _____, which was an experiment.

A. ARPANET B. Dark web C. WWW D. ARPAWEB

7. _____ is the most popular search engine in the world.

A. Yahoo B. ChatGPT C. Google D. Goggle

8. There may well not be a better place for tutorials than _____.

A. YouTube B. Instagram C. Facebook D. Tiktok

9. You must have _____ if you really want to secure your account.

A. 2FD B. 2FA C. 3FD D. 3FA

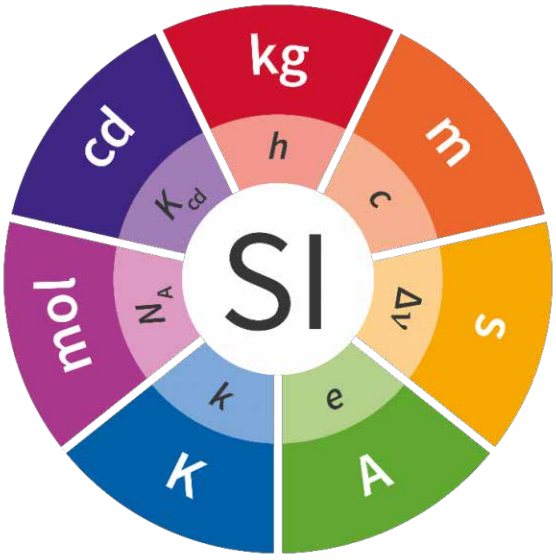
10. You neglected to tell me your computer was infected with _____.

A. good vibes B. malware D. links D. weeds

Task 3 - Write an email to a friend, detailing your experience with various types of antiviruses and anti-malware programs (15 sentences).

Module 3 - Introduction to Automation

Unit 9: Units of measurement in computer engineering, automation and robotics



Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What types of measurement systems do you know?
2. Which measurements can be done in computer engineering?
3. Which units of measurement do you know?
4. What are the most commonly used prefixes used in these measurements?
5. What is the most common measurement of memory storage in the modern day?

Reading

Exercise 2: Read the text and translate the words in bold text.

In computer engineering, robotics, and automation, precise units of measurement are crucial for standardization, accuracy, and consistency in design, development, and operation. Here are some fundamental units commonly used in these fields:

Bits and **Bytes**: These are the most basic units of data measurement. A "bit" represents the smallest unit of information and can either be a 0 or a 1. Eight bits

make up a "byte," which is the standard unit for measuring file sizes, memory capacity, and data transfer rates.

Hertz (Hz): Hertz measures **frequency** and is often used in describing the **clock speed** of processors and the frequency of signals in communication systems. **Gigahertz** (GHz) is commonly used to denote billions of cycles per second in CPU clock speeds.

Volts (V) and **Amperes** (A): These units measure electrical voltage and current, respectively. They are essential for understanding the power supply requirements in electronic circuits and robotics systems.

Ohms (Ω): Ohms measure electrical resistance. In robotics and automation, Ohm's law (V = I * R) is used to calculate voltage, current, and resistance in electrical components and circuits.

Watts (W): Watts represent electrical power and are used to quantify the rate of energy consumption or production. In computer engineering and automation, it's essential to determine power requirements for devices and systems.

Meters (m): The meter is the standard unit for measuring distance and length in the **International System of Units (SI)**. It is used extensively in robotics to define the physical dimensions of robotic arms, sensors, and other components. This of course also includes **centimeters** and further measurements of length when precision is required.

Degrees **Celsius** (°C): Temperature measurement in degrees Celsius is essential for monitoring and controlling the operating temperature of computer systems, processors, and robotics components.

Newton (N): The Newton is a unit of **force** used in robotics to describe the forces exerted by motors, actuators, and sensors. Understanding these forces is crucial for designing robots that can move and interact with their environment effectively.

Radian (rad): Radians are used to measure angles in robotics and automation. They provide a more natural way to describe **rotational motion** and position, especially in control algorithms.

Seconds (s): Time measurement in seconds is vital for synchronization, timing, and scheduling in robotics and automation systems. Accurate timing is critical for tasks such as motion control and sensor data acquisition.

These units of measurement form the foundation of computer engineering, robotics, and automation. Engineers and developers rely on these standards to ensure precision, compatibility, and reliability in their designs and systems, enabling the seamless integration of technology into various applications.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. A byte is composed of four bits.
2. Gigahertz (GHz) is commonly used to measure the storage capacity of computer systems.
3. Ohms (Ω) are used to measure electrical current in robotics and automation.
4. Watts (W) are used to quantify the rate of energy consumption or production in computer engineering.
5. Radians (rad) are units of measurement used for timing and scheduling in robotics and automation systems.

Exercise 4: Look at the image and speak on the difference between the decimal and binary systems of measuring data storage.

Multiple-byte units V·T·E

Decimal			Binary				
Value	Metric		Value	IEC		Legacy	
1000	kB	kilobyte	1024	KiB	kibibyte	KB	kilobyte
1000^2	MB	megabyte	1024^2	MiB	mebibyte	MB	megabyte
1000^3	GB	gigabyte	1024^3	GiB	gibibyte	GB	gigabyte
1000^4	TB	terabyte	1024^4	TiB	tebibyte	TB	terabyte
1000^5	PB	petabyte	1024^5	PiB	pebibyte		–
1000^6	EB	exabyte	1024^6	EiB	exbibyte		–
1000^7	ZB	zettabyte	1024^7	ZiB	zebibyte		–
1000^8	YB	yottabyte	1024^8	YiB	yobibyte		–

Orders of magnitude of data

Grammar

Future Perfect, Future Perfect Continuous

The **Future Perfect Tense** is used to describe actions or events that will be **completed in the future before another action** or event takes place. It emphasizes the completion of an action at a specific point in the future.

Used to describe actions or events that will be completed in the future before a specific point or action occurs.

Formed with the auxiliary verb "will have" or "shall have" (less commonly used) and the past participle of the main verb. Much like all previous future tenses, it can also be created with the form "be going to"

Affirmative Form (Positive): Subject + Will have/be going to have + Past Participle Verb

Negative Form: Subject + Will not have/be not going to have + Past Participle Verb (contracted as "won't have")

Question Form: Will/be + Subject + Have/going to have + Past Participle Verb?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I will have finished I am going to have finished	I won't have finished I'm not going to have finished	Will I have finished? Am I going to have finished?
You	You will have learned You are going to have learned	You won't have learned You aren't going to have learned	Will you have learned? Are you going to have learned?
We	We will have completed We are going to have completed	We won't have completed We aren't going to have completed	Will we have completed? Are we going to have completed?
They	They will have eaten They are going to have eaten	They won't have eaten They aren't going to have eaten	Will they have eaten? Are they going to have eaten?

He/She/It	He/She/It will have arrived He/She/It is going to have arrived	He/She/It won't have arrived He/She/It isn't going to have arrived	Will he/she/it have arrived? Is he/she/it going to have arrived?

Examples:

Affirmative:

"By this time next year, I will have completed my degree."

"They are going to have finished their meal before the movie starts."

Negative:

"I won't have finished reading the book by tomorrow."

"She isn't going to have learned all the new vocabulary words by the end of the week."

Question:

"Will you have completed the project by the deadline?"

"Is he going to have arrived at the airport before you leave?"

Exercise 5: Fill in the blank with the appropriate form of the verb in brackets, as well as the unit of measurement most fitting according to the situation in the sentence.

1. By the end of the month, the data transfer rate _____ (reach) 10 _____ per second.
2. Next year, the temperature in the city _____ (rise) to 40 degrees _____.
3. By tomorrow, the circuit _____ (complete) its test. Its resistance will measure 50 _____.
4. In a week, the power consumption of the device _____ (reduce) to 5 _____.
5. By next month, the frequency of the radio signal _____ (increase) to 5 _____.
6. After a year of training, the runner _____ (cover) a distance of 1 _____.
7. By the end of the experiment, the voltage across the circuit _____ (reach) 100 _____.
8. Next week, the length of the cable _____ (extend) to 200 _____.
9. By tomorrow, the force applied to the object _____ (exert) 50 _____.

10. In a month, the time interval between events _____ (elapse) for 20 _____.

Exercise 6: Choose the correct verb form to complete each sentence, as well as the unit of measurement most fitting according to the situation in the sentence.

1. By next week, the computer's storage capacity _____ (will have increased / will increase) to 1 _____.
2. The frequency of the signal _____ (will have reached / will reach) 2 _____ by tomorrow.
3. The resistance in the circuit _____ (will have measured / will measure) 500 _____ by the end of the experiment.
4. By the time the repair is completed, the voltage _____ (will have reached / will reach) 220 _____.
5. In a month, the power consumption of the device _____ (will have decreased / will decrease) to 10 _____.
6. By the end of the race, he _____ (will have covered / will cover) a distance of 10 _____.
7. The temperature _____ (will have dropped / will drop) to -10 degrees _____ overnight.
8. I'm sure that I _____ (will have completed / will complete) the experiment within five hours.
9. By next year, the company aims to achieve data transfer rates of 1 _____ (megabyte / megahertz) per _____.
10. She believes that she _____ (will have exerted / will exert) a force of 50 _____ by the end of the workout.

The **Future Perfect Continuous Tense** is used to describe actions or events that **will have been ongoing for a duration up to a specific point in the future**. It emphasizes both the duration of an action and its completion before another action or event in the future.

Used to describe actions or events that will have been in progress for a duration leading up to a specific point or action in the future.
Formed with the auxiliary verb "will have been" and the base form of the main verb with "-ing" added. Like all other future tenses, it can also be formed with the form "be going to"
Affirmative Form (Positive): Subject + Will have been/be going to have been + Base Form Verb + -ing
Negative Form: Subject + Will not have been/be not going to have been + Base Form Verb + -ing (contracted as "won't have been")
Question Form: Will/be + Subject + Have been/going to have been + Base Form Verb + -ing?

Pronoun	**Affirmative**	**Negative**	**Question**
I	I will have been working I am going to have been working	I won't have been working I'm not going to have been working	Will I have been working? Am I going to have been working?
You	You will have been studying You are going to have been studying	You won't have been studying You aren't going to have been studying	Will you have been studying? Are you going to have been studying
We	We will have been traveling We are going to have been traveling	We won't have been traveling We aren't going to have been traveling	Will we have been traveling? Are we going to have been traveling?
They	They will have been cooking They are going to have been cooking	They won't have been cooking They aren't going to have been cooking	Will they have been cooking? Are they going to have been cooking?
He/She/It	He/She/It will have been playing	He/She/It won't have been playing	Will he/she/it have been playing?

	He/She/It is going to have been playing	He/She/It isn't going to have been playing	Is he/she/it going to have been playing?

Examples:

Affirmative:

"By next year, I will have been working here for a decade."

"They are going to have been studying English for six months by then."

Negative:

"I won't have been living in this city for a year yet."

"He isn't going to have been playing the piano for very long."

Question:

"Will you have been waiting for a long time by the time they arrive?"

"Is she going to have been gardening all morning when I visit?"

Exercise 7: Fill in the blank with the appropriate form of the verb in brackets.

1. By the end of the week, she _____ (work) on the project for 50 hours.
2. In a month's time, they _____ (study) the subject for 1000 hours.
3. By next year, the temperature _____ (rise) for 365 days.
4. The speed of light _____ (travel) at a constant rate for billions of years.
5. In two hours' time, he _____ (run) on the treadmill for 120 minutes.
6. By next week, the voltage _____ (fluctuate) between 110 and 220V.
7. The clock _____ (tick) for 24 hours straight by midnight.
8. By the end of the experiment, the weight _____ (decrease) for 10kg.
9. In six months' time, the length _____ (extend) by 1000m.
10. By next month, they _____ (measure) the distance at 50km.

Exercise 8: Choose the correct verb form to complete each sentence.

1. By next year, the company _____ (will have been producing / will have produced) 1 million microchips.

2. The temperature _____ (will have been dropping / will have dropped) to -10 degrees Celsius by tomorrow morning.
3. The volume of the liquid _____ (will have been decreasing / will have decreased) steadily for the past hour.
4. By the end of the day, I _____ (will have been working / will have worked) on the project for 8 hours.
5. In a week's time, they _____ (will have been studying / will have studied) the subject for 50 hours.
6. The weight of the object _____ (will have been increasing / will have increased) steadily since morning.
7. The length of the wire _____ (will have been extending / will have extended) to 10 meters by the end of the month.
8. By next week, the speed of the vehicle _____ (will have been reaching / will have reached) 100 kilometers per hour.
9. In six months' time, the frequency of the signal _____ (will have been fluctuating / will have fluctuated) between 1 and 2 megahertz.
10. By the end of the experiment, the power consumption _____ (will have been decreasing / will have decreased) to 5 watts.

Reading

Exercise 9: Read the text and translate the words in bold text. Use the listed prefixes to transform the words *meter, second* and *gram*.

Measurement precision is crucial, and often, we deal with quantities spanning a wide range. To facilitate this, a system of **prefixes** is used to modify standard units of measurement, making them larger or smaller as needed. Here are some of the most commonly used prefixes:

Kilo- (k): Kilo represents a factor of 1,000. For example, a kilobyte (KB) is 1,000 bytes, and a kilohertz (kHz) is 1,000 hertz.

Mega- (M): Mega signifies a factor of 1,000,000 or one million. A megabyte (MB) is one million bytes, and a megahertz (MHz) is one million hertz.
Giga- (G): Giga denotes a factor of one billion (1,000,000,000). A gigabyte (GB) is one billion bytes, and a gigahertz (GHz) is one billion hertz.
Tera- (T): Tera represents a factor of one trillion (1,000,000,000,000). A terabyte (TB) is one trillion bytes.
Milli- (m): Milli signifies a factor of one-thousandth (0.001). A millisecond (ms) is one-thousandth of a second.
Micro- (μ): Micro denotes a factor of one-millionth (0.000001). A microsecond (μs) is one-millionth of a second.
Nano- (n): Nano represents a factor of one-billionth (0.000000001). A nanometer (nm) is one-billionth of a meter.
Pico- (p): Pico signifies a factor of one-trillionth (0.000000000001). A picosecond (ps) is one-trillionth of a second.
These prefixes allow engineers and scientists to work with a broad range of quantities efficiently. Whether measuring the speed of a processor in gigahertz or the precision of a sensor in **nanometers**, these prefixes help standardize measurements across various domains, ensuring clear communication and consistency in technology-related fields.

Exercise 10: Please answer the following questions according to the text.
1. What does the prefix "Kilo-" (k) represent?
A) one million
B) one billion
C) one thousand
D) one trillion
Which prefix denotes a factor of one million (1,000,000)?
A) Mega- (M)
B) Giga- (G)

C) Tera- (T)

D) Milli- (m)

If a measurement is in nanometers, what does the prefix "Nano-" (n) signify?

A) one billionth

B) one millionth

C) one thousandth

D) one trillionth

Vocabulary

Exercise 11: Please fill in the blanks using the words in the box.

Hertz, ohms, watts, meters, newtons, seconds, radian, SI system, force, nanometers

1. The _____ is a standard framework for scientific measurement.
2. _____ is a unit used to measure angles in circular motion.
3. _____ represent the force exerted by objects like motors and actuators.
4. _____ measure the electrical resistance in circuits.
5. _____ are commonly used units for measuring distance in the International System of Units.
6. _____ quantify the rate of energy consumption or production.
7. _____ measures frequency, often used for describing clock speed or signal frequency.
8. _____ denote a very small unit of length, commonly used in nanotechnology.
9. _____ is a physical quantity measured in newtons.
10. _____ are crucial for precise timing and synchronization in various applications.

Speaking

Exercise 12: Please speak about which measurements you use in your specialty, which ones you believe will be used in the future of automation and robotics and why.

We often use…

This measurement is used because…

In robotics, it's always important to measure…

Using this measurement, we can...

Writing

Exercise 13: Please write a list of measurements you use daily and grade them through a variety of prefixes which fit those measurements. (10-12 measurements)

Unit 10: Theory of computation

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What is the theory of computation?
2. How and why is this theory relevant to modern day computer engineering, robotics and automation?
3. How do we apply this theory in practice?
4. Do you know how this theory developed?
5. What are the main points of the theory?

Reading

Exercise 2: Read the text and translate the words in bold text.

The **theory of computation** is a branch of computer science that delves into the study of algorithms, **computation**, and the limits of what can be computed by machines. It seeks to answer fundamental questions about what problems can be solved **algorithmically**, how efficiently they can be solved, and whether there are limits to what can be computed by any **conceivable** computer.

The history of the theory of computation is a fascinating journey, characterized by contributions from various mathematicians, **logicians**, and computer scientists.

The theory of computation found its foundation in Alan Turing's groundbreaking work in 1936. Turing introduced the concept of a "**Turing machine**," a theoretical construct capable of solving any problem that can be algorithmically computed. His work laid the groundwork for understanding the limits of computation and the notion of "computational universality."

Concurrently with Turing in the 1930s, Alonzo Church developed **lambda calculus** another fundamental concept in the theory of computation. Lambda calculus is a formal system for expressing computation based on functions and variables, and it played a vital role in understanding the principles of computation.

In the 1940s John von Neumann's work on the design of the **stored-program** computer architecture greatly influenced the practical realization of computational devices. His ideas helped bridge the gap between theoretical concepts and practical computing machines.

Complexity theory emerged as a crucial aspect of the theory of computation in the 1970s. Researchers like Stephen Cook and Richard Karp introduced the concept of **NP-completeness**, which focuses on classifying problems based on their computational complexity.

Throughout the 20th century, the theory of computation became a central field of study in computer science, leading to the development of algorithms, formal languages, **automata theory**, and the exploration of computational complexity.

Today, the theory of computation continues to evolve, encompassing areas such as **quantum computing**, **distributed computing**, and more. It plays a vital role in shaping our understanding of the capabilities and limitations of computers, influencing the design of algorithms, programming languages, and the development of new computing **paradigms**.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F).

1. The theory of computation primarily focuses on hardware development.

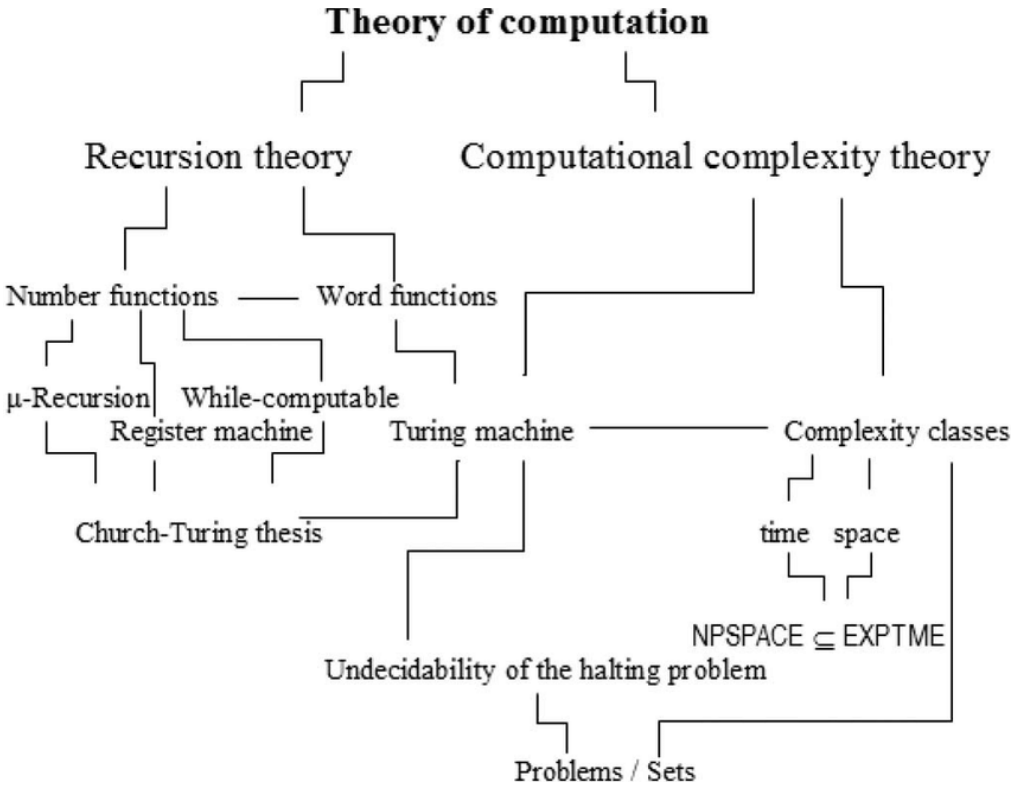
2. Lambda calculus is a formal system for expressing computation.

3. Alan Turing's work laid the groundwork for quantum computing.

4. Complexity theory became significant in the 1970s.

5. The theory of computation is static and doesn't evolve.

Exercise 4: Try to describe the progression of the theory of computation according to the image below.



Grammar

Modal Verbs

Modal verbs are a special category of auxiliary verbs used in English to express a variety of meanings, including **ability, possibility, necessity, permission, requests**, and more. They add nuance to the main verb in a sentence.

"Can" and "Could":

Can: Used to express ability or capability in the present.

Example: "I can swim."

Could: The past form of "can" used for past ability or to make a polite request.

Example: "Could you pass the salt, please?"

"May" and "Might":

May: Used to express permission or possibility.

Example: "You may go to the party."

Might: Used to express a smaller degree of possibility or a more tentative suggestion.

Example: "It might rain later."

"Must":

Used to express necessity, obligation, or strong certainty.

Example: "You must finish your homework."

"Shall" and "Should":

Shall: Used primarily in formal or legal contexts to express future action or make suggestions.

Example: "We shall meet tomorrow."

Should: Used to give advice, make recommendations, or express an obligation that is not as strong as "must."

Example: "You should eat more vegetables."

"Will" and "Would":

Will: Used to express future actions or predictions.

Example: "She will arrive at 3 PM."

Would: Often used as a conditional verb to express a hypothetical situation or a polite request.

Example: "Would you like some tea?"

Additional Forms:

"Ought To":

Used to express moral obligation, duty, or strong recommendation.

Example: "You ought to apologize for your behavior."

"Had Better":

Used to give strong advice or a warning about potential consequences.

Example: "You had better study for the exam if you want to pass."

Modal verbs are versatile and can be used in various ways to convey different shades of meaning in sentences. It's important to understand their specific functions in different contexts to use them effectively in English communication.

Exercise 5: Complete the following sentences by choosing the correct modal verb according to the meaning in the brackets.

1. The theory of computation _____ (will/would) encompass various models and approaches.
(Expressing a definite assertion about the future.)
2. Lambda calculus _____ (can/could) serve as a foundation for functional programming languages.
(Expressing a general capability or possibility.)
3. Quantum computing _____ (shall/should) revolutionize the speed at which certain problems are solved.
(Expressing a strong assertion about a future outcome.)
4. Automation in robotics _____ (can/could) significantly improve efficiency in industrial processes.
(Expressing a general capability or possibility.)
5. NP-completeness _____ (will/would) pose challenges in developing efficient algorithms for specific problems.
(Expressing a definite assertion about the future.)
6. Machine learning _____ (may/might) involve the use of complex algorithms for pattern recognition.
(Expressing a possibility or likelihood.)
7. Meticulous planning _____ (shall/should) underpin the development of cost-effective computational solutions.
(Expressing a strong recommendation or necessity.)
8. The turing machine _____ (can/could) simulate the computation of any algorithmic process.

(Expressing a general capability or possibility.)

9. Artificial intelligence _____ (will/would) play a pivotal role in shaping the future of technology.

(Expressing a definite assertion about the future.)

10. Questions in automata theory _____ (may/might) lead to innovative solutions in computational complexity.

(Expressing a possibility or likelihood.)

Exercise 6: Complete the following sentences by choosing the correct modal verb according to the meaning in the brackets.

1. The paradigm shift in quantum computing _____ (can't/couldn't) be ignored by researchers.

(Expressing the impossibility or inability.)

2. NP-completeness _____ (shouldn't/should) be underestimated when designing algorithms.

(Expressing a recommendation against an action.)

3. Automation _____ (may not/might not) always result in a decrease in labor requirements.

(Expressing the possibility of something not happening.)

4. Meticulous attention to detail _____ (won't/wouldn't) be necessary for all computational tasks.

(Expressing the negation of a future necessity.)

5. Lambda calculus _____ (can't/couldn't) be easily understood without a solid foundation in mathematical logic.

(Expressing the impossibility or inability.)

6. _____ (can/could) the application of lambda calculus extend beyond theoretical computer science?

(Asking about the possibility.)

7. _____ (might/must) cost-effective solutions in computation be achieved without meticulous planning?
(Asking about a necessity.)
8. _____ (might/must) automata theory provide insights into the limits of computation?
(Asking about a possibility.)
9. _____ (will/would) quantum computing fundamentally change the landscape of computational power?
(Asking about a future outcome.)
10. _____ (should/must) machine learning algorithms be deployed in real-world scenarios?
(Asking about the advice.)

Exercise 7: Complete the following sentences by using the correct modal verb according to the meaning in the brackets.
1. Quantum computing _____ rely solely on traditional computational principles.
(Expressing a prohibition or necessity to avoid something.)
2. The turing machine _____ be applicable to certain classes of problems.
(Expressing the possibility of something not happening.)
3. Artificial intelligence solutions _____ disregard ethical considerations.
(Expressing a recommendation against an action.)
4. Computation _____ always provide instantaneous solutions to complex problems.
(Expressing the impossibility or inability.)
5. The theory of computation _____ exclude interdisciplinary perspectives.
(Expressing a prohibition or necessity to avoid something.)
6. _____ the turing machine be considered the theoretical foundation of computation?

(Asking about a general capability.)

7. _____ artificial intelligence eventually surpass human cognitive abilities?

(Asking about a future outcome.)

8. _____ robotics revolutionize the way industries handle automation?

(Asking about a future outcome.)

9. _____ NP-completeness pose challenges for algorithmic efficiency in various domains?

(Asking about the likelihood.)

10. _____ meticulous attention to detail always underpin cost-effective computational solutions?

(Asking about a general recommendation.)

Reading

Exercise 8: Read the excerpt and translate the words in bold text. Find any modal verbs and add modal verbs to 5 sentences that do not have them, use words such as *may, can, might, could, will*, etc.

Ladies and gentlemen,

Today, I'm here to shed light on how the theory of computation, a fundamental concept in computer science, finds its application in the dynamic worlds of automation and robotics. It's a field where innovation and precision are crucial, and the theory of computation serves as the guiding force behind many groundbreaking developments.

In automation, computational theory **underpins** the very **core** of systems that control industrial processes. Automating tasks, such as assembly lines, relies on **sophisticated** algorithms to ensure smooth and efficient operations. These algorithms are designed to optimize processes, manage resources, and adapt to changing conditions, ultimately driving productivity and **cost-effectiveness**.

When we turn our attention to robotics, **computational theory** takes center stage. Robots are essentially complex machines that require **meticulous** planning and programming. The theory of computation enables us to develop algorithms that govern a robot's movements, **decision-making**, and interaction with its environment. These algorithms are responsible for tasks ranging from precise manufacturing in industries to **autonomous** navigation in **self-driving** cars.

Furthermore, as we delve into **artificial intelligence** and **machine learning**, computational theory plays a **pivotal** role in enabling robots to learn and adapt to new situations. These machines can process vast amounts of data and make decisions based on sophisticated algorithms, allowing them to recognize patterns, make predictions, and even engage in natural language understanding.

In conclusion, the theory of computation is the **backbone** of modern automation and robotics. It empowers us to create intelligent and autonomous systems that not only perform tasks more efficiently but also adapt and learn from their experiences. As we continue to push the boundaries of automation and robotics, the theory of computation will remain at the forefront of innovation, shaping the future of these fields.

Exercise 9: Please answer the following questions according to the information in the excerpt.

1. How does the theory of computation contribute to automation in industrial processes?

A. by enhancing artistic creativity.

B. by optimizing processes and managing resources.

C. by exploring natural language understanding.

D. by focusing on historical analysis.

2. What crucial role does computational theory play in the field of robotics?

A. governing weather patterns.

B. facilitating artistic expression.

C. enabling precise movements and decision-making.

D. enhancing taste and smell.

3. In artificial intelligence and machine learning, how does computational theory contribute to robots?

A. by promoting physical fitness.

B. by enabling them to process data and make decisions.

C. by mastering musical composition.

D. by specializing in historical literature.

Vocabulary

Exercise 10: Please fill in the blanks with the appropriate words from the box.

Cost-effective, artificial intelligence, pivotal, autonomous, robotics, backbone, automata theory, turing machine, computation, algorithm

In the realm of modern technology, _____ and machine learning stand as the _____ of innovation, driving the development of autonomous systems and robotics. The integration of _____ solutions has become _____ in expanding the reach of these advanced technologies. AI and ML algorithms inspired by concepts from _____ and the foundational principles of computation, are transforming the landscape of automation.

The _____, a cornerstone of computability theory, serves as a guiding principle in designing _____ that power autonomous machines. This amalgamation of computation and algorithmic intelligence not only propels _____ into new frontiers but also ensures that the deployment of autonomous systems is efficient and cost-effective. As the synergy between _____, automata theory, and advanced algorithms continues to evolve, we witness the seamless integration of AI and ML into everyday life, shaping the future of _____ technologies.

Speaking

Exercise 11: Please speak about the importance of the theory of computation in your field of study, why it is vital and how it affects your outlook.

I believe the theory of…

It is the backbone of…

This theory has been…

Throughout the last century…

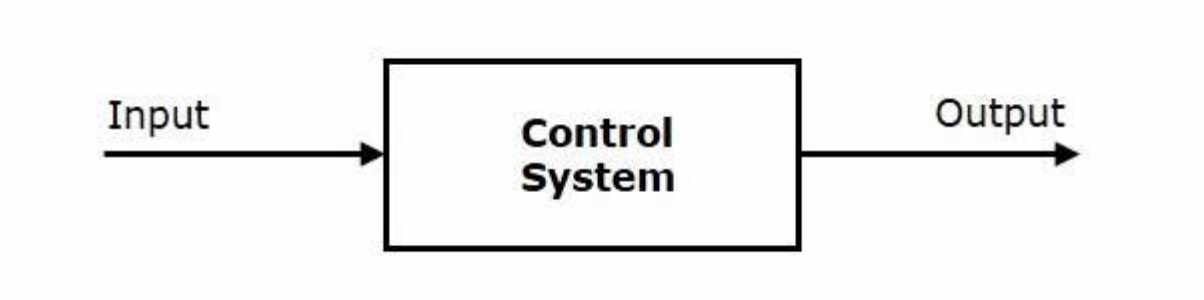
Its influence on robotics…

There is no denying that...

Writing

Exercise 12: Please write a dialogue in which two scientists argue which development in the history of the theory of computation was the most important one. (11-12 lines)

Unit 11: Control systems



Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What are control systems?
2. Why are control systems important?
3. What types of control systems do you know?
4. How is your specialty related to control systems?
5. What does a control system do?

Reading

Exercise 2: Read the text and translate the words in bold text.

A control system is a fundamental concept in technology and engineering that plays a critical role in regulating, managing, and influencing the behavior of various processes and devices. At its core, a control system comprises components that work together to maintain desired conditions or responses within a system, often in the face of external disturbances or variations.

Here are some of the various control systems that exist within the field of technology: **Feedback** Control System: This is one of the most common types of control systems. It continuously monitors the output of a system and compares it to a desired reference value (**setpoint**). If there is any deviation, the system applies **corrective actions** to bring the output back to the desired state. An example is the **thermostat** in your home, which regulates temperature by turning the heating or cooling system on or off as needed.

Open-Loop Control System: Unlike feedback control systems, open-loop control systems do not continuously monitor the output. Instead, they use **predefined** input commands to achieve desired outputs. These systems lack the ability to adjust to changes or disturbances in the system.

Digital Control System: Digital control systems use digital components, such as **microcontrollers** or **digital signal processors (DSPs)**, to manage and process control signals. They offer precise control and can easily incorporate complex algorithms for tasks like data processing or automation.

Analog Control System: Analog control systems, on the other hand, use analog components like operational **amplifiers** and continuous signals to regulate processes. While less precise than digital systems, they are still used in applications where continuous control is necessary.

Hybrid Control System: Hybrid control systems combine elements of both analog and digital control. They leverage the precision of digital components while maintaining continuous control through analog elements.

Adaptive Control System: Adaptive control systems have the ability to adjust their parameters in real-time to account for changes in the system or disturbances. They are commonly used in applications where the environment or system dynamics are variable, such as in **aerospace** or robotics.

Nonlinear Control System: Nonlinear control systems deal with processes where the relationship between inputs and outputs is not linear. These systems require advanced mathematical techniques and algorithms to achieve control objectives.

Predictive Control System: Predictive control systems use predictive models to anticipate future system behavior and make control decisions accordingly. These systems are often used in complex industrial processes where optimizing performance is critical.

Hierarchical Control System: In complex systems, hierarchical control is employed, where multiple layers of control are used to manage various aspects of the system.

This approach ensures that high-level goals are met while addressing specific **subsystem** requirements.

These are just some examples of the diverse control systems in technology. They are integral in applications ranging from manufacturing and robotics to aerospace and automotive industries, enabling precise and automated control of processes and systems.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F).

1. The open-loop control system continuously monitors system outputs.
2. Digital control systems lack the ability to incorporate complex algorithms.
3. Adaptive control systems are commonly used in static environments.
4. Analog control systems use digital components like microcontrollers.
5. Hierarchical control systems involve multiple layers of control.

Grammar

Prepositions of time and place

Prepositions of time and place help provide context and information about when and where an action or event is taking place. They share 3 major prepositions, "at, in, on", here are some examples and explanations for their meanings depending on what they describe.

Prepositions of Time:

At:

Used to specify a precise point in time or a particular time of day.

Example (Time): "I have a meeting at 3 PM."

Example (Time of Day): "They usually have dinner at 7 o'clock."

In:

Used to indicate a general period of time, such as a month, year, season, or a longer duration.

Example (Month): "My birthday is in July."

Example (Year): "They got married in 2020."

Example (Season): "I love skiing in winter."

Example (Longer Duration): "She'll finish her project in a week."

On:

Used to pinpoint a specific date or day of the week.

Example (Date): "Our anniversary is on May 15th."

Example (Day of the Week): "We'll meet on Friday."

During:

Used to indicate a period or range of time.

Example: She studied hard during the exam week.

For:

Used to express the duration of an action or event.

Example: They have been living in the city for five years.

Since:

Indicates the starting point of an action or the beginning of a specific time.

Example: He has been working here since January.

By:

Indicates a deadline or the latest possible time for the completion of an action.

Example: Please submit your report by Friday.

From...to/until:

Indicates the starting and ending points of a particular time period.

Example: The store is open from 9 a.m. to 6 p.m.

Prepositions of Place:

At:

Used to specify a particular point or location.

Example: "I'm waiting for you at the bus stop."

In:

Used to indicate an enclosed or more general area.

Example (Enclosed Space): "He's in the kitchen."

Example (General Area): "They live in a small town."

On:

Used to indicate a surface or a position in contact with a surface.

Example (Surface): "The book is on the table."

Example (Position): "She's sitting on the chair."

Above:

Used to indicate a higher position or level.

Example: The birds were flying above the clouds.

Below:

Indicates a lower position or level.

Example: The treasure chest was buried below the sand.

Under:

Signifies a position beneath or covered by something.

Example: The cat is under the table.

Over:

Indicates a position that is higher or covering.

Example: The plane flew over the mountains.

Between:

Used when something is in the middle of two things or two points.

Example: The park is between the library and the school.

Exercise 4: Fill in the blanks with the correct preposition of time.

1. The seminar is scheduled to start _____ 10 AM.
2. We will be on vacation _____ two weeks.
3. The project must be completed _____ the end of the month.

4. The conference is happening _____ October 15th to 17th.

5. They have been working on the project _____ last Monday.

6. We are planning to meet _____ the morning.

7. The company has been operating _____ 2005.

8. The meeting is scheduled _____ 3 PM.

9. They will be away _____ the weekend.

10. The workshop will take place _____ Friday.

Exercise 5: Fill in the blanks with the correct preposition of place.

1. The thermostat is strategically located _____ the wall.

2. The hybrid control system integrates components both _____ and below the surface.

3. User input is crucial in achieving optimal performance _____ the system.

4. The airplane is flying _____ the clouds.

5. The predefined parameters were set _____ the control panel during the initial stages.

6. The research and development lab is located _____ the cutting-edge technology park.

7. The analog components are usually housed _____ the top layer of the control panel.

8. The digital display is mounted _____ the control panel.

9. The basement is _____ the ground floor.

10. The setpoint is typically defined _____ the initial stages of system design.

Exercise 6: Fill in the blanks with the correct preposition of place and/or time.

1. The advanced layer operates _____ the control system, ensuring precision _____ real-time.

2. The predefined parameters are usually set _____ the control panel _____ the initial stages.

3. The research and development endeavor has been ongoing _____ a decade _____ the cutting-edge technology park.
4. The control system has been operational _____ user input _____ its implementation.
5. The thermostat is strategically placed _____ the center of the room _____ the advanced layer of the control system.

Reading

Exercise 7: Please read the text, translate the words in bold text and use them with the prepositions in the grammar section to create 5 sentences.

Dear Mr Boro,

I wanted to share some insights regarding the application of control systems in our automation and robotics projects. These systems are the **linchpin** of our operations, ensuring efficiency, precision, and adaptability in our technology-driven **endeavours**.

Firstly, our Feedback Control Systems have been instrumental in our robotic **manufacturing** processes. By continuously monitoring and adjusting parameters, these systems guarantee that our production lines maintain consistent quality and output, even in the face of minor variations. This reliability has been a **game-changer** for our manufacturing **division**.

In our **research and development (R&D)** efforts, Digital Control Systems have proven invaluable. Their capacity for handling complex algorithms and data processing has significantly enhanced our ability to create intelligent and adaptive robots. These systems are central to our vision of machines that can learn and respond to **dynamic environments**.

Moreover, our **adoption** of Hybrid Control Systems has allowed us to strike a balance between precision and continuous control. This approach is particularly useful in scenarios where we need **fine-tuned** adjustments without sacrificing the fluidity of the process.

In projects where system dynamics can be unpredictable, Adaptive Control Systems have demonstrated their **prowess**. These systems autonomously adjust parameters in real-time, making them an ideal choice for our aerospace applications, where **external factors** can vary dramatically.

For nonlinear processes, such as those encountered in our **cutting-edge** research initiatives, we've harnessed the capabilities of Nonlinear Control Systems. Their advanced mathematical techniques are essential in tackling the intricate relationships between inputs and outputs.

Lastly, our robotics projects often rely on Predictive Control Systems. Their ability to anticipate future behavior has proven pivotal in optimizing our robots' performance, particularly in applications demanding precision and **responsiveness**.

In conclusion, the integration of these diverse control systems has propelled our automation and robotics endeavors to new heights. They've provided us with the tools to address specific challenges across various industries and set the stage for innovation and efficiency. I look forward to further exploring these technologies to continue driving our success in this ever-evolving field.

Sincerely,

Jack Stroheim

Exercise 8: Please answer the following questions according to the text.

1. What role do Feedback Control Systems play in the manufacturing division's robotic processes?

A. handling complex algorithms.

B. guaranteeing consistent quality and output.

C. striking a balance between precision and continuous control.

D. anticipating future behavior.

2. Which control system is particularly useful in aerospace applications where external factors can vary dramatically?

A. Nonlinear Control Systems.

B. Digital Control Systems.

C. Adaptive Control Systems.

D. Predictive Control Systems.

3. How do Hybrid Control Systems contribute to the projects?

A. by autonomously adjusting parameters in real-time.

B. by ensuring consistent quality and output.

C. by striking a balance between precision and continuous control.

D. by anticipating future behavior.

Vocabulary

Exercise 9: Please connect the following words with their definitions.

1. analog
2. feedback
3. thermostat
4. predefined
5. hybrid
6. adaptive
7. subsystem
8. division
9. cutting-edge
10. prowess

A. Able to adjust or change in response to different conditions or environments.

B. A device used to control temperature by regulating heating or cooling systems.

C. At the forefront of technology or innovation, often referring to the latest advancements.

D. Information or responses provided in response to a process or action, often used for improvement.

E. A self-contained part of a larger system with specific functions and interactions.

F. Referring to continuous or non-digital data, often in the form of a continuous electrical voltage.

G. A separate or distinct area or category within a larger context.

H. Already established or determined in advance.

I. At the forefront of technology or innovation, often referring to the latest advancements.

J. Combining or integrating elements from two different sources or technologies.

Speaking

Exercise 10: Please speak about the importance of control systems in automation and robotics, share your thoughts and experiences with various control systems.

I believe that control systems…

They are important because…

I've had a lot of experience with…

Hybrid control…

Analog control systems…

...they have been a game changer…

...relies on Predictive Control Systems...

Writing

Exercise 11: Please write about the future of using control systems in automation and robotics. (11-12 sentences)

Module 3 Test

Task 1 - Translate the following sentences into Ukrainian.

1. Bits and bytes are the most common measurement used for data.

2. Hertz is one of the most used measurements in computer technologies.

3. The theory of computation is a fundamental branch of modern tech science.

4. Artificial intelligence and machine learning are the future of research.

5. There are as many types of control systems as there are types of automation.

Task 2 - Fill in the gaps.

1. The main measure of frequency is _____, you always see it in CPU ads.

A. Volts B. Hertz C. Ohms D. Watts

2. The field of robotics and automation often uses _____ to measure angles.

A. N B. rad C. C D. s

3. The prefix most often used before measurements to denote a thousand is _____.

A. micro B. mega C. kilo D. nano

4. We can always test your code on a _____ machine if you want to see it work.

A. turning B. turing C. trueno D. turner

5. Automatics as a field of study requires _____ theory.

A. automatics B. autonomy C. auto D. automata

6. The computational theory is one of the most vital pieces of _____.

A. farming B. robotics C. robots D. brobots

7. The theory of computation has become the _____ of modern automatics.

A. spine B. founding bone C. backbone D. frontbone

8. The reference value in a feedback control system is called a(n) _____.

A. setpoint B. pointset C. set of points D. point of sets

9. An analog control system doesn't use _____ components, but regular ones.

A. analog B. amplified C. digital D. adaptive

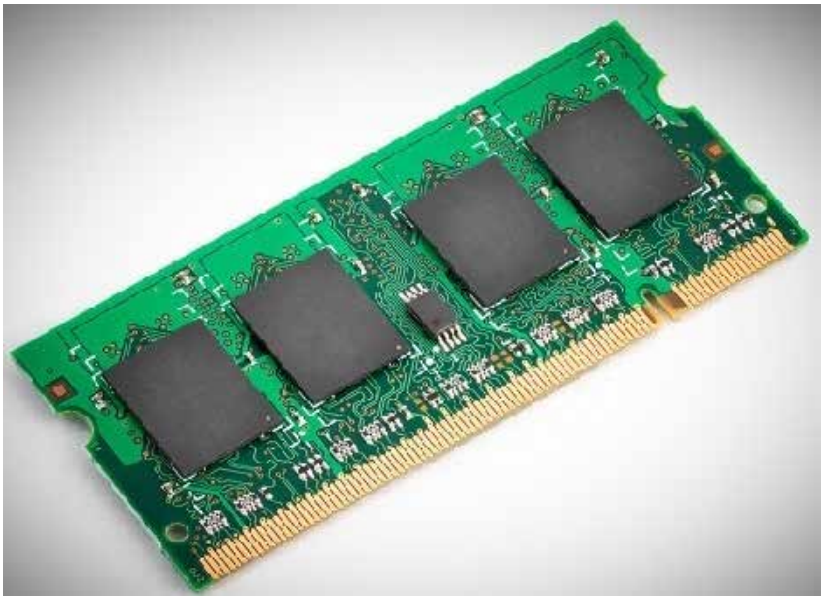
10. We always turn to our _____ department for the development of new systems.

A. R&R B. R&S C. D&D D. R&D

Task 3 - Please write out your own reasoning for why artificial intelligence and machine learning will be the future of our technological progress.

Module 4 - The Language of Computers

Unit 12: Types of memory in computer sciences, automation and robotics



Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What are some types of memory you can name?
2. What does memory mean in terms of automation and robotics?
3. Is memory important in terms of machine learning?
4. Which is more important - short term memory or long term memory?
5. Can an artificial intelligence have both short term and long term memory?

Reading

Exercise 2: Read the text and translate the words in bold text.

In the realms of automation, machine learning, and artificial intelligence, memory is a **multifaceted** concept that mirrors human **cognition** in some intriguing ways. Just as our brains have short-term and long-term memory systems, these fields also employ variations of memory to process and store information.

Short-term memory, **analogous** to our working memory, plays a crucial role in immediate decision-making. In machine learning models, it's akin to a temporary **scratchpad** where the system holds and manipulates data for short-duration tasks. This memory type is often used for quick computations, allowing AI systems to process **real-time data** efficiently. In automation, short-term memory assists robots in navigation and obstacle avoidance by storing recent sensor data and updates on their surroundings.

Conversely, **long-term memory** in the context of automation and AI is akin to human long-term memory. It involves the storage and retrieval of information over extended periods. In machine learning, long-term memory is used for **training models**, where vast datasets and knowledge accumulate gradually, enabling AI systems to recognize patterns, make predictions, and learn from past experiences. In automation, long-term memory is vital for retaining historical data about processes, allowing for analysis and continuous improvement.

Furthermore, there's **episodic memory**—a fascinating type of memory inspired by human cognition. In AI and machine learning, episodic memory refers to the ability of systems to remember specific events or episodes, along with **contextual details**. This type of memory enables AI agents to recall past experiences and make decisions based on those **recollections**. It's particularly useful in applications such as autonomous vehicles, where the ability to remember past routes, obstacles, and scenarios enhances decision-making.

Semantic memory is another intriguing concept. It involves the storage of general knowledge, facts, and concepts. In AI and machine learning, semantic memory helps systems understand language, recognize objects, and interpret information in a meaningful way. For automation, it aids in the comprehension of complex instructions and allows robots to work effectively in dynamic environments.

Additionally, there's **procedural memory**, which is vital for automating repetitive tasks. In this context, procedural memory stores sequences of actions or steps necessary to complete a task. It enables robots and AI systems to execute **predefined**

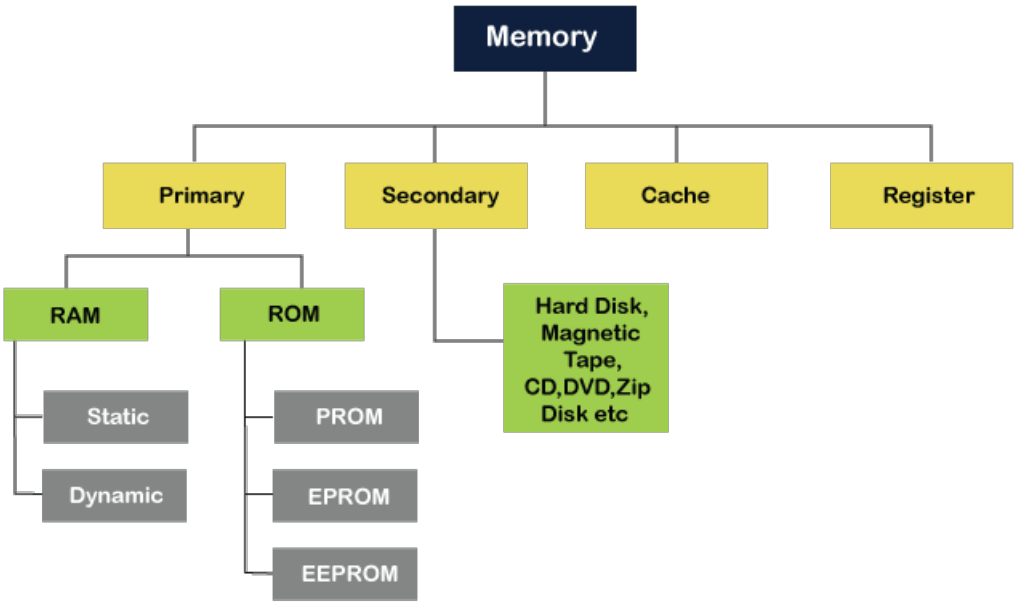
operations efficiently, making it **indispensable** in industrial automation and process control.

Finally, **declarative memory** is concerned with facts and knowledge that can be explicitly stated. In AI and machine learning, declarative memory encompasses knowledge bases and **ontologies** that provide structured information for problem-solving and decision-making. In automation, it assists in managing and accessing critical domain-specific knowledge for optimal system performance.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. Episodic memory in AI refers to general knowledge storage.
2. Long-term memory is vital for real-time data processing.
3. Procedural memory aids in automating complex decision-making tasks.
4. Semantic memory in AI involves understanding language and recognizing objects.
5. Declarative memory in automation focuses on managing dynamic environments.

Exercise 4: Describe how the different types of memory in the image work, how much they can store and for what purpose.



Grammar

Adverbs, degrees of comparison of adverbs

Adverbs are a type of word in English that provide more information about verbs, adjectives, other adverbs, or entire sentences. They often describe how, when, where, or to what extent an action or condition takes place.

Formation of Adverbs:

Adverbs can be formed in several ways:

Adding "-ly": Many adverbs are formed by adding "-ly" to an adjective. For example, "quick" becomes "quickly."

From Adjectives: Some adverbs are identical in form to adjectives. For example, "fast" can be both an adjective and an adverb.

Irregular Forms: A few adverbs have irregular forms that do not follow the "-ly" pattern. For example, "well" is the adverb form of "good."

Usage of Adverbs:

Adverbs can be used to modify verbs, adjectives, and other adverbs:

Modifying Verbs: Adverbs often describe how an action is performed. Example: "She sang beautifully."

Modifying Adjectives: Adverbs can intensify or weaken the meaning of an adjective. Example: "The movie was very entertaining."

Modifying Other Adverbs: Adverbs can further describe or modify other adverbs. Example: "He spoke extremely softly."

Degrees of comparison of Adjectives:

Like adjectives, adverbs can also form degrees of comparison, usually to compare the characteristics of 2 or more actions.

Example: "The movie looked more beautiful than the cartoon."

Most adverbs which end in "-ly" will create degrees of comparison using the words "more" and "the most"

positive	**comparative**	**superlative**
carefully	**more** carefully	**the most** carefully
beautifully	**more** beautifully	**the most** beautifully

timely	**more** timely	**the most** timely
intelligently	**more** intelligently	**the most** intelligently
terribly	**more** terribly	**the most** terribly

Exercise 5: Please transform the adjectives in the following sentences into adverbs, and change the sentence to match it.

1. The short-term memory function of the AI system is quite efficient, but it becomes even more efficient with continuous updates.
2. Real-time data processing is important, but the ability to process data in real-time is more important for certain applications.
3. The long-term memory capacity of the computer system is impressive, but as technology advances, it becomes more impressive with each new model.
4. The scratchpad provides a useful space for temporary data storage, making it more useful in situations where quick notes are essential.
5. The training model for the AI system is complex, but it becomes more complex as it learns from diverse datasets.
6. Automation is the most prevalent field in many industries, more so than robotics.
7. The AI system's ability to handle large datasets is indispensable, and its importance only becomes more indispensable as data volumes increase.
8. Episodic memory is crucial for personal experiences, but its significance becomes more crucial when considering its role in decision-making.
9. The iterative nature of developing AI models allows for continuous improvement, making the process more continuous with each iteration.
10. The use of buffers is at its most effective when preventing data loss.

Exercise 6: Please choose whether an adjective or an adverb fits better in the following sentences. Rewrite the sentences using the other option.

1. The training model for the AI system operates _____ (iterative/iteratively), refining its algorithms with each dataset.

2. The scratchpad is a _____ (convenient/conveniently) tool for temporary data storage during complex computations.
3. The long-term memory capacity of the computer system is an _____ (impressive/impressively) feature, allowing for vast data storage.
4. Analogous to human cognition, the AI system exhibits _____ (intricate/intricately) processes in information retrieval.
5. The AI system processes data _____ (analogous/analogously) to human cognition, demonstrating its adaptability.

Exercise 7: Please put the following adverbs into fitting degrees of comparison.
1. The iterative development of the training model enhances its performance _____. (consistently)
2. The AI system handles long-term memory _____ (efficiently) than traditional computing systems.
3. Among various memory functions, the AI system's semantic memory operates _____ (effectively), compared to any other.
4. The robotics professor replied to his colleague _____ (defiantly) out of anyone in the room.
5. The short-term memory comparison was understood far _____ (easily) than anyone had anticipated.
6. He hadn’t had any conflict with his fellow colleagues, which _____ (undoubtedly) made him confused.
7. The CPU and RAM worked far _____ (harmoniously) than they had anticipated.
8. The CPU handled these processes _____ (effortlessly).
9. The memory hierarchy is _____ (essentially) a set of blocks.
10. He _____ (ultimately) failed to achieve his goals.

Reading

Exercise 8: Read the text and translate the words in bold text. Find the adjectives in this text and transform them into adverbs.

Memory hierarchy is a critical architectural concept that underpins the performance of modern computing systems, including those used in machine learning, automation, and artificial intelligence (AI). The hierarchy goes from the top, which is the CPU memory (SRAM) to the bottom, which is solid state and virtual memory. At its core, memory hierarchy is designed to address the **principle of locality**, which encompasses both temporal locality and spatial locality.

Temporal locality refers to the tendency of a program to access the same memory locations repeatedly over a short period. In machine learning and AI applications, this manifests when algorithms repeatedly access the same data or weights during **iterative** training processes. To exploit temporal locality, memory hierarchy includes levels of memory with varying access speeds and sizes.

Spatial locality, on the other hand, involves accessing memory locations that are near each other. For instance, in image processing tasks common in automation and AI, pixels or data points located close to each other are often accessed together. Memory hierarchy takes advantage of spatial locality by organizing data in blocks or pages to **minimize** access times.

One crucial component of memory hierarchy is cache memory, which acts as a **buffer** between the CPU and main memory (RAM). There are different types of cache memory, including:

Direct-Mapped Cache: Each block of main memory maps to exactly one **cache line**. This simple mapping helps reduce hardware complexity but can lead to more frequent **cache conflicts**.

Fully Associative Cache: In this type, any block of main memory can map to any cache line. It offers flexibility but requires more complex hardware for **tag checking**.

Set-Associative Cache: A compromise between direct-mapped and fully associative caches, set-associative caches divide cache lines into sets, and each block from main

memory maps to one set. Within each set, blocks can be placed freely, offering a balance between complexity and flexibility.

Memory hierarchy aims to maximize **hit rates**, which occur when data requested by the CPU is found in cache memory. High hit rates indicate efficient use of the cache hierarchy and result in faster data access times.

Conversely, cache misses occur when data is not found in the cache and must be fetched from slower main memory. There are several types of **cache misses**:

Cold Miss: This happens when data is not present in the cache because it hasn't been accessed yet. It's common at the start of program execution or when switching to new data in machine learning tasks.

Capacity Miss: Caused by a too-large working set.

Conflict Miss: Occurs when there are more blocks that need to be stored in a set than the set can hold. This leads to cache conflicts, which can negatively impact performance.

To optimize memory hierarchy in machine learning, automation, and AI, developers and engineers employ techniques like data prefetching, data reordering, and algorithmic optimizations. These strategies help minimize cache misses, improve hit rates, and ultimately enhance the overall efficiency and speed of computation-intensive tasks. Memory hierarchy remains a foundational element in achieving high-performance computing in these fields, allowing systems to harness the principle of locality to their advantage.

Exercise 9: Please answer the following questions according to the text.

1. What is the purpose of memory hierarchy in computing systems?

A. to maximize hit rates

B. to minimize cache misses

C. to organize data in blocks

D. to exploit spatial locality

2. Which type of cache memory offers flexibility but requires more complex hardware for tag checking?

A. Direct-Mapped Cache

B. Fully Associative Cache

C. Set-Associative Cache

D. Virtual Memory

3. When does a Cold Miss occur in cache memory?

A. when data is not present because it hasn't been accessed yet.

B. when there is a too-large working set.

C. when there are more blocks than the set can hold.

D. when data is found in the cache.

Vocabulary

Exercise 10: Please fill the blanks with the appropriate words from the box.

Short-term memory, long-term memory, training model, semantic memory, indispensable, minimize, buffer, principle of locality, hit rate, cache miss

1. Please remind me which type of _____ a cold miss is.
2. Why would you _____that tab? It had a lot of important material!
3. A computer's _____is determined primarily by its HDD and SSDs.
4. The way this _____ is set up makes it difficult for the AI to properly learn.
5. _____ aids in the comprehension and learning process of complex instructions and information.
6. What is the _____of your cache memory? It's really important to make sure it's as high as possible.
7. _____ exists in order to address the directional relationship between memory blocks.
8. A computer system's RAM determines the majority of its functional _____.
9. This processor is _____to this computer's functionality.
10. Cache memory primarily acts as a _____ between the CPU and the RAM.

Speaking

Exercise 11: Please explain the way memory hierarchy works in your own words.

Memory hierarchy is…

I believe that it…

Cache memory is very…

There are many different types of…, which…

There are also such concepts as...

Writing

Exercise 12: Write about which types of memory are currently in need of development in the field of robotics and AI, explain why. (10-11 sentences)

Unit 13: Computer languages

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. What is a computer language?
2. What computer languages do you know?
3. Can computer languages be used for automation and robotics?
4. What can a computer language do?
5. What are the differences between computer languages?

Reading

Exercise 2: Read the text and translate the words in bold text.

Computer languages, often referred to as **programming languages**, are the means by which humans communicate instructions to computers. These languages are pivotal in the realms of automation and robotics, enabling the development of **codebases** that power intelligent and autonomous systems.

In the context of automation and robotics, different codebases serve specific purposes, reflecting the diversity of tasks these systems are designed to perform. Here are some key aspects of computer languages in this domain:

High-Level Languages: High-level programming languages like Python, C++, and Java are widely used for automation and robotics. These languages offer readability,

flexibility, and extensive libraries that simplify complex tasks. Python, in particular, is favored for its ease of use and versatility in machine learning and artificial intelligence applications.

Real-Time Languages: Real-time systems in automation and robotics require precise control and timing. Languages like **C** and **Ada** are well-suited for these applications, as they allow developers to manage hardware resources and execute code with strict timing constraints.

Scripting Languages: Scripting languages like **Lua** and **JavaScript** are valuable for rapid **prototyping** and scripting tasks in automation. They enable quick development and testing of algorithms, making them useful in scenarios where agility is essential.

Robot-Specific Languages: Some robots and automation systems have their dedicated languages. For instance, the **Robot Operating System (ROS)** uses its language for robot control, offering a comprehensive framework for developing robotics applications.

Domain-Specific Languages (DSLs): DSLs are tailored to specific tasks or industries. In automation and robotics, DSLs can be used to create codebases optimized for a particular type of machine or process, streamlining development and enhancing performance.

Simulation and Visualization Tools: In addition to programming languages, simulation and visualization tools like **MATLAB** and **Simulink** are essential in automation and robotics. These tools help engineers and researchers model, simulate, and test their codebases in a controlled environment before deploying them on physical systems.

Codebases in automation and robotics are diverse and encompass a wide range of functions, from control algorithms for industrial robots to machine learning models for autonomous vehicles. These codebases leverage computer languages to implement tasks such as path planning, sensor data processing, **image recognition**, and real-time control.

The development of codebases for automation and robotics requires a deep understanding of the specific domain and its requirements. Engineers and developers must consider factors like precision, timing, reliability, and safety when choosing the most suitable programming languages and tools for their projects.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F)

1. Python is not commonly used in automation and robotics.
2. Scripting languages like Lua and JavaScript are valuable for rapid prototyping.
3. Domain-Specific Languages (DSLs) are used for general-purpose tasks.
4. Real-Time Languages are well-suited for applications with strict timing constraints.
5. MATLAB and Simulink are not essential in automation and robotics.

Exercise 4: Look at the following image and describe what the code languages named in it do, and what they are primarily used for.

Grammar

Forming questions

In order to form questions with question words in the English language, one must first determine which part of the sentence the question is directed to. Different question words are directed to different types of questions and have different meanings, therefore replace different words in a sentence when asking. After all, there is no way to ask a question about who did something while also mentioning the very person that did it in the same position. Therefore, the question word must replace a part of the sentence which denotes that meaning. These are the meanings various question words replace and their examples:

Who - asking for a person and animal;

Replaces **subject;**

Do not use do, does, did after question word

Example:

Jane opened the door. - Who opened the door?

Tom helped in the garden. - Who helped in the garden?

Who - asking for a person and animal;

Replaces **object;**

Use do, does, did after question word

Example:

They greet their teacher. - Who do they greet?

He asked Mary about the burglary. - Who did they ask about the burglary?

What - asking for a thing;

Replacing **subject;**

Do not use do, does, did after question word

Example:

His ankle hurts. - What hurts?

The flower pot fell on the floor. - What fell on the floor?

What - asking for a thing;

Replaces **object;**

Use do, does, did after question word

Example:

She usually wears jeans. - What does she usually wear?

They built a castle in the sand. - What did they build in the sand?

Which - asking for a limited number of items;

Replaces **subject;**

Do not use do, does, did after question word

Example:

She likes visiting foreign countries. - Which countries has she already visited?

We should take the bus to the center. - Which bus should we take to get to the center?

Whose - asking for the 2nd case

Example:

This is Peter’s pencil. - Whose pencil is this?

Carol’s father was a drummer. - Whose father was a drummer?

When - asking for the time

Example:

I saw her yesterday. - When did you see her?

They came home at midnight. - When did they come home?

Where - asking for the place

Example:

He flew to Manchester. - Where did he fly?

He lives in a big house. - Where does he live?

Why - asking for a reason

Example:

He stayed at home because he was ill. - Why did he stay at home?

They like him because he is always friendly. - Why do they like him?

How - asking for the manner

Example:

He drove fast. - How did he drive?

My holidays were great. - How were your holidays?

How long - asking for a period of time

Example:

They stayed there for a week. - How long did they stay there?

He lived in London for a year. - How long did he live in London?

How many - asking for an exact amount

Example:

In this factory work 500 people. - How many people work in this factory?

50 kids were at his party. - How many kids were at his party?

How much - asking for not an exact amount

Example:

He gets 10 pounds pocket money a month. - How much pocket money does he get a month?

She bought three bottles of wine. - How much wine did she buy?

How often - asking for frequency

Example:

They play tennis twice a week. - How often do they play tennis?

She meets him every Friday. - How often does she meet him?

Exercise 5: Please transform the following sentences into questions using the words ‘who, whose, what’.

1. Jake never expected to write the letter with his keyboard.
2. Jenny has never been a very good poet, but her voice synthesizer is exceptional.
3. He always tries to use his own code in the program, but it never works.
4. Many companies try to create their own codebases.
5. My data set is organized neatly into blocks.

Exercise 6: Please transform the following sentences into questions using the words ‘how much, how many, how’.

1. I have created a lot of codebases over the last 10 years.
2. There is a lot of money riding on me making this program in C++.

3. There is no way I can do it properly, there is too much at stake.
4. I organized the data into blocks and automated its transfer, there was a lot of involved.
5. These instruction sets were extremely useful in organizing the processor's functions.

Exercise 7: Please put the appropriate question word at the beginning of the following sentences:
1. _____ computer is this? And _____ did it appear here?
2. _____ are you asking me about C+? It's a dead language!
3. _____did you make this program? I can't make heads or tails of its code.
4. _____ have you been standing there, watching me work?
5. _____of these is your program?
6. _____do you want from me, a program made in 3 different languages? That's impossible.
7. _____ have you already used for this project? Surely not all codebases have been accounted for.
8. _____ do you use this computer? There is so much dust here!
9. _____ is your supplier? This keyboard is top notch!
10. _____ was the last time you slept? Go to bed!

Reading

Exercise 8: Read the text and translate the words in bold text. Transform several sentences into questions using the question words "when, where, why, how, how often".
Subject: Understanding How Computers Process Information through Code

Dear Ms Ark,

I hope this email finds you well. Today, I wanted to provide you with an overview of how computers process information through code, breaking down the fundamental concepts involved.

At its core, a computer processes information through a series of instructions encoded in code. These instructions are part of what we call the "**instruction set**" of the computer's processor. Each instruction specifies an operation to be performed on data. These operations range from basic arithmetic calculations to more complex tasks like data transfers, **conditional branches**, and **logical comparisons**.

To facilitate the execution of instructions, **data** is organized into **blocks** or **segments** in memory, each with a unique address. Think of these data blocks as individual containers that hold information. The processor reads data from these memory locations, performs operations as instructed, and then stores the results back into memory or sends them to other parts of the system.

One crucial aspect of code execution is the concept of conditional branches. These are instructions that allow the computer to make decisions based on the values of certain data. For instance, if a specific condition is met (e.g., if x is greater than y), the computer will execute one set of instructions; otherwise, it will follow a different path. Conditional branches are the foundation of decision-making in code and enable computers to perform complex tasks based on varying input data.

Additionally, data transfers play a vital role in **code execution**. Computers need to move data efficiently between different parts of memory, the processor, and input/output devices. The effectiveness of data transfers impacts the overall performance of a computer system.

I hope this explanation provides you with a clearer understanding of how computers work at the **code level**. If you have any further questions or would like to delve deeper into any of these concepts, please feel free to reach out.

Best regards,

John Stromburg

Exercise 9: Please answer the following questions according to the text.

1. What is the "instruction set" of a computer's processor?

A. a set of tools

B. a series of instructions

C. data blocks in memory

D. results of operations

2. How does the computer make decisions in code execution?

A. through arithmetic calculations

B. by performing data transfers

C. with conditional branches

D. storing results in memory

3. Why are data transfers important in code execution?

A. to organize data into blocks

B. to facilitate instruction sets

C. to move data between system parts

D. to perform arithmetic calculations

Vocabulary

Exercise 10: Connect existing code languages with computer language types as outlined in the unit.

High-Level Language	C Ada
Real-Time Language	Lua C++
Scripting Language	Java DSL
Robot-Specific Language	Python ROS
Domain-Specific Language	MATLAB Simulink
Simulation and Visualization Tool	JavaScript

Speaking

Exercise 11: Talk about which codebases you're familiar with, whether you've worked with them before or you simply studied them.

I've worked with… before…

I've studied about…

I can tell you that…

This code language is… (better/worse/different)

When comparing these codebases...

Writing

Exercise 12: Write out your own understanding of how code languages work with computer systems. (10-11 sentences)

Unit 14: Arithmetic for computers

Introduction

Exercise 1: Before reading the text, please answer the following questions.

1. How different is math for computers when compared with humans?
2. How do computers count?
3. What are the basic numbers computers use for their functions?
4. Why do computers carry out calculations?
5. Which hardware is related to calculations?

Reading

Exercise 2: Read the text and translate the words in bold text.

Arithmetic in computers is a fundamental operation that forms the basis of most computational tasks. Computers utilize **binary sets**, composed of 0s and 1s, to carry out arithmetic calculations. In **binary representation**, each **digit** represents a power of 2, just as in our **decimal system**, where each digit represents a power of 10. When it comes to **addition** and **subtraction**, computers employ binary arithmetic much like we do in decimal, except with only two digits. For addition, they consider the binary digits **column** by column, similar to carrying over in decimal addition. Subtraction follows a similar process but may require **borrowing**. These binary

arithmetic operations are executed by dedicated circuits in the CPU, making them incredibly fast and efficient.

Multiplication and **division** in computers are typically carried out through a series of addition and subtraction operations. For multiplication, a computer uses repeated addition, adding one number to itself as many times as indicated by the other number. Division, on the other hand, involves repeated subtraction, counting how many times one number can be subtracted from another until the remainder is less than the divisor.

Computers perform arithmetic calculations at astounding speeds, often completing **millions** or even **billions** of operations per second. This rapid processing power is one of the reasons computers are so adept at handling complex calculations and simulations, essential in various fields, including science, engineering, and finance.

However, arithmetic operations in computers are not without limitations. One challenge is the issue of **overflow** and **underflow**. Overflow occurs when the result of an arithmetic operation exceeds the capacity of the binary representation, causing the computer to discard the overflow bits and potentially leading to incorrect results. Conversely, underflow happens when a result is too small to be accurately represented, potentially resulting in loss of precision.

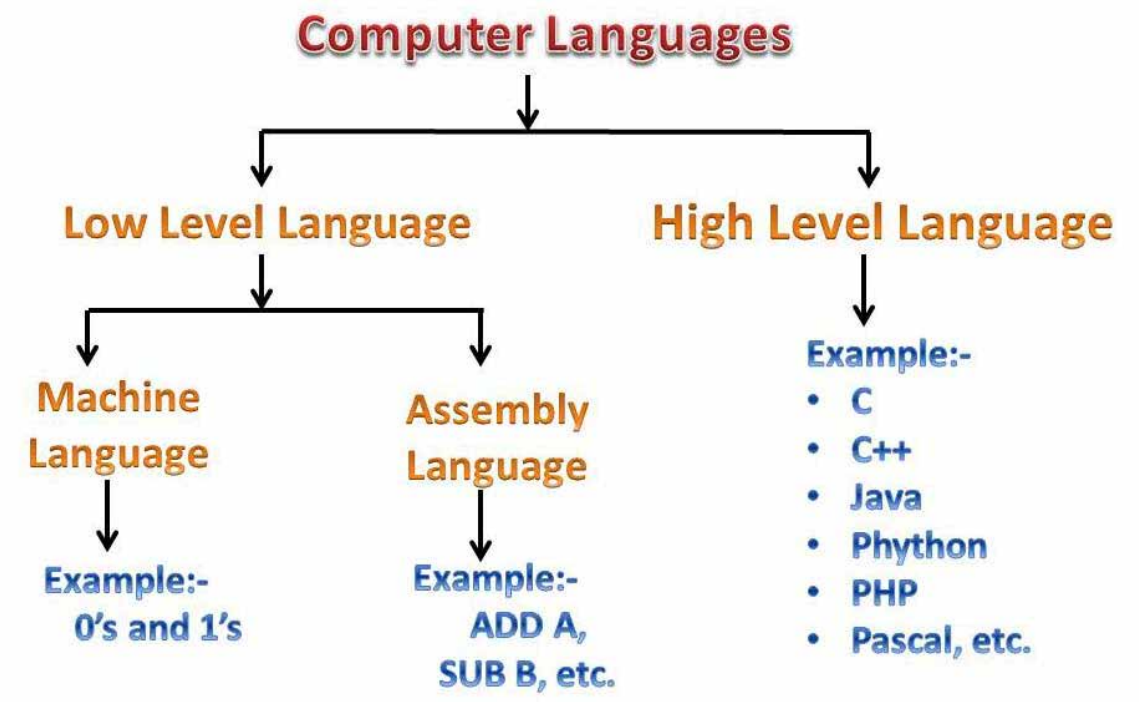
To mitigate these challenges, computer systems use techniques like **floating-point representation**, which allows for a wider range of numbers with varying precision. Additionally, modern processors employ specialized hardware for arithmetic operations, further enhancing accuracy and speed.

Exercise 3: Read the following statements and determine whether they are True (T) or False (F).

1. Binary digits represent powers of 2.
2. Multiplication in computers uses repeated subtraction.
3. Overflow in computers leads to the loss of precision.
4. Division in computers involves adding one number to itself.

5. Modern processors use specialized hardware for arithmetic operations.

Exercise 4: Look at the following image and describe the difference between low level languages and high level languages, and their uses.



Grammar

Conjunctions

Conjunctions are an essential part of the English language. They are connecting words that join words, phrases, clauses, or sentences together. Conjunctions serve various purposes and are used to establish relationships between different parts of a sentence or between multiple sentences.

Coordinating Conjunctions:

Usage: Coordinating conjunctions connect words, phrases, or clauses of equal importance. They are often used to join similar elements.

Words such as: "and," "but," "or," "nor," "for," "so," "yet."

Example:

"I like tea, and she prefers coffee."

"He wanted to go to the park, but it started raining."

Subordinating Conjunctions:

Usage: Subordinating conjunctions introduce dependent clauses (subordinate clauses) that cannot stand alone as complete sentences. They establish a relationship of dependence between the main clause and the subordinate clause.
Words such as: "although," "because," "while," "if," "since," "unless," "until," "after," "before."
Example:
"Although it was raining, we went for a walk."
"I'll come if I have time."

Correlative Conjunctions:

Usage: Correlative conjunctions work in pairs to join similar sentence elements. They are used to emphasize the relationship between these elements.
Words such as: "both...and," "either...or," "neither...nor," "not only...but also."
Example:
"She is both intelligent and hardworking."
"You can have either tea or coffee."

Conjunctive Adverbs:

Usage: Conjunctive adverbs are used to connect independent clauses and provide transitions between ideas. They can often be used with a semicolon or a comma.
Words such as: "however," "therefore," "meanwhile," "moreover," "nevertheless," "consequently."
Example:
"He was late; nevertheless, he made it to the meeting."
"I wanted to go; however, I couldn't find a ride."

Subordinating Conjunctions in Time Clauses:

Usage: Subordinating conjunctions like "when," "while," "as," and "since" are often used to introduce time-related clauses.
Example:
"I'll call you when I get home."
"While I was reading, the phone rang."

Conjunctions are crucial for creating clear and coherent sentences and for showing the relationships between different parts of a text. Using the appropriate conjunctions helps writers and speakers convey their ideas more effectively and maintain the flow of their language.

Exercise 5: Please put the appropriate coordinating conjunction into the following sentences.

1. The CPU performs calculations, _____ the GPU handles graphical tasks.
2. You can use either a for loop _____ a while loop for repetitive tasks.
3. Addition is fundamental _____ subtraction is its inverse operation.
4. The algorithm is efficient, _____ it requires more memory.
5. You can optimize code for speed, _____ you can optimize it for readability.
6. Multiplication is a basic arithmetic operation, _____ is division.
7. The data is stored in the array, _____ the program retrieves it when needed.
8. You can use bitwise operators to manipulate individual bits, _____ you can perform logical operations.
9. The loop runs until a certain condition is met, _____ it continues indefinitely.
10. Floating-point arithmetic allows for precise decimal calculations, _____ it may introduce rounding errors.

Exercise 6: Please put the appropriate subordinating conjunction into the following sentences.

1. _____ the algorithm is efficient, it is widely used in computer science.
2. You should debug the code _____ you run the final version.
3. _____ bitwise operations are fast, they may be hard to understand.
4. The function executes _____ a specific condition is satisfied.
5. _____ the early days of computing, addition and subtraction have been essential operations.

6. You can use a conditional statement _____ you need to execute code based on a condition.
7. _____ loops are useful when you want to repeat a block of code multiple times.
8. The CPU fetches instructions from memory _____ it needs to execute them.
9. The program executed successfully _____ all the conditions were met.
10. _____ the variable is null, an error may occur during execution.

Exercise 7: Please put the appropriate correlative conjunctions into the following sentences.
1. _____ addition and subtraction are fundamental operations in arithmetic.
2. _____ the CPU nor the GPU can function without proper cooling.
3. _____ does the program compile quickly, but it _____ runs efficiently.
4. _____ optimize the code for speed, or optimize it for readability.
5. _____ you use a for loop or a while loop depends on the specific task.
6. _____ the RAM and the hard drive contribute to a computer's memory.
7. _____ the algorithm nor the data structure was well-suited for the task.
8. _____ did the program crash, but also it caused data loss.
9. _____ you prefer Linux or Windows, the programming language remains the same.
10. _____ the user input is valid, or an error message is displayed.

Reading

Exercise 8: Read the text and translate the words in bold text. Find all existing conjunctions, rewrite the text connecting as many sentences using conjunctions as possible.

Bits determine the fundamental functions of computers. Each word contains a set number of bits, and each combination corresponds to a number. These numbers are represented in one of several **number bases**. Although we typically think in base 1-,

computers function best in base 2. Each number set is subscripted with a ten or a two to indicate to whether it is decimal or binary.

Computers use arithmetic to signal various functions. Computers must distinguish between **positive** and **negative numbers** in order to operate the hardware. A **signed number** refers to a number that has a negative or positive sign. An unsigned number does not have a sign, so it must be zero or a positive number. **Two's complement** is a representation of signed binary numbers that uses **leading 0's** and **leading 1's**. If the word has a leading 0, it is positive. if it has a leading 1, it is negative.

The hardware is programmed to test the **sign bit** for positivity or negativity. The sign bit is also the **most significant bit**, which is farthest to the left. The bit with the highest value is the digit to the right of the sign bit. The rightmost bit is the **least significant bit**, or the bit with the lowest value.

Exercise 9: Please answer the following questions according to the text.

1. In which number base do computers function best?

A. Base 1

B. Base 2

C. Base 10

D. Base 16

2. What does the sign bit represent in a signed binary number?

A. the least significant bit

B. the most significant bit

C. the rightmost bit

D. the digit with the highest value

3. What does a leading 1 in Two's complement representation indicate?

A. a positive number

B. a negative number

C. the least significant bit

D. the most significant bit

Vocabulary

Exercise 10: Please connect the following words with their definitions.

1. Multiplication
2. Decimal system
3. Column
4. Overflow
5. Digit
6. Number base
7. Signed number
8. Leading 1’s
9. Most significant bit
10. Least significant bit

A. A mathematical operation that combines numbers to find their product.

B. A numerical value that includes information about its sign (positive or negative).

C. The base or radix used in a numeral system, such as base 10 (decimal) or base 2 (binary).

D. In data and databases, a vertical arrangement of data elements within a table.

E. A digit '1' appearing at the beginning of a numerical value.

F. A numerical symbol (0-9) used in numeral systems, including the decimal system.

G. A base-10 numbering system that uses ten digits (0-9) to represent numbers.

H. The rightmost bit in a binary number, representing the smallest value.

I. When data exceeds the capacity of a container or system, causing errors or unexpected behavior.

J. The leftmost bit in a binary number, representing the largest value.

Speaking

Exercise 11: Act out a dialogue between two robotics experts discussing what could've gone wrong with the arithmetic in the process of creating a robot's processing unit.

This robot could've…

The numbers could've over/under…

In order to offset this, we used…

The number base was useful because...

Writing

Exercise 12: Write about how a computer's mathematical system works, from the point of view of their processor. (10-11 sentences)

Module 4 Test

Task 1 - Translate the following sentences into Ukrainian.

1. There are as many types of computer memory as there are types of human memory.
2. An AI has a memory hierarchy, just like regular computers. Its RAM goes in order.
3. High-level computer languages are often used to write code for automatons.
4. An engineer must know codebases and instruction sets perfectly.
5. Computer arithmetic is always carried out in binary, which is a set of 0s and 1s.

Task 2 - Fill in the gaps.

1. When an arithmetic operation in a system exceeds its capacity, it's called a(n) ____.

A. underflow B. overflow C. flow D. reflow

2. While computers use the binary system, humans use the _____ system.

A. dozen B. decimation C. decimal D. detrimal

3. At the code level, data is organized into _____, which have unique addresses.

A. blocks B. quarters C. stakes D. sections

4. Simulation and _____ tools often help in the field of robotics.

A. practice B. theoretic C. language D. visualization

5. The languages computers engineers use to create software are called _____.

A. code systems B. coding lingos C. codebases D. code servers

6. Cache misses are a common thing, especially with large working sets, causing ___.

A. capacity misses B. cold misses C. conflict misses D. cache misses

7. In order to facilitate the correct distribution of memory blocks, we need _____.

A. memory hierarchy B. memory cache C. memory space D. HDDs

8. HDDs are a type of _____ computer memory, different from RAM.

A. primary B. cache C. secondary D. register

9. Semantic memory helps in the storage of _____.

A. concepts B. procedures C. code D. sequences

10. Real-time data is stored through short-term memory, which is used by _____.

A. HDDs B. SSDs C. RAM D. BRAM

Task 3 - Write a dialogue between two experts, arguing the importance of knowing both high and low level computer languages. (15-16 lines)

Glossary

3D design	3D дизайн
3D modeling	3D моделювання
3D rendering	3D рендеринг
actuator	виконавчий пристрій
adaptive	адаптивний
addition	додавання
adoption	ухвалення
aerospace	аерокосмічний
aesthetics	естетика
affordability	доступність
agriculture	сільське господарство
algorithm	алгоритм
algorithmic	алгоритмічний
ampere (A)	ампер (A)
amplifier	підсилювач
analog	аналоговий
analog computer	аналоговий комп'ютер
analog sensor	аналоговий датчик
analogous	аналогічний
analyze	аналізувати
anonymous	анонімний
anti-malware	антивірус
antivirus	антивірус
application software	застосункове програмне забезпечення
archive	архів
artificial intelligence (AI)	штучний інтелект (ШІ)
assembly	асемблер
assist	допомагати
audio	аудіо

audio jack	аудіороз'єм
audiophile	аудіофіл
automata theory	теорія автоматів
automation	автоматизація
autonomous	автономний
autonomous weapon	автономна зброя
avenue	шлях
backbone	основа
backup	резервне копіювання
bias	відхилення
billion	мільярд
binary code	двійковий код
binary representation	двійкове представлення
binary set	двійковий набір
bit	біт
borrow	позичати
brimming	переповнений
buffer	буфер
built-in	вбудований
burgeoning	стрімкий ріст
bus speed	швидкість шини
byte	байт
cache	кеш
cache conflict	конфлікт кешу
cache line	лінія кешу
cache miss	промах кешу
capacity	потужність
capacity miss	втрата потужності
category	категорія
Cathode-Ray Tube (CRT)	катодно-променева трубка (КПТ)

celsius (°C)	градус Цельсія (°C)
centimeter (cm)	сантиметр (см)
Central Processing Unit (CPU)	центральний процесор (ЦП)
chat	чат
clock speed	тактова частота
cloud storage	хмарне сховище
cloud-based	заснований на хмарі
cluster	кластер
code	код
code execution	виконання коду
code level	рівень коду
codebase	кодова база
cognition	когніція
cold miss	промах за низької температури
column	колонка
Compact Disc (CD)	Компакт-диск (CD)
comprehensive	всебічний
computation	обчислення
computer arithmetic	комп'ютерна арифметика
computer cluster	комп'ютерний кластер
computer function	функція комп'ютера
computer language	мова програмування
computer science	інформатика
conceivable	уявний
condition	умова
conditional branch	умовний перехід
conflict miss	конфлікт кеш-промаху
consequence	наслідок
consolidate	консолідація
contextual detail	контекстуальний деталь
contiguous	суміжний

continuous	безперервний
continuous signal	неперервний сигнал
convergence	збіжність
cooling solution	система охолодження
core	ядро
corrective action	виправний захід
corrupt file	пошкоджений файл
cost-effectiveness	вартість та ефективність
critical component	критичний компонент
crucial role	ключова роль
cutting-edge	передовий
cyber threat	кіберзагроза
cybersecurity threat	кібербезпека загроза
cyberspace	кіберпростір
data	дані
data block	блок даних
data loss	втрата даних
data processing	обробка даних
data segment	сегмент даних
data transfer rate	швидкість передачі даних
decentralized system	децентралізована система
decimal system	десяткова система
decision-making	прийняття рішень
declarative memory	декларативна пам'ять
defragmentation	дефрагментація
desktop	робочий стіл
develop	розробляти
digit	цифра
digital computer	цифровий комп'ютер
digital shield	цифровий щит
Digital Signal Processor (DSP)	цифровий сигнальний процесор

	(DSP)
Digital Versatile Disc (DVD)	цифровий універсальний диск (DVD)
digitize	цифрувати
direct-mapped cache	прямодоступний кеш
discrete signal	дискретний сигнал
discrimination	дискримінація
disk cleanup	очищення диска
display	дисплей
distributed computing	розподілена обчислювальна система
distro	дистрибутив
division	ділення
domain-specific language	мова, специфічна для області
dot matrix printer	точковий матричний принтер
Double Data Rate Synchronous Dynamic Random Access Memory (DDR SDRAM)	Динамічна оперативна пам'ять з подвійною частотою передачі даних і синхронною динамікою доступу (DDR SDRAM)
download	завантажити
driver	драйвер
driver	драйвер
drone	безпілотник
DVORAK	ДВОРАК
dynamic	динамічний
dynamic environment	динамічне середовище
Dynamic Random Access Memory (DRAM)	Динамічна оперативна пам'ять (DRAM)
E-commerce	Електронна комерція (е-комерція)
e-mail	електронна пошта
editing	редагування
electronic device	електронний пристрій

electronics	електроніка
email client	поштовий клієнт
embark	почати, розпочати
embedded computer	вбудований комп'ютер
empower	надавати можливість
enabler	засіб, що дозволяє
endeavour	намагання, зусилля
energy-efficient	енергоефективний
enterprise environment	підприємницьке середовище
episodic memory	епізодична пам'ять
error	помилка
Error-Correcting Code RAM (ECC RAM)	RAM із кодом коригування помилок (ECC RAM)
essential	важливий, необхідний
evaluate	оцінювати
experimental	експериментальний
external factor	зовнішній фактор
failure	відмова
familiarity	знайомство
fans	вентилятори
fascinating	захоплюючий
Fedora	Федора
feedback	зворотний зв'язок
fine-tuned	дотонко налаштований
firewall	брандмауер
fix	виправляти
flash memory	флеш-пам'ять
floating-point	рухома кома
floating-point representation	представлення рухомої коми
floppy disk	гнучкий диск

force	сила
fragmentation	фрагментація
frequency	частота
fully associative cache	повністю асоціативний кеш
function key	клавіша функції
game-changer	гравець, який міняє гру (змінююча величина)
giga (G)	гіга
gigahertz (GHz)	гігагерц (GHz)
Google	Google
government agency	урядова агенція
graphic design	графічний дизайн
Graphical User Interface (GUI)	Графічний інтерфейс користувача (GUI)
Graphics Processing Unit (GPU)	Графічний процесор (GPU)
groundbreaking	першопрохідний
hacker	хакер
hands-on experience	практичний досвід
Hard Disk Drive (HDD)	Жорсткий диск (HDD)
hardware	апаратне забезпечення
harmoniously	гармонійно
headphones	навушники
healthcare	охорона здоров'я
herz (Hz)	герц (Гц)
hierarchical	ієрархічний
high-end	висококласний
high-level language	мова високого рівня
hit rate	частота попадань
human intervention	втручання людини
hybrid	гібридний
hybrid computer	гібридний комп'ютер
identity theft	крадіжка ідентичності

image recognition	розпізнавання зображень
in-ear	внутрішньовушний
index	індекс
indispensable	невід'ємний
industrial automation	промислова автоматизація
information	інформація
inkjet printer	струменевий принтер
Input/Output (I/O) device	пристрій введення/виведення (I/O)
Instagram	Instagram
instruction set	набір інструкцій
integral	інтегральний
integrated graphics	вбудована графіка
interact	взаємодіяти
interactivity	взаємодія
interconnected	взаємопов'язаний
interface	інтерфейс
International System of Units (SI)	Міжнародна система одиниць (SI)
Internet of Things (IoT)	Інтернет речей (IoT)
internet security	інтернет-безпека
interplay	взаємодія
intertwined	переплетений
IT specialist	IT-спеціаліст
iterative	ітеративний
job displacement	втрата робочих місць
journey	подорож
keyboard	клавіатура
kilo	(k) кіло
lambda calculus	лямбда-ісчислення
laptop	ноутбук
laser printer	лазерний принтер
layer	шар

leading 0	провідний 0
leading 1	провідний 1
least significant bit	менший значущий біт
leisure	дозвілля
life-and-death decision	рішення життєвого і смертельного характеру
linchpin	опора, головна ланка
link	посилання
liquid cooling system	рідинна система охолодження
Liquid Crystal Display (LCD)	рідкокристалічний дисплей (LCD)
logical comparison	логічне порівняння
logical thinking	логічне мислення
logician	логік
logistics	логістика
long-term memory	довгострокова
loop	цикл
Low-Power Double Data Rate Synchronous Dynamic RAM (LPDDR)	Динамічна оперативна пам'ять з подвійною частотою передачі даних і синхронізацією
lowercase	рядковий регістр (LPDDR)
machine learning (ML)	машинне навчання (ML)
magnetic tape	магнітна стрічка
mainframe computer	мейнфрейм
maintain	утримувати
malware	вредоносний код (малвар)
managing	управління
manipulate	маніпулювати
manufacturing	виробництво
marquee	маркіз
mathematics	математика
media player	медіапрогравач

medical robot	медичний робот
mega	(M) мега
memory hierarchy	ієрархія пам'яті
mesmerizing	захоплюючий
meter (m)	метр (м)
meticulous	дбайливий
micro	(μ) мікро
microcontroller	мікроконтролер
microphone	мікрофон
milestone	важливий етап
milli	(m) мілі
million	мільйон
minicomputer	мінікомп'ютер
minimize	мінімізувати
mobile computer	мобільний комп'ютер
monitor	монітор
most significant bit	найбільш значущий біт
motherboard	материнська плата
mouse	миша
multidisciplinary	багатодисциплінарний
multifaceted	багатогранний
multimedia	мультимедіа
multimedia controls	елементи управління мультимедіа
multiplayer	багатокористувацький
multiplication	множення
nano	(n) нано
nanometers	нанометри
navigation	навігація
negative number	від'ємне число
neglect	нехтувати

network	мережа
network traffic	мережевий трафік
newton (N)	ньютон (Н)
non-standard	нестандартний
nonlinear	нелінійний
NP-completeness	NP-повнота
nuance	відтінок
number base	система числення
object	об'єкт
ohm (Ω)	ом (Ω)
on-ear	на вухо
on-the-go	в русі, на ходу
onboard	вбудований
online account	онлайн-акаунт
ontology	онтологія
open-loop	відкритий цикл
open-source	відкритий код
Operating System (OS)	операційна система (ОС)
optical technology	оптична технологія
optimization	оптимізація
option	опція
output	вивід
over-ear	навколо вуха
overflow	переповнення
painting	малювання
paradigm	парадигма
paramount	найважливіший
password	пароль
PC	ПК (персональний комп'ютер)
perceive	сприймати
personalization	персоналізація

phenomenon	явище
phishing	фішинг
physics	фізика
pico	(р) піко
pivotal	ключовий
poised	готовий
positive number	додатне число
Power Supply Unit (PSU)	блок живлення (БЖ)
powered off	вимкнений
precursor	передвісник
predefined	передбачений
predictive	передбачуваний
prefix	префікс
presentation software	програмне забезпечення для презентацій
principle of locality	принцип локальності
printer	принтер
privacy breach	порушення конфіденційності
problem-solving skills	навички вирішення проблем
procedural memory	процедурна пам'ять
process	процес
process control	управління процесом
proficient	вправний
programming	програмування
programming language	мова програмування
protocol	протокол
prototyping	прототипування
prowess	майстерність
punched card	перфокартка
quantum	квантовий
quantum computing	квантове обчислення

radian (rad)	радіан (rad)
Random Access Memory (RAM)	оперативна пам'ять (ОЗП)
ransomware	викупне програмне забезпечення
real-time data	дані в реальному часі
real-time language	мова реального часу
rearrange	перестановка
recipe	рецепт
recollection	відтворення
refreshing	оновлення
registry	реєстр
rehabilitation	реабілітація
render	відтворювати
reorganize	переорганізація
repair	ремонт
represent	представляти
Research and Development (R&D)	науково-дослідницька робота (НДР)
reshuffle	переміщення
resource-demanding	вимогливий до ресурсів
resource-intensive	вимагаючий багато ресурсів
responsiveness	реактивність
risk	ризик
Robot Operating System (ROS)	Робототехнічна операційна система (ROS)
robot-specific language	мова, специфічна для роботів
robotics	робототехніка
rotational motion	обертальний рух
rudimentary	примітивний
safeguard	захист
scalability	масштабованість
scam	шахрайство
scanner	сканер

science fiction	наукова фантастика
scratchpad	блокнот
Scripting language	мова сценаріїв
seamless	безшовний
seamless integration	безшовна інтеграція
seamlessly	безперервно
second (s)	секунда (с)
self-driving	автономний
semantic memory	семантична пам'ять
sensor	сенсор
sequential	послідовний
sequential data access	послідовний доступ до даних
set-associative cache	кеш асоціативного типу
setpoint	задане значення
short-term memory	короткострокова пам'ять
sign bit	біт знака
signed number	знакове число
simulation tool	інструмент симуляції
simulink	simulink
simultaneous	одночасний
skills	навички
sleek	елегантний
smart robotics	розумна робототехніка
smartphone	смартфон
smartwatch	смарт-годинник
social media	соціальні мережі
soft-robotics	м'яка робототехніка
software	програмне забезпечення
software compatibility	сумісність програмного забезпечення
Solid-State Drive (SSD)	твердотільний накопичувач (SSD)
solve	вирішувати

sophisticated	вишуканий
sound card	звукова карта
spatial locality	просторова локальність
specialist	спеціаліст
spreadsheet	електронна таблиця
spyware	шпигунське програмне забезпечення
Static Random Access Memory (SRAM)	Статична оперативна пам'ять (SRAM)
stationary computer	стаціонарний комп'ютер
statistics	статистика
storage device	пристрій зберігання
store	зберігати
stored-program	програмний метод
streamline	оптимізувати
subfield	підгалузь
subsystem	підсистема
subtraction	віднімання
supercomputer	суперкомп'ютер
superintelligent AI	суперінтелект ШІ
swarm robotics	ройова робототехніка
synchronize	синхронізувати
tag check	перевірка тегу
temporal locality	часова локальність
tera	(T) тера
theory	теорія
theory of computation	теорія обчислень
thermostat	термостат
touchpad	сенсорна панель
training model	модель навчання
transferable	передавальний
transformative	трансформаційний
transforming	трансформація

transparent	прозорий
transportation	транспорт
trend	тенденція
Turing machine	машина Тьюрінга
tutorial	навчальний посібник
Twitter	Твіттер
Two-Factor Authentication (2FA)	двофакторна аутентифікація (2FA)
two's complement	двійкова доповнювальна форма
underflow	недоповнення
underpin	підтримувати
unwind	розгортати
upload	завантаження
uppercase	прописні літери
USB drive	USB-накопичувач
USB port	USB-порт
user-driven	користувацько-орієнтований
user-friendly	зручний для користувача
vacuum	вакуум
variable	змінна
variety	різноманіття
vehicle	транспортний засіб
verification code	код підтвердження
video editing	відеомонтаж
Virtual Private Network (VPN)	віртуальна приватна мережа (VPN)
visualization tool	інструмент візуалізації
volatile	летючий
volt (V)	вольт (В)
watt (W)	ватт (Вт)
wattage	потужність
web-centric	зорієнтований на веб
website	веб-сайт

welding	зварювання
Wi-Fi network	бездротова мережа Wi-Fi
wired	з'єднаний дротом
wireless	бездротовий
workstation	робоча станція
World Wide Web (WWW)	всесвітня мережа (WWW)
wristwatch	наручний годинник
YouTube	Ютуб

Methodological recommendations

This English language guide is recommended for students of the course "Automation, computer-integrated technologies and robotics". In the field of computer technologies and automatics, the knowledge of the English language is paramount, as it is the current lingua franca, and is the language used for most new technological innovations in computer-related fields. Nearly all computer languages, which are required for most types of work in this field, are based on English.

This guide divided into two main modules, in which students will familiarize themselves with topics from their specialty in a way that gradually introduces new concepts and increases their grammatical and lexical knowledge.

The first module primarily focuses on computer-integrated technologies and computer engineering, as it is closely tied to the wider field of automation and robotics. Without knowledge of computer engineering and science, it is difficult to work with more complex hardware and software that is involved in the design and development of automatic machinery and robots.

The second module focuses on the topics required for understanding the underlying concepts of automation and robotics, such as computer languages, computer arithmetic, control systems, and many more. The second module is designed to be studied after the first, but it can also function as a standalone teaching tool for students that have already studied computer technologies beforehand.

Unit/Topic	Expected amount of hours per unit/topic according to type of learning			
	full-time learning		part-time learning	
	practical	individual	practical	individual
Module 1 - Computer engineering and computer-integrated technologies				
Unit 1: Introduction to computer sciences, automation and robotics	8	4	1	2
Unit 2: Types of computers	8	4		4
Unit 3: I/O Devices	8	4		4

Unit 4: Storage Devices	4	4		2
Test for module 1	2			
Total for module 1	30	16		12
Module 2 - Internet and computers				
Unit 5: Inside the Case	8	4	1	2
Unit 6: Operating Systems	8	4		2
Unit 7: Internet	8	4		2
Unit 8: Internet Security	4	4		2
Test for module 2	2			
Total for module 2	30	16		8
Module 3 - Introduction to Automation				
Unit 9: Units of measurement in computer engineering, automation and robotics	4	4	1	2
Unit 10: Theory of computation	8	4		2
Unit 11: Control Systems	8	4		4
Test for module 3	2			
Total for module 3	22	16		8
Module 4 - The Language of computer-integrated technologies				
Unit 12: Types of memory in computer engineering, automation and robotics	8	4	1	2
Unit 13: Computer languages	8	4		4
Unit 14: Arithmetic for computers	4	4		2
Test for module 4	2			

Total for module 4	22	16		8
Total	104	56	4	36

Each unit is constructed following a similar structure, which introduces the topic with questions related to it, texts which introduce relevant lexical units, grammatical rules and exercises related to them, using the previously learned words and phrases, and creative exercises that focus on the use of the vocabulary.

Due to the nature of the structure and exercises in the guide, it can be used both online and offline without the need to change the teaching method. The instructions provided and the order of the topics allow for assisted and individual learning of the subject without issue.

The primary focus of this guide is individual learning, focusing on exercises which can be completed alone, without collaboration with other students. However, some of the more creative writing and speaking assignments recommend working in pairs to create dialogues or debates on certain topics, which is aimed at groups of students, rather than individuals. In case collaborative work is impossible, these exercises can be modified for individual completion.

Suggested methods of testing include by-unit tests, in which students complete tests after each unit, and by-module tests, in which students complete tests after each completed module. Examples of by-module tests can be found on the next page. Specific vocabulary and grammar tested must be determined by the teacher. Exam control can be similar to by-module tests, only encompassing both modules.

This book can be used as both primary and secondary study material which the teacher and students of this specialty can use to acquire and practice their knowledge of English in relation to the specialty "Automation, computer-integrated technologies and robotics".

Exam Test Sample

I. Speak on the following topic.

The modern field of automation and robotics is increasing in complexity each year, requiring new specialists in the field to have more knowledge before entering the field. What do you think about this rise in complexity? Should we expect this field to become even more complex? What could help us deal with this problem?

II. Choose the correct words to complete the text.

In 1965, computer engineer Gordon Moore made a remarkable **1.** _____. He said that computer processing power should **2.** _____ every two years. While the rate **3.** _____, the overall trend actually follows it quite closely. This theory is known as **4.** _____.

Moore's law is based on various factors. As manufacturing improves, the cost of **5.** _____ decreases. The decline in cost corresponds to a rise in production. Engineers can afford to place more transistors on each circuit. As a result, computing power increases at a steady rate.

However, not everyone benefits from such rapid **6.** _____. As computing power expands, older models fade quickly into **7.** _____. Even though costs have decreased, computers are still expensive for some. Many **8.** _____ cannot afford a new computer every two years.

Some **9.** _____ predict that the trend will not last. They suggest that growth will begin to stabilize in a few years. If predictions are correct, **10.** _____ may double in three years instead of two.

obsolescence, Moore's law, prediction, double, transistors, analysts, growth, improvements, fluctuates, average consumers

III. Choose the word that fits the definition best.

1. A(n) _____ is a mouse that uses LEDs to track hand movements across a surface.
A. electromechanical B. laser C. optical D. ball
2. A(n) _____ is an electrical current that changes the direction it flows in at regular intervals.
A. direct current B. alternating current C. changing current D. steady current
3. A(n) _____ is a general course of study that students take to prepare for a degree program.
A. national course B. intensity C. foundation D. basic course
4. If something is _____, it is new, creative, and advanced.
A. cool B. smart C. innovative D. outdated
5. _____ is the amount of power in an electrical current.
A. Newton B. Ampere C. Ohm D. Wattage
6. A(n) _____ is a place where a user enters and receives information from a computer system.
A. keyboard B. UI C. terminal D. interface
7. A(n) _____ is a part of a whole number, such as a quarter or half.
A. frame B. bit C. morpheme D. fraction
8. A(n) _____ is a piece of hardware that directs information around a network.
A. router B. modem C. antenna D. network
9. _____ is a force that attracts bodies with mass towards each other.
A. Newton B. Speed C. Resistance D. Gravity
10. A(n) _____ is a unit of measurement with a prefix based on factors of ten.
A. IEC unit B. IBM unit C. SI unit. D. CRT unit

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