### **1 Computer programming and the activities it involves.**

Computer programming is the process of designing and building an executable computer program to accomplish a specific computing result or to perform a specific task. Computer programming encompasses a broad set of activities that include planning, coding, testing and documenting. For example, Software Engineers tend to focus on designing and testing activities.

### **2 Programming paradigms.**

There are four programming paradigms: procedural, functional, logical, object-oriented. Procedural is based on commands and it’s built around the idea that programs are sequences of instructions to be executed. Functional paradigm employs functions as the main driving force behind the development. Logical has its foundation in math logic so program statements express facts and rules about problems within a system. Object-oriented formulates programs as a series of objects and methods that interact to perform a specific task.

### **3 The types of programming languages.**

There are 2 types of programming languages: low-level and high-level languages. Low-level languages are machine code that consists of 0s and 1s with which the computer works. High-level languages are more user-friendly and closer to human language. Programs written in high-level languages cannot be directly processed by the computer until they have been compiled, which means converted into machine code. This is done by a computer program called the compiler. When a program written in one of the high-level languages is designed to do a specific task such as calculating a company’s payroll, it is called an application program.

### **4 Object-oriented programming.**

Object-Oriented Programming (OOP) is a programming paradigm that based on objects. An object can be thought of as a data field that has unique attributes and behavior.

Objects are instances of classes, which are like blueprints or templates from which objects are created. Each object has a state and behavior. The state is related to the attributes of the object, and the behavior is related to the methods of the object.

There are 4 principles of OOP: Encapsulation, Abstraction, Inheritance, Polymorphism. In encapsulation, data is protected from user by using setters and getters. In abstraction, class methods are described but not implemented. Polymorphism allows objects to take on many forms depending on the context, enabling multiple behaviors through one name. In inheritance, classes can have common methods and properties inherited from parent classes.

### **5 Programming languages in demand.**

The most popular OOP languages are:

Изображение выглядит как текст, снимок экрана, Шрифт, число

Автоматически созданное описание

Изображение выглядит как текст, снимок экрана, Шрифт, число

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Автоматически созданное описание

### **6 Artificial Intelligence, its usage, advantages and disadvantages.**

The goal of AI is to create smart computer systems that can solve complex problems like humans. AI enables a machine to simulate human behavior. This is achieved by learning from data. The main applications of AI include Siri, online game playing, and intelligent humanoid robots.

Disadvantages: High cost of creation. Making humans lazy. Unemployment. No emotions. Lacking out of the box thinking.

Advantages: Efficiency through Task Automation. Assistance in Medical Diagnosis. Innovations in Various Industries:

AI impacts finance (fraud detection), marketing (personalized recommendations), and manufacturing (predictive maintenance).

### **7 Machine Learning, Deep Learning, Big Data.**

ML is a sub-branch of artificial intelligence that works with diverse datasets to make predictions or take automated decisions based on patterns and experiences without explicit programming. It utilizes trained models for prediction and decision-making based on the data it receives. Analysis in ML is managed by analysts who evaluate different databases using ML algorithms. ML has various practical applications, including statistics, diagnosis, prediction, arbitrage, and classification.

DL is a subset of machine learning that focuses on the construction of hierarchical networks, helping in interpreting the world as nonlinearity concepts. All the information in DL is processed through some stages that are self-directed for their relationships across all the stages. DL stages are self-directed through some algorithms used for practical fetching and data analysis. DL has various practical applications, including visual recognition, facial recognition, translation, and speech handling.

Big Data is a term that describes the large volume of data. It has become a key player in solving problems in various areas due to the rise of machine learning. Big Data is often characterized by the following five V’s:

a) Volume: This refers to the amount of data. Big Data deals with high volumes of various forms.

b) Velocity: This refers to the speed at which new data is generated and moves.

c) Variety: This refers to the wide range of data formats. The data may be structured, semi-structured, or unstructured and can present data as text, images, audio, and more.

d) Veracity: This refers to the quality and accuracy of data.

e) Value: This refers to the usefulness of the data received.

### **8 The difference between Virtual Reality and Augmented Reality.**

Augmented Reality (AR):

AR is a blend of digital and physical elements to create an artificial environment. It uses computer vision, mapping, and depth tracking.

This functionality allows users to collect, send, and process data to show digital content appropriate to what any user is looking at.

In AR, the user’s physical environment is enhanced with contextually relevant digital content in real-time.

Virtual Reality (VR):

VR uses computer technology to create an artificial immersive environment. It is used in 3D movies and video games.

It helps create simulations close to the real world and beyond!

The viewer may use computer screens, sensory devices like haptic gloves, or through simply wearing gaming glasses or headset devices.

Differences between AR and VR:

AR simulates artificial objects in real environments, while VR creates an immersive universe that is entirely different from the real world.

### **9 Game programming, genres, components, programming language.**

There are 5 main genres of games:

Role-Playing Games (RPGs): In this genre, players take on the roles of characters in a fictional setting. Players are responsible for acting out these roles within a narrative, either through literal acting or through structured decision-making or character development actions according to well-defined rules.

Puzzle Games: This genre requires controlling problem-solving skills including logic, pattern recognition, lateral thinking, spatial recognition, and memory. Games succeed or fail according to a final score total system rules.

Simulation Games: This genre of video game is designed to imitate real-world activities.

Adventure Games: In this type, the player assumes the role of a protagonist and is asked by someone else for help. For example, Mario.

Strategy Games: This genre makes demands upon skillful thinking and planning. The story and character make multiplayer single difficult.

Main components:

Art: This includes various elements like game texture, 3D modeling of characters/objects, particle systems to create fire, fog, and game levels.

Characters: Characters are a fundamental part of any video game. You choose their looks and personality, how they move, and what mannerisms and characteristics they should possess.

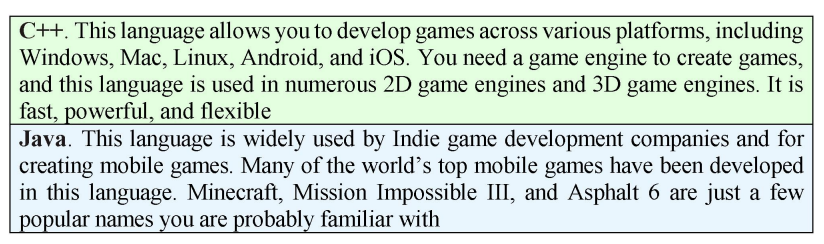
Level Design: Video games have various levels that increase in difficulty as you progress through them. Each design must be unique for an individual player’s tastes or adapt to the next layer.

Audio: Audio is the backbone of video games. It should support the game and yet not be too loud nor too soft so that it becomes monotonous. It must vary from high tempo battle music with lots of basses to gentle background music.

Lighting: Lighting is very important for mood setting. When there’s less of it, it’s an association with horror games whereas more light can offer more detail and better vision so it can be used as guidance for players or even show where there are obstacles.

Story: The story can have a linear structure which is relatively easy or it can even have a non-linear structure with various plot changes according to character’s actions. The main point is that there should be something interesting to hook your players.

Languages:



Изображение выглядит как текст, снимок экрана, Шрифт, число

Автоматически созданное описание

### **10 Robotics, types of robots.**

There are 6 types of robots: virtual robots, rolling robots, stationary robots, autonomous robots, walking robots, remote-control robots.

Autonomous Robots: These robots operate independently without human intervention. They are self-contained and rely on software inside a computer, often used to explore areas or perform tasks without evolving much intelligence.

Walking Robots: These robots are designed with legs, allowing them to move around in various settings. They can imitate human beings or animals, and they are especially useful in rocky or uneven terrain.

Stationary Robots: These robots are fixed in one place and typically perform repetitive tasks. They are often used in industry settings and can work in difficult or dangerous areas.

Remote Control Robots: These robots are guided by a person with a remote control.

Rolling Robots: Rolling Robots are a type of mobile robot that uses wheels to move around. They can be autonomous, meaning they operate independently without human intervention.

Virtual Robots: Virtual Robots are computer-simulated robots that exist in a virtual environment. They are used for educational purposes, allowing users to learn how to program and code, understand which sensors and systems run the robot, and comprehend the physics concepts and principles that impact their robots6. Virtual Robots can be controlled in immersive 3D worlds, providing a hands-on learning experience.

### **11 Robotic system and its consistent components**

The Robotic system consists of processing unit, power supply, sensor, program, end-effector and actuator. Processing unit: It acts as the "brain" of the robot. In other words, it is the robot component that provides feedback to outside stimuli. It functions similarly to the human brain. Data comes in through sensors just as information comes to the neurons in your brain through your body's senses, then this component interprets it and acts accordingly. Power supply: It can take different forms. Stationary robots, like those in factories, receive it directly just like any other appliances. Mobile robots typically sport high- capacity batteries while robotic probes and satellites are generally equipped with solar panels for harvesting energy from the sun. Robots need energy to function. Almost all robots receive it from electricity. Sensor: Robots typically incorporate a wide range of them. Important types include light, sound, temperature, contact, distance, pressure, positioning ones. They act as eyes and ears to help a robot take in information about its surroundings. Program: It isn't a physical component, but within a robot it provides the logic that drives its behaviors. It contains "logic trees" that gather and analyses task and environmental data, and then choose an appropriate response. End-effector: The examples of such tools might include screwdrivers, rivet guns, paint sprayers, grippers, shovels, drills, hammers, cameras, lights, scalpels, etc. The term refers to the tools aboard the robot - the parts that perform the actual work and interact with the environment or a workpiece. They allow robots to carry out their specific tasks with precision. Actuator: They function like muscles. They are small motors attached directly to the structure of the machine that facilitate movement. Some robots use hydraulic systems which use oil to facilitate movement, others - pneumatic motors which use air or electric motors which use electric current and magnets to facilitate movement.

### **12 Robotics programming, its main approaches and languages.**

Components for Complex Robotic Systems:

There are numerous components used to build intricate robotic systems. These range from mechanical parts to electronics, each playing a crucial role in a robot’s functioning.

Choosing a Programming Language:

Java: A preferred language for developing artificial intelligence systems, including machine learning algorithms and neural networks. These are essential for advanced robot development.

C/C++: These versatile languages allow low-level hardware interaction. They provide real-time performance and come with rich libraries.

Python: A high-level language ideal for automation, teaching, and post-processing robotic applications. Python scripts can simulate entire robot programs efficiently.

Complementing Languages:

Recognize that each language has its strengths, weaknesses, and specific uses. Different applications may require knowledge of different programming languages.

The more languages you know, the better, as robotic programming encompasses various aspects.

### **13 Robots’ applications, their benefits and threats.**

Advantages: They can go to far away planets. They give us information that humans can't get. They work at places 24/7 without any salary and food. They can perform tasks faster, more consistently and accurately than humans. Most of them are automatic, so they can go around by themselves without any human interference. They can go far down into the unknown waters and mines where humans can't.

Disadvantages: They need a supply of power. They need maintenance to keep them running. It costs money to make or buy a robot. People can lose jobs in factories.

The main threat from robots is that they can take over our world and stop obeying humans.

Robots are used in manufacturing, automotive industry (self-driven cars), space/earth exploration, medicine, security, nanotechnology (nanobots), education.