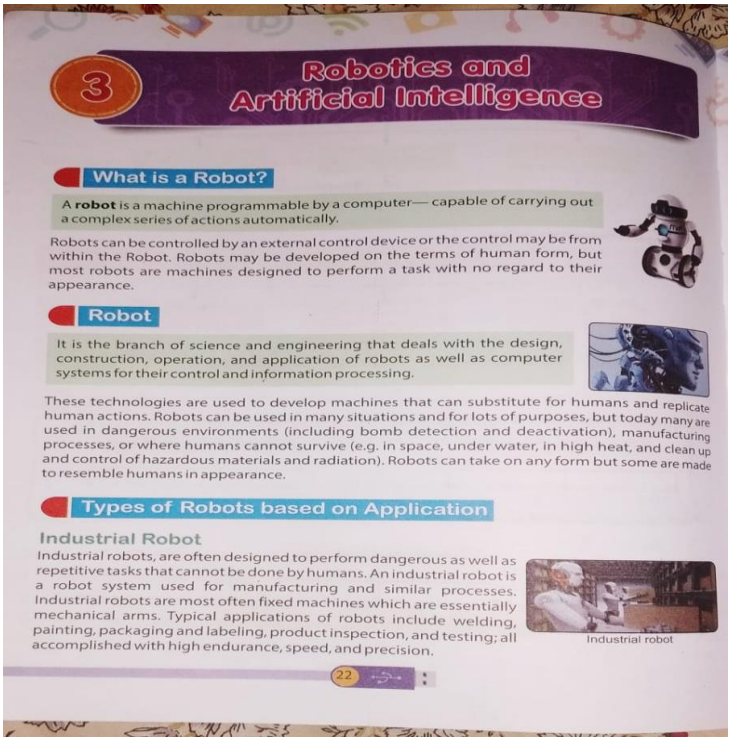
Computer-Ch 3(Exercises+Question/answers+Diagrams)



3 Robotics and Artificial Intelligence

What is a Robot?

A **robot** is a machine programmable by a computer— capable of carrying out a complex series of actions automatically.

Robots can be controlled by an external control device or the control may be from within the Robot. Robots may be developed on the terms of human form, but most robots are machines designed to perform a task with no regard to their appearance.

Robot

It is the branch of science and engineering that deals with the design, construction, operation, and application of robots as well as computer systems for their control and information processing.

These technologies are used to develop machines that can substitute for humans and replicate human actions. Robots can be used in many situations and for lots of purposes, but today many are used in dangerous environments (including bomb detection and deactivation), manufacturing processes, or where humans cannot survive (e.g. in space, under water, in high heat, and clean up and control of hazardous materials and radiation). Robots can take on any form but some are made to resemble humans in appearance.

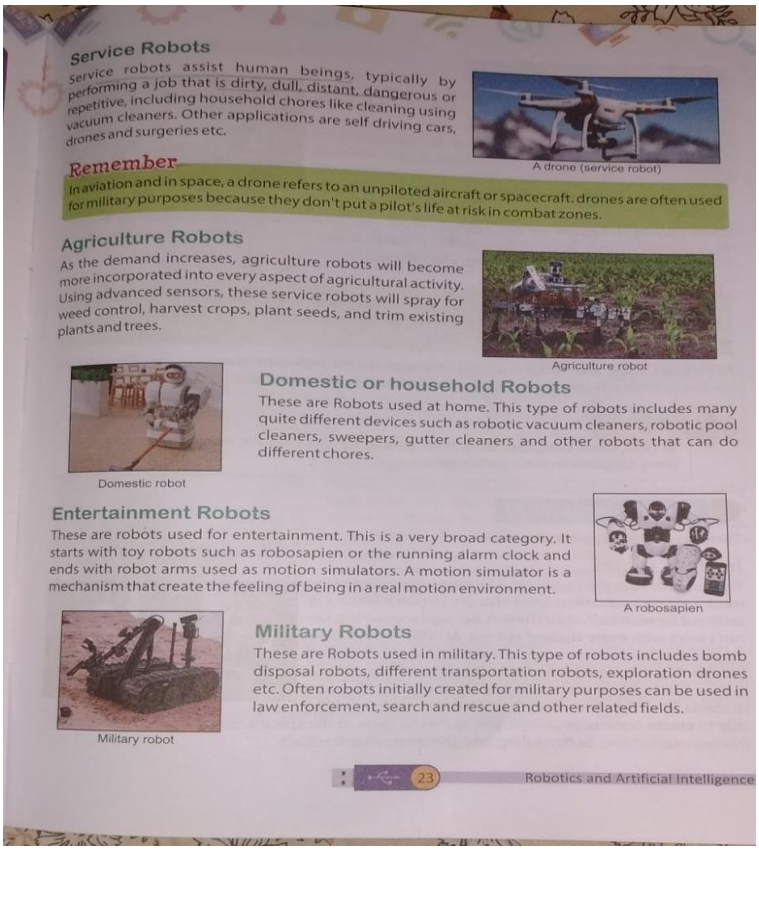
Types of Robots based on Application

Industrial Robot

Industrial robots, are often designed to perform dangerous as well as repetitive tasks that cannot be done by humans. An industrial robot is a robot system used for manufacturing and similar processes. Industrial robots are most often fixed machines which are essentially mechanical arms. Typical applications of robots include welding, painting, packaging and labeling, product inspection, and testing; all accomplished with high endurance, speed, and precision.

Industrial robot

22



Service Robots

Service robots assist human beings, typically by performing a job that is dirty, dull, distant, dangerous or repetitive, including household chores like cleaning using vacuum cleaners. Other applications are self driving cars, drones and surgeries etc.

A drone (service robot)

Remember

In aviation and in space, a drone refers to an unpiloted aircraft or spacecraft. drones are often used for military purposes because they don't put a pilot's life at risk in combat zones.

Agriculture Robots

As the demand increases, agriculture robots will become more incorporated into every aspect of agricultural activity. Using advanced sensors, these service robots will spray for weed control, harvest crops, plant seeds, and trim existing plants and trees.

Agriculture robot

Domestic robot

Domestic or household Robots

These are Robots used at home. This type of robots includes many quite different devices such as robotic vacuum cleaners, robotic pool cleaners, sweepers, gutter cleaners and other robots that can do different chores.

Entertainment Robots

These are robots used for entertainment. This is a very broad category. It starts with toy robots such as robosapien or the running alarm clock and ends with robot arms used as motion simulators. A motion simulator is a mechanism that create the feeling of being in a real motion environment.

A robosapien

Military robot

Military Robots

These are Robots used in military. This type of robots includes bomb disposal robots, different transportation robots, exploration drones etc. Often robots initially created for military purposes can be used in law enforcement, search and rescue and other related fields.

Artificial Intelligence

Artificial Intelligence(AI) is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the humans think.

Artificial Intelligence is accomplished by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems.

Chess playing computers are one example where computer learns and improve games learning from previous games. Some of the activities computers with artificial intelligence are designed for include: Speech recognition, Learning, Planning and Problem solving.

Remember

The field of AI research was founded at a workshop held on the campus of Dartmouth College during the 1956. McCarthy was one of the founders of the discipline of artificial intelligence. He invented the term "artificial intelligence" (AI).

AI includes tools and techniques like Artificial Neural networks, machine Learning, Natural Language Processing and Deep Learning to work like the human mind.

FACT FILE

In 1997, chess computer Deep Blue, created by IBM, beat the leading world champion, Garry Kasparov, in a series of six games.

Applications of AI

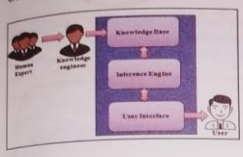
There are multiple applications of AI.

In class rooms

The future of AI in the classroom is looking bright. One of the most exciting innovations is the idea of a personal AI tutor or assistant for each individual student. Because a single teacher can't work with every student at once, AI tutors would allow for students to get extra, one-on-one help in areas of needed growth. AI tutors also eliminate the scary idea of tutor labs or human tutors which can cause anxiety and stress for some students. When students sit at their desk, their devices will be able to create lessons, problems, and games to tailor to the specific student's needs, particularly where a student may be struggling, and give immediate feedback.

Hospital and Medicine

AI helps in computer-aided interpretation of medical images. Such systems help scan digital images, e.g. from computed tomography (CT Scan), for typical appearances and to highlight obvious sections, such as possible diseases. A typical application is the detection of a tumor.



Expert Systems

There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice to the users. An expert system is computer software that attempts to mimic the decision-making expertise of an expert in a given field.

Speech Recognition

Some intelligent systems are capable of hearing and understanding the language in terms of sentences and their meanings while a human talks to it. It can handle different accents, slang words, noise in the background, change in human's noise due to cold, etc.

Intelligent Robots

Robots are able to perform the tasks given by a human. They have sensors to detect physical data from the real world such as light, heat, temperature, movement, sound, bump, and pressure. They have efficient processors, multiple sensors and huge memory, to exhibit intelligence. In addition, they are capable of learning from their mistakes and they can adapt to the new environment.

Entertainment

A familiar application of AI in everyday life is seen with services like Netflix or Amazon, wherein an algorithms analyze the user's activity and compare it with that of other users to determine which shows or products to recommend. The algorithms are becoming intelligent with time—to the extent of understanding that a user may want to buy a product as a gift and not for himself/herself, or that different family members have different watching preferences.

Smart Virtual Assistants

A virtual assistant is an application that can understand voice commands and complete tasks for a user. Virtual assistants are available on most smartphones and tablets, traditional computers, and, now, even standalone devices like the Amazon Echo and Google Home. Apple's Siri, Google assistant, Amazon's Alexa and Microsoft's Cortana accept voice commands to do many things are example of Smart Virtual Assistants.

They combine specialized computer chips, microphones, and software that listens for spoken commands from you and usually answers back with a voice that you select.

Recap

- A robot is a machine programmable by a computer.
- Robotics is the branch of science and engineering that deals with the design, construction, operation, and application of robots.
- Industrial robots, are often designed to perform dangerous as well as repetitive tasks that cannot be done by humans.
- Service robots assist human beings, typically by performing a job that is dirty, dull, distant, dangerous or repetitive, including household chores.
- Agricultural robots using advanced sensors, will spray for weed control, harvest crops, plant seeds, and trim existing plants and trees.
- Miltary robots includes bomb disposal robots, different transportation robots, exploration drones etc.
- Artificial Intelligence(AI) is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think.
- A virtual assistant is an application that can understand voice commands and complete tasks for a user.
- An expert system attempts to mimic the decision making expertise of an expert system in a given field
- Speech recognition systems are capable of hearing and understanding in terms of sentences and their meaning while a human talks to it.
- AI helps in computer aided interpretation of medical images.
- Intelligent robots are capable of learning from their mistake and they can adapt to new environment.

EXERCISE

Multiple Choice Questions. Tick (✓) the correct answer.

1. It is the branch of science and engineering that deals with the design, construction, operation, and application of robots
   a. Borotics ☐ b. Robotics ☑
   c. Information Technology ☐ d. Computer Science ☐
2. These type of Robots, are often designed to perform dangerous as well as repetitive tasks in industries that cannot be done by humans.
   a. Industrial Robots ☑ b. Service Robots ☐
   c. Agricultural robots ☐ d. Military Robots ☐
3. These type of intelligent systems are capable of hearing and understanding the language in terms of sentences and their meanings while a human talks to it.
   a. Command recognition ☐ b. Work Recognition ☐
   c. Speech recognition ☑ d. Biometric ☐
4. These system provide explanation and advice to the users.
   a. Common system ☐ b. Clever system ☐
   c. Expert system ☐ d. Virtual assistant ☐
5. This is an application that can understand voice commands and complete tasks for a user.
   a. virtual assistant ☑ b. personal assistant ☐
   c. Expert system ☐ d. Machine Assistant ☐
6. _____ invented the term Artificial intelligence (AI)
   a. Watson ☐ b. Blaise Pascal ☐
   c. Charles Babbage ☐ d. McCarthy ☑

Write (T) for True and (F) for False statements.

1. Domestic robots are used at home. ( )
2. Dumb Robots are capable of learning from their mistakes and they can adapt to the new environment. ( )
3. Artificial intelligence cannot be used in schools. ( )

4. AI helps in computer aided interpretation of medical images. ( )
5. An expert system is a computer software that attempts to mimic the decision making expertise of an expert in a given field. ( )
6. A virtual assistant is an application that can understand voice commands and complete tasks for a user. (I)

Select the suitable word to fill in the blanks.

robot industrial Military Robotics Service robots Artificial Intelligence

1. A _____ is a machine programmable by a computer.
2. _____ is the branch of science and engineering that deals with the design, construction, operation, and application of robots.
3. An _____ robot is a robot system used for manufacturing and similar processes.
4. _____ assist human beings, typically by performing a job that is dirty, dull, distant, dangerous or repetitive.
5. _____ robots includes bomb disposal robots, different transportation robots, exploration drones etc.
6. _____ is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner the intelligent humans think.

Answer the following in 2-3 lines.

1. What is a Robot?

2. What is an Expert system?

3. What is Robotics?

4. Write about Industrial robots.

5. Write about agricultural robots.

6. Write about speech recognition.

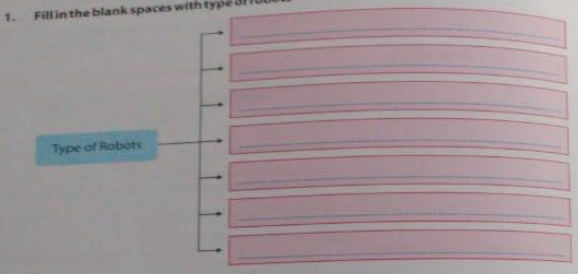
7. Write the use of AI in classrooms.

Think and Tell (Oral Questions)

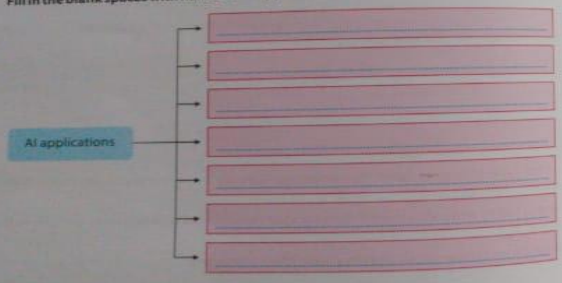
1. Which type of robots assist human beings typically by performing a Job that is dirty, dull, distant or dangerous?
2. Neeraj has to write about work done by agriculture robots. Give him some example so that he can write it.
3. What do you know about the 'deep blue' chess computer?

Worksheet

1. Fill in the blank spaces with type of robots



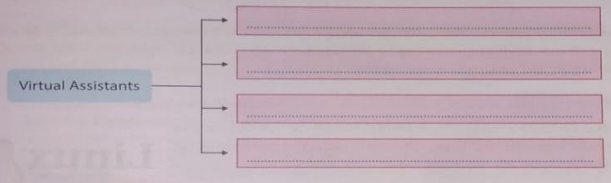
2. Fill in the blank spaces with names of AI applications



3. Write down correct terms in front of definitions

.....	It is an application that can be understand voice commands and complete tasks for a user.
.....	Application of AI in services like Netflix or Amazon.
.....	These types of robots are capable of learning from their mistakes.
.....	It is a computer software that attempts to mimic the decision making expertise in a given field.

4. Write down the names of virtual Assistants.



Answer the following questions:

Q1. What is a robot?
Ans. A robot is a machine programmable by a computer capable to carry out complex series of actions automatically.

Q2. What is an expert system?
Ans. An expert system is a computer software that attempts to mimic the decision-making expertise of an expert in a given field. They provide explanation and advice to the users.

Q3. What is robotics?
Ans. It is a branch of science and engineering that deals with the design, construction ,operation and application of robots as well as computer system for their processing and information processing.

Q4. Write about industrial robots.
Ans. An imdustrial robot is a robot system ,used for manufacturing and similar processes.They are most often fixed machines.They can be used for welding, packaging, painting, testing etc at a high speed.

Q5. Write about agricultural robots.
Ans. Agricultural robots are being designed to work in agricultural field. Using sensors, they will be able to spray weed control, harvest crops and plant seeds, trim existing plants and trees.

Q6. Write about speech recognition.
Ans. Speech recognition means systems are capable of hearing and understanding the language in terms of sentences and their meanings while human talks to them.

Q7. Write the use of AI in classrooms.
Ans. In classrooms, AI tutors can allow students to get extra, one on one help in the areas of needed growth.

Diagrams: Drone, robosapien, expert system, speech recognition.

Holiday homework-Solve the worksheets given on page 30,31 in rough copies and later on stick those pages in computer copies.
SEA activity- Draw the parts used in various generations of computer and write about their properties.

Note- (i)Write down the question/answers in any copy u have and later on stick those pages in your computer copy

(ii)Solve the exercises in any rough copy and later on in your books.

(iii) SEA should be performed at home in a drawing sheet which will be checked when the school reopens.

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