



# ARTIFICIAL INTELLIGENCE



Incorporates  
NEP 2020





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Incorporates  
NEP 2020



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# ARTIFICIAL INTELLIGENCE

● ● ● <This book belongs to>

<Name> .....</Name>  
<Class> .....</Class> <Section> .....</Section>  
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<School> .....  
.....</School>

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# PREFACE

**“Computers are able to see, hear and learn. Welcome to the future.”**

**-Dave Waters**

**Artificial Intelligence** is the most talked about subject and we all understand that the future lies in knowing it well. The **Touchpad AI** series is written for classes I to VII keeping in mind about the future and scope that lies in AI. Classes VIII to XII are strictly based on CBSE curriculum. They have competency-based questions to ensure that students are capable of applying their learning to solve some real-life challenges. The knowledge is spread in a phased manner so that at no age the kid finds it difficult to understand the theory.

Each lesson begins with a short conversation between human characters and one humanoid which tries to explain in simple words about the topics related to Artificial Intelligence. The story is built up in such a way that the curiosity of the reader compels to read the entire lesson. The idea behind introducing humanoid is to touch the hearts of our kids with the existence of friendly robots in the form of humanoids.

**Touchpad Artificial Intelligence** series has some salient features such as **AI Reboot**, **AI Deep Thinking**, **AI in Life**, **AI Lab** and **AI Ready** which ensures that **NEP 2020** guidelines are followed.

There are plenty of **Video Sessions** for students and teachers to go beyond the syllabus and enrich their knowledge. There are some brainstorming questions in the form of **AI Task** in between the topics to ensure that students give pause to their learning and use their skills to reach to some creative ideas in solving given problems.

I would like to humbly acknowledge the support provided by my family, friends and Orange Education Pvt Ltd team to accomplish

this noble task.

I am sure that this book will prove to be a tool in making the students future ready for Artificial Intelligence.

Wishing learners great success in future endeavours. Enjoy the journey of happy learning!!

All your feedbacks and suggestions will always be wholeheartedly welcomed to improve and grow.

—Publisher

# INCORPORATES NEP 2020

This textbook has been created with new dimensions of Joyful Learning along with the parameters based on pedagogy of National Education Policy 2020.



## DIGITAL RESOURCES

### Animated Audio & Video eBook



- Works offline after download
- Chapter Audio & Video
- Interactive Exercises with Answer Checks & Subjective Questions
- Features like Spotlight, Zoom Sliders, Add Notes, Highlighter & Pen on the eBook



Student Worksheet



Software Download Link

Visit [www.touchpadwebsupport.com](http://www.touchpadwebsupport.com) and enter the credentials.



	ais7@epuborange.com
	orange@2023

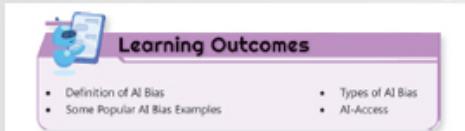
# INSIDE THE SERIES

The key features of the series have been designed to ensure better learning and assessment.

## Learning Resources

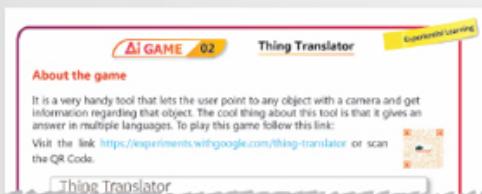
### Learning Outcomes:

It provides an overview of the unit/chapter contents.



### AI Game:

It contains an interesting game or activity for the students to try on their own or with their classmates to learn how the game mechanics work while having fun.



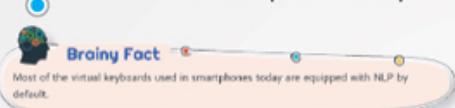
### AI Innovators:

It presents information about the pioneers in the field of AI.



### Brainy Fact:

It presents an interesting fact relevant to the topic or the chapters.



### At a Glance:

This section provides a summary of the chapter.

### At a Glance

- Human Machine Interaction, Natural Language Processing and Computer Vision are different domains of Artificial Intelligence.
- HMI can be defined as the interaction and communication between a human and a machine.
- Touch screens are example of HMI.
- The Human Machine Interaction can broadly be classified into 4 stages as Intention, Selection, Execution and Evaluation.
- Natural Language Processing helps the computers to understand human language.
- The aim of Natural Language Processing is to interpret, process and convert it to meaningful data.

### Video Session:

This section contains a link of the video related to the topic for better understanding of the concept.



### AI Glossary:

This section contains definition of important AI terms.



## Assessment Resources

### AI Reboot:

It presents questions to the students to assess their current progress in the ongoing topic.

#### AI Reboot

Explain briefly, how AI can help the medical sector.

\_\_\_\_\_

### AI Quiz:

It contains MCQs for the students to test and improve their mental dexterity.

#### AI @Quiz

Tick (✓) the correct option.

1. Which bank has recently used AI and NLP enabled app?  
a. SBI      b. OCB  
c. PNB      d. AXIS

### Exercise:

It contains a variety of questions to assess the concepts taught in the unit/chapter.

#### Exercise

A. State whether these statements are true or false.

1. AI is only useful for robotics.
2. Artificial intelligence tries to imitate the thinking capability of a human.

### AI Ready:

It contains an assessment for the students to analyse their progress towards acquired AI-readiness skills.

#### AI Ready

Answer the following questions:

1. You have often heard that the development in the field of artificial intelligence will lead to ethical issues. Do you agree?

### Test Sheet:

It contains questions for self evaluation.

#### Test Sheet 1

(Based on Units 1 & 2)

A. Tick (✓) the correct option.

3. Which of the following AI systems are commonly used?  
a. Human AI      b. Strong AI  
c. None of these      d. Both of these

### Projects:

It helps the students work outside the classroom environment while improving their practical skills.

#### PROJECTS

1. Prepare a MS PowerPoint presentation on the topic "Human Intelligence Vs Artificial Intelligence". Present 10 slides, and use pictures to illustrate the differences, use one slide to one difference. You may even share images, if needed. Share your presentation with your class.



### AI Task:

It provides an activity to the students allowing them to research and learn new things.

#### AI Task

If you were given the authority to update the security of our defense systems, write a feature that you are going to implement in it. Write an essay in the space given below.

### AI in Life:

It presents questions that promotes the moral growth and experiential learning.

#### AI in Life

1. Do you think enabling the machines to be able to think for themselves is a good idea? Write a brief note and share with your teacher and the class.
2. Does Human Machine Interaction make a user slow and inefficient over time? Express your views in 100 words and discuss them with your teacher and the class.

### AI Deep Thinking:

It presents a question/scenario in which the students are required to think deeply and apply their knowledge.

#### AI Deep Thinking

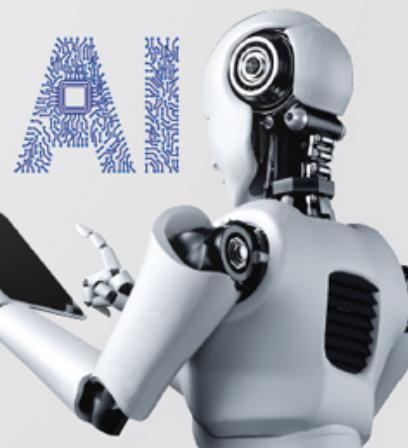
1. Can Artificial Intelligence replace human beings from their respective jobs? Mention few sectors where you think AI systems would replace the humans and few areas where they can not.
2. Today many robots which will make our day-to-day work easy are being manufactured. They would be a sort of personal assistant. Draft a policy on behalf of the government to define the safety and society measures to be taken by the manufacturers before they make it available to the public.

### AI Lab:

It contains tasks that helps the students to improve their practical skills.

#### AI Lab

1. In light of the current advancements, write your views in 10 sentences on how AI can improve over the current technology. Use Google Docs or MS Word to write your views and share with your class.
2. What is the difference between reasoning and problem solving? How can these two factors affect the AI systems? Write your views supporting some real-life examples.



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- Ross Quillian
- Edward Feigenbaum
- Marvin Minsky
- IBM

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- Real Life Applications of Different Domains of AI

## Test Sheet 1

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- Navigation
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**AI Ready**

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**AI Innovators**



## Learning Outcomes



- What is AI?
- Difference between Human and Machine Intelligence
- AI as Defined by Different Organizations
- Types of AI

The interface consists of two columns. The left column has a yellow background and contains three messages from a black robot icon. The right column has a light blue background and contains two messages from a circular profile picture of a person with glasses.

**Robot:** Hello Alice! Have you googled famous restaurants in nearby places?

**Alice:** Yes, but it's pretty weird that it gives me a list of famous restaurants of some random places.

**Robot:** Grant permission to Google to access your location.

**Alice:** What difference will it make?

**Robot:** Google empowered with AI first traces our location, then finds the restaurants nearby. Let me introduce you to some basic .

We all know by now that AI learns, thinks and behaves like humans. So, AI in simple terms is a computer program which can learn and perform tasks that require a higher level of intelligence like learning from its past experience, planning and problem solving etc. which any human being does with ease.

### What is AI?

AI is the branch of computer science that focuses on developing machines which can think and work like human beings. These machine are created to be smart and would be able to simulate the human thinking process.

Since ancient time, humans were fascinated to make machine as smart as themselves. This desire led to the development of one of the most ground breaking technology that could change the future AI. Humans have been creating smart machine for quite a long time but, even then there are certain differences that sets human intelligence apart from artificial intelligence.

## Difference between Human and Machine Intelligence

To understand Artificial Intelligence, we need to understand the difference between Machine intelligence and Human intelligence.

S.No.	Human Intelligence	Machine Intelligence
1.	Humans are naturally intelligent.	Machine's Intelligence is created by the humans.
2.	The intelligence level of a human keeps varying with age.	Machine's intelligence level keeps on growing with time, never having a peak or any descent.
3.	Humans behave according to their experience.	Machines behave and perform as they are programmed.
4.	Humans are independent and need no support to take a decision.	Machines need humans for guidance. Their creativity is very limited.
5.	Humans can adapt to changes easily.	AI takes more time to respond to unusual or different situations.
6.	Human brain is analogous.	Machine's brain is digital.
7.	Humans learn from past experiences, exploring ideas and their mistakes.	Machine learn from information provided to them and through regular training.
8.	Human brain normally uses 20 watts of energy.	Machines usually use 65 to 250 watts.
9.	Data processing speed is slower in human beings.	Machines can process huge volumes of data quickly.
10.	Humans may make mistakes as per their capabilities and circumstances.	Since machines lack emotions, they are capable to produce more accurate results.



### Brainy Fact

Human Brain can store an estimated 2.5 million gigabytes of digital data.



## AI as Defined by Different Organizations

There are different influential organisations that have been studying the impact of AI on the future of human beings and economical market. They define AI based on their analysis and research outcomes. Let us take a look at some of these organisations.

### World Economic Forum (WEF)



World Economic Forum is the International Organisation for Public-Private Cooperation. The organisation shapes global, regional and industry agendas. Artificial Intelligence (AI) is a key driver of the Fourth Industrial Revolution. Its effects can be seen in homes, businesses and even public spaces. In its embodied form of robots, it will soon be driving cars, stocking warehouses and caring for the young and elderly. AI holds the promise of solving some of society's most pressing issues but also presents challenges such as inscrutable "black box" algorithms, unethical use of data and potential job displacement.

## **Niti Aayog: National Strategy for Artificial Intelligence (NSAI)**



National Institution for Transforming India, also known as NITI Aayog, is a public policy think tank of the Government of India.

AI refers to the ability of machines to perform cognitive tasks like thinking, perceiving, learning, problem solving and decision making. Initially conceived as a technology that could mimic human intelligence, AI has evolved in ways that far exceed its original conception. With incredible advances made in data collection, processing and computation power, intelligent systems can now be deployed to take over a variety of tasks, enable connectivity and enhance productivity. As AI's capabilities have dramatically expanded, so have its utility in a growing number of fields.

## **European Artificial Intelligence (AI) Leadership, the Path for an Integrated Vision**



AI is not a well-defined technology and no universally agreed definition exists. It is rather a cover term for techniques associated with data analysis and pattern recognition.

AI is not a new technology, having existed since the 1950s.

While some markets, sectors and individual businesses are more advanced than others, AI is still at a relatively early stage of development, therefore the range of potential applications and the quality of most existing applications have ample margins left for further development and improvement.

## Encyclopaedia Britannica

Artificial Intelligence is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience.



State any 2 differences between Human Intelligence and Machine Intelligence.

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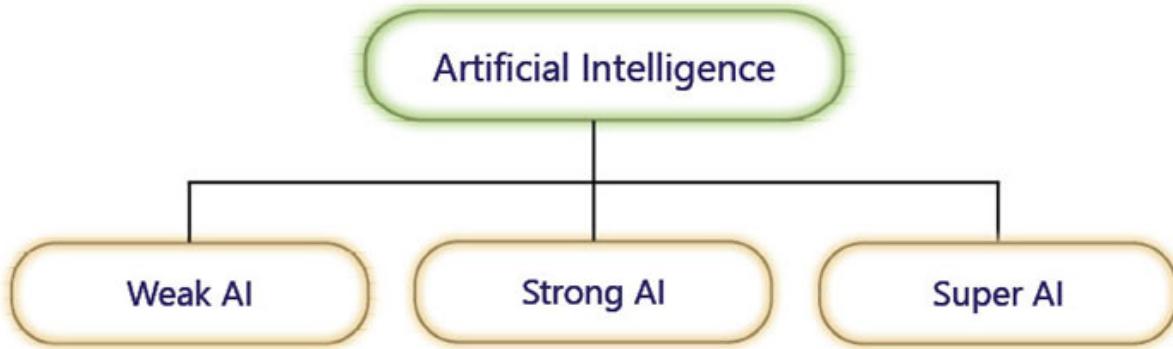
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## Types of AI

AI has already become an integral part of our daily life, therefore it's important to understand what AI can actually do. In fact, AI is a broad term which includes Machine Learning, Big data or Natural Language Processing (NLP) as its subsets. These subsets can also be classified by the level of intelligence.

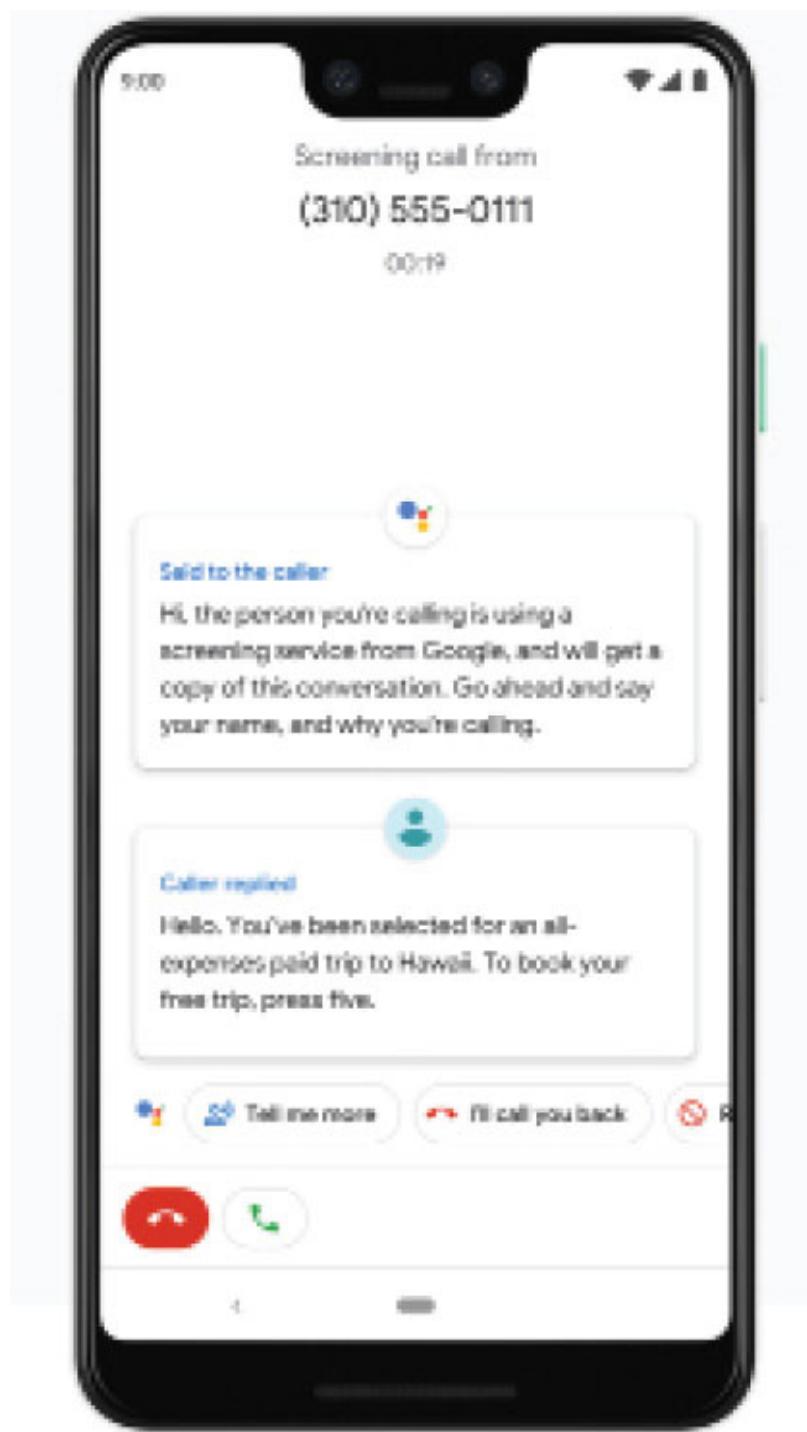
AI can be classified into 3 categories which are based on the functionality of AI applications. The chart given below shows the classification of AI machines.



## Weak AI

Weak AI is also known as Narrow AI. It is the most common type of AI that we can see and use all around us. Characteristics of this AI are :

- Narrow AI performs dedicated tasks with intelligence.
- It has a limited scope of functionality and can perform a specific task only.
- Examples are Siri, Google voice assistant, IBM's Watson, chatbots, etc.



## Strong AI

Strong AI is also termed as General AI. Machines with the following characteristics will fall in this category:

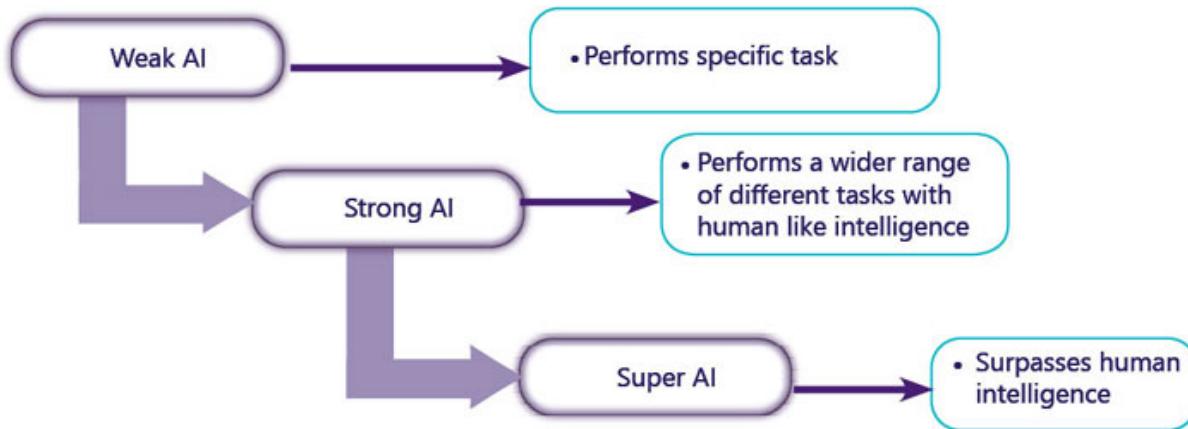


- These machines have human like intelligence.
- The machine has problem solving and learning capabilities.
- These machine are hypothetical and are yet to be developed.

## Super AI

Super AIs are in their hypothetical stage. Following are the characteristics of Super AI:

- These systems would be completely autonomous and won't require any kind of human interference.
- These machine would be smarter than an average human being and would also understand human emotions.



AI Task

## Critical Thinking

There are different types of voice assistants all around us. We have learned that voice assistants are example of weak AI. This begs the question, if all voice assistants are weak AI, is there any difference between them? If yes, what are they? In this activity, let's find out.

Select any two voice assistants of your choice, preferably from different manufacturers. Note the features of 2 different types of Voice Assistants and compare according to your observations.

## Voice Assistant 1

Voice Assistant 1

Voice Assistant 2

Voice Assistant 2

 **Video Session**

Watch this video and prepare a presentation on Google Slides or MS PowerPoint on 'AI' and share it with your class.

Visit: <https://www.youtube.com/watch?v=ad79nYk2keg> or scan the QR code.



**Subject Enrichment**

## AI GAME 01

### Tic-Tac-Toe Game

**Experiential Learning**

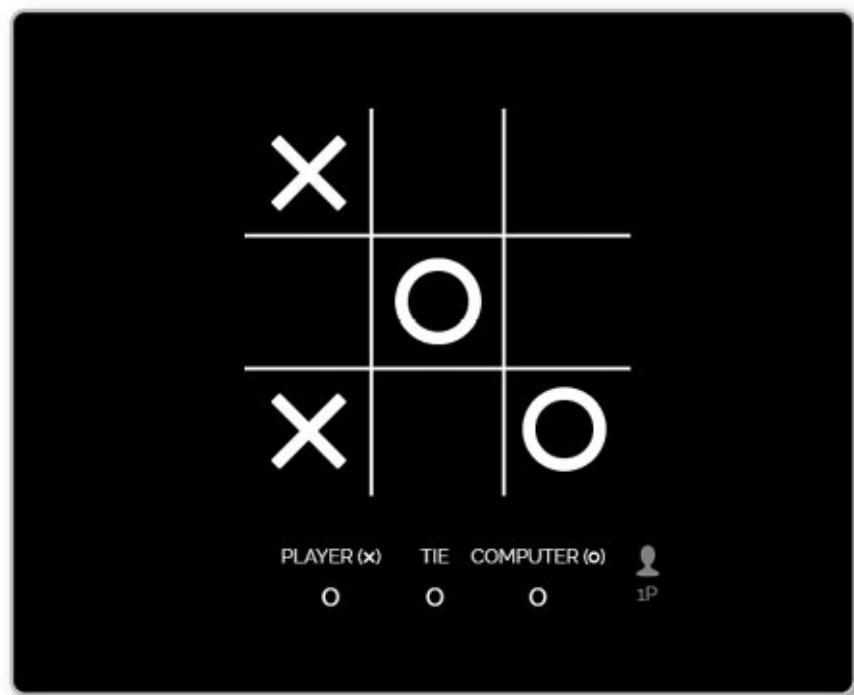
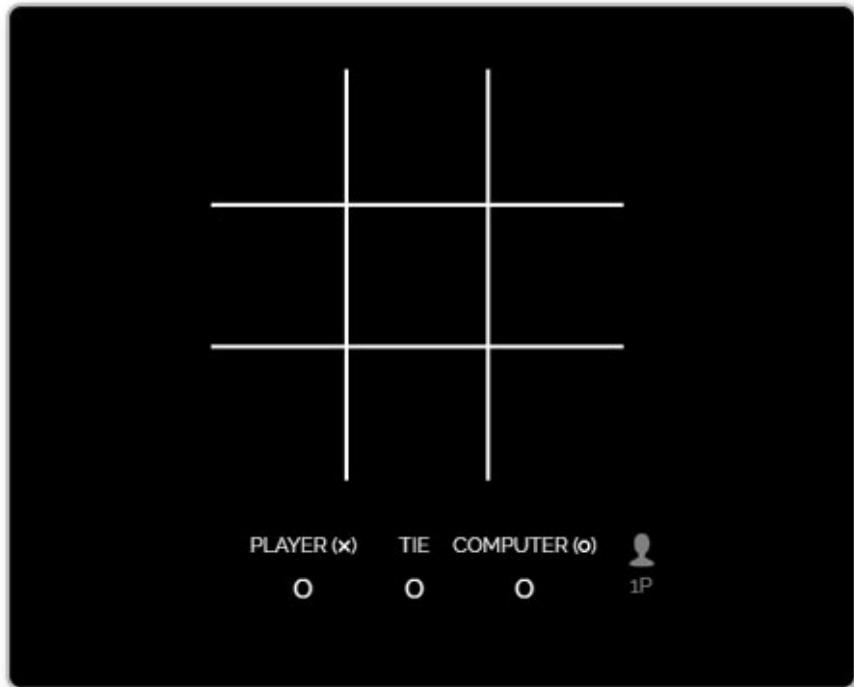
#### About the game

Play AI driven Tic-Tac-Toe game and fill in the given table of the match results and discuss with your friends about their achievement. Take each match as 10 points.

You Won	Machine Won	Draw

To play game visit <https://playtictactoe.org/> or scan the QR Code.





Now, play with your friends and have fun.

## About the game

It is a very handy tool that lets the user point to any object with a camera and get information regarding that object. The cool thing about this tool is that it gives an answer in multiple languages. To play this game follow this link:

Visit the link <https://experiments.withgoogle.com/thing-translator> or scan the QR Code.



## Thing Translator

May 2017 | By Dan Notzenbecker

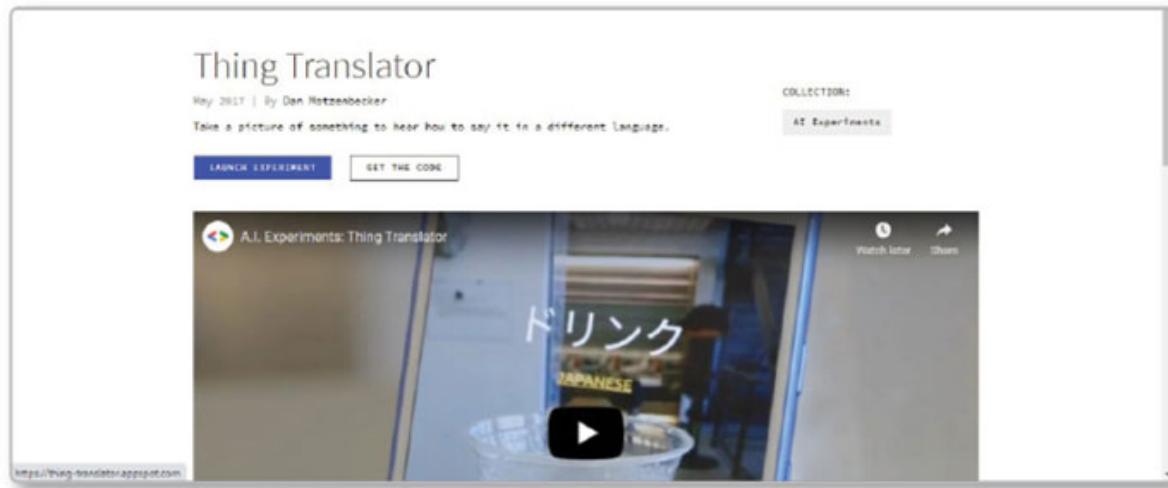
Take a picture of something to hear how to say it in a different language.

COLLECTION:  
AI Experiments

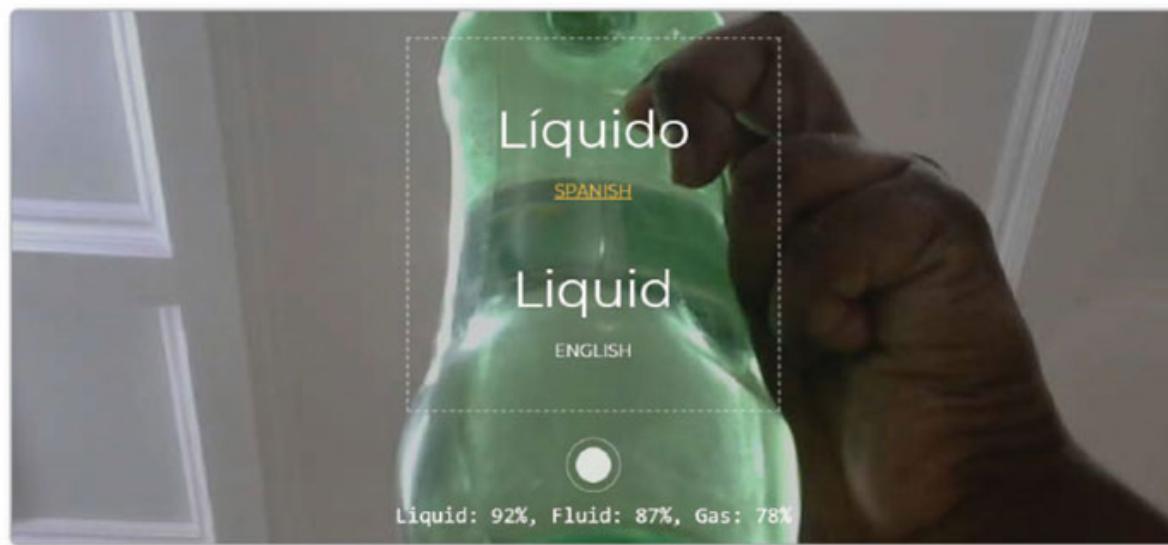
LAUNCH EXPERIMENT GET THE CODE

A screenshot of a video player showing a person holding a clear plastic cup with a straw. The video title is "A.I. Experiments: Thing Translator". The video interface shows a play button in the center, with "Watch later" and "Share" options at the top right. The video content itself shows a close-up of the cup with the word "ドリンク" (Drink) written in large white letters on a dark background, with "JAPANESE" written below it in smaller letters.

Click on the “Launch Experiment” button.



It will detect your camera and ask you to take a picture.  
Hold the object in front of your camera and click a picture. It will tell you about the object instantly.



Now go ahead and explore more on your own.



## At a Glance

- AI is a branch of computer science that focuses on developing machines which can think and work like human beings.
- AI is of three types Weak AI, Strong AI and Super AI.

- Weak AI is designed to perform one type of task only.
- Narrow AI performs dedicated tasks with intelligence.
- Strong AI will be able to perform a wide variety of tasks.
- Machines with Strong AI have human like intelligence.
- Super AI would be able to surpass human intelligence in performing any task.

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## Ai Quiz

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**Tick (✓) the correct option.**

1. Which of the following technology was developed to mimic human behaviour?
  - a. Robots
  - b. Computers
  - c. Artificial Intelligence
  - d. None of these
2. Which of the following is the strategy on AI laid by Niti Ayog?
  - a. AIForAll
  - b. AI for only engineers
  - c. AI for students
  - d. AI for teachers
3. In how many categories can we classify AI?
  - a. 1
  - b. 2
  - c. 3
  - d. 4
4. Narrow AI performs ..... tasks with intelligence.
  - a. Dedicated

- b. Non dedicated task
- c. Both a and b
- d. None of these



## Exercise

### A. State whether these statements are true or false.

- 1. Machines have natural intelligence.....
- 2. AI takes more time to respond to unusual or different situations.....
- 3. Humans do not learn from their experiences. ....
- 4. Narrow AI is smart enough to understand that a person is angry.  
.....
- 5. Apple's Siri is an example of weak AI.....

### B. Fill in the blanks.

- 1. ..... work according to their programming.
- 2. Machines can produce accurate results because they lack  
.....
- 3. ..... systems are completely autonomous and don't need human interference.
- 4. Weak AI is also known as ..... AI.

### C. Answer the following questions.

- 1. Define Artificial Intelligence.
- 2. What are the types of AI ?
- 3. Write any two characteristics of Strong AI.
- 4. State any 5 difference between human and artificial intelligence.



**AI In Life**

Inter-Disciplinary

Write a letter in 200 words to your future self from 2050 and mention the latest technology and changes that you would see around yourself. Use Google Docs to write the letter.



## AI Deep Thinking

Critical Thinking

AI is everywhere. What, according to you, will happen if suddenly AI becomes smarter than humans?  
Write a short note on Google Docs and share with your class.



## AI Lab

Creativity

1. Prepare a presentation using Google Slides and demonstrate in the class on different stages of AI Development.
2. Prepare a document using Google Docs on your views on Future of AI.



## Learning Outcomes



- Alan Turing
- John McCarthy
- Ross Quillian
- Edward Feigenbaum
- Marvin Minsky
- IBM



Alice, did you ever think how amazing it is that machines can think and act like humans.

I mean, how humans think of making a machine matter and how they actually accomplished that goal.



Well, You should know that John McCarthy is known as the father of AI. Sure! I will tell you more about the pioneers in the field of AI.



Yes! It is unbelievably amazing. But I also wonder how it started.



How what started?



AI, How it began and who were the people that came up with this brilliant idea?



Good thinking! In this chapter, I am going to tell you how it began and the people who were the pioneers in the field of AI.

Humans have always tried to make machines smart and capable enough to work on their own. The foundation of this thought was first

laid at Dartmouth College by John McCarthy. Similarly, over the years, there have been many notable contributors in the field of Artificial Intelligence. Let us have a look at some these pioneers in the field of Artificial Intelligence whose contribution proved to be a milestone for the future generation.



## Alan Turing



Alan Turing was a brilliant British Mathematician, Biologist and Computer Scientist. His Turing Machine was one of the first, basic computers created. In 1950, Alan Turing published a ground breaking seminal paper “Computing Machinery and Intelligence” on the topic of artificial intelligence. It introduced the concept of what is now known as Turing Test.

The test is still a matter of standards today. It establishes that if a computer can have a simple dialogue with a person via a printer, then that itself is a proof that the machine is “thinking”. It was for this work that led him to be regarded as the Father of Theoretical Computer Science and Artificial Intelligence.



### Brainy Fact

In 2014, a chatbot posing as a 13-year-old Ukrainian boy, earned the title of the first machine to pass the Turing Test. The bot, dubbed Eugene Goostman, convinced a third of the judges he spoke to that he was a human.

## John McCarthy



John McCarthy was an American Computer Scientist and Cognitive Scientist. He is known as the “Father of Artificial Intelligence”.

He developed the LISP (an acronym for List Processing) programming language and soon it became the choice of programming language. In 1971 he received the **Turing Award**. He was a pioneer in Mathematical Logic for Artificial Intelligence.

## Ross Quillian



Ross Quillian was a leading Scientist and Researcher in the field of electronics and communications during 1960. His work “SYNTHEX” is widely accredited in the field of AI. In his project, Quillian developed the

first semantic web. It is the map of words and concepts that a computer could use to understand relations. For example, if you think of Pizza, your brain understands there are other associated words with it. The words like cheese, Dominos, thin crust, snacks, toppings, eat, friends, party, hungry, and so on. AI missed this crucial component before Quillian's semantic web was introduced. Now, it has provided necessary map of relational understanding to computers.

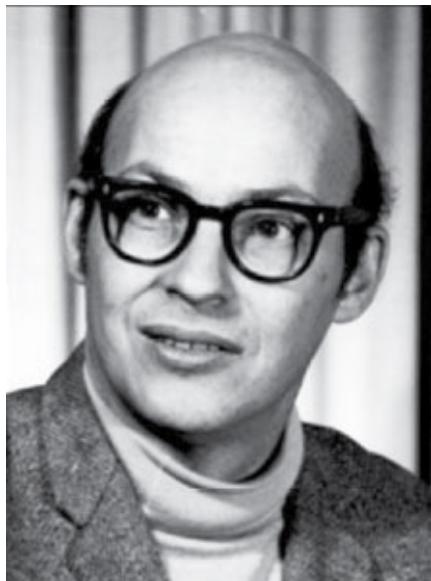
## Edward Feigenbaum



Edward Feigenbaum is often called the, “Father of Expert Systems”. He was the joint winner of 1994 ACM Turing Award.

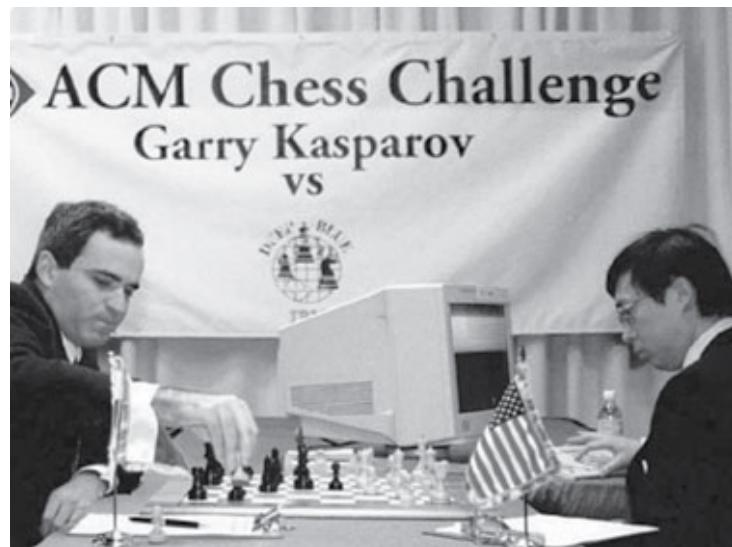
While he was a student, he developed EPAM (Elementary Perceiver and Memorizer), one of the first computer models of how people learn, as his Ph.D. project. His project Dendral was the most important to AI Sciences. It used computer systems to identify and communicate the presence of diseases when given spectrometer readings of blood samples. This was the first use of an AI “Expert System”.

## Marvin Minsky



Marvin Minsky was an American Cognitive and Computer Scientist.

He wrote the book ‘Perceptrons’ as his ground breaking work on Artificial Neural Networks. He created several new models of AI systems. He provided expert advice on several projects including Stanley Kubrick’s, “A Space Odyssey”.



IBM company stood as the next pioneer in the field of Artificial Intelligence as it hit a major milestone with its development and creation of Deep Blue. It was an AI system which was dedicated to play

chess with an objective to beat a human chess master using AI. On February 10, 1997, it played against world renowned chess master Garry Kasparov. For the first time AI won against a human.

As a result of the work of these pioneers, artificial intelligence has come this far and continues to grow and make our future bright.

### **AI Reboot**

1. Who created Deep Blue?

---

2. Who is known as the "Father of Expert Systems"?

---

### **AI Task**

Surf the Internet and find some more pioneers in the field of AI. Write an essay in 200 words about a scientist who worked in the field of AI. You may write about someone who is not mentioned in the chapter. Create an MS Word document and add pictures to make it attractive.

#### **01**

#### **4th of July Fireworks**

 Experiential Learning

#### **About the game**

This is a fun game that helps to celebrate 4th of July, without harming the environment.

To play the game follow given steps:

Visit the following link or scan the QR Code:

<https://artsandculture.google.com/experiment/3wFbmusK9c852w>



Click on Launch Experiment button.

The screenshot shows the Google Arts & Culture interface. A central callout box displays the title "Fourth of July Fireworks" and a brief description: "Sparkles fly on the Fourth of July. Celebrate Independence Day with Google Arts & Culture". Below the description is a blue "Launch experiment" button. To the right is a thumbnail image of the Statue of Liberty at night, illuminated by fireworks. The top navigation bar includes "Home", "Explore", "Play", "Nearby", "Favorites", and a search icon. A "Sign In" button is in the top right corner.

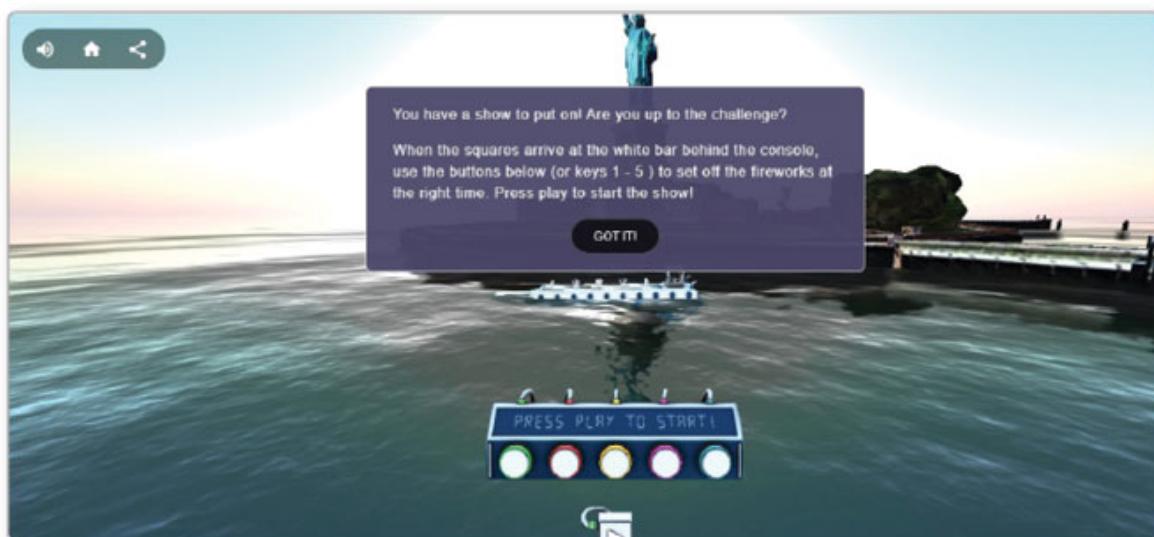
Click on the Skip button to start playing the game or you can go through the story.

The screenshot shows a dark, semi-transparent overlay window. At the top right is a small circular close button with an 'X'. In the center, the text "This Fourth of July..." is displayed. At the bottom center is a blue "SKIP" button. The background is mostly black, indicating it is a modal window.

Now select a venue from the given choices.



Follow the instructions and press the number keys on top of the alphabet keys to shoot the fire crackers.



Now try different venues and enjoy the fire works.



## At a Glance

- Alan Turing was a brilliant British Mathematician, Biologist and Computer Scientist.

- John McCarthy was an American Computer Scientist and Cognitive Scientist.
- Ross Quillian was a leading Scientist and Researcher in the field of electronics and communications during 1960.
- Edward Feigenbaum is often called the, “Father of Expert Systems”. He was the joint winner of 1994 ACM Turing Award.
- Marvin Minsky was an American Cognitive and Computer Scientist.
- IBM company stood as the next pioneer in the field of Artificial Intelligence as it hit a major milestone with its development and creation of Deep Blue.



**Tick (✓) the correct option.**

1. Who is regarded as the Father of Artificial Intelligence?

- a. Alan Turing
- b. Marvin Minsky
- c. Edward Feigenbaum
- d. John McCarthy

2. Who created the Deep Blue?

- a. IBM
- b. Alan Turing
- c. Ross Quillian
- d. Marvin Minsky

3. Who developed the first semantic web?

- a. John McCarthy
- b. IBM
- c. Ross Quillian
- d. Alan Turing

4. In 1997, which chess master was defeated by Deep Blue?
- Vishwanathan Anand
  - Garry Kasparov
  - Bobby Fischer
  - Magnus Carlsen
5. Who provided expert advice on Space Odyssey?
- John McCarthy
  - Marvin Minsky
  - IBM
  - Edward Feigenbaum

## Exercise

### A. Fill in the blanks.

- ..... was an American Computer Scientist and Cognitive Scientist.
- ..... was the joint winner of 1994 ACM Turing Award.
- ..... developed the first semantic web.
- Perceptrons was written by .....
- Alan Turing published a ground breaking seminal paper “Computing Machinery and Intelligence” on the topic of .....

### B. State whether the following statements are true or false.

- John McCarthy created the Turing test.....
- Alan Turing was a brilliant British Mathematician, Biologist and Computer Scientist.....
- IBM company hit a milestone with the development of Deep Blue.....
- Marvin Minsky wrote the book ‘Perceptrons’.....

5. Ross Quillian's work "SYNTHEX" is not widely accredited in the field of AI. ....

### C. Answer the given questions.

1. Explain the Turing test.
2. Who developed the first semantic web?
3. Who developed the LISP programming language?
4. Write a short note about Edward Feigenbaum.
5. What was the objective of Deep Blue?



#### Ai Deep Thinking

Critical Thinking

Try to imagine a world when AI was not visualised. As a computer scientist what do you think would be the factor that would lead to the invention of such an advanced idea?



#### Ai Lab

Creativity

1. Now that you have learned about various pioneers who have contributed to the field of AI, prepare a PowerPoint presentation about the same and discuss it with your teacher.
2. Search the web and find out about the application of Turing test and write your findings in MS Word document and share with the class.



## Learning Outcomes



- Domains of AI
- Real Life Applications of Different Domains of AI



Hello Vincy! I read an article about AI helping doctors to find the severity of infectious diseases.

Really? Tell me more about it.



Yes! AI can be used as an early outbreak warning system. For example, BlueDot, an AI-driven algorithm, detected the outbreak of Zika virus in Florida.

You said AI driven algorithm, could you tell me more about it?



Sure! But, I can also see that you have some more questions to ask. Lets hear them?



Yes, I want to about Deep Learning that was used in studying the symptoms of people suffering from serious ailments.



It is nice to see that you are so curious to learn about AI. So, in this chapter let us learn more about the various domains of AI .

We all are aware of the fact that every machine or organism is made of smaller parts that perform a specific type of task. Similarly, the AI system is also built from different smaller mechanisms that help the AI to work properly. These working mechanisms are the different components with which the AI system can work. They are commonly

called domains of AI. In this chapter, we are going to learn about the different domains of AI.

Barr and Feigenbaum in 1981 defined AI as “Artificial Intelligence (AI) is the part of computer science concerned with designing intelligent computer systems, that is, systems that exhibit characteristics we associate with intelligence in human behaviour—understanding language, learning, reasoning, solving problems, and so on.”

## Domains of AI

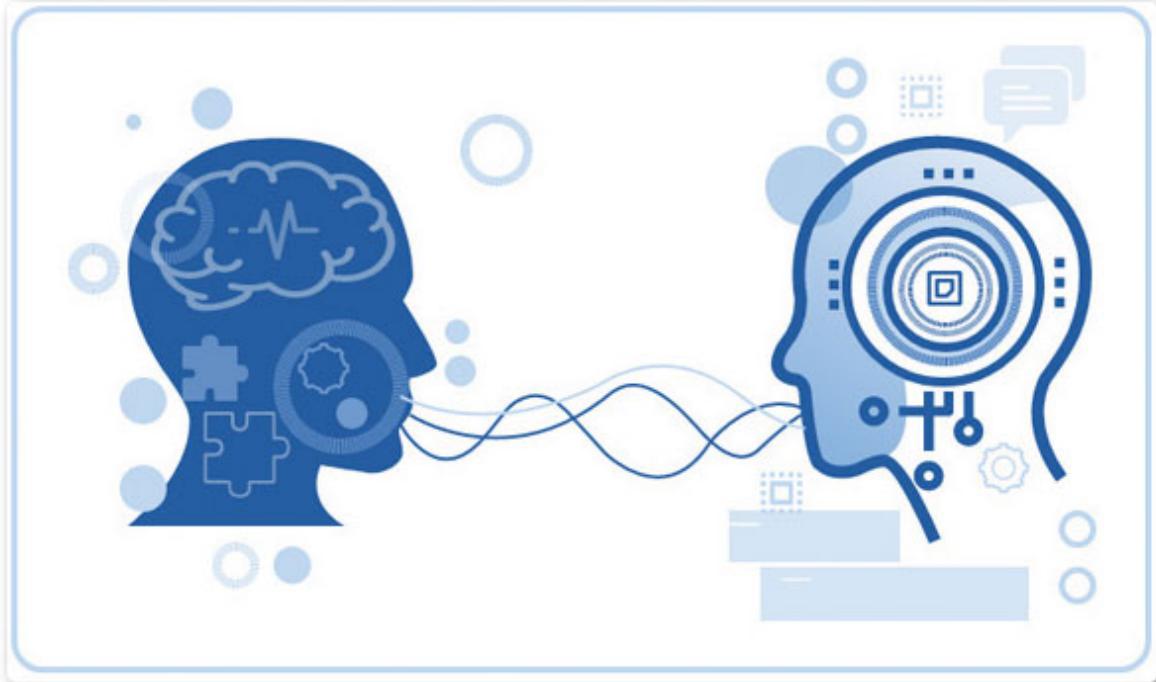
There are different approaches or domains to achieve Artificial Intelligence. There are various methods through which we can develop artificially intelligent systems. Let us learn about these domains.



## **Natural Language Processing (NLP)**

This is a subfield of AI which helps in communication between human and computer in natural language. It enables a computer to read and understand data by mimicking human natural language.

This subfield of AI is used for a variety of tasks such as email filters. A lot of people receive a lot of emails which are useless. NLP checks the sender of the email and categorises the mails as spam or junk. NLP also finds its use in the auto complete and spell check feature of word processors. NLP also proves to be quite useful in voice text messaging and virtual assistants.



Name any 2 domains of AI.

## Big Data

AI's ability to work so well with data analytics is because of its use of Big data. Without making its presence known, Big data has already been everywhere. Big data has become a valuable commodity. It can be defined as massive amount of stored data which when analysed properly could reveal valuable insights into industry to which the data belongs.

### Usage of Big Data in AI

Internet is the biggest data provider of consumer habits, likes and dislikes, activities and personal preferences which were otherwise not possible. Social media accounts, online profiles, product reviews,

tagged interest, shared content, almost every information adds value to the Big data pool.

Using data from many sources, AI can build a store house of knowledge that ultimately leads to accurate predictions about a consumer.



### Brainy Fact

Developed by scientists at DAMO Academy, Alibaba's global research program, the Alibaba model scored 0.54 in the MS Marco question-answering task, which evaluates a machine's ability to use natural language that topped the human score of 0.539.

## Computer Vision (CV)

Computer Vision is a very popular field of AI that trains a computer to understand and interpret the visual world. Human vision starts at the “eyes” but machine uses digital images from a camera for vision. Deep learning models and machines accurately identify and classify objects that act according to what they see, using digital images from camera.

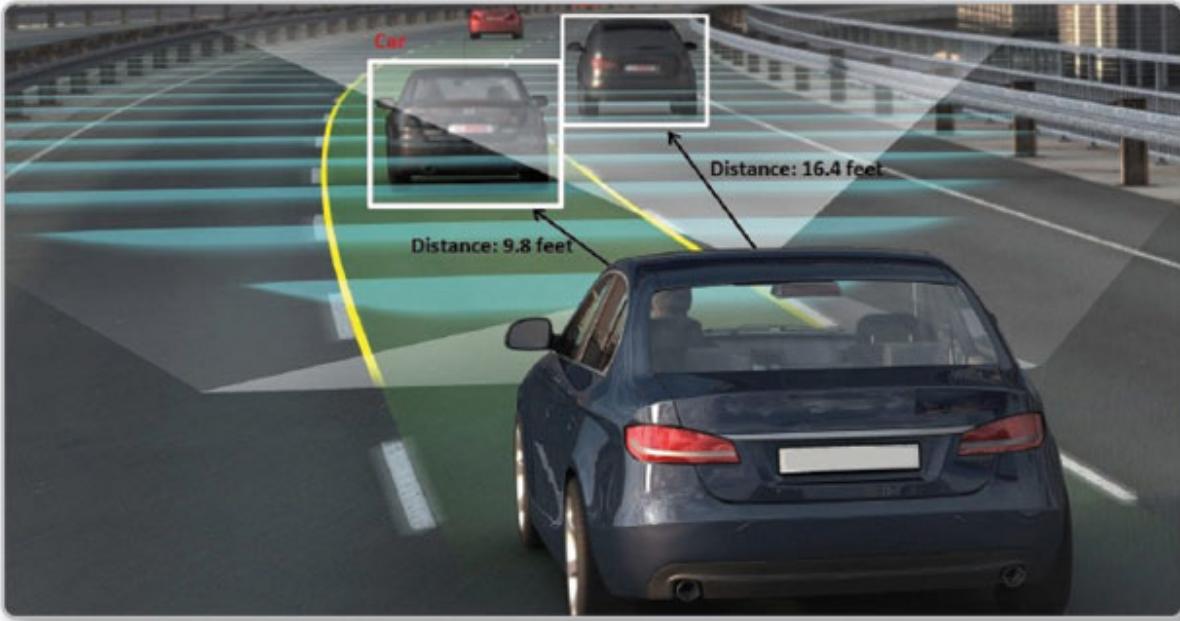
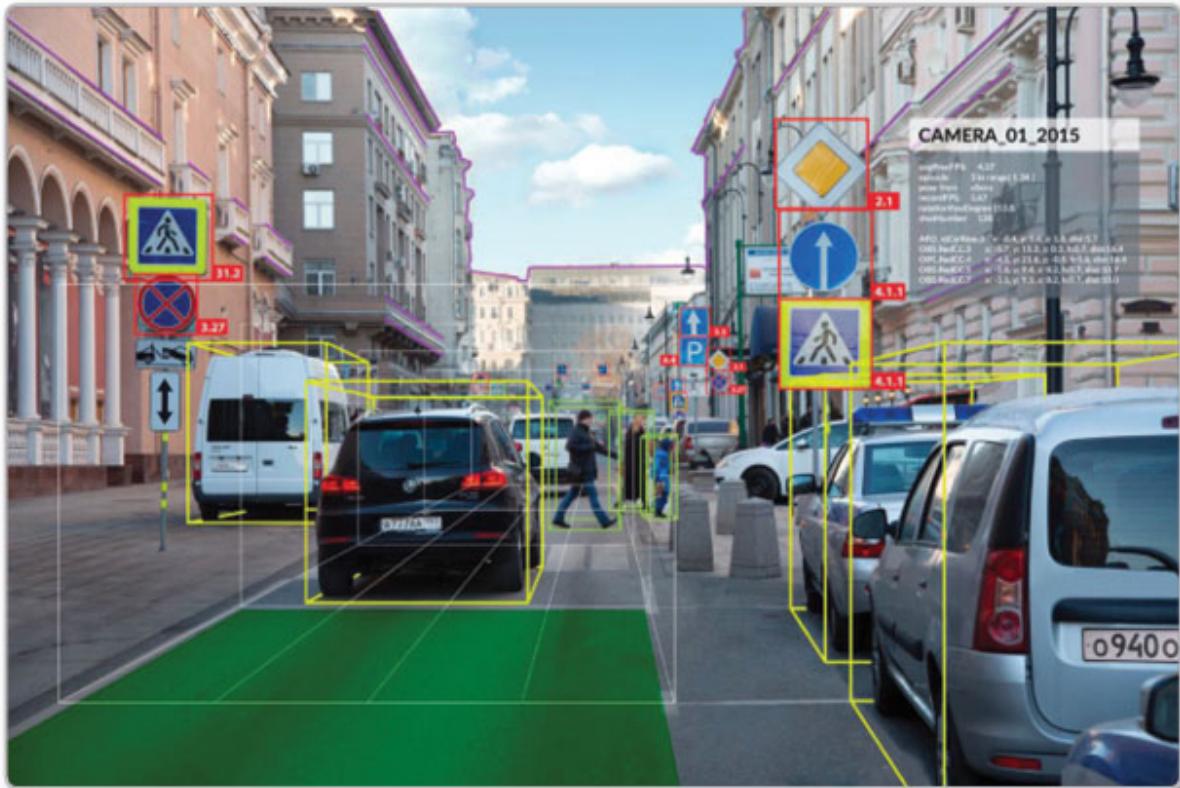
According to Fei-Fei Li, Computer Vision is defined as “a subset of mainstream artificial intelligence that deals with the science of making computers or machines visually enabled, i.e., they can analyse and understand an image.”

## Applications of Computer Vision

From recognizing to processing the live action of a football game, Computer Vision challenges and surpasses human visual abilities in

many areas. Let us understand some of the real time uses of Computer Vision:

Self-driving cars use computer vision to examine their surroundings and plan its path. Drones can use computer vision to examine the health of crops and alert the farmers of the crop's condition. In healthcare industry, computer vision can be used to check the patient's image and determine the ailment. Computer Vision is also used for security and surveillance.



## Giorgio Cam

This is a fun Google experiment. It allows the user to create music with the help of pictures of the objects around them. The user needs to take snapshots of the objects around them and feed it to the algorithm. It then checks the image, identifies it and puts a label for it and converts those labels to lyrics of a song.



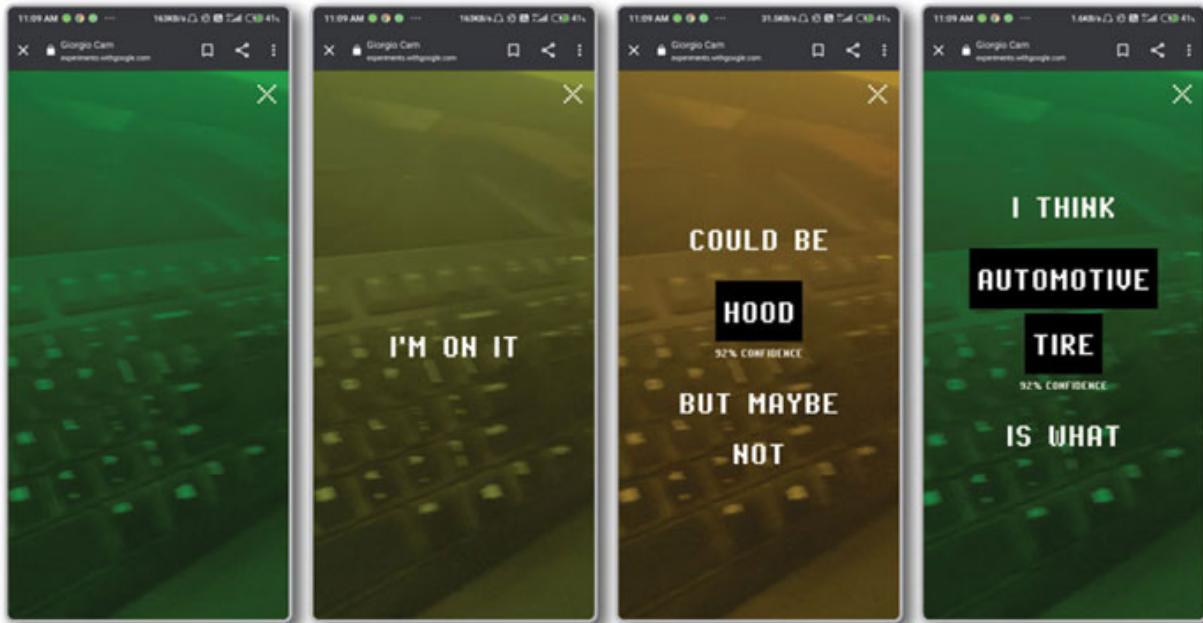
Visit the link: <https://experiments.withgoogle.com/giorgio-cam> or scan the QR Code and click on 'Launch Experiment'.

A screenshot of a web browser showing the 'Giorgio Cam' experiment page. The page has a dark header with 'Experiments with Google' and navigation links like 'Collections', 'Experiments', 'Search', and 'SUBMIT EXPERIMENT'. Below the header, the title 'Giorgio Cam' is displayed, along with the date 'May 2017' and creators 'Eric Rosenbaum &amp; Yotam Mann'. A subtext says 'Take a picture to make music with the computer.' There are two buttons: 'LAUNCH EXPERIMENT' and 'GET THE CODE'. To the right, there's a 'COLLECTION' section with 'AI Experiments'. Below this, there's a video thumbnail showing a hand holding a yellow cup with the words 'GOT DRINK' on it, with a play button over it. To the right of the video are 'Watch later' and 'Share' buttons.

Click on 'Let's Go' to start the experiment.



Take pictures of your surroundings and let the algorithm figure out what you captured.



Create your own songs and write your lyrics here.

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## Real Life Applications of Different Domains of AI

AI is all around us. Let us look at some real life applications of the different domains of AI.

### **Big Data**

In everyday life, a person may carry out a variety of tasks on the Internet. These tasks generate data and these data is processed by organisations to improve their business. Big Data helps to analyse this data and these data include information about consumer shopping habits, personalized marketing, fuel optimization tools, etc.



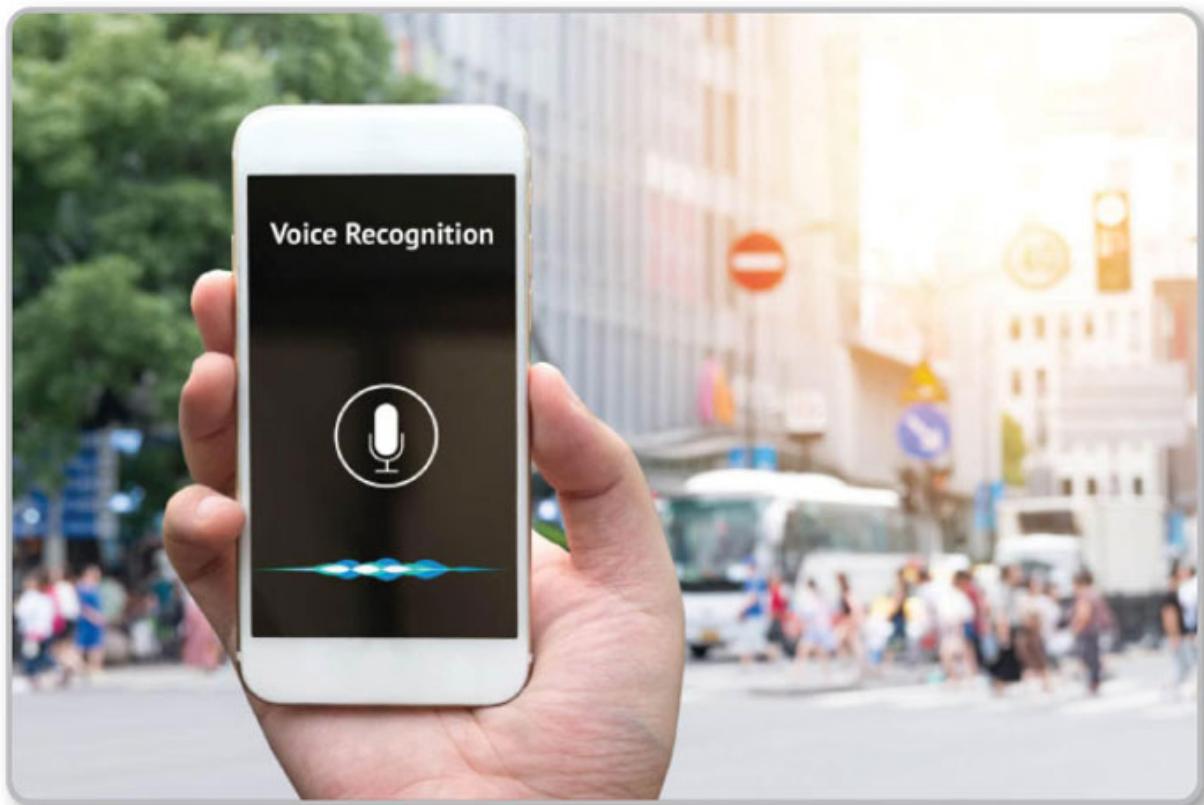
## Computer Vision

Computer vision is a very important tool and it helps us in many areas. For example, self driving cars, drones that can examine crop health, patient imaging and diagnostics, security and surveillance.



## Natural Language Processing

NLP is very helpful in day to day life as it provides speech recognition capability to smartphones and other devices. Voice assistants and chatbots extensively use NLP to carry out the tasks given by the user.



Name any two uses of computer vision in real life.

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A.I. Duet

Experiential Learning

## About the game

It is an AI based program that responds to you when you play keyboard.

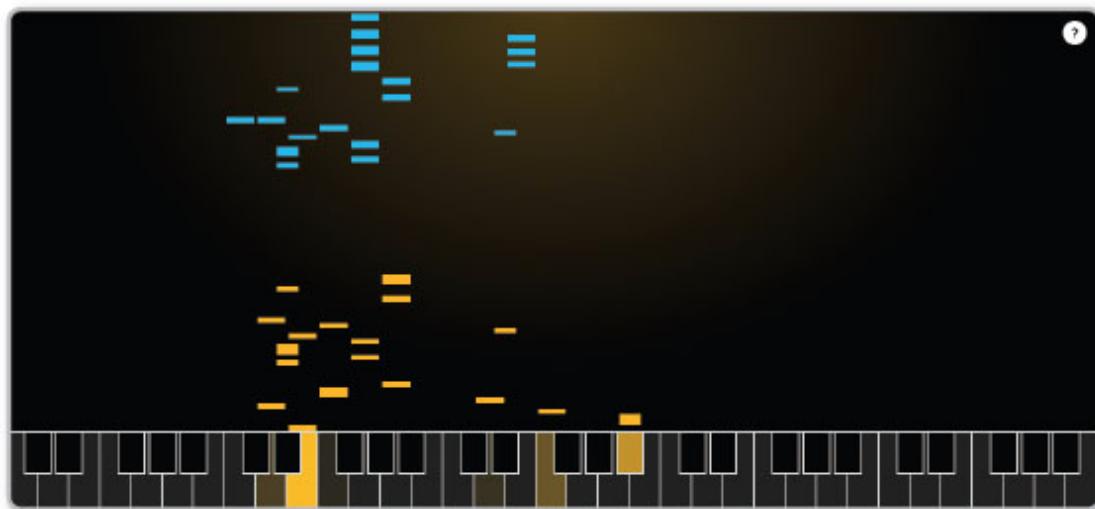
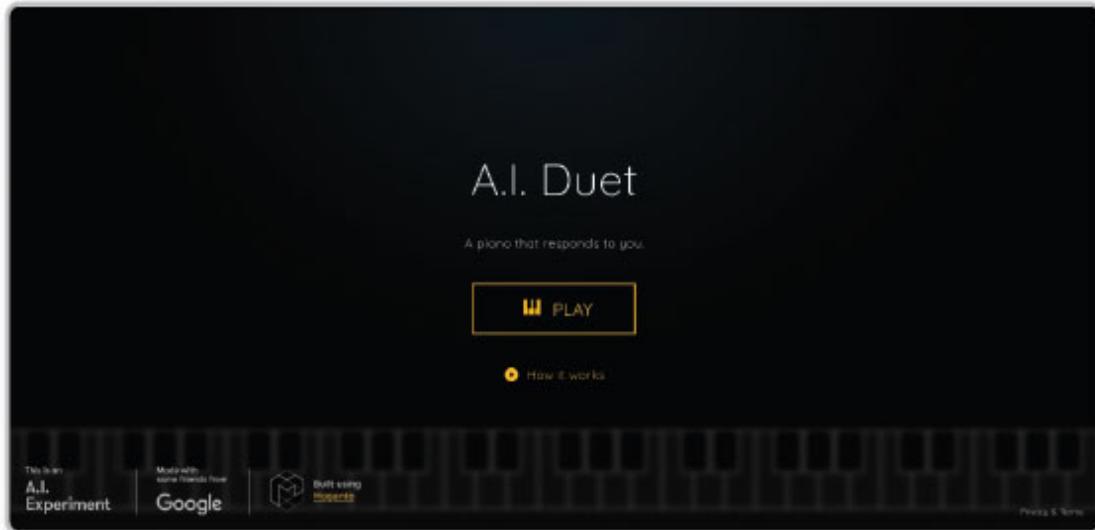
To play, just start clicking your mouse or use your computer keys. You may also plug in a MIDI keyboard and AI will respond to your melody. While playing Piano, you will feel how machine learning can spark creativity in new ways.

By Yotam Mann with friends on the Magenta and Creative Lab teams at Google, A.I. Duet was built using Tensorflow, Tone.js and open-source tools from the Magenta project.

Visit the link <https://experiments.withgoogle.com/ai/ai-duet/view/> or scan the QR Code.



Click on '**PLAY**' to play the game.



## At a Glance

- AI is divided into 3 domains Natural Language Processing (NLP), Big Data, Computer Vision.
- NLP is focused towards the communication between human and machine through the naturally spoken language.
- Big Data allows AI systems to train on live data and provide valuable information.

- Computer vision works like human vision as it helps AI systems to gather and process information through camera sensors.

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## AI Quiz

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**Tick (✓) the correct option.**

1. Which of the following technology will be used to track player movements in tennis?
  - NLP
  - Machine Learning
  - Computer Vision
  - None of these
2. .... and ..... uses machine learning to diagnose cancerous tissues.
  - Oncology
  - Pathology
  - Both a and b
  - None of these
3. What is Artificial Intelligence?
  - Playing a game on computer
  - Making a machine intelligent
  - Programming on machine with your own intelligence
  - Putting your intelligence in machine
4. What is/are the application(s) of Artificial Intelligence?
  - Expert Systems
  - Gaming
  - Vision Systems

d. All of the above



## Exercise

### A. State whether these statements are true or false.

1. NLP helps the AI systems to gather data from visual routes.  
.....
2. Big Data helps AI systems to train using real-time data.  
.....
3. Email filters are the most basic application of NLP.....
4. Big Data helps AI to discover the customer's shopping habits.....
5. The Spell check feature of MS Word is based on NLP.....

### B. Fill in the blanks.

1. .... are one of the best examples of Computer Vision.
2. Google Assistant is example of .....
3. Artificial Intelligence is about programming machine to mimic .....
4. Machine can't learn without the presence of .....

### C. Answer the following questions:

1. Write a short note on the domains of AI.
2. What do you understand by Machine Learning?
3. Write any two real life usages of NLP.
4. Define Computer Vision.



### AI Deep Thinking

Critical thinking

Make a table-list using Google Docs of at least 10 tasks that can be performed by you and the machine you are using daily under the three domains. Try to determine the domain in which each of these tasks fall.



## AI In Life

We have become quite dependent on AI. It helps us with many of our daily tasks. Write an essay in 150 words on how this could lead to humans becoming too dependent on AI.

Life Skills & Values



## AI Lab

If you own a grocery shop, what kind of machines would you like to keep and at which places? Give suitable name to your shop and write some lines about each machine. You may also deploy some imaginary machines that should be able to use any domain of AI. Create a presentation and share with the class.

Creativity

# Test Sheet 1

(Based on Units 1 to 3)

## A. Tick (✓) the correct option.

1. Which of the following technology was developed to mimic human behaviour?
  - a. Robots
  - b. Computers
  - c. Artificial Intelligence
  - d. None of these
  
2. Which of the following is the strategy on AI laid by Niti Ayog?
  - a. AIForAll
  - b. AI for only engineers
  - c. AI for students
  - d. AI for teachers
  
3. Who is regarded as the Father of Artificial Intelligence?
  - a. Alan Turing
  - b. Marvin Minsky
  - c. Edward Feigenbaum
  - d. John McCarthy
  
4. Who created the Deep Blue?
  - a. IBM
  - b. Alan Turing
  - c. Ross Quillian
  - d. Marvin Minsky

5. Which of the following technology will be used to track player movements in tennis?
- a. NLP
  - b. Machine Learning
  - c. Computer Vision
  - d. None of these
6. ..... and ..... uses machine learning to diagnose cancerous tissues.
- a. Oncology
  - b. Pathology
  - c. Both a and b
  - d. None of these
7. Which of the following domains help AI to build store house to accurately predict consumer habits?
- a. NLP
  - b. Big Data
  - c. CV
  - d. None of these
8. Who provided expert advice on Space Odyssey?
- a. John McCarthy
  - b. Marvin Minsky
  - c. IBM
  - d. Edward Feigenbaum

**B. Fill in the blanks.**

1. ..... is a test to distinguish between a human and a machine.

2. .... is known as the father of Artificial Intelligence.
3. .... was an American Computer Scientist and Cognitive Scientist.
4. .... was the joint winner of 1994 ACM Turing Award.
5. .... are one of the best examples of Computer vision.
6. Google Assistant is example of .....

**C. State whether these statements are true or false.**

1. Machines have natural intelligence.....
2. AI takes more time to respond to unusual or different situations.....
3. John McCarthy created the Turing test.....
4. Alan Turing was a brilliant British Mathematician, Biologist and Computer Scientist.....
5. NLP helps the AI systems to gather data from visual routes.....
6. Big Data helps AI systems to train using real-time data.....

**D. Answer the following questions.**

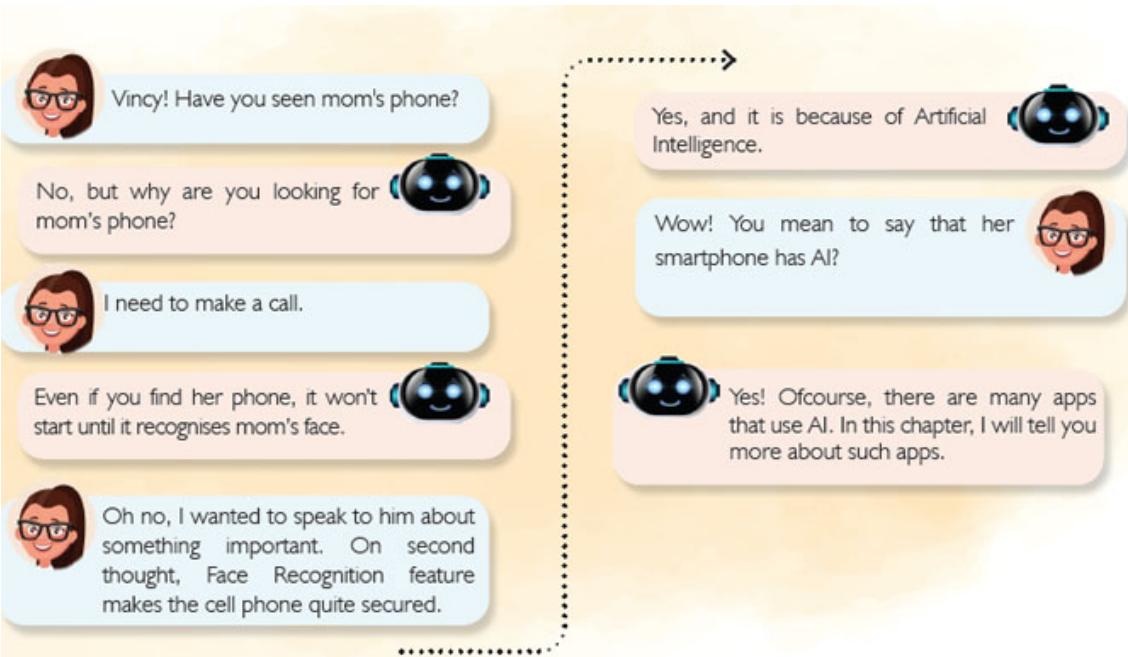
1. Define Artificial Intelligence.
2. What are the types of AI ?
3. Explain the Turing test.
4. Who developed the first semantic web?
5. Write a short note on the domains of AI.
6. What do you understand by Machine Learning?



## Learning Outcomes



- Smartphone Industry
- Social Media Platforms
- Banking and Financial Sector
- E-Commerce
- Autonomous Vehicles
- Security and Surveillance
- Navigation
- Healthcare
- Education



Artificial Intelligence is commonly used in wide range of fields like smartphones, social media platforms, e-commerce, autonomous vehicles, security and surveillance, entertainment industries, navigation, banking and financial sectors, smart homes, etc.

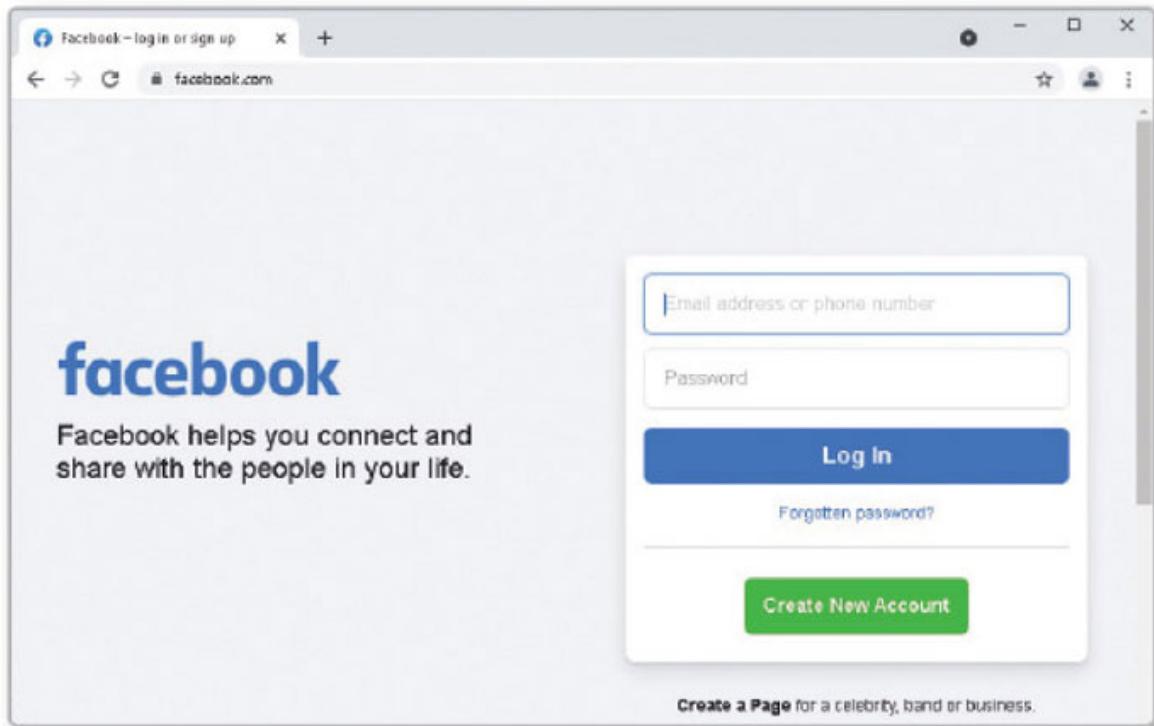
## Smartphone Industry

Smartphones come preloaded with AI based special features. Right from the lock security, there is AI in many applications. To unlock your smartphone, you use face recognition, the process which needs the Computer Vision tool of AI. Similarly, the voice enabled assistant like Google Assistant or Siri uses Natural Language Processing tool of AI.



## Social Media Platforms

AI is extensively used in social media platforms to serve personalized content. These sites monitor the way you use the features that they provide and record the way you use it. This data is used to create ads that are customised according to your preferences.



## Banking and Financial Sector

AI helps the banks and financial sectors in various ways. AI predicts future scenarios by analysing past user experiences. This way it suggests the banks for future outcomes and trends. It also helps banks to identify frauds and detect anti-money laundering patterns.

AI assistants, such as chatbots, use artificial intelligence to generate personalized financial advice and natural language processing to provide instant, self-help customer service.





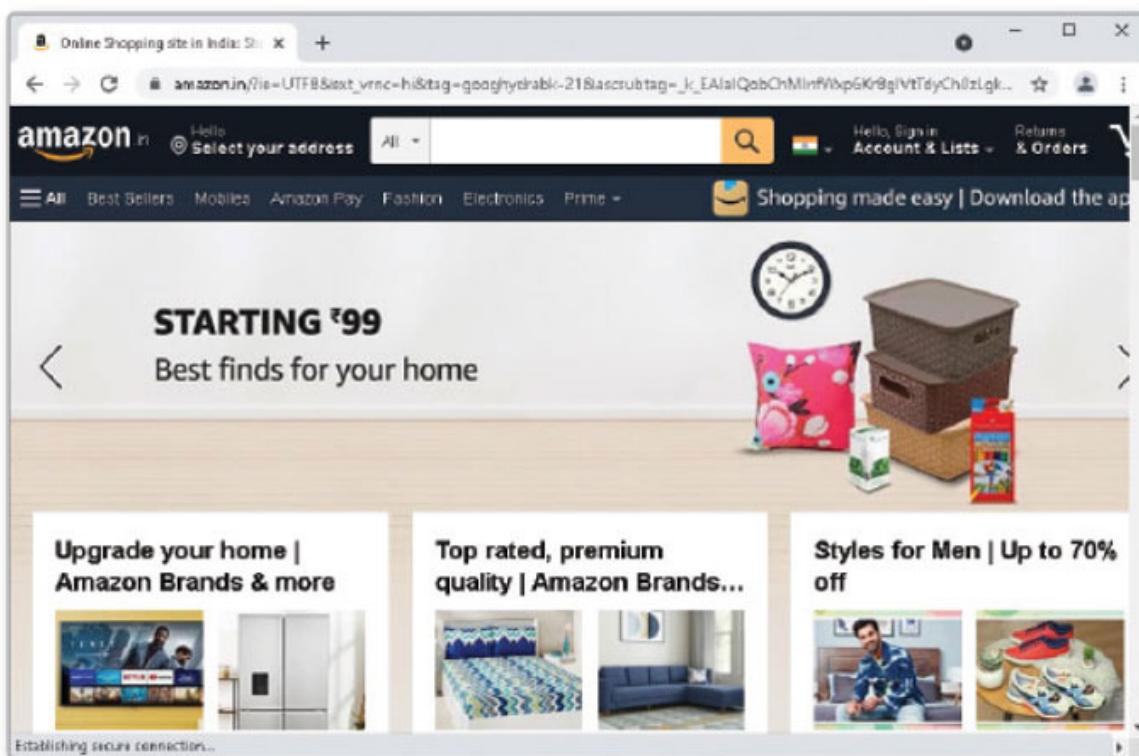
Write any two uses of AI in banking sector.

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## E-Commerce

AI in e-commerce helps in interactive and personalized buying experience. With the AI-enabled systems, companies can see their customer's preferences and can boost their sales by reliable and customized shopping experiences. AI helps in the real time database analysis to predict the number of customers willing to buy a new product and also helps in running a cashierless store.



## Autonomous Vehicles

The Autonomous vehicles or self-driving cars use cameras, radars, sensors and artificial intelligence to travel from one place to another without human intervention. Autonomous Driving is one of the key

applications of AI. The sensors generate massive amount of data to make decisions like humans.



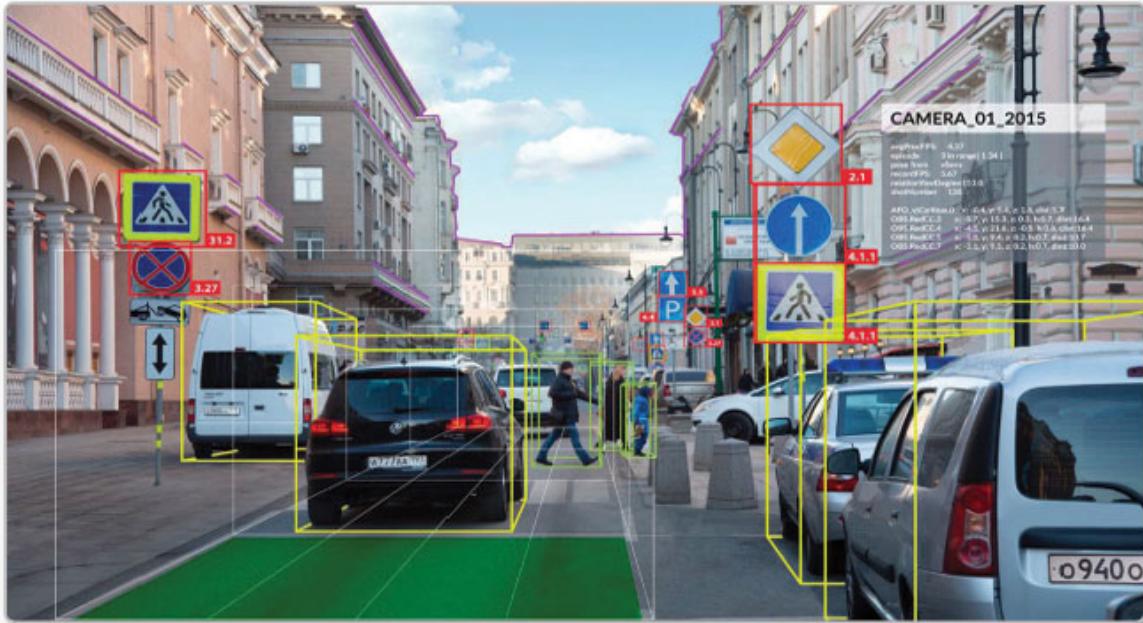
### Brainy Fact

Argo AI is an organisation commonly known for building AI based autonomous cars. They also create software, hardware, maps and cloud support infrastructure to aid their technology.



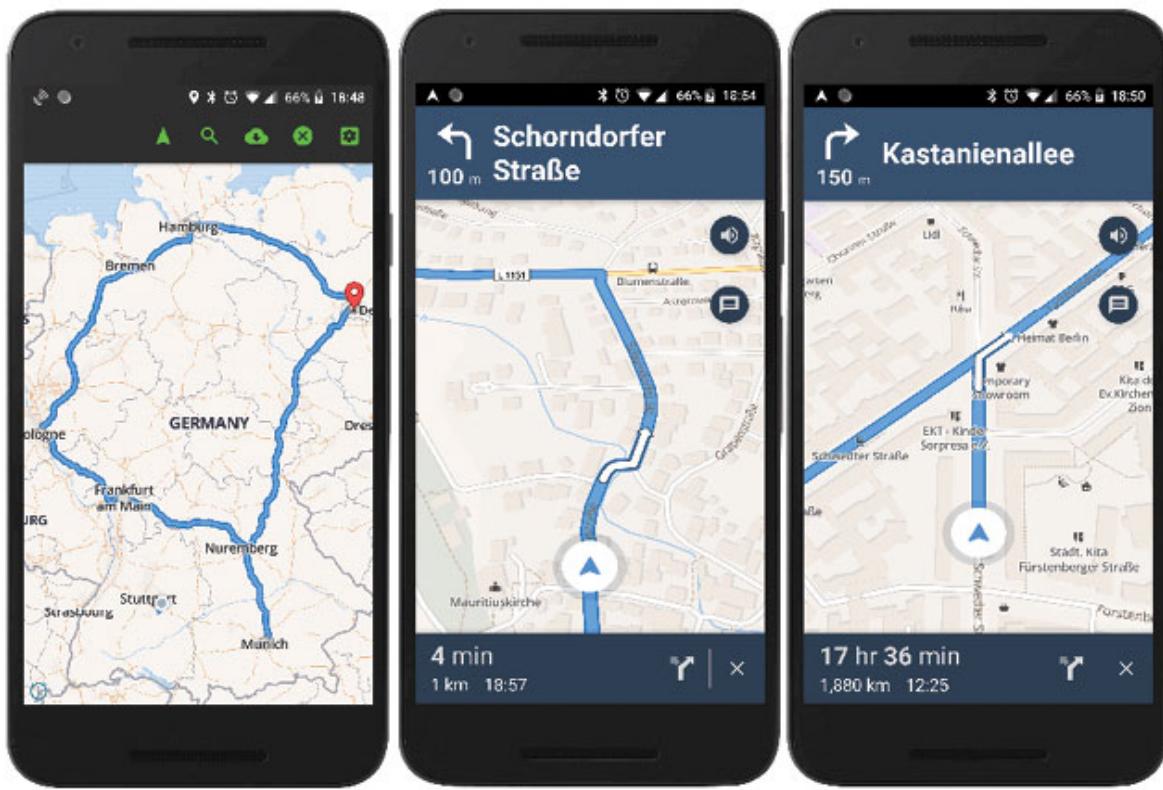
## Security and Surveillance

For Security and Surveillance, AI program functions by using Computer Vision. The video surveillance cameras have AI programs that analyse images and audio in order to recognize humans, various objects, vehicles and actions. The Artificial Intelligence program sends an alert if it detects some unusual activities breaking the set rules.



## Navigation

Google Maps are the best examples of use of AI in Navigation. Google Maps use Machine Learning domain of AI to generate predictions of traffic patterns and live traffic conditions based on the sets of data. It now provides real-time tracking data and can forecast delays in hundreds of cities worldwide.



### Brainy Fact

DroneSense is a drone software platform for public safety officials that takes raw data captured by drones and turn it into actionable insights for police, fire and other emergency teams.



### Healthcare

AI in healthcare is used to diagnose ailments, treat patients, develop new drugs, provide personalized medicines, monitor and take care of the patients.

AI based healthcare products include mental health care chatbots like Shim, Woebot, Wyse, Toss and Therachat. These apps can track the emotions of the patient and then suggest exercises and provide psychoeducation too.



Explain briefly, how AI can help the banking and financial sector.

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## Education

Education sector can highly benefit with the use of AI. Now, primarily its being used as a tool to develop skills and test systems. Today essay-grading systems are in place to grade the children's thoughts in its primary stage. It can also be used in providing individualized learning, which is a challenging task at teacher's level.

These systems respond to the needs of a student, putting greater emphasis on certain topics, repeating things that students haven't mastered, and generally helping students to work at their own pace, whatever that may be.



### Brainy Fact

Content Technologies Inc. customizes textbooks to personalize the learning process better.

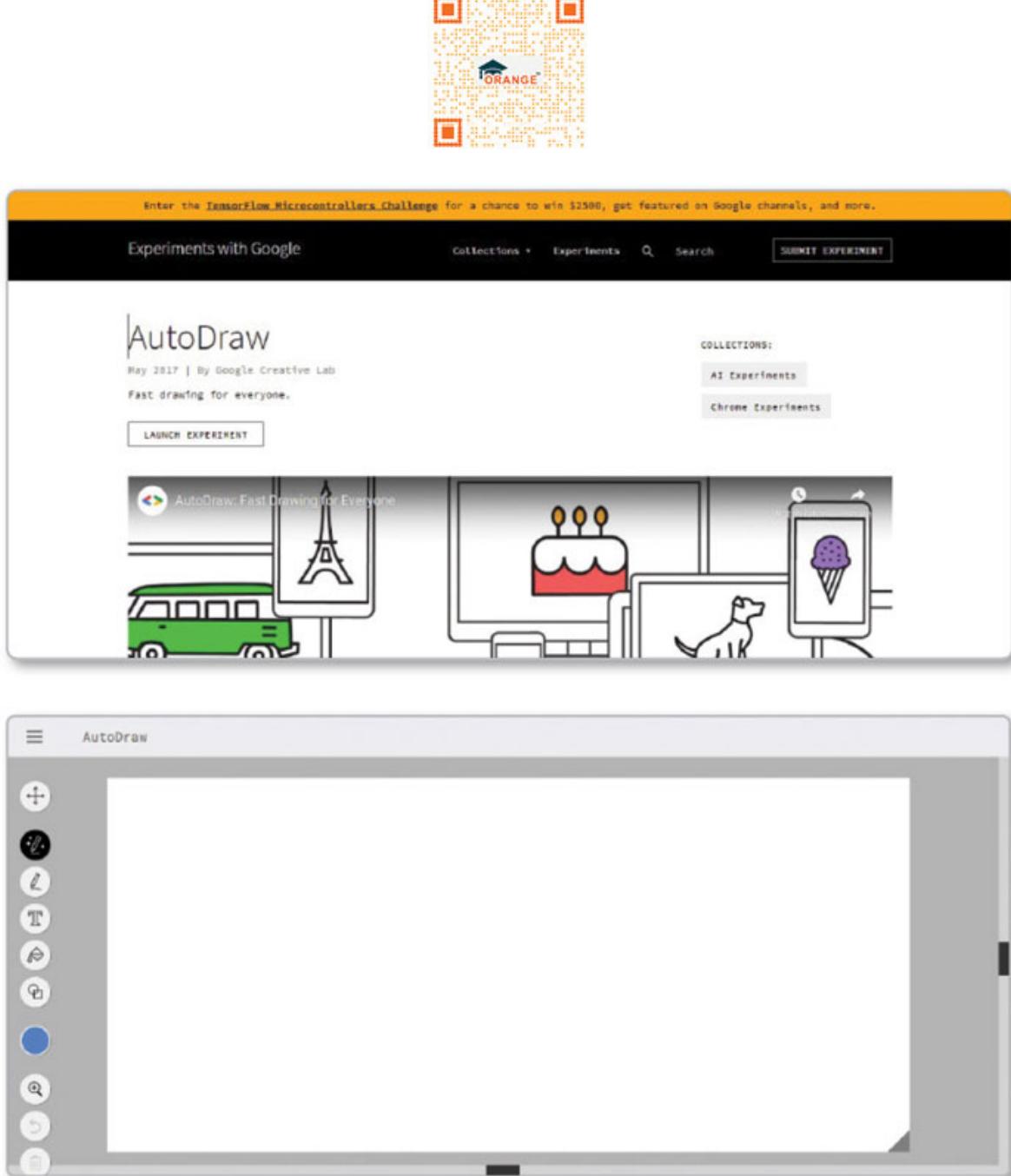


Art Integration

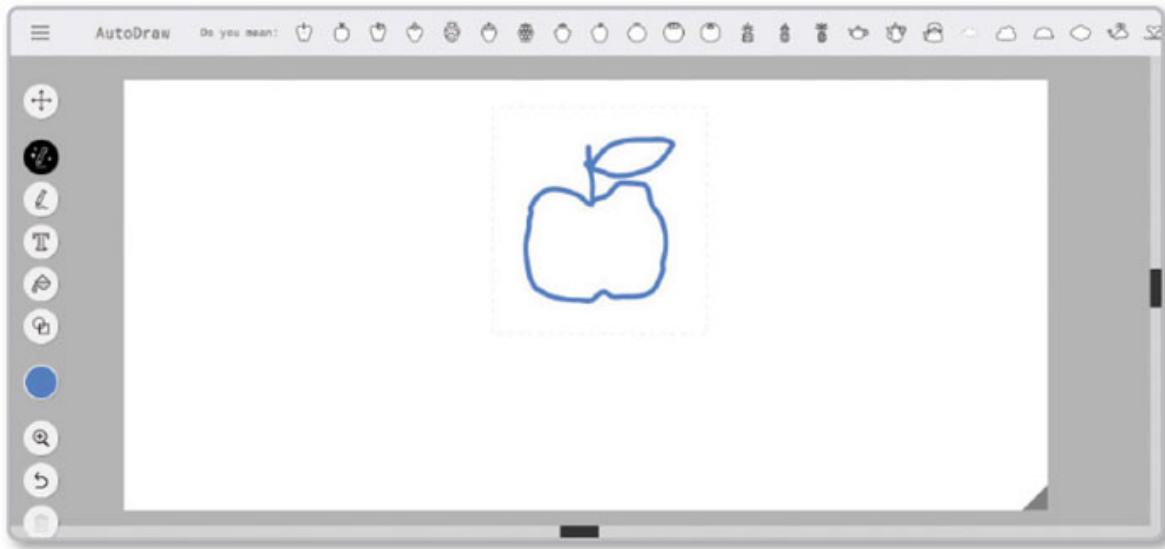
Drawing is a fun activity for both children and adults, but drawing on a digital platform can be difficult because people don't have the required experience. Catering to this problem, Google came up with a solution, AutoDraw.

AutoDraw is a powerful tool used for drawing images. It deploys AI features to enhance the images drawn. Follow these steps to use AutoDraw:

- Visit <https://experiments.withgoogle.com/autodraw> or scan the QR code and click on "Launch Experiment".

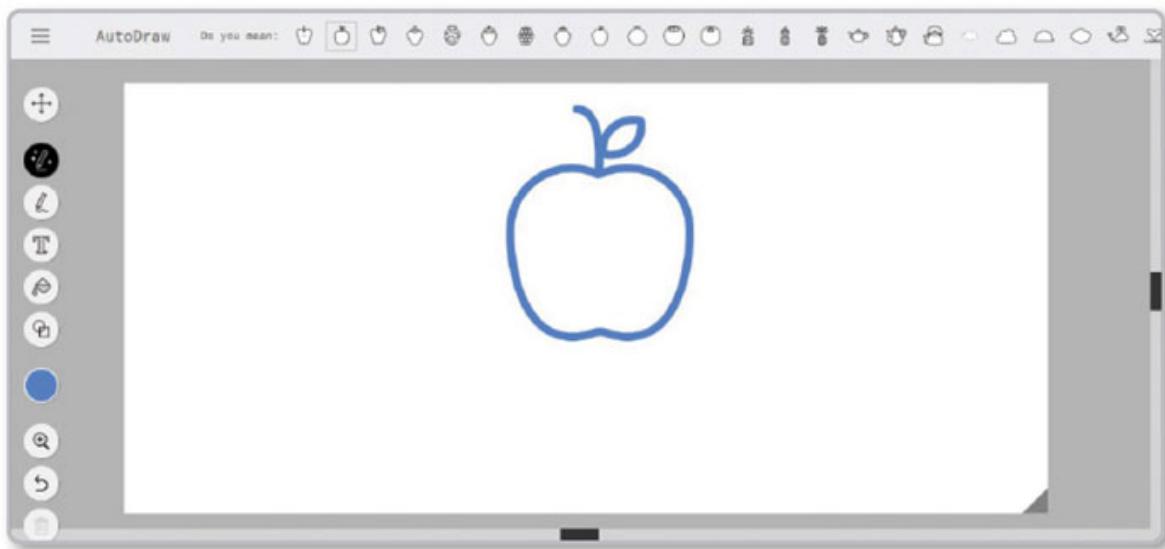


- On the left hand side you can see the toolbar, select any tool and drag on the drawing canvas to draw any shape.



Once you have drawn on the canvas you will see that a toolbar appears on the top of the drawing canvas.

- For this toolbar, select the shape that resembles your idea.



Now go ahead and make your own drawings.

**AI GAME** 01

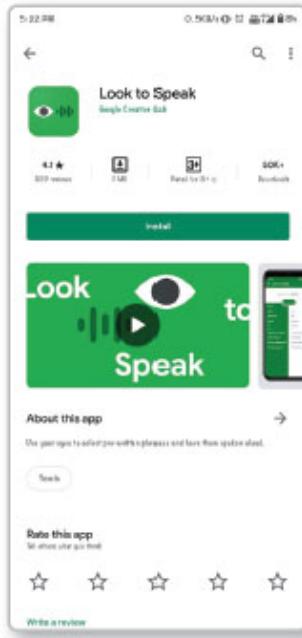
**Look to Speak**

Experiential Learning

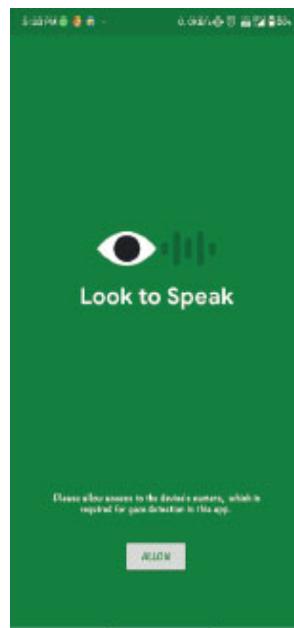
This is an application that can be downloaded from the Play Store. This app can be used to select pre written devices and have them spoken aloud.

To download this app, follow these steps:

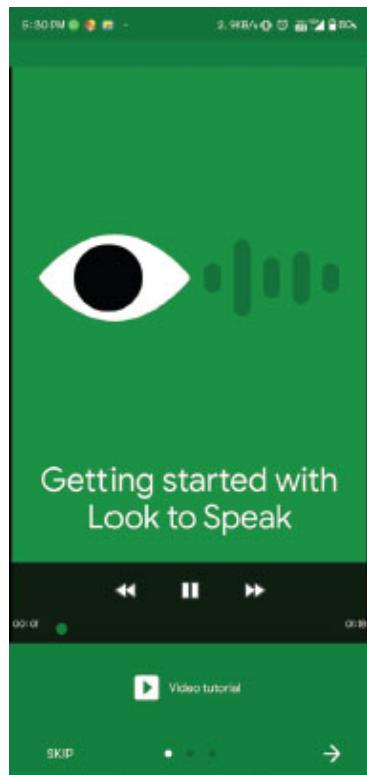
Step 1: Open Play Store and search Look to Speak.



Step 2: Touch on the app icon shown below and click on Install button.



Step 3: Once the app is installed, open the app. It will ask your permission to set up camera functions. Click on Allow button.



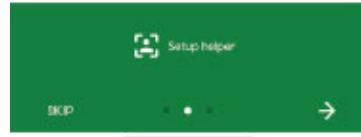
Step 4: Go through the video tutorial and follow the instructions to setup the app.



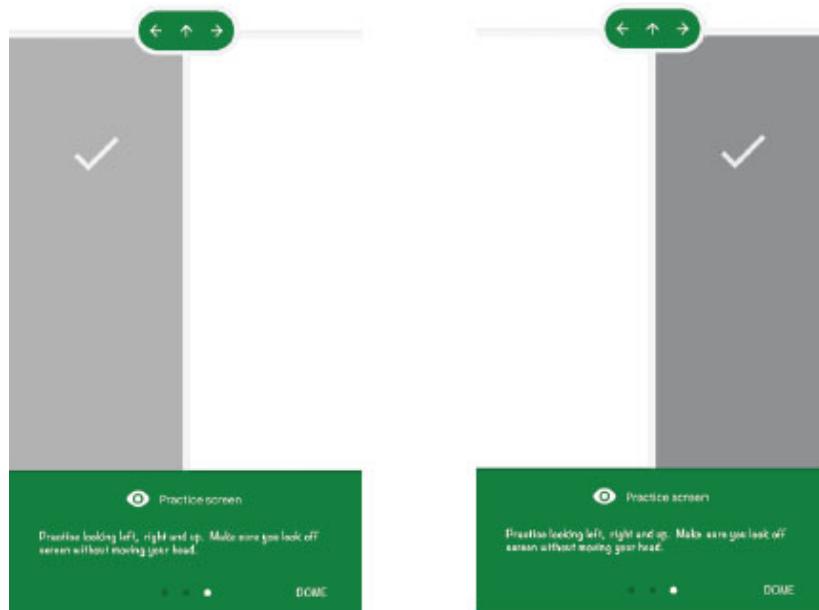
1 Point the device to your head applier in this circle.



2 The device should be placed slightly below a head. Ideally, it should be secured using a mount.



Step 5: After the setup is complete, you will see a practice screen, follow the instructions and complete the practice run. Touch the Done button to complete the process.



Step 6: Now you can see a list of words on which you can practice. You can also add more phrases through the menu button from the top left corner.



## At a Glance

- AI is being used in many areas like healthcare, economic development, entertainment and education.
- AI has contributed a lot during pandemic to the healthcare sector.
- Many robots are developed which help in skilled surgery.
- AI based apps help in accurate diagnosis of diseases and predict its future occurrence and severity etc.
- In financial sector, AI is being used to predict credit scores of the customers.
- Online banking, digital wallets, financial risk calculations, chatbots for customer care are few examples where AI is providing great support.
- AI in transportation sector helps increase passenger safety, prevent accidents, reduce carbon emissions, manage traffic congestion

thereby minimising overall financial expenses.

- Real life uses of AI includes spam filters in emails, online shopping, smart phones, digital personal assistant, social media etc.

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## AI Quiz

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**Tick (✓) the correct option.**

1. Which of the following features uses computer vision?
  - a. Fingerprint scanner
  - b. Facial recognition
  - c. Dolby Atmos
  - d. None of these
2. Which of the following is not a social media platform?
  - a. Facebook
  - b. Youtube
  - c. Twitter
  - d. All of these
3. Which of the following domains of AI is used by Google Maps to generate predictions of traffic patterns?
  - a. Deep Learning
  - b. Computer Vision
  - c. Machine Learning
  - d. None of these
4. AI in banking helps to detect .....
  - a. identity frauds
  - b. money laundering
  - c. future trends
  - d. all of these

5. Which of the following generate a massive amount of data to take decisions like a human being?
- a. mirror
  - b. camera
  - c. engine
  - d. sensor

## Exercise

### A. State whether these statements are true or false.

- 1. Unlocking the mobile device using face recognition is not an example of AI.....
- 2. Siri is an example of voice recognition system of AI.....
- 3. AI is incapable of detecting money laundering patterns.....
- 4. AI in e-commerce help to serve personalized products for the customer.....
- 5. Autonomous vehicles uses radars, cameras, sensors and AI to work efficiently.....

### B. Fill in the blanks.

- 1. E-commerce sites are powered with ..... for a hassle free delivery experience.
- 2. AI programs uses ..... for security and surveillance.
- 3. Google Maps use ..... to generate predictions of traffic patterns
- 4. ..... is an example of a mental health chatbot.
- 5. ..... systems helps in grading essays at school.

### C. Answer the following questions.

- 1. How AI is useful in healthcare?
- 2. Why do we use AI in e-commerce websites?
- 3. How does Google map predict traffic?
- 4. How is AI used in military?

## 5. How is education sector benefitted from using AI?



### Ai In Life

AI is rapidly growing and helping humans in every field imaginable. But, imagine a scenario where AI steps up to help an elderly. Do you think AI is capable enough to take care of an elderly? Discuss with your teacher and classmates.

Life Skills & Values



### Ai Deep Thinking

Since e-commerce companies are using chatbots so extensively, what will happen if we get a wrong advice from the chatbot and how will it affect us? Explore and discuss your findings with your class.

Critical Thinking



### Ai Lab

Create a presentation using MS PowerPoint or Google Slides to compare the features of different payment apps available for commercial uses. Choose the app that you like the most and discuss its advantages and disadvantages with the class.

Experiential Learning



## CONCEPT OF SMART LIVING



### Learning Outcomes



- Smart Homes
- Devices Used in Smart Homes



Hello Vincy! I was surfing the Internet. While doing so, i accidentally typed 'smarthome' and made a search. I was surprised to see so many results related to my query.

Well, you could have shouted EUREKA! A great researcher named Archimedes shouted that term when he made an ground breaking discovery.



Really! Have I made such a discovery?

Well! Smart home is an interesting concept and researchers are extensively working on improving the experience of people living in such homes. And, I can see, you have a question.



Yes, what is a smart home?



Good question! In this chapter I will tell you more about smart homes and the concept of smart living.

Nowadays, people use a variety of gadgets in their homes to make their life easier. Using such gadgets makes it easier for the user to focus on other important tasks rather than work on mundane tasks.



## Smart Homes

Home is a place where people living in feel safe, cared and appreciated. Smart Homes enhance this experience and provide a better life for the people living in them.

Smart Homes are homes that use internet connected devices to empower remote monitoring and management of appliances and devices such as for lighting and heating.



### Brainy Fact

The most common Smart Home devices include appliances, camera systems, thermostats, security systems and lighting.

## Benefits of Smart Homes

Smart Homes provide insights to efficient energy usage. They also enhance people's level of safety. The benefits are:

- **Power Saver:** Smart Homes are great at saving power. Often it is found that people are lazy in turning off lights, which increases the consumption of power and water. These types of homes allow their users to turn off the lights and electronic gadgets even when they are off to bed.
- **Increased Energy Efficiency:** The Smart Home technology makes it possible to make the home energy-efficient. The control of heating and cooling of home with a programmable thermostat learns the user's preferences and then suggests the best energy efficient settings throughout the day. Even the lights could be programmed to automatically switch to an evening mode as the sun sets or automatically turn off when no one is at home.
- **Protect Home and its Belongings:** The home is protected from intruders with AI systems. Once they are configured, the door/window and motion sensors notify the owner when someone tries to break in their house, when no one is at home. There are

wireless doorbells and intelligent locks that provide an additional level of security to live with mental peace.

- **Interactive Home:** The AI enabled appliances are controlled through voice or smart phones. Some appliances even support gestures by sensing the motion like hand gestures or tap recognition like a knock.
- **One Point Access:** All the devices are accessed from one point, that is one of the biggest advantages of a Smart Home. Gadgets are connected through one interface and are completely controlled by the app on tablets or smartphones. These apps are user friendly and easy to access.
- **Flexibility:** Smart Home systems are flexible to accommodate new devices, appliances and technology with the existing one. They also provide space to a complete replacement of old devices with the new ones. The user gets the advantage of upgrading to the latest lifestyle.
- **Remote Control:** A very powerful and popular use of Smart Home is the power of controlling the house remotely. Imagine the owner is at a shopping centre and is afraid of getting home late for dinner. But if he has a Smart Home, he would just use his cell phone to switch on the microwave to preheat the dinner. He can also switch on AC before entering the house to make it cool on a scorching summer day. The user could even check if the lights are off or someone is at the door.
- **Climate Control:** AI enabled smart devices now take the comfort of their users to the next level. The ambient temperature across corners can be tracked easily and the central cooling unit can be commanded to facilitate optimum cooling. If the windows or doors are kept open for a long time, the user may program to switch off the cooling systems automatically.
- **Protection:** The Smart Home provides instant alerts on the smartphone if the house is hit by fire, flood or any other disaster. The central automation system can also be configured to take preventive measures. This can be like triggering an alarm and automatically disabling the locks for a quick evacuation.



## Devices Used in Smart Homes

Smart Home owners are always connected to the Internet and they use AI enabled devices to monitor and manage appliances and systems with remote control. These devices use the various domains of AI like Computer Vision, Machine Learning, Natural Language Processing and Deep Learning. Following are popular smart devices in trend nowadays:

### **Smart Hubs**

Smart Hubs are known as gateways. They provide connectivity with appliances and systems to control through smart phones using the Internet.



### **Video Doorbells**

Video doorbells provide security as the owner can watch who is outside the door before actually opening it. It has a built-in camera to watch and a microphone to talk to the visitor through the intercom.



## Smart Cameras

When it comes to home security, smart cameras are the most important devices. It is used to monitor the indoor and outdoor activities . It not only records the movements but also sends alerts for suspicious movements.



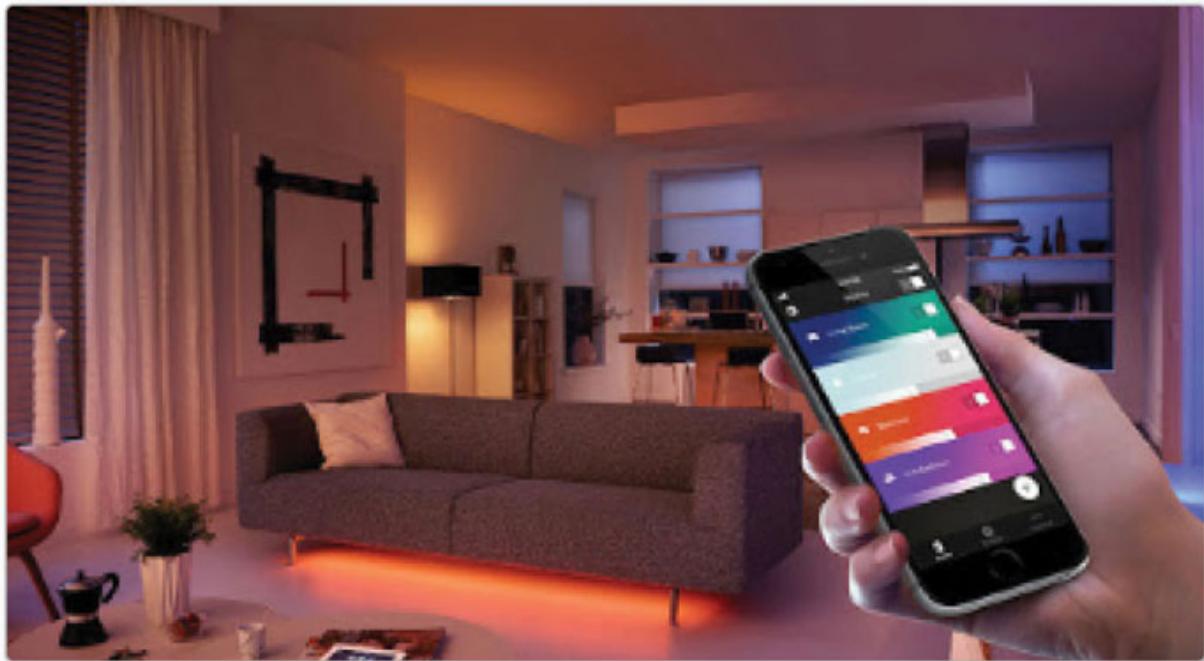
## Smart Smoke Detectors

This device sounds an alarm when smoke is detected. It can warn you if there is fire in your home.



## Smart Lighting

Smart lights help in saving and conserving the energy. It can be programmed to turn on/off, control the brightness and store your preferences.



## Smart Thermostats

To automatically control the temperature of a smart home, this device is used. This device is capable of setting the temperature as per your preferences and time schedule.



## Smart Speakers

These smart speakers can accept voice commands and can be controlled through smart phones. They can also perform activities like creating a playlist, turning on reminders, searching information on the Internet, etc.



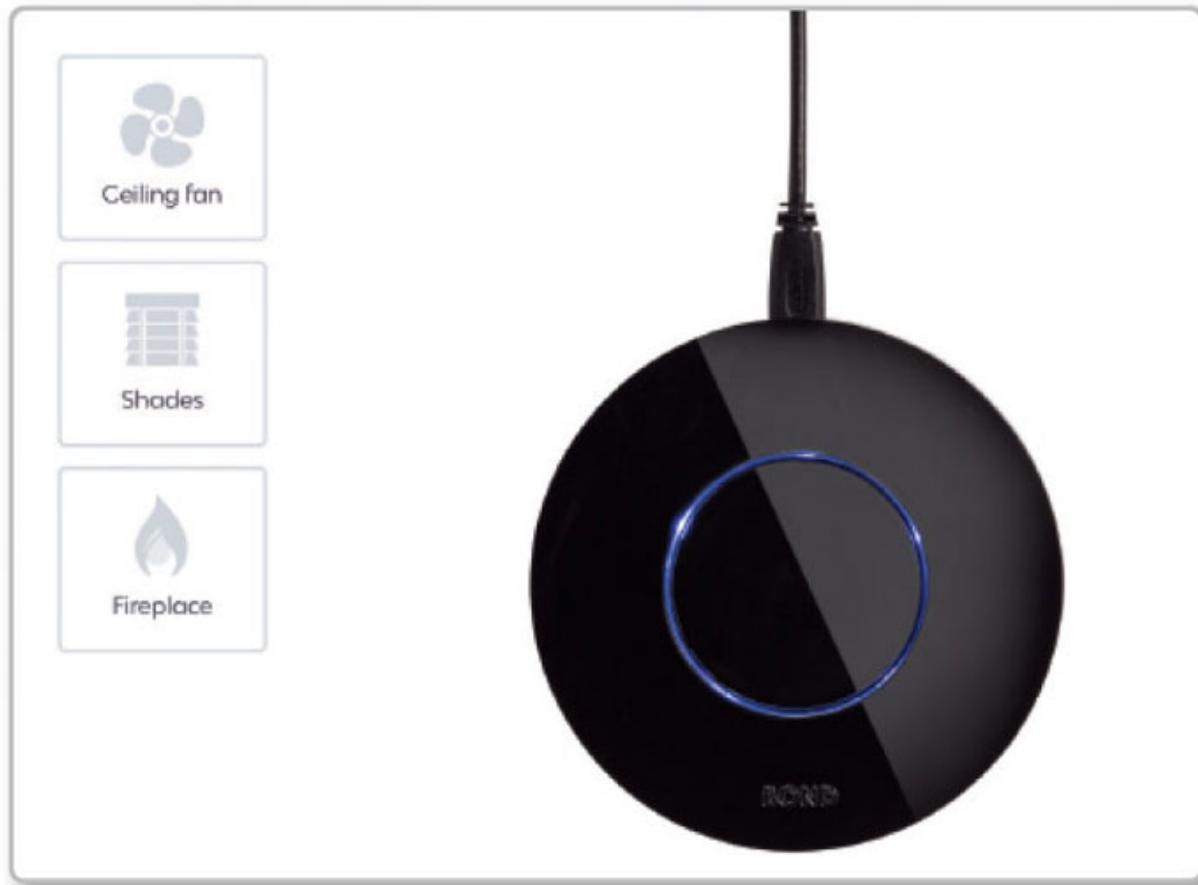
## Ego Lawnmower and Eve Aqua

Automatic gardening devices like automatic watering system and lawn mowers can help to maintain a pristine garden without all the effort as these AI systems can sense the weather and water the plants accordingly. The lawnmower can keep track of the mowing cycles and maintain the lawn accordingly without any human interference.



## Smart Remote Controllers

Smart remote controller helps the user to streamline the use of a remote by connecting it to an app through which the user can control the smart devices in their home.



Smart home often has a lot of remote systems to operate the various devices in use. In such scenarios a smart remote can be very beneficial. In the image, you can see a smart remote that can be used in a very simple fashion to operate the various devices in the home.



Name any three smart home gadgets.

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Based on your learning so far draw a floor plan for your future smart home.



### Video Session

You may use this video link to learn more about Smart Homes

Visit: <https://www.youtube.com/watch?v=a-LLDP4BfWk> or scan the QR code.



After watching the video, reconsider your floor plan of the previous activities and make necessary changes accordingly.



### At a Glance

- Smart living is an evolving trend that improves the living standards of people by using smart devices to make the life comfortable.

- Smart homes use devices that are internet and AI enabled.
- Smart homes are eco-friendly and economical.
- Smart devices are Internet enabled, customized and can be remotely controlled.



**Tick (✓) the correct option.**

1. .... can perform activities like creating a playlist, turning on reminders, searching information on the Internet, etc.
  - a. Smart Thermostats
  - b. Smart Cameras
  - c. Smart Speakers
  - d. Video Doorbells
2. Which of the following is controlled using a smart thermostat?
  - a. Temperature
  - b. Power
  - c. Density
  - d. Intensity
3. Which of the following protects a smart home from intruders?
  - a. Camera and AI
  - b. Motion sensor and AI
  - c. Heat sensor and AI
  - d. All
4. Smart ..... are known as gateways.
  - a. Network Card
  - b. Hub

- c. Modem
- d. Repeater



## Exercise

### A. State whether these statements are true or false.

1. Smart home systems are not flexible to accommodate new devices.....
2. All the devices are accessed from one point, is one of the biggest advantages of Smart homes.....
3. Smart devices can not be controlled with remote.....
4. The AI enabled appliances are controlled through voice or smart phones.....
5. Smart homes are great in saving power. ....

### B. Fill in the blanks.

1. .... often has a lot of remote systems to operate the various devices in use.
2. Smart speakers are example of ..... home devices.
3. Smart homes use devices that are internet and ..... enabled.
4. The Smart home provides instant alerts on the ..... if the house is hit by fire, flood or any other disaster.
5. ..... device is capable of setting the temperature as per your preferences and time schedule.

### C. Answer the following questions.

1. What do you understand by Smart living?
2. Name any three smart devices use in Smart home.
3. List any four benefits of Smart homes.
4. Explain Smart Cameras.



## AI Deep Thinking

AI has settled its roots deep into our lives. These days AI is being used everywhere. We are using a part of it without even knowing. What according to you are the disadvantages of this scenario?



### AI Lab

Experiential Learning

- Go to your computer lab and study the gadgets that can be used to improve the conditions of the lab. Share your ideas with the class.



## Learning Outcomes



- Future of AI
- Safety and Security
- Traffic Management
- Smart Homes and Cities
- Smart Highway
- Health Care Industries
- AI in Education
- AI in Finance
- AI in Military and Cybersecurity



Hey Vincy! I have been hearing so much about AI, it makes me wonder, can we really have technology which is advanced enough to work on its own?



Well! To be honest, the field of AI is growing rapidly. In the coming future, we will definitely have technology advanced enough to perform certain tasks on its own.



That sounds exciting! Could you give some examples related to these technology?



Sure! Do you know, automatic cars are available in the market and these cars can drive on their own.



Really! We really have automated cars?



Vincy: Yes dear! In this chapter I will tell you more about the future of AI.

The scope of Artificial Intelligence is widening over the last few decades. The technology is making its way out of research labs and into our everyday lives, promising to help us tackle humanity's greatest challenges. The future of AI is promising and our own robotic companion is not far from reality. The influence of AI has evolved from machine intelligence to Artificial General Intelligence in three stages:

The first stage of AI involved expert systems such as chatbots like Eliza and IBM Watson which were good in answering under certain conditions and domain of knowledge and context.

The second wave of AI technology was based on machine learning which included the systems that were designed to learn and perceive. These systems included voice-enabled digital assistants and more efficient chatbots and Robotics Process Automation System.

The Third stage had systems that receive, understand and process applications without human intervention using credit history, social scores and interaction with the application.



## Brainy Fact

Robotic Process Automation (RPA) is a technology that mimics the way humans interact with software to perform high-volume, repeatable tasks.



## Future of AI

There are prospects of AI creating media platform in which the viewer or listener can choose their needs such as genre of music. Our smart devices will not provide mechanical responses; instead they will offer human-like responses and sensible solutions. Facial recognition technology will replace credit cards. The list is endless; let us discuss a few prospects of Future AI.

## Automated Transportation

In future, AI will have a huge impact on automated transport. Automated transportation will ensure that there are fewer accidents. Google began testing a self-driving car in 2012. Many other automobile manufacturers like General Motors, Ford, Mercedes, BMW, etc. are in the process of developing driverless car systems.



## Safety and Security

CCTV based monitoring using AI can help in building surveillance systems to keep a check on potential criminal incidents and security of the residents. Social media intelligence platform with data from social media can predict potential activities that can affect safety.



### Brainy Fact

In Surat, the crime rate has declined by 27% after the implementation of AI-powered systems.

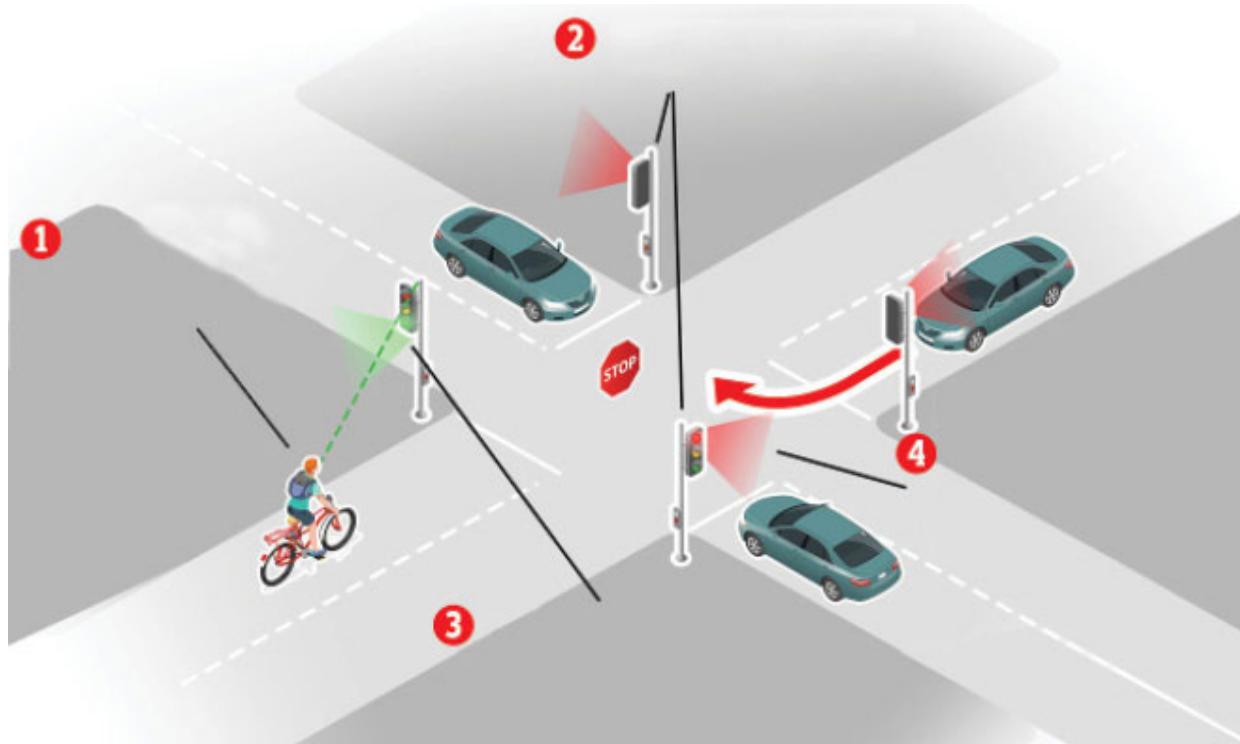


How does CCTV help reduce crime rate?



## Traffic Management

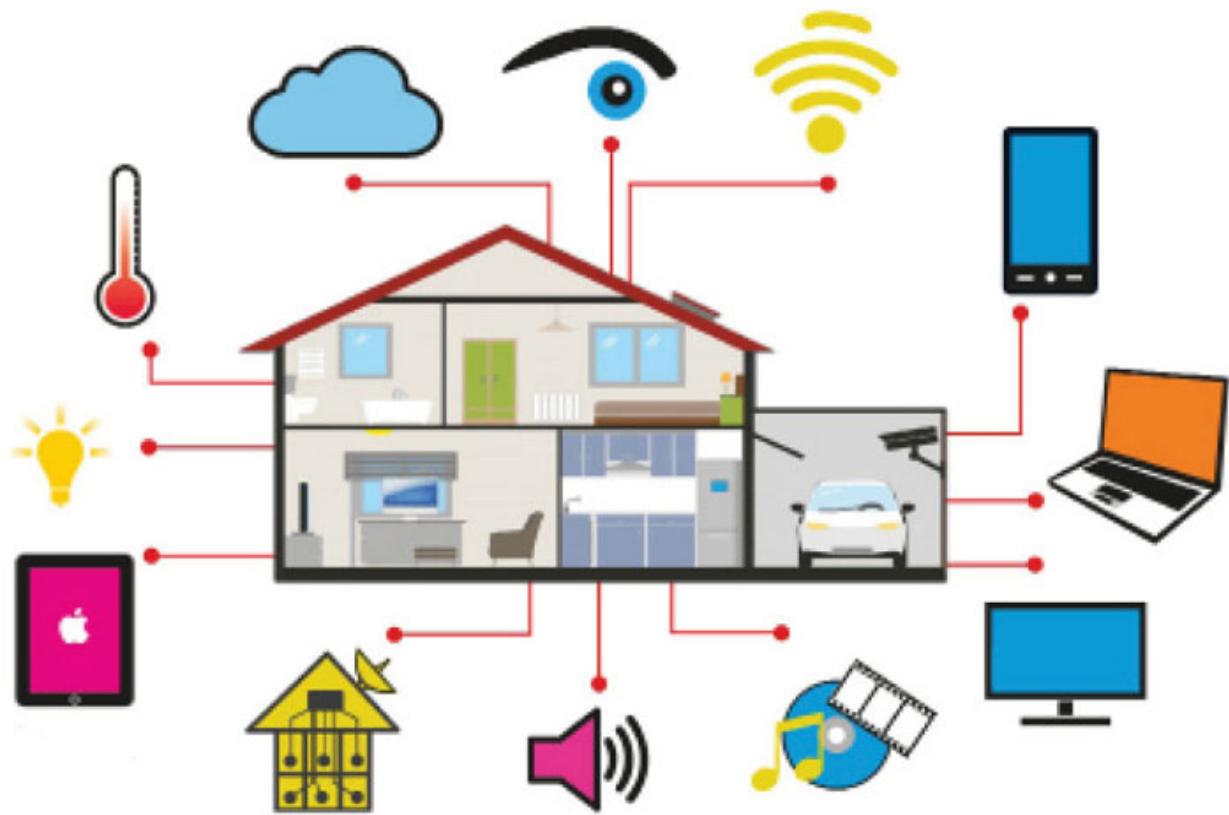
AI can revolutionize the way traffic can be controlled and managed in cities. Congestion can be reduced by route selection, predictive alerts, and route deviation.



## Smart Homes and Cities

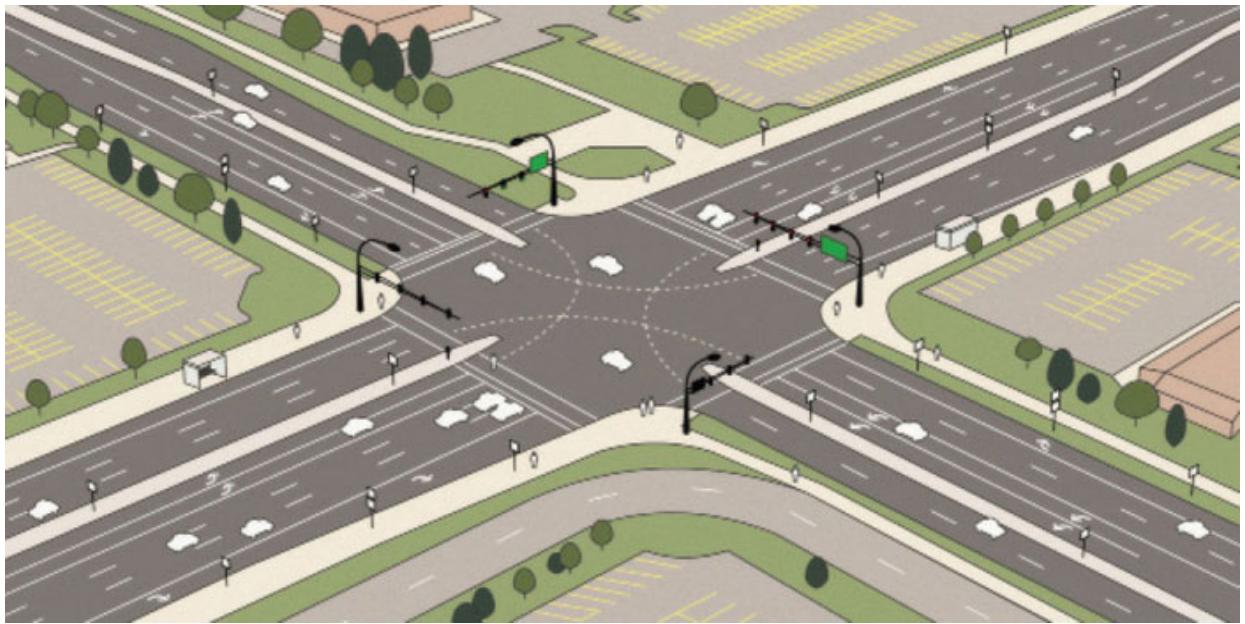
AI enabled homes will let us turn on our lights, play favourite music or change our room temperature, at the tap of our smartphones. We can have our coffee ready when we wake up, automatically turn on and off ACs, lights, fans, etc.

The concept of smart cities varies from city to city. In general, the concept of smart city refers to the use of technology to provide better services to the residents and to solve their problems. The main idea behind smart city is reduced waste and inconvenience, and improved social and economic quality.



## Smart Highway

A smart highway is green, which means there are plants and trees all around the road. In case of space constraints, there could be vertical gardens. There is a system which gives SMS alerts on traffic and medical information in case of medical emergencies and requirements. No red lights, no parking troubles, sound and air pollution free environments are some of the other important features.



## Health Care Industries

Google's DeepMind has already beaten doctors in detecting fatal diseases like breast cancer in its early detection. It will not be very far that AI will detect even common diseases as well. Drug discovery has sped up and streamlined due to AI.



**Google  
DeepMind**



## AI in Education

Every country's development depends on the quality of education provided to its citizens. Right now AI is a subject of education. In the future we might find that it is going to transform the classical way of education.



## AI in Finance

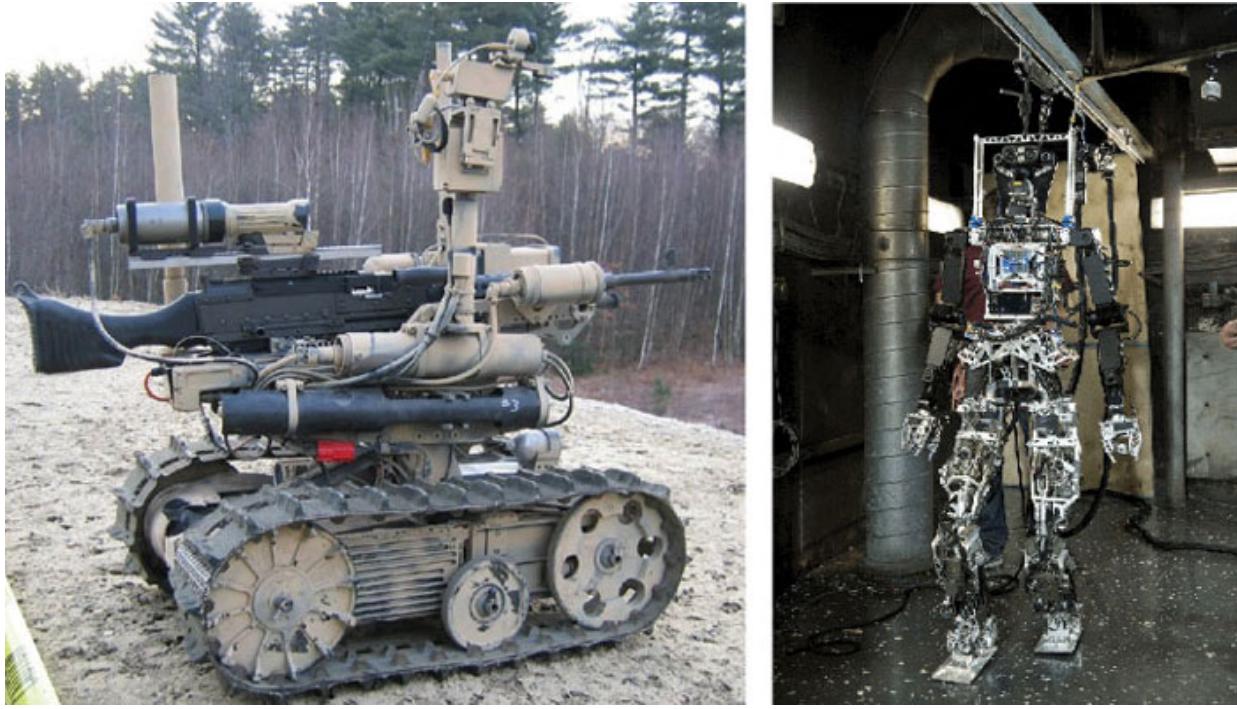
Any country's growth depends on its economic and financial condition. AI has a great potential to boost an individual's economic health. Nowadays, AI algorithms are being used to manage equity funds.



## AI in Military and Cybersecurity

AI-assisted Military technology has built an autonomous weapon system. This does not need human intervention, thereby building the safest way of enhancing the security of a nation.

We will soon see robot military in the near future. They would be as intelligent as the soldiers/commandos and will be able to perform their best in most difficult and challenging terrains.



## **AI Task**

Make a list of different devices or services around you that use AI technology. Study the working of these devices and how they are implemented. You can use the following for reference. Also write what improvements you would like to see in the future for AI technology.

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## **At a Glance**

- The AI technology is making its way out of research labs and into our everyday lives, promising to help us tackle humanity's greatest challenges.
- In future, AI will have a huge impact on automated transport.
- CCTV based monitoring using AI can help in building surveillance systems to keep a check on potential criminal incidents and security of the residents.
- AI can revolutionize the way traffic can be controlled and managed in cities. Congestion can be reduced by route selection, predictive alerts, and route deviation.
- AI enabled homes will let us turn on our lights, play favourite music or change our room temperature, at the tap of our smartphones.
- When someone tries to break into our home through the door or window, the motion sensor will notify us when we are away.

## Δi Quiz

**Tick (✓) the correct option.**

1. Which stage of AI was brought about by expert systems like Eliza and IBM Watson?
  - a. First
  - b. Second
  - c. Third
  - d. None of these
2. Which future prospect of AI will ensure fewer accidents?
  - a. Traffic management
  - b. Automated transportation
  - c. Smart homes
  - d. All of these

3. What will help us in getting instant alerts in case of any security breaches in our house?
- Smart highway
  - Traffic management
  - Intelligent security
  - None of these
4. Which stage of AI was based on Machine learning?
- First
  - Second
  - Third
  - None of these

## Exercise

### A. Answer in one word.

- Name one technique using which AI can reduce congestion of traffic in cities.....
- Name one feature of a smart highway.....
- Name any one future prospect of AI.....
- Name one task that a smart AI enabled home will be able to perform.....

### B. Fill in the blanks.

- Face recognition is a feature that requires .....
- AI serves. .... content on social media.
- AI in finance sector predicts future by analysing past user .....
- AI in security and surveillance work by using .....

### C. Answer the following questions.

1. Describe the role of AI in transportation industry.
2. How has AI affected the automated transportation?
3. Write a short note on how AI has revolutionised the traffic management system?
4. Name any two self driving car manufacturers.



## Ai Deep Thinking

Critical Thinking

Use the Internet to research about the various companies that are currently working in the field of AI. Find out what applications they are trying to develop and implement for the future. Do you think it is more important for computers to start thinking like humans or to start behaving like humans based on past experience?



## Ai Lab

Creativity

Create a PowerPoint presentation about all the ways in which AI will be changing our lives in the future. Use the internet for researching and also add your own ideas about what you would like to see in the future.

## **Test Sheet 2**

(Based on Units 4 to 6)

### **A. Tick (✓) the correct option.**

1. Which of the following features uses computer vision?
  - a. Fingerprint scanner
  - b. Facial recognition
  - c. Dolby Atmos
  - d. None of these
  
2. Which of the following is not a social media platform?
  - a. Facebook
  - b. Youtube
  - c. Twitter
  - d. All of these
  
3. ..... perform activities like creating a playlist, turning on reminders, searching information on the Internet, etc.
  - a. Smart Thermostats
  - b. Smart Cameras
  - c. Smart Speakers
  - d. Video Doorbells
  
4. Which of the following is controlled using a smart thermostat?
  - a. Temperature
  - b. Power
  - c. Density
  - d. Intensity

5. Which stage of AI was brought about by expert systems like Eliza and IBM Watson?
- a. First
  - b. Second
  - c. Third
  - d. None of these
6. Which future prospect of AI will ensure fewer accidents?
- a. Traffic management
  - b. Automated transportation
  - c. Smart homes
  - d. All of these
7. AI in banking helps to detect .....
- a. identity frauds
  - b. money laundering
  - c. future trends
  - d. all of these
8. Which stage of AI was based on Machine learning?
- a. First
  - b. Second
  - c. Third
  - d. None of these
9. Smart ..... are known as gateways.
- a. Network Card
  - b. Hub
  - c. Modem

d. Repeater



**B. Fill in the blanks.**

1. E-commerce sites are powered with ..... for a hassle free delivery experience.
2. AI programs uses ..... for security and surveillance.
3. ..... often has a lot of remote systems to operate the various devices in use.
4. Smart speakers are example of ..... home devices.

**C. State whether these statements are true or false.**

1. Unlocking the mobile device using face recognition is not an example of AI.....
2. Siri is an example of voice recognition system of AI.....
3. Smart home systems are not flexible to accommodate new devices.....
4. All the devices are accessed from one point, is one of the biggest advantages of Smart homes.....

**D. Answer the following questions.**

1. How AI is useful in healthcare?
2. Why do we use AI in e-commerce websites?
3. What do you understand by Smart living?
4. Name any three smart devices use in Smart home.
5. Describe the role of AI in transportation industry.
6. How has AI affected the automated transportation?



### **Answer the following questions.**

1. Do you think that Super Intelligent machines are possible in near future?

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2. Write a short note on importance of prediction in AI.

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3. India decides to adopt AI systems that would recommend future political leaders. Write your views on the success of such system and what could be the risk factors of such systems.

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4. You own a completely AI controlled Hotel. Write advantages and disadvantages of such hotel.

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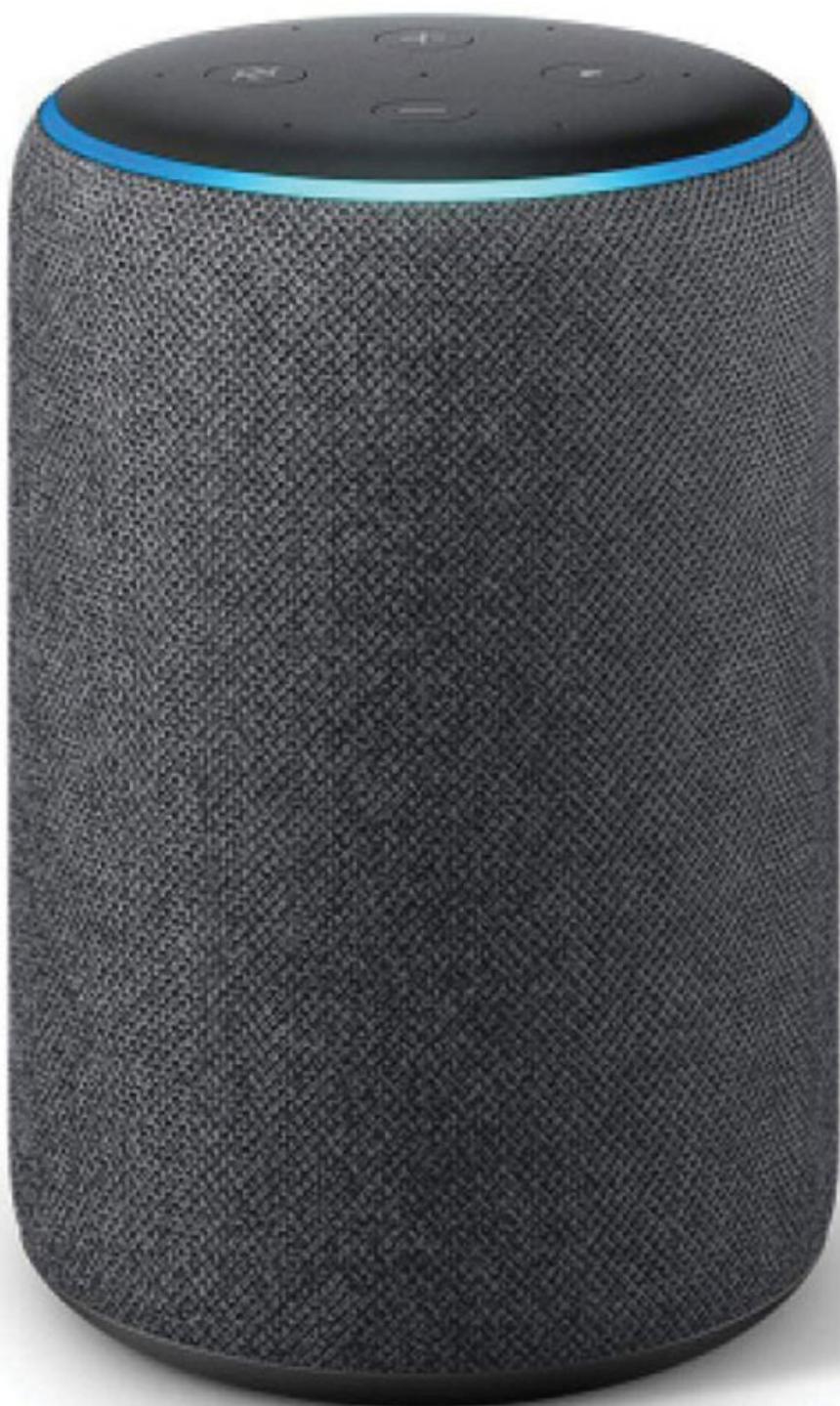
1. Prepare a MS PowerPoint presentation on the topic "Human Intelligence V/s Artificial Intelligence." Prepare 10 slides, and use pictures to illustrate the differences. Use one slide for one difference. You may even draw images, if needed. Share your presentation with your class.



2. Surf the Internet and find out more about the people who have contributed to the field of AI in the modern times. Select any 2 of them and write a report in MS word, cite their work and describe their contributions to the field. Describe how their contribution is helpful to the society. Share your report with your class.

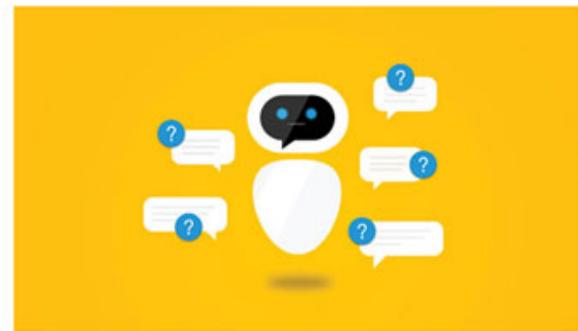


3. Surf the Internet and find out more about the domains of AI. Write a report on the applications of various domains of AI in everyday objects in 200 words. For example, voice assistants, smart speakers.



4. We have been using AI since a long time. Surf the Internet and find out 3 more technologies that use AI. Prepare a 10 slides using MS

PowerPoint on the topic, "AI in our Surroundings". Describe any 3 devices, mention their usage and features. Share your presentation with the class.



5. Home is a place where we have peace of mind and we feel safe. Integrating AI into our homes makes it a grand experience. Imagine you are making a plan for your dream home. What kind of gadgets are you going to use in your smart home.





## AI GLOSSARY

-  **Artificial Stupidity:** When machine learning algorithms make stupid mistakes while learning from the data then it's called artificial stupidity.
-  **Bias:** Showing preference for one person or thing over the another.
-  **E-Commerce:** Buying and selling of products and services using internet is called E-Commerce.
-  **Face Recognition:** Facial Recognition is a way of identifying or confirming an individual's identity using their faces.
-  **Fraud Detection:** Fraud detection is set of activities undertaken to prevent unauthorised financial activities.
-  **Healthcare:** An organized provision of medical care to any individual or a community.
-  **Interface:** A device or program that enables a user to communicate with a computer.
-  **Neural Network:** Neural Network is set of algorithms that goals to achieve relationship between set of data in the same way how human brain works.
-  **Prediction:** An action of forecasting something. It can be defined as a statement about something that may happen in future.
-  **Skimming:** Skimming is an illegal practice used by identity thieves to capture credit card information from a cardholder secretly.
-  **Speech Recognition:** Speech recognition is the process of enabling a computer to respond to the human speech or sound.
-  **Weights:** The connection strength between units or nodes in a neural network.

## AI Innovators

Andrew Ng is undoubtedly one of the most prominent AI researchers, instructors, and practitioners in the field today.



**Andrew Ng**

He is known for Artificial Intelligence, Deep learning, MOOC and educational technology. Andrew is a co-founder of Baidu Research and the online learning platform Coursera. In Coursera he has taught over 4.5 million students, and is also an adjunct Professor of Computer Science at Stanford University. He was also co-founder and head of Google Brain.



**Cassie Kozyrkov**

Cassie Kozyrkov is a South African data scientist and statistician. She founded the field of Decision Intelligence at Google, where she serves as Chief Decision Scientist. Her area of focus at Google is on applied AI and data science process architecture. She is also called a data science Thought Leader . She has personally trained more than 20,000 Googlers on machine learning, decision-making and statistics.