

# Dream Space TV: The brAIn\_waves Series



Microsoft

Image created by Microsoft Designer

## **brAI\_n\_waves SERIES INFORMATION**

Dream Space TV: brAI\_n\_waves series is a collaboration between RTÉ Learn and Microsoft Dream Space which aims to educate young people on the importance of understanding Artificial Intelligence (AI) from how it works and what is behind it, to its impact on us and why we should be learning about it. This series will provide hands-on lessons focused on developing AI literacy<sup>1</sup> for all schools and the youth sector across the island of Ireland. The brAI\_n\_waves series for post-primary students is a four-part series which explores the fundamentals of AI and its impact on our everyday lives with specific lesson areas including algorithms and data to machine learning and ethics. After completing activities to put learning into practice across each episode, students are invited to work in teams and develop their own AI for Good solutions which can then enter into our national brAI\_n\_waves competition and be in with a chance to win some amazing prizes.

## **brAI\_n\_waves EDUCATOR GUIDE INFORMATION**

This educator guide provides the links to all of the episodes for your class PLUS a walkthrough of each episode. It also includes curriculum links, UNESCO curricula links, worksheets and additional resources including extension activities.

# ARTIFICIAL INTELLIGENCE: TERMINOLOGY

**ARTIFICIAL INTELLIGENCE**  
MACHINES THINKING AND LEARNING LIKE HUMANS, SOLVING PROBLEMS WITHOUT EXPLICIT PROGRAMMING

**MACHINE LEARNING**  
TEACHES COMPUTERS TO LEARN PATTERNS FROM DATA AND MAKE PREDICTIONS WITHOUT EXPLICIT PROGRAMMING

**DEEP LEARNING**  
INTERCONNECTED NETWORKS TO SOLVE COMPLETE PROBLEMS LIKE RECOGNISING SPEECH OR IMAGES

**NEURAL NETWORKS**  
COMPUTER SYSTEMS MODELLED AFTER THE HUMAN BRAIN, LEARNING AND MAKING DECISIONS

**SUPERVISED LEARNING**  
TEACHING COMPUTERS WITH LABELLED EXAMPLES TO PREDICT OUTCOMES IN NEW SITUATIONS

**COMPUTER VISION**  
MACHINES HAVING THE ABILITY TO UNDERSTAND AND INTERPRET VISUAL INFORMATION

**BIAS IN AI**  
UNINTENTIONAL UNFAIRNESS IN MACHINE DECISION MAKING DUE TO BIASED DATA

**ALGORITHM**  
STEP BY STEP LISTS OF INSTRUCTIONS THAT ARE USED TO SOLVE A PROBLEM OR COMPLETE A TASK

**INTERNET OF THINGS**  
DEVICES THAT ARE ALL CONNECTED TO THE INTERNET AND SHARE AND EXCHANGE DATA FOR SMART APPLICATIONS

**AI ETHICS**  
THESE ARE PRINCIPLES OR GUIDELINES FOR ENSURING RESPONSIBLE AND ETHICAL AI IS USED IN AI DEVELOPMENT

**NLP**  
NATURAL LANGUAGE PROCESSING IS WHEN COMPUTERS UNDERSTAND AND INTERPRET HUMAN LANGUAGE

**GENERATIVE AI**  
IS A FORM OF AI THAT CAN CREATE NEW CONTENT (TEXT, IMAGES, AUDIO, AND VIDEO)



# Dream Space TV: The brAI\_n\_waves Series Episode 1



# brAI\_n\_waves

## Episode 1

### Episode Objectives

By the end of this episode, students should be able to

- 1 Outline what Artificial Intelligence (AI) is and its history. 🤖
- 2 Distinguish between what AI can and cannot do. 😬
- 3 Compare human intelligence with AI. 🧠
- 4 Explain how AI technology is used in our everyday life with examples. 💻
- 5 Name three components of AI technology. 🧑‍💻
- 6 Explain what a dataset is. 📊
- 7 Outline how data can be collected and utilised by humans and/or machines. 📈
- 8 Organise and analyse a dataset. 📉
- 9 Make predictions from a dataset and communicate about them. 🌟

### UNESCO: K-12 AI Curricula

Artificial Intelligence (AI) refers to machines that imitate some features of human intelligence.

Artificial Intelligence, is a rapidly growing field that has the potential to impact many aspects of our lives. To prepare students for this future, UNESCO, the United Nations Educational, Scientific and Cultural Organization, has included AI as part of their K-12 curriculum. This series has used the UNESCO K-12 AI curricula to curate lessons on AI to help students understand what AI is, what it can do, and how it might impact society. The goal is to equip students with the knowledge and skills they need to navigate a world where AI is increasingly prevalent.

## UNESCO K-12 AI Curricula - Knowledge

### Data Literacy

- Understand the principles and processes of data collection and simple analysis.
- Understand how to collect, process, analyse, and report using data.
- Understand data trends.

### AI Definitions and Components

- Understand what AI is and is not.
- Understand the parts of AI.
- Describe basic features of AI.
- Know the history of AI and its development over time.
- Can compare human and computer intelligence.
- Explains how data is used to make predictions

## UNESCO K-12 AI Curricula - Values

### Interests in ICT

- Explores existing AI tools

### Reflection

- Explores emerging technologies that have the potential to disrupt the way people live, learn and work

### Collaboration

- Works as part of a team

## UNESCO K-12 AI Curricula - Skills

### Data Literacy

- Saves, changes and sorts simple databases

### AI Applications

- Uses algorithms to produce art, music, etc

## Episode 1: Timestamps

00:00 – 01:25: Introduction and learning outcomes

01:25 – 03:35: History of Artificial Intelligence

03:35 – 08:53: Human intelligence and AI capabilities

08:53 – 16:30: Creativity with AI

16:30 – 18:23: Components of AI

18:23 – 21:55: Data in sport

21:55 – 26:10: Data in music

26:10 – 27:29: Episode closure

Watch this episode at  
<https://aka.ms/DSTVAI1>

### Lesson Procedure

**History of Artificial Intelligence (5 minutes):** Students are introduced to the brAI\_n\_waves series with a brief explanation of the history of AI.

**Intelligence Comparisons (15 minutes):** During this section students are encouraged to think about the skills we have as humans and how they relate to different AI technologies.

**Activity 1: Human Creativity(17 minutes):** Students will have the opportunity to get creative in this challenge. They will have five minutes to list, draw or write something in which their partner has prompted them to do. Once completed, teachers can use <https://www.bing.com/chat> to showcase how AI has created this same prompt. Use the time to compare the human and AI answers and see how they differ.

**The components of AI: What is Data? And Data in Sports (5 minutes):** During this section of episode one students are introduced to the idea that there is three main components that make up AI. Data, algorithms and machine learning. There is then a short interview with Colin who manages a female league of Ireland soccer team, who explains how he uses data to ensure his team is successful.

**Activity 2: Data in the music industry (15 minutes):** Students will complete a music dataset from a popular music streaming service, on this dataset they are expected to draw five conclusions from the information they see in front of them.



## Warmup Activity: Human Skills

Which AI technologies are imitating human intelligence?

HUMAN	ARTIFICIAL INTELLIGENCE
Language (speaking and listening)	
Vision	
Learning	
Reasoning	
Creativity	

## Warmup Activity: Sample Answers



Speaking and Listening



Translation Tools and Voice Assistants

- 💡 Teachers can showcase examples of these AI technologies by using
- Microsoft Translator (or similar)
  - Siri, Cortana, Alexa (or similar)



Vision



Facial/Object/Image Recognition

- 💡 Teachers can showcase examples of these AI technologies by using
- Seeing AI (used in the episode)





Learning



Social Media and Streaming Services

- Teachers can showcase examples of these AI technologies by using
  - Netflix (or similar)
  - Spotify (or similar)
 And asking students to draw conclusions from what these services have learnt about them.



Reasoning



Navigation and Scheduling Tools

- Teachers can showcase examples of these AI technologies by using
  - Bing Maps (or similar)



Creativity



ChatGPT or DALL-E

Brainstorm and share some examples of artificial intelligence and human intelligence you use in your everyday life.

HUMAN	ARTIFICIAL INTELLIGENCE
Language (speaking and listening)	
Vision	
Learning	
Reasoning	
Creativity	

What are some of the benefits and challenges of AI and human collaboration?

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How can you use your human skills and intelligence to complement and enhance AI?

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## Episode 1 Activity 1: Human Creativity

1. Students should write a question for the person they are sitting beside. They should use verbs like "create", "write", "draft", "illustrate".
2. Once their question is complete, they should swap this with their partner and start a 5-minute timer.
3. When students are done, ask for volunteers and teachers should input their answers into ChatGPT/BingChat, read the answers out loud to the class.
4. Sample Bing Chat response below:

Create a 3 verse poem about a dog that loved marshmallows.



Your personal and company data are protected in this chat

Hello, this is Bing. I can try to create a poem for you. 😊

Here is a 3 verse poem about a dog that loved marshmallows:

There once was a dog named  
Fluffy  
Who had a sweet tooth for  
marshmallows  
He would beg and plead for a  
treat  
Whenever he saw the white  
pillows

He loved to roast them on the  
fire  
And watch them turn golden brown  
He would gobble them up with  
delight  
And then chase his tail around

But one day he ate too many  
And felt a pain in his tummy  
He learned his lesson the hard  
way  
That too much sugar is not yummy







## Episode 1 Activity 2: Datasets in Music

Congratulations, you've been promoted to music producer. Your job is to analyse and draw basic conclusions from a music streaming dataset.

Answer the following questions:

1. How is the data collected?
2. What 5 conclusions can you make from the dataset?
3. Which techniques did you use to draw those conclusions
4. Which artist would sing your next big hit?

## Episode 1 Activity 2: Sample answers

1. Students should access the data set through the link <https://aka.ms/DSdataset>
2. Once on the dataset students should think about and answer the following questions
  - **How is the data collected?** *Spotify uses algorithms and machine learning to analyse this data and identify the most popular songs among its users.*
  - **What 5 conclusions can you make from the dataset?** *Examples might include, what the most or least popular song is, what was the most popular genre, which song has the most danceability etc.*
  - **Which techniques did you use to draw those conclusions?** *Some techniques might include, filtering the data, sorting the data in alphabetical order or from largest number to smallest number.*
  - **Which artist would sing your next big hit?** *Personal preference but students should be looking for the artist that is showing up the most in the charts.*

## Activity 2: Datasets in Music Worksheet

Name \_\_\_\_\_

**How is the data collected?**

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**What 5 conclusions can you make from the dataset?**

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**What techniques did you use to draw those conclusions?**

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**Which artist would you get to sing your next big hit and why?**


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## History of AI: Extra Teacher Resource



**1950:** Alan Turing proposes the "Turing Test" to determine a machine's ability to exhibit intelligent behaviour

The Turing Test is a measure of a machine's ability to exhibit intelligent behaviour that is indistinguishable from a human. The test involves a human who uses natural language conversations with both a human and a machine, without knowing which is which. If the human is unable to consistently tell the difference between the responses of the machine and the human, the machine is said to have passed the Turing Test.


 *The "Turing Test" can be tested out with students in class, see the extension activities for a lesson plan on how to do this.*



**1956:** The term "artificial intelligence" was coined by John McCarthy at the Dartmouth Summer Research Project on Artificial Intelligence (DSRPAI)<sup>1</sup>




**1966:** The ELIZA program, a computer-based psychotherapist, demonstrates natural language processing capabilities.

 *The ELIZA program can be tested out with students in class, see the extension activities for a lesson plan on how to do this.*



**1969:** Shakey, the first mobile robot with AI capabilities, is developed at Stanford Research Institute

 [Shakey the Robot: The First Robot to Embody Artificial Intelligence - YouTube](#)

## History of AI Continued: Extra Teacher Resource



1990: AI defeats chess world champion, highlighting advancements in AI and game-playing



2005: The field of machine learning sees significant progress, including advancements in neural networks and deep learning



# Extension Activity 1: Turing Test

To introduce students to the concept of the Turing test and its implications for artificial intelligence and human identity.

## 1. Preparation (5 minutes):

Divide the class into groups of three. Assign each student a role: **judge, human, or computer**. Give each student a paper and a pen. Explain that the judge will ask 7 questions to the human and the computer, who will write their answers on the paper. The judge will then try to guess who is the human and who is the computer based on their answers. The computer will try to imitate a human as much as possible but will use a chatbot to get their answer (i.e BingChat or ChatGPT), while the human will try to be honest and natural. The judge will not know who is who until the end of the test.

## 2. Test (15 minutes):


Give each judge a list of 7 questions to ask the human and the computer. You can use the list below or create your own. Tell the judges to read each question aloud and give the human and the computer 30 seconds to write their answers. Tell the judges to collect the papers after each question and keep them separate. Repeat until all 7 questions are asked.

## 3. Evaluation (5 minutes):

Tell the judges to review the answers and decide who is the human and who is the computer. Tell the judges to explain their reasoning and reveal their guesses. Tell the human and the computer to confirm or deny their identities. Discuss the results and the accuracy of the guesses.

## Question

1. What day is it?
2. What is your favourite hobby?
3. What is the capital of France?
4. What is the weather like today?
5. What is something that you are curious about?
6. What year did Barack Obama become president?
7. What is your favourite thing about Space?

 This lesson plan was created by BingChat and quality controlled by the teaching team  
Prompt: Create an activity for students to take part in the Turing Test. Split the students into groups of 3, one being the human, the computer and the judge. Also provide 10 appropriate questions for the Turing Test.

## Extension Activity 2: The ELIZA Program

**Introduce the ELIZA chatbot program, its history, and its significance in the development of AI and natural language processing.**

*The ELIZA chatbot program was developed in the mid-1960s by Joseph Weizenbaum at the Massachusetts Institute of Technology (MIT). It was one of the earliest examples of natural language processing and is considered a pioneering program in the field of AI. ELIZA used simple pattern matching and substitution techniques to simulate conversation and was able to engage users in a seemingly intelligent dialogue. Its significance lies in its ability to demonstrate the potential of AI and natural language processing, and it paved the way for further research and development in these fields. Despite its limitations, ELIZA remains an important milestone in the history of AI and continues to be studied and discussed today.*

### Hands-on with ELIZA (10 minutes)

1. Provide students with access to the ELIZA chatbot program and allow them to interact with it.
2. Encourage students to experiment with different inputs and observe ELIZA's responses.
3. Ask students to try and identify patterns in ELIZA's responses and discuss their observations.

### Group Discussion (15 minutes)

- After students have had a chance to interact with ELIZA, lead a group discussion about their experiences.
- Ask students to share their thoughts on ELIZA's capabilities and limitations.
- Discuss the implications of ELIZA's responses and what they reveal about the challenges of natural language processing and AI.

# Dream Space TV: The brAI\_n\_waves Series Episode 2





# brAI\_n\_waves

## Episode 2

### Episode Objectives

By the end of this episode, students should be able to

- 1 Explain what an algorithm is 🤖
- 2 Identify coding elements in an algorithm 🧠
- 3 Explain how chatbots use datasets and algorithms to support users 🗣️
- 4 Design an algorithm to solve a problem using pseudocode/code that utilises the parts of an algorithm (input → process → output)

### UNESCO: K-12 AI Curricula

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### Episode 2: Timestamps

00:00 – 01:02: Introduction and learning outcomes

01:02 – 03:00: Introduction to Computational Thinking

03:00 – 06:00: Algorithms

06:53 – 10:10: Pseudocode

10:10 – 11:26: MakeCode micro:bit & activity 1

11:26 – 15:25: Activity 1 solution

15:25 – 19:23: Data and algorithms (chatbot) & activity 2

19:23: Episode closure

Watch this episode at  
<https://aka.ms/DSTVAI2>



## UNESCO K-12 AI Curricula - Knowledge

### Algorithm Definition and Applications

- Understands what algorithms are and do
- Understands that learning algorithms are sets of instructions created by humans to modify an input to create an output

### Algorithm Components and Processes

- Understands the parts of an algorithm (input, steps to change input, output)
- Understands the process of training, testing and deploying algorithms

### Programming Languages

- Develops knowledge of block-based and other programming tools

### Computational Thinking

- Understands abstraction
- Understands decomposition
- Explains the roles of decomposition, abstraction, pattern recognition and algorithms in computation

## UNESCO K-12 AI Curricula - Skills

### Algorithms

- Recognises patterns
- Follows clear instructions for action (algorithms) and carries them out
- Formulates clear instructions for action (algorithms) verbally and in writing

### Programming

- Constructs simple code scripts using block-based programming

## UNESCO K-12 AI Curricula - Values

### Persistence/Resilience

- Solves problems using programming methodology


## Episode Two: Lesson Plan

### Lesson Procedure

#### **Introduction to Computational Thinking (5 minutes):**

Alongside the episode learning outcomes students will be introduced to the concept of computational thinking which includes four main part; abstraction, pattern recognition, decomposition and algorithm design.

**Example of an Algorithm (2 minutes):** Here students will be shown an algorithm that can be used every day by humans. This will help students understand how algorithms need to be efficient and really specific.

 *Teachers click here for an extension activity for students to create their very own algorithms for an everyday task in which humans can follow.*

**Pseudocode (3 minutes):** In this section students will see how algorithms written by humans can be translated into pseudocode to get ready for the programming of the algorithm.

**MakeCode micro:bit (30 minutes):** Using the code file attached students should use their problem-solving skills and decide the sequence of the code. Answer solutions are included in the episode, with a walkthrough.

**Data and Algorithms (20 minutes):** Students will have the opportunity to explore how data and algorithms work together to create something like a basic chatbot.

## Episode 2 Activity 1: Algorithms

- Students can download the code file at the following link [here](#) and open it up in <https://makecode.microbit.org>
- Using the pseudocode for support, put the code back in sequence so that it completes its timer task for us.
- When students are done, make sure they test it out.

### Pseudocode

1. **SET timer** to 3 minutes (180 seconds)
2. **WHILE timer** is > 0  
**Show timer**  
**Change timer by -1 second**  
**Pause for 1 second**
3. **REMOVE egg from pot**

## Coding Resources

**Micro:bit resources**



**Python resources**



**Web Design resources**



## Episode 2 Activity 2: Chatbots

Visit the Dublin Airport website and answer the following questions

- (i) List the sources of the data that you think this chat bot utilises.
- (ii) Write a simple algorithm for how this chat bot works using the key word "if, then" – you can write this out in full or in pseudocode.

## Episode 2 Activity 2: Sample Answers

- (i) List the sources of the data that you think this chat bot utilises.

- flight information
- live data from security lines
- data from carpark to see how to pay for a space, the cost and how to book.
- data on shops and restaurants
- accessibility

(ii) Write a simple algorithm for how this chat bot works using the key word "if, then" – you can write this out in full or in pseudocode.

**If user clicks flights**

**Then the chatbot shows flight information**

**Else if the user clicks on shopping**

**Then the chatbot will show information regarding to the shops in Dublin airports.**





# Introduction to Computational Thinking: Extra Teacher Resource

Computational thinking is a way of thinking that helps us solve problems using computers. It involves four main steps: decomposition, pattern recognition, abstraction, and algorithmic thinking

Decomposition means breaking down a complex problem into smaller and simpler parts that are easier to understand and solve.

💡 *You can decompose the problem of baking a cake into smaller parts, such as finding a recipe, gathering the ingredients, measuring the quantities, etc.*

Pattern recognition means finding similarities and differences among the parts of the problem and identifying rules or trends that can help us solve it.

💡 *Let's say you're playing X's and O's. You can recognize patterns among the moves of the game, such as how to win, how to block your opponent, or how to avoid losing.*

Abstraction means ignoring irrelevant details and focusing on the essential features of the problem that matter for the solution.

💡 *You can abstract the problem of writing a story by using characters, settings, plots, and themes to represent and organize your ideas in a general way, without worrying about the specific details.*

Algorithmic thinking means designing a series of clear and precise instructions that can be followed by a computer or a human to solve the problem.

💡 *Suppose you are making a paper airplane that can fly far and fast. You can design an algorithm, or a set of instructions, that can be followed by yourself or someone else to make the paper airplane, using the materials and tools that you have.*

# Dream Space TV: The brAI\_n\_waves Series Episode 3



By the end of this episode, students should be able to

1

Explain the term Machine Learning (ML) 🤖

2

Distinguish between supervised and unsupervised ML 🧠

3

Outline how supervised learning works and provide an everyday life example 🧑

4

Outline how unsupervised learning works and provide an everyday life example 🧑

## UNESCO: K-12 AI Curricula

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## Episode 3: Timestamps

0:00-0:51: Introduction and learning outcomes

0:51 – 04:31: What is Machine Learning?

04:31 – 08:49: Supervised Machine Learning

08:49 – 12:08: Unsupervised Machine Learning

12:08 – 12:56: Episode closure

Watch this episode at  
<https://aka.ms/DSTVAI3>

## UNESCO K-12 AI Curricula - Knowledge

### AI Definitions and Components

- Understands and uses basic and general terms related to AI and machine learning writing
- Describe the basic features of AI

### Understanding How AI Works

- Explains types of AI techniques and how they work (supervised, unsupervised, reinforcement, ML/DL)
- Understands how neural networks work and their parts (feed forward, evaluation of a prediction for accuracy, back propagation)

### Understanding AI Technologies

- Explores AI technology and tools
- Understands recommender systems and the technology behind them

### Human Agency

- Understands that humans control AI and machine learning
- AI Advantages and Disadvantages

## UNESCO K-12 AI Curricula - Skills

### Ethics of AI

- Identifies instances of bias in AI algorithms





## Episode 3 Activity 1: Exploring Video Indexer

### The training data that you think was needed for the categories that the Video Indexer Contains

- (1) The Training Data that you think was needed for the categories that the Video Indexer contains (e.g. people)
- (2) Where you think a tool like Video Indexer would be useful in business or even in your personal life.

## Episode 3 Activity 1: Sample Answers

### (1) 🧑 People:

- Face images of the people that the user wants to recognise in the videos.
- Videos that contain the people that the user wants to recognise.
- Optional labels or names for the people that the user wants to recognise.
- The face images should be clear, frontal, and well-lit.
- The diversity and quantity of the face images for each person. The more face images that you add for a person generally means the better chances there are to get accurate recognition of that person.



### Key Topics:

- A transcription AI model needs data that consists of audio recordings and their corresponding text transcripts. The data should be of high quality, meaning that the audio should be clear and audible, and the text should be accurate and complete. The data should also be diverse, meaning that it should cover different languages, accents, domains, and scenarios.



## Episode 3 Activity 1: Sample Answers

### Sentiment Analysis:

- Sentiment Analysis is a processing task that aims to classify texts or sentences according to their emotional tone, such as positive, negative, or neutral. To perform sentiment analysis, an AI model needs training data that consists of texts or sentences and their corresponding sentiment labels. The training data should be relevant, diverse, and balanced for the specific domain and task that the model is intended for.

### Where is a tool like Video Indexer used in real life?

#### Sports:

- **Individual level sports video indexing:** This is a technique that can recognise each player in a multi-player game based on their jersey numbers. This can help to identify who is who in a sports video and provide statistics and information about each player.
- **Event based indexing of sports video:** This is a technique that can detect and annotate key events or highlights in a sports video, such as goals, fouls, penalties, or substitutions. This can help to provide a summary and navigation of the video and enhance the user experience

#### Marketing and Influencing:

- **Content creation:** Video indexing can help influencers create new and engaging video content from existing videos by using the insights extracted from the video, such as keyframes, scenes, and timestamps. For example, influencers can create trailers, highlight reels, or social media content based on the video content
- **Content optimization:** Video indexing can help influencers optimise their video content for better discoverability and performance by using the data generated from the video, such as title, description, tags, and categories.

## Episode 3 Activity 1: Sample Answers

### 💖 Social Media:

- TikTok uses video indexing to create personalized video feeds, discover trending topics and hashtags, and moderate its content for safety and quality .
- YouTube uses video indexing to generate captions, thumbnails, and tags for its videos, as well as to monitor and enforce its community guidelines and policies.
- Facebook uses video indexing to improve its video search and recommendation features, as well as to detect and remove harmful or misleading content from its platform.

💡 *This sample answer was created based on this Microsoft Learn article*  
<https://learn.microsoft.com/en-us/azure/azure-video-indexer/audio-effects-detection-overview>



## Episode 3 Activity 2: AI for Oceans

**Go to this website link <https://code.org/oceans> and walk through the full activity, including the videos if you can.**

**During the activity, consider the following:**

- (1) How am I training the data?
- (2) How can bias occur?
- (3) How is the algorithm being trained or guided towards a set outcome?

## Episode 3 Activity 2: Sample Answers

**How am I training the data?**

The data is being trained by labelling the data (images in this instance) with the label "fish" "not fish", further along in the activity it is trained on labelled data that is conveying emotions or personalities for the fish such as "funny", "happy" etc.

**How can bias occur?**

- If the training data has more images of one type of fish or trash than another, the AI bot may be more likely to classify new images as the more frequent type.
- If the training data has some images that are labelled incorrectly or differently from the rest, the AI bot may learn from the wrong or conflicting examples.
- If the AI bot is used to decide which fish to catch or which trash to recycle, it may affect the biodiversity of the ocean or the livelihood of the people who depend on it.

**How is the algorithm being trained or guided towards a set outcome?**

- This is done by labelling the data. By doing this the technology or computer knows what to look out for, therefore can make predictions as to which image is a fish.



## What is Machine Learning?: Extra Teacher Resource

**Machine Learning (ML) is the learning component of AI. In this case the machine doesn't need to be explicitly programmed and instead it learns from experience. It's normally based on training data that we provide to it or based on data that it gathers for itself.**



**Recommendation Systems:** Machine learning can help find new products, songs, movies, or books that match your preferences and interests. For example, **Spotify** and **Netflix** use machine learning to recommend music or TV shows based on your previous listening and viewing history.



**Social Media Connections:** Machine learning can help connect with people who share similar hobbies, passions, or goals. For example, **LinkedIn**, **Instagram**, **Facebook**, and **X** use machine learning to suggest “people you may know” based on your contacts, comments, likes, or existing connections.



**Image Recognition:** Machine learning can help create fun and creative face filters, stickers, or emojis that can enhance your selfies or messages. For example, **Snapchat** and **Instagram** use machine learning to detect your face and apply filters that match your facial expressions



**Natural Language Processing:** Machine learning can help communicate with different languages, dialects, or accents. For example, Microsoft Translate and Duolingo use machine learning to translate text or speech from one language to another, or to help you learn a new language.



## What is Supervised Machine Learning?: Resource

Supervised machine learning is a way of teaching machines to learn from data and perform tasks that would normally require human intelligence.

For example, you can use supervised machine learning to create a program that can recognize faces, translate languages, or diagnose diseases.

Supervised machine learning works by using labelled data, which means data that has both input and output values. For example, if you want to create a program that can recognize faces, you need to provide it with images of faces as input and the names of the people as output.

In this part of the episode students are shown an image of a busy road. The objects in this picture all have bounding boxes on them which helps identify each object. Each object is then labelled with specific keywords, in this case it could be car, taxi, colour, type of car etc.

💡 Teachers can access an extension activity here, where students can take part in a game which teaches them about supervised machine learning.

## Unsupervised Machine Learning: Extra Teacher Resource

**Unsupervised machine learning** is when the machine is not familiar with the data that was used as the input and relies instead on a data set that has some labelled data points which it then often groups according to patterns or traits.

Unsupervised machine learning works by using an algorithm, which is a set of rules or instructions that tells the machine how to process the data. The algorithm can be simple, such as grouping similar things together, or complex, such as finding hidden patterns or structures in the data.

### Clustering

**Clustering** is a way of finding patterns in data by grouping similar data points together. Clustering can help us understand the structure and characteristics of the data, as well as identify outliers or anomalies. Clustering is an example of unsupervised learning, which means that we do not have any labels or predefined categories for the data, and we have to discover them by ourselves

💡 Teachers click here for an extension activity on unsupervised machine learning: clustering.

## Extension Activity 1: I went to the beach

**In this activity students will be introduced to the concept of supervised machine learning by using inputs (words) and outputs (yes or no labels)**

To start the teacher should think of a word. This word should start out the secret rule. For example, the teacher can say "I went to the beach, and I brought an umbrella".

The secret rule is going to be that the word starts and ends with a vowel.

Students can then take guesses as to what they think they can bring to the beach. They may say items such as "hat", "water", "suncream" these will all get the label **no**. It is important to have a no and yes column so students can see the labelling.

If students say "I went to the beach and I brought an orange" their word would go in the **yes** column.

This game can use any rule, some other examples of word rules can be:

- Start with a vowel
- Plural
- Double letters
- Start with the same letter. For example teacher word is cat, student word is castle.
- Certain number of letters in each word, for example they all must have 5 letters
- If the words first letter contains the same first letter of the students name who guessed it. For example, Orlaith brings Oreos.
- Action words

## Extension Activity 2: Clustering with Cards

**Introducing the concept of clustering, which is a type of unsupervised learning that groups data points based on their similarity.**

**Materials:** A deck of cards (or any other set of items that have different attributes, such as colour, shape, size, etc.)

### **Procedure:**

- 1.Shuffle the deck of cards and distribute them evenly among the students. Each student should have at least four cards.
- 2.Ask the students to look at their cards and think of a way to group them based on some criteria. For example, they can group them by suit, by rank, by colour, or by any other attribute they can think of.
- 3.Ask the students to share their grouping strategy with the class and explain why they chose it. Compare and contrast the different strategies and discuss the advantages and disadvantages of each one.
- 4.Explain that clustering is a way of finding patterns in data by grouping similar data points together. Clustering can help us understand the structure and characteristics of the data, as well as identify outliers or anomalies. Clustering is an example of unsupervised learning, which means that we do not have any labels or predefined categories for the data, and we have to discover them by ourselves.
- 5.Ask the students to think of some real-world applications of clustering. For example, clustering can be used to segment customers based on their preferences, to group documents based on their topics, to find similar images based on their features, etc.
- 6.Ask the students to try a different grouping strategy for their cards and see how it changes the clusters. For example, they can group them by the sum of their ranks, by the number of letters in their names, by the parity of their ranks, etc.
- 7.Ask the students to reflect on how changing the criteria affects the clusters. How does it change the number, size, and shape of the clusters? How does it change the similarity and diversity within and between the clusters? How does it change the interpretation and meaning of the clusters?

# brAI\_n\_waves

## Episode 4

### Episode Objectives

By the end of this episode, students should be able to

- 1 Outline the role of artificial neural networks in deep learning 🤖
- 2 Explain what is meant by Generative AI 🧠
- 3 Provide examples of Generative AI in action 🤖
- 4 Explain the importance of responsible AI 😬
- 5 Discuss bias in AI and examples of how this occurs 🚫
- 6 Describe the ethical challenges that can occur with AI 🌍

### UNESCO: K-12 AI Curricula

Artificial Intelligence (AI) refers to machines that imitate some features of human intelligence.

Artificial Intelligence, is a rapidly growing field that has the potential to impact many aspects of our lives. To prepare students for this future, UNESCO, the United Nations Educational, Scientific and Cultural Organization, has included AI as part of their K-12 curriculum. This series has used the UNESCO K-12 AI curricula to curate lessons on AI to help students understand what AI is, what it can do, and how it might impact society. The goal is to equip students with the knowledge and skills they need to navigate a world where AI is increasingly prevalent.

### Episode Timestamps

00:00 – 01:18: Introduction and learning outcomes

01:18 – 02:59: Advancements in AI

02:29 – 11:37: Deep Learning and Generative AI

11:37 – 17:00: Ethical AI

17:00 – 18:16: Episode closure

Watch this episode at  
<https://aka.ms/DSTVAI4>

## **UNESCO K-12 AI Curricula - Knowledge**

### **Ethical Terms, Definitions and Examples**

- Understands what ethical terms such as 'bias', 'fairness' and 'representation' mean in relation to AI
- Describes the limitations of AI
- Understands the ethical considerations and dilemmas which may arise from AI

### **Bias**

- Explains how the biases of the programmers influence the fairness of the AI rules
- Understands the effects of information quality in decision-making
- Understands algorithmic bias and types/sources of bias
- Analyses cases where AI has been clearly fair or unfair

### **Intellectual Property**

- Understands intellectual property rights
- Defends a position on ownership of art generated or enhanced by AI
- Understands/respects basic intellectual property laws

### **Transparency / Explainability**

- Understands the mechanisms of image and data manipulation

### **Human Agency**

- Understands how to ethically create and/or use AI

### **AI Advantages and Disadvantage**

- Understands how AI can benefit humans
- Outlines the advantages and disadvantages of AI in different social, educational, and professional contexts

## **UNESCO K-12 AI Curricula - Skills**

### **Ethics of AI**

- Identifies instances of bias in AI algorithms

## **UNESCO K-12 AI Curricula - Values**

### **Critical Thinking and Reflection**

- Explains how the programmers' bias influences the fairness of AI rules

## Episode 4 Activity 1: Image Creator Prompts

Put your entrepreneurial skills to the test – you’ve been given a grant to start your own company.

What is your company name?

What market are you operating in?

Write the prompt for Image Creator that will provide you with some logo options and an ad campaign.

## Episode 4 Activity 1: Sample Answers

### What is your company name?

Here students can be creative and produce their own name for a company or they can use a feature like Bing Chat to help them. Here is an example of a prompt and answer from Bing Chat.



Your personal and company data are protected in this chat

Sure, I can help you with that. Here are some possible names for a dog walking business that I came up with:

- **Pawsome Walks:** This name is catchy and fun, and it plays on the word “awesome” and “paws”. It also suggests that your service is amazing and that you love dogs.
- **Walkies:** This name is simple and cute, and it is a common word that dog owners use to ask their dogs if they want to go for a walk. It also implies that your service is friendly and reliable.
- **Furry Friends:** This name is warm and inviting, and it shows that you care about the dogs and their owners. It also indicates that your service is more than just walking, but also providing companionship and socialization for the dogs.

### What market are you operating in?

This is relative to the student's idea.



## Episode 4 Activity 1: Sample Answers

Write the prompt for Image Creator that will provide you with some logo options for your company.

<https://www.bing.com/images/create>



**Prompt: Create a logo for a dog walking business that is cute and fun.**



**Prompt: Create a logo for a dog walking business that has a human and a dog in it, but also shows the dog is happy.**

## Episode 4 Activity 1: Sample Answers

Write the prompt for Image Creator that will provide you with what is needed for your ad campaign



**Prompt: Create an image of a dog on a walk, the dog is happy, wearing sunglasses, it's a sunny day and the human walking the dog is eating an ice-cream. Option 1.**

**Prompt: Create an image of a dog on a walk, the dog is happy, wearing sunglasses, it's a sunny day and the human walking the dog is eating an ice-cream. Option 2.**



## Episode 4 Activity 2: AI Principles

Match the AI principles to their definitions

- (1) Reliability and Safety
- (2) Privacy and Security
- (3) Fairness
- (4) Transparency
- (5) Inclusiveness
- (6) Accountability

## Episode 4 Activity 2: Answers

<b>A. Reliability and Safety</b>	4. AI should work for people across different conditions & <u>contexts</u> , <u>and</u> should not cause harm to the world.
<b>B. Privacy and Security</b>	2. AI engineers should always review the sources of data and how the data is protected.
<b>C. Fairness</b>	6. AI should allocate opportunities, resources, or information in ways that are fair to the humans who use it.
<b>D. Transparency</b>	1. AI should be explained well so that <u>people</u> don't misunderstand, misuse, or incorrectly estimate the capabilities of the system.
<b>E. Inclusiveness</b>	3. AI should be inclusive of all populations and therefore supportive of all.
<b>F. Accountability</b>	5. AI developers should be accountable with systems created and ensure that this isn't interfered with in an inappropriate way.

## Match the AI principles to their definition

<b>A. Reliability and Safety</b>	
<b>B. Privacy and Security</b>	
<b>C. Fairness</b>	
<b>D. Transparency</b>	
<b>E. Inclusiveness</b>	
<b>F. Accountability</b>	

1. AI should be explained well so that people don't misunderstand misuse, or incorrectly estimate the capabilities of the system.
2. AI engineers should always review the sources of data and how the data is protected.
3. AI should be inclusive of all populations and therefore supportive of all.
4. AI should work for people across different conditions and contexts and should not cause harm in the world.
5. AI developers should be accountable with systems created and ensure that this isn't inferred with an inappropriate way.
6. AI should allocate opportunities, resources, or information in ways that are fair to the humans who use it.



## Episode 4 Activity 3: AI Use Scenario Evaluation

Using the worksheet provided, complete the following:

Part 1: Review Scenario A, B and C provided.

Part 2: Complete the table by selecting two principles of Responsible AI that are being neglected and the steps you would take to rectify this.



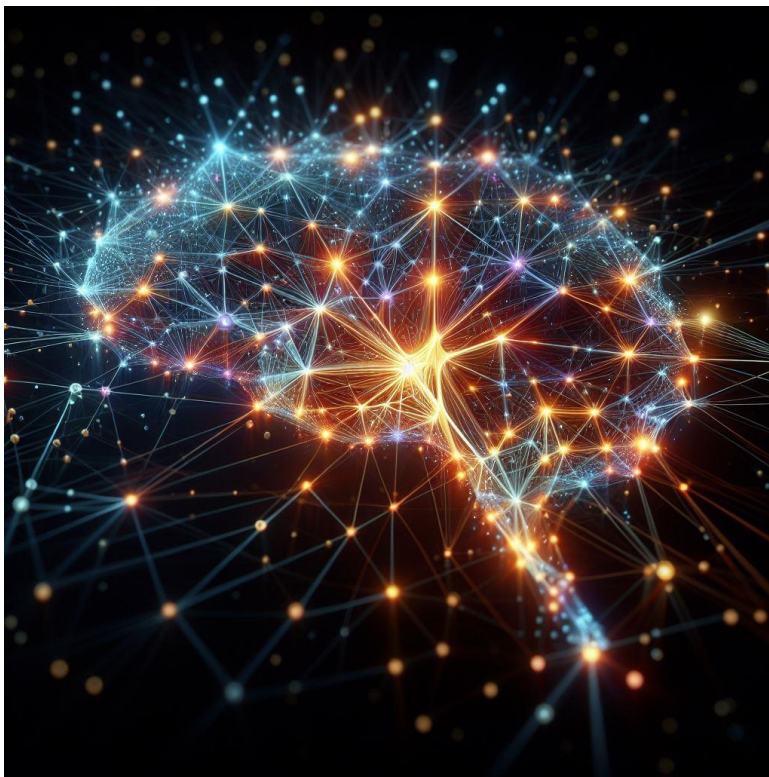






## Deep Learning: Extra Teacher Resource

Deep learning is a branch of artificial intelligence that uses **neural networks** to learn from data and perform tasks. Neural networks are composed of layers of **neurons**, which are mathematical functions that mimic the way the human brain works. Neurons take some input, process it, and produce some output. By connecting many neurons together, we can create complex networks that can learn to recognize patterns, classify images, generate text, and more.



*Image created by Microsoft Designer.*

*Prompt: Depict an image of neural networks and how its compares to human brain function*

To understand more about neural networks and how they work, teachers can play this video to dive into that subject a little bit deeper. <https://www.youtube.com/watch?v=JrXazCEACVo>

## Generative AI: Extra Teacher Resource

Throughout the episodes and throughout this educator guide an AI technology called “Generative AI” is being used.

**Generative AI** is a form of artificial intelligence that can create new content, such as text, images, audio, and video, based on existing data. Generative AI uses techniques like neural networks, which are mathematical models that learn from data and can perform various task

Large language models (LLM’s) like ChatGPT and Bing Chat have been all over the news lately as this new wave of AI is taking off. It is important for students to know how these LLM’s work, even at a basic level.

This video will inform teachers and students of how they work  
<https://www.youtube.com/watch?v=X-AWdfSFCHQ>



By learning how to use ChatGPT / Bing Chat correctly, students can benefit from its capabilities and potentials, while also being responsible and ethical users of artificial intelligence.

It is important for students to learn how to use ChatGPT correctly because ChatGPT is a powerful tool that can help them with various tasks, such as writing essays, summarising texts, generating creative content, and more. However, ChatGPT is not perfect, and it has some limitations and challenges that students need to be aware of. For example:

- ChatGPT is based on a large amount of data from the internet, which may not be accurate, reliable, or appropriate. Students need to verify the information and sources that ChatGPT provides and avoid using biased or offensive content.

## Generative AI: Extra Teacher Resource

- ChatGPT may not always understand the context or the intention of the user, and it may generate irrelevant or nonsensical responses. Students need to check the coherence and logic of the texts that ChatGPT produces and edit them accordingly.
- 💡 Students will more than likely have heard of ChatGPT and its capabilities, therefore try to use it for some of their schoolwork. By teaching students how to use it correctly it can benefit them in school rather than hinder them.



DALL-E and Bing Image Creator / Microsoft Designer are a system that can create images from text descriptions using a large dataset of text-image pairs.

DALL-E is cool because it can create images from text descriptions using a large dataset of text-image pairs. It can generate images that are creative, diverse, and sometimes surprising. It can also combine different concepts and attributes in ways, such as creating an armchair in the shape of an avocado, or a snail made of a harp. DALL-E can also modify existing images based on text inputs, such as changing the colour, style, or perspective of the image. DALL-E is a powerful example of how artificial intelligence can be used for artistic and expressive purposes.

🎬 Can AI be creative?

<https://www.youtube.com/watch?v=X994dDnmRmY&t=1s>

## Extension Activity 1: AI Debate

**Objective:** To develop students' communication and critical thinking skills by discussing the advantages and disadvantages of AI in various domains.

**Materials:** Three sheets of paper with "Agree", "Disagree" and "Not Sure" written on them, markers, flipcharts, pens.

### Procedure:

1. Introduce the topic of the walking debate and explain the rules. Each student will choose whether they "Agree", "Disagree" or are "Not Sure" by standing in a specific side of the room. They will then have to persuade others to join their side by explaining their reasons.

2. After all four topics have been discussed. Divide the class into small groups of four or five students. Assign each group a topic a stance i.e for or against. Give them some time to research it using Bing or other online sources. They should look for information about the pros and cons of AI in that domain, such as how it can improve efficiency, accuracy, safety, etc., or how it can pose ethical, legal, social, etc., challenges.

3. Have each group present their findings to the rest of the class using posters. Encourage them to use facts, statistics, examples, quotes, etc., from credible sources to support their arguments.  
4. Repeat steps 3 until all topics have been covered or until time is up.

5. Wrap up the lesson by summarising the main points of each topic and highlighting some common themes or issues that emerged from the debate. Ask students to reflect on what they learned from this activity and how they can apply it to their own lives or future careers.


 This activity was created by BingChat and quality controlled by the teaching team  
Prompt: create a detailed lesson plan for students to take part in a walking debate about different AI topics. These topics are: - should AI take over from human judges in criminal trials - should self-driving cars be the only cars allowed on the road - should facial recognition be used to identify and arrest criminals - should social media sites check a user's wellbeing



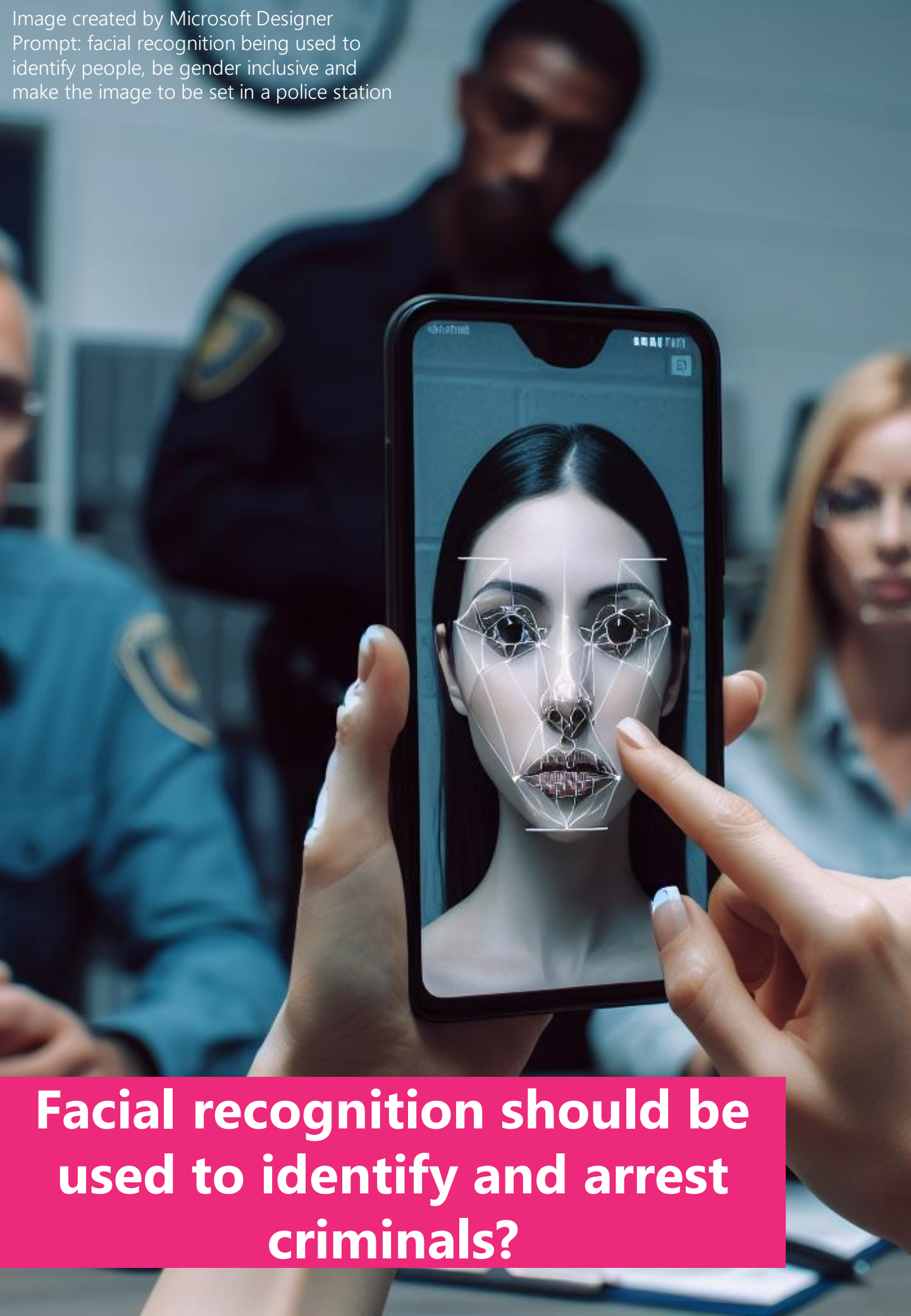
Image created by Microsoft Designer  
Prompt: A robot dressed as a judge, being a judge in a criminal trial, with people in background



**AI should replace human judges in criminal trials?**

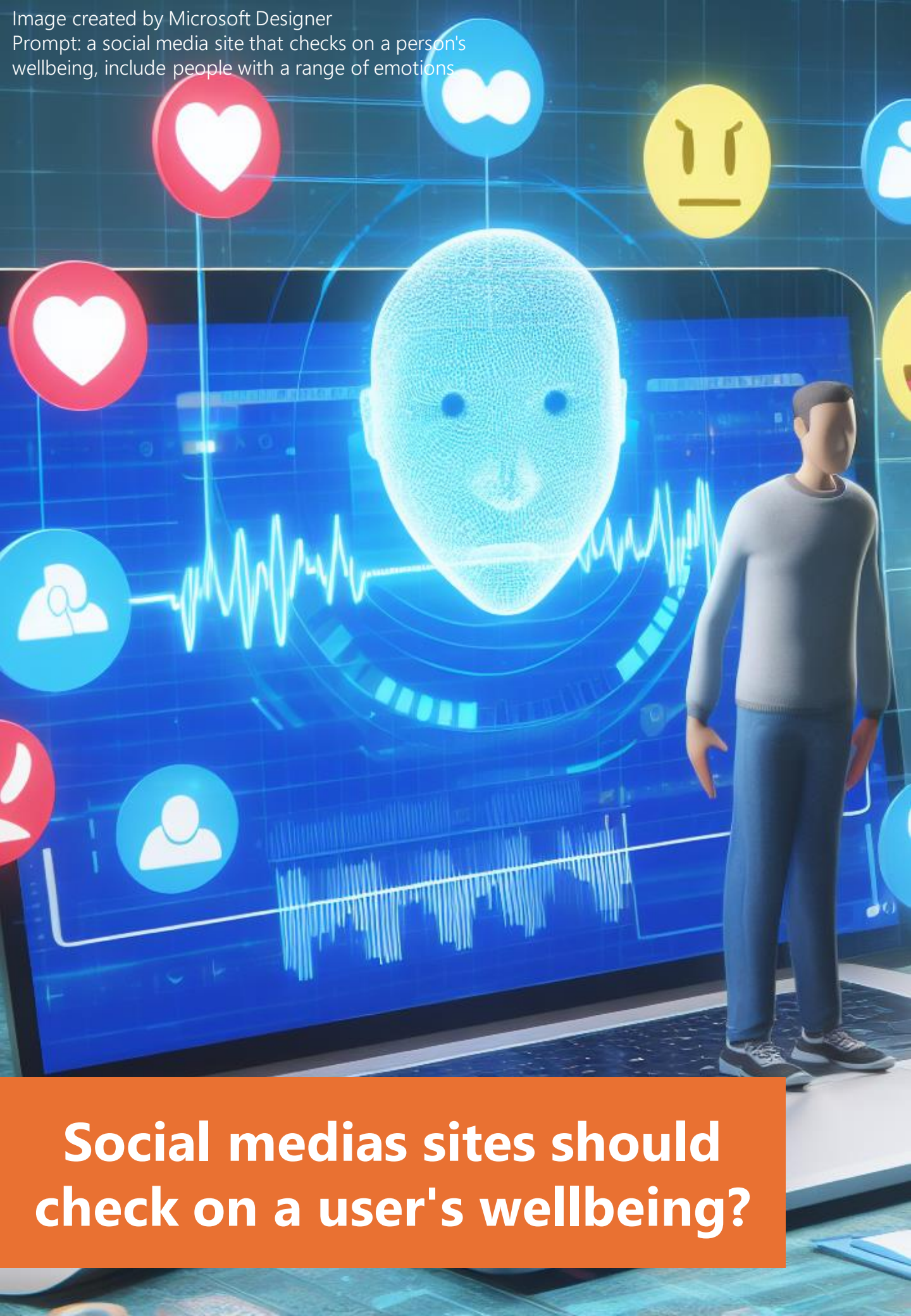


Image created by Microsoft Designer  
Prompt: facial recognition being used to identify people, be gender inclusive and make the image to be set in a police station



**Facial recognition should be used to identify and arrest criminals?**

Image created by Microsoft Designer  
Prompt: a social media site that checks on a person's wellbeing, include people with a range of emotions



**Social medias sites should check on a user's wellbeing?**



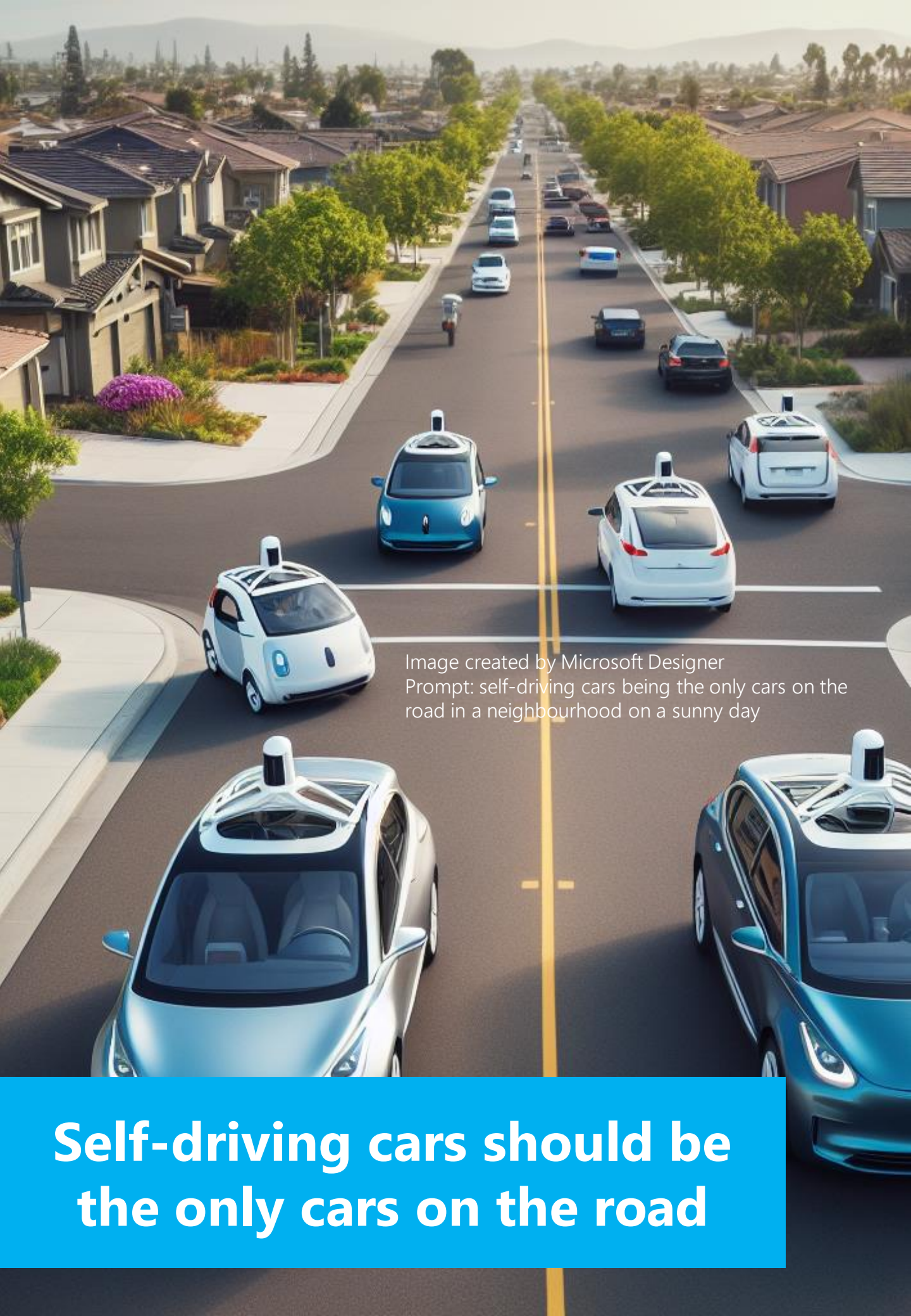


Image created by Microsoft Designer  
Prompt: self-driving cars being the only cars on the road in a neighbourhood on a sunny day

**Self-driving cars should be  
the only cars on the road**



# Dream Space TV: The brAI\_n\_waves Series Competition



## Competition Information

Watch a short video of the competition overview at <https://aka.ms/DSTVAIComp>

### Who is this competition for?

This competition is for post-primary school students across the Republic of Ireland and Northern Ireland. For this, you should be working in a team of 2-4 people (min. of 2 and max. of 4)

### What is involved?

We want you to pitch a new AI for Good concept using the template we provide.

AI for Good is exactly what it sounds like- it is AI technology that can be utilised by humans to make improvements in the world & potentially solve problems that humanity is currently facing.

### Tips from the judges?

1. Make sure the concept that you are pitching is really specific – you should be able to break it down and explain it well.
2. Make sure your concept can support an area that needs it and something that isn't currently available in the market. If you have done any research to show this- make sure to include it.
3. Try to showcase any further learning you have done (based on some links from the resource guide). For example, in here you might be able to learn more about exploring data, develop your programming skills or learn about different AI applications and how they are used.

### What happens after students enter?

1. Judges will review the entries
2. 20 groups will be shortlisted and receive prizes.
3. Top 5 move on to the grand finale.

# Marking Rubric

Criteria	Low (1)	Medium (2)	High (3)
Innovation: How original is the technology?	The technology <b>lacks innovation</b> . It is already in existence, or is an idea put forward by many teams in the competition.	The technology shows <b>some innovation</b> . It is an addition to an existing AI approach or shows good creativity.	The technology is <b>very innovative</b> . It is either completely new or represents an exciting update on an existing AI approach.
Artificial Intelligence: How is the <b>data</b> being collected?	The team has outlined the <b>type</b> of data used.	The <b>source</b> and the <b>type</b> of data is explained in detail in relation to their technology.	The <b>source</b> and the <b>type</b> of data is <b>explained in detail</b> alongside how the data will work effectively in relation to their technology.
Artificial Intelligence: <b>Machine Learning</b>	The team are able to <b>reference</b> how their AI is learning.	The team can be <b>specific</b> about the form of machine learning happening.	The team is able to <b>describe in detail</b> how the machine is learning in their technology.
Impact: What is the potential positive <b>impact</b> of the technology for "AI for Good"	The technologies potential for good is <b>not high</b> .	The technology has <b>potential</b> to make an impact for "AI for Good".	The technology has <b>great potential</b> to make an impact for "AI for Good".
Creativity: How <b>creatively</b> was the technology presented?	The team presented the technology in a <b>basic manner</b> using the template provided.	The team made a good effort to present their technology creatively using the template with some <b>creative additions</b> .	The team was exceptionally creative in how it presented the technology using the template, but also including <b>drawings, simulations, videos or other formats</b> to support their submission.
Ethics: How well does the Solution meet the <b>AI principles</b> of fairness, inclusiveness, reliability and safety, privacy and security, transparency and accountability?	There was <b>limited</b> reference to the AI principles to explain the technology.	The team made a <b>good effort</b> to align their technology with the AI principles.	The team had a <b>strong alignment</b> with the AI principles.