



# AI using PictoBlox

**course booklet**



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# Course Description

"AI using PictoBlox" is a beginner-level, project-based online course designed to introduce students (ages 8-14) to the exciting world of Artificial Intelligence (AI) through block-based coding. Using the intuitive PictoBlox software, students will explore a wide range of AI concepts while working on engaging, hands-on projects that qualify them for a *Junior AI* badge.

By the end of the course, students will have gained foundational AI knowledge and practical coding experience, empowering them to understand and develop basic AI systems. No prior coding experience is required—just curiosity and a willingness to explore! Each class is concise and easy to follow, perfect for young learners.

## Key Course Highlights:

- **Level:** Beginner
- **Age Group:** 8-14 years
- **Learning Mode:** Online, project-based
- **Duration:** Short, interactive lessons
- **Software Used:** PictoBlox (block coding)

This course provides an engaging pathway for students to explore AI concepts in a fun and practical way, sparking creativity and building confidence in technology.

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# Introduction to AI

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Artificial Intelligence (AI) is a technology that helps machines learn, think, and make decisions, similar to how humans do. In this course, we'll explore how AI works using **PictoBlox** and apply it to fun projects.

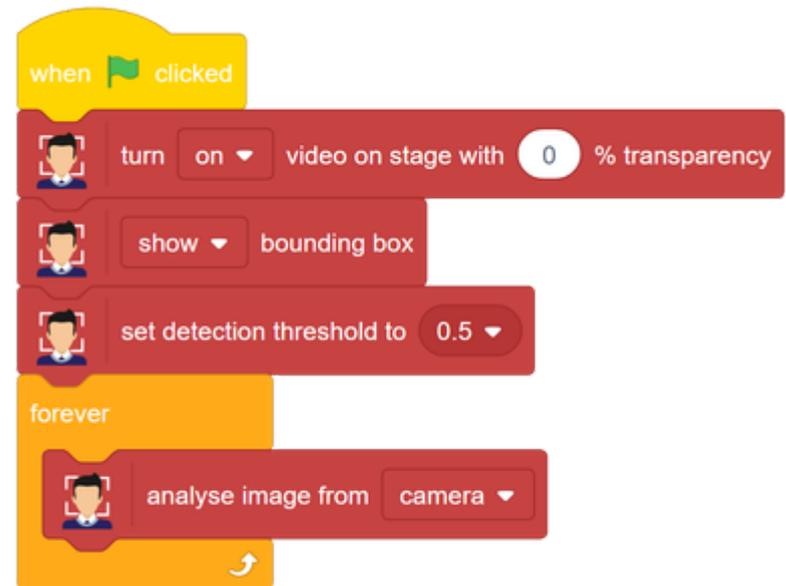
- **Learning with Data:** AI begins by receiving lots of pictures or information to understand differences. For example, to distinguish cats from dogs, it studies many images of both. 
- **Analyzing with Algorithms:** AI follows specific instructions, called algorithms, to analyze the information and find patterns, like identifying what makes a cat different from a dog. 
- **Making Decisions:** After learning, AI can make decisions. When shown a new image, it can determine if it's a cat or a dog based on what it has learned. 

Through these steps, AI develops skills just like students in school. Get ready to dive into AI and create exciting projects using PictoBlox!

# Face Detection

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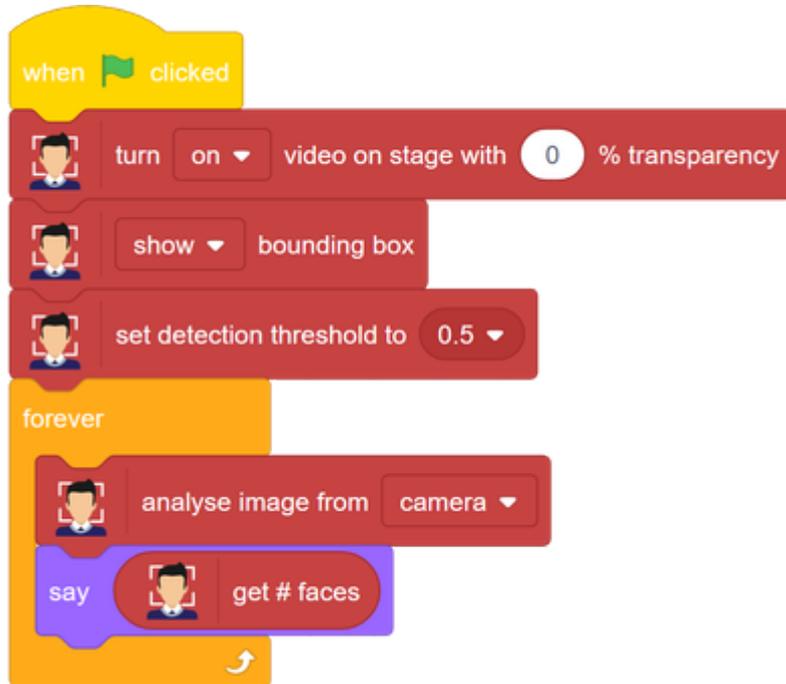
In this lesson, students will explore how to program **face detection** using PictoBlox. They will learn how the computer identifies the presence of a face by analyzing key features such as the eyes, nose, and mouth.



**Tasks:** Detect faces using the camera, apply effects when a face is detected, and test it with friends for real-time performance.

# Face Counter

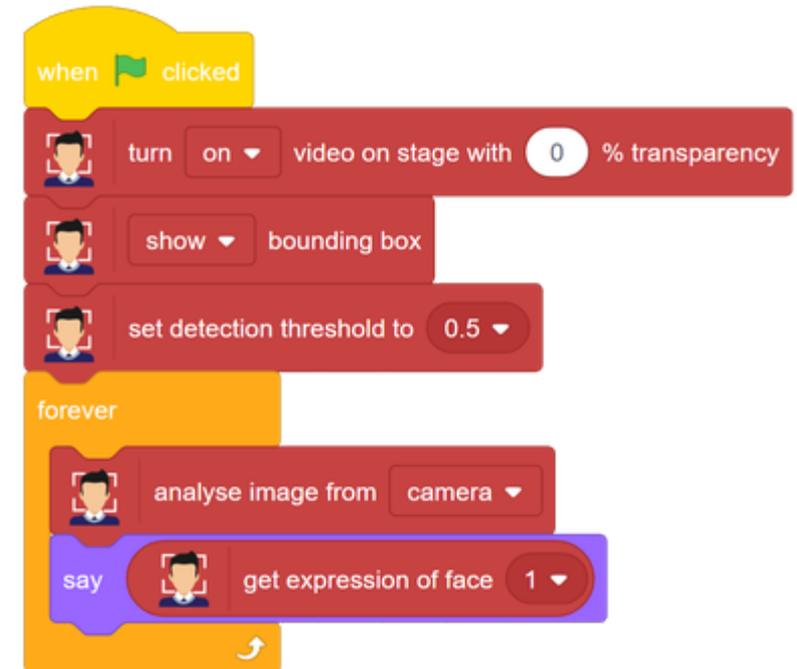
Students will learn to build a **face counter** with AI. This project teaches how the system identifies multiple faces and counts them accurately from video input.



**Tasks:** Program real-time face counting, display the total count on screen, and test in different environments to measure accuracy.

# Face Emotion

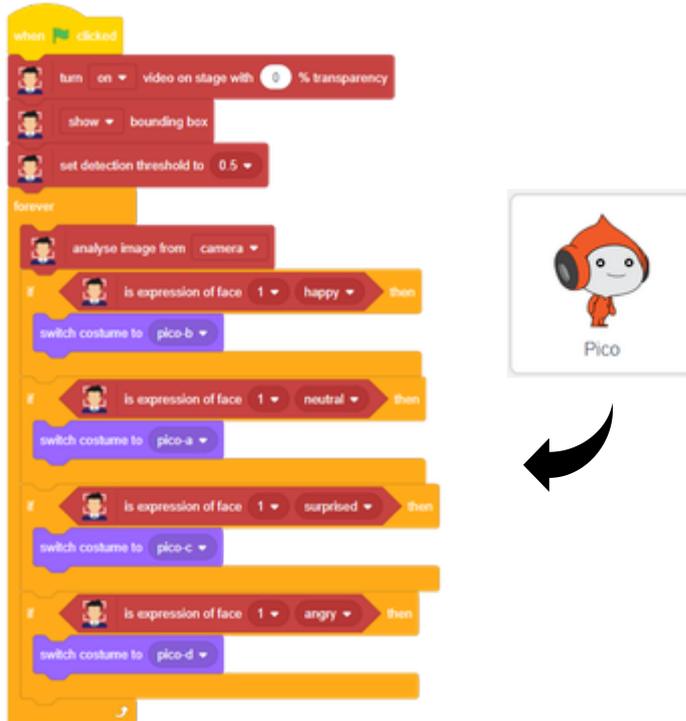
This lesson introduces **emotion detection** through facial expressions. Students will program the AI to detect emotions like happiness or sadness by analyzing facial features.



**Tasks:** Detect faces using the camera, apply effects when a face is detected, and test it with friends for real-time performance.

# Face Matching

Students will create a project that **matches their facial expressions with a character (Sprite)**. The character will mimic their expressions in real-time, like smiling or frowning.



```
when clicked
  turn on video on stage with 0 % transparency
  show bounding box
  set detection threshold to 0.5
  forever
    analyse image from camera
    if is expression of face 1 happy then
      switch costume to pico-b
    if is expression of face 1 neutral then
      switch costume to pico-a
    if is expression of face 1 surprised then
      switch costume to pico-c
    if is expression of face 1 angry then
      switch costume to pico-d
```

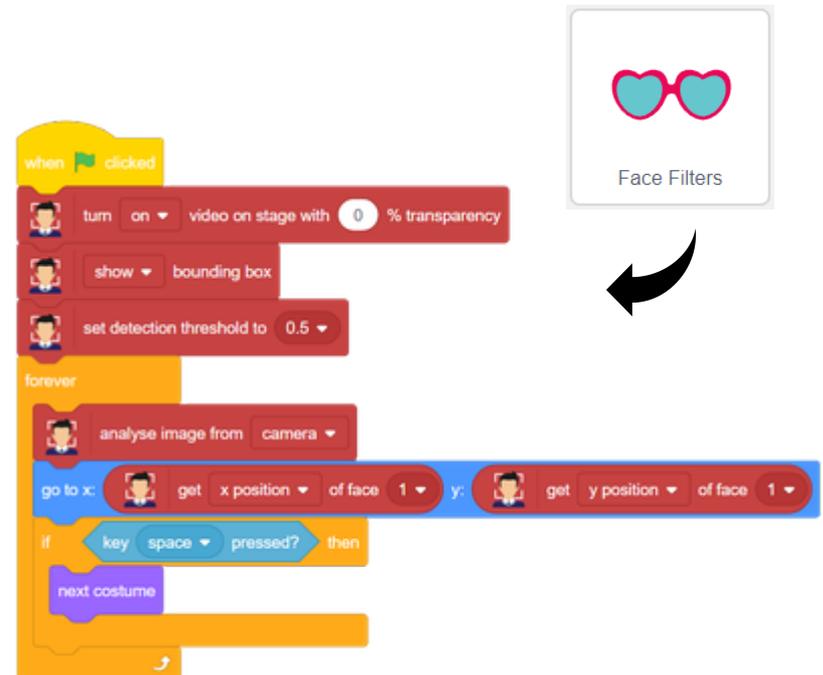


A small image of the character Pico, a white robot with a red helmet and a single antenna.

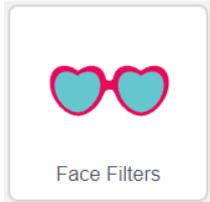
**Tasks:** Detect expressions with the camera, make the Sprite mirror those expressions, and ensure real-time synchronization through testing.

# Face Filters

In this fun lesson, students will design and apply **face filters** like hats or glasses using PictoBlox. The project identifies facial features and overlays filters dynamically.



```
when clicked
  turn on video on stage with 0 % transparency
  show bounding box
  set detection threshold to 0.5
  forever
    analyse image from camera
    go to x: get x position of face 1 y: get y position of face 1
    if key space pressed? then
      next costume
```

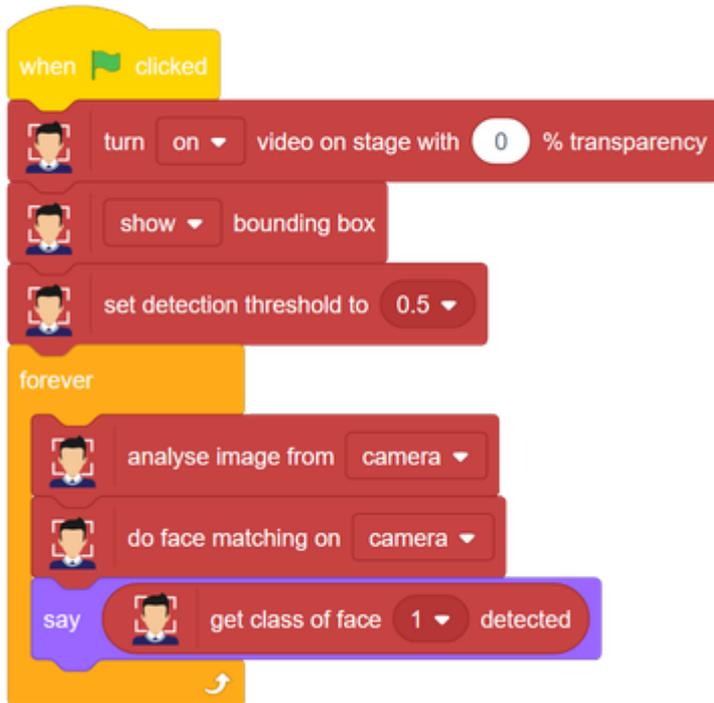


A square box containing a pair of red heart-shaped glasses and the text "Face Filters" below it.

**Tasks:** Detect faces using the camera, apply effects when a face is detected, and test it with friends for real-time performance.

# Face Recognition

This project teaches students how to implement **face recognition**. They will train the AI to identify specific people by associating faces with names.

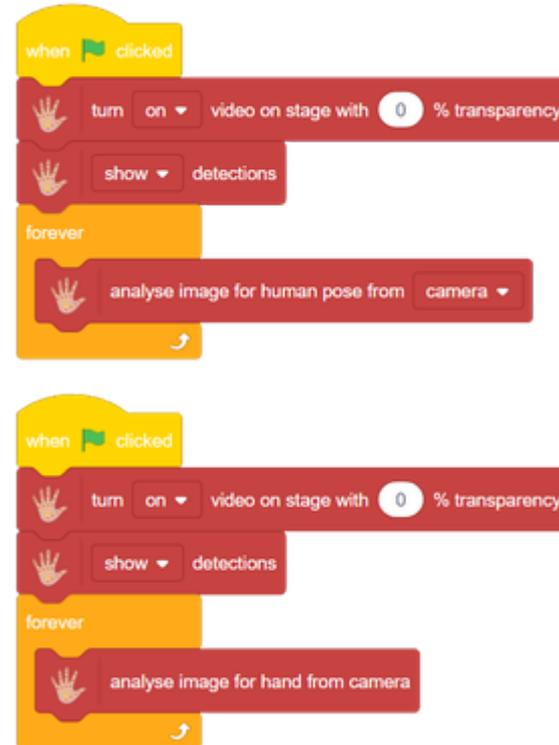


```
when clicked
  turn on video on stage with 0 % transparency
  show bounding box
  set detection threshold to 0.5
  forever
    analyse image from camera
    do face matching on camera
    say get class of face 1 detected
```

**Tasks:** Train the AI on different faces, display names when recognized, and test how accurately the system identifies multiple faces.

# Body Detection

Students will explore **body detection**, where the AI identifies a human body or specific parts, like hands, from a video stream. This enables interaction based on movement.



```
when clicked
  turn on video on stage with 0 % transparency
  show detections
  forever
    analyse image for human pose from camera

when clicked
  turn on video on stage with 0 % transparency
  show detections
  forever
    analyse image for hand from camera
```

**Tasks:** Detect bodies or hands using the camera, add effects upon detection, and ensure accurate recognition through testing.

# Hand Tracking

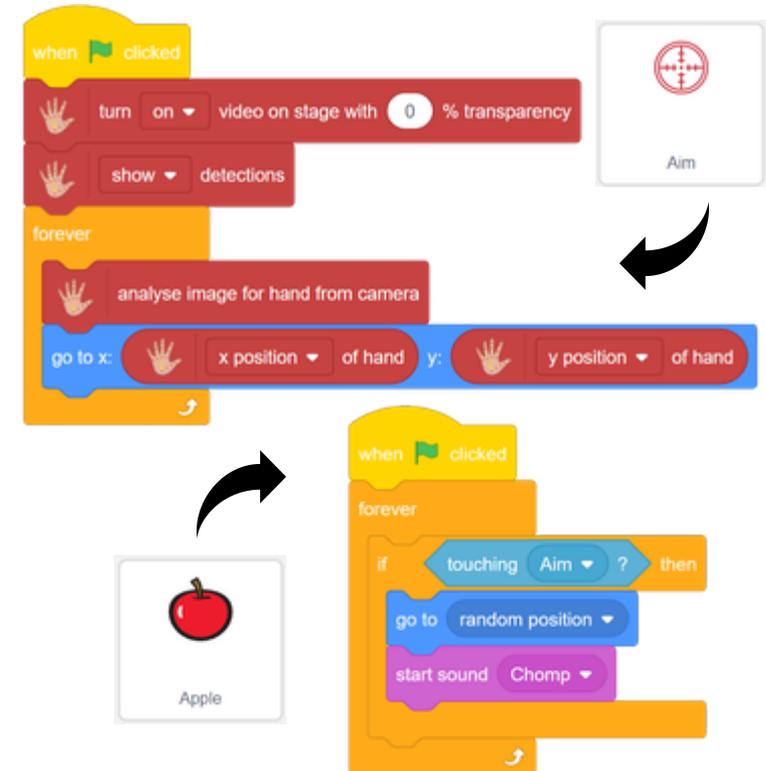
In this lesson, students will learn **hand tracking**, enabling them to control objects or commands by moving their hands in front of the camera.



**Tasks:** Program hand tracking, link movements to object control or commands, and test the system with various hand movements.

# Hand Collecting

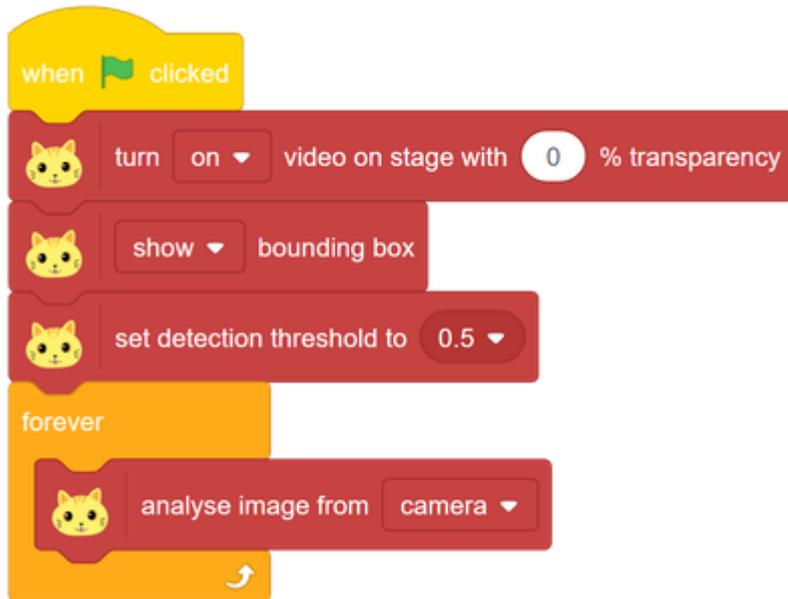
Students will create an interactive game where they collect apples using **hand movement tracking**. They will control the game by moving their hands as if playing in real life.



**Tasks:** Track hand movements to collect apples, add a scoring system, and test their speed and accuracy in gathering apples.

# Identify Objects

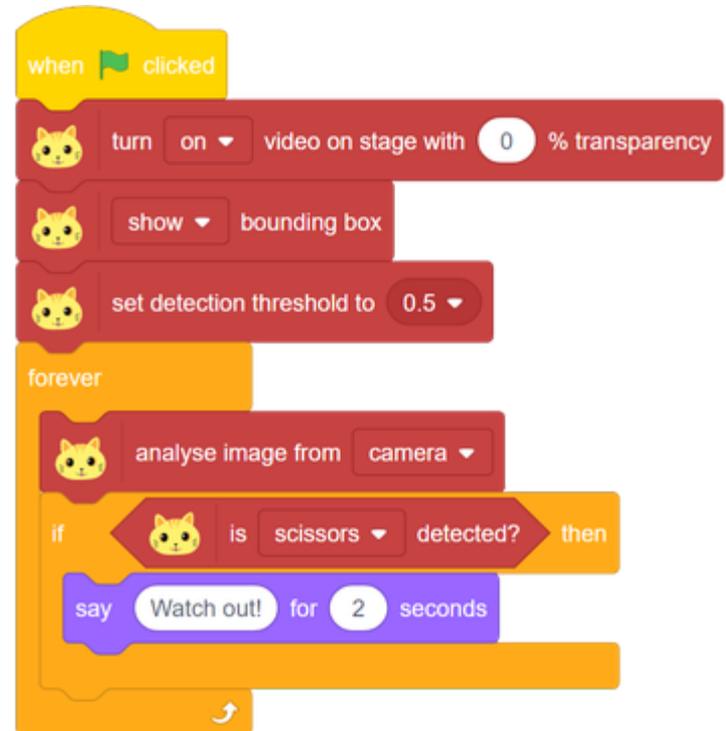
This lesson focuses on **object identification** using AI. Students will use AI to recognize and label different objects using images or live camera input.



**Tasks:** Program the AI to identify objects, display object names in real-time, and test the accuracy in recognizing various objects.

# Detect Objects

Students will extend their learning by **detecting multiple objects** within a single frame. The project identifies objects like furniture, fruits, or vehicles using AI.



**Tasks:** Program object detection, show labels on identified items, and ensure the system works with various objects in real-world settings.

# Detect Animals

This lesson teaches students how to build a project that **identifies animals** through image recognition. They will use the AI to distinguish animals such as dogs or cats.

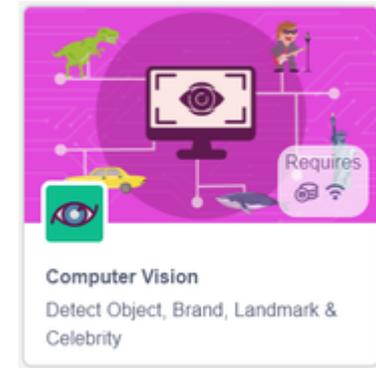
```
when clicked
  turn on video on stage with 0 % transparency
  show bounding box
  set detection threshold to 0.5
  forever
    analyse image from camera
    if is cat detected? then
      start sound Meow
      say That's a cat for 2 seconds
    if is dog detected? then
      start sound Dog1
      say That's a dog for 2 seconds
    if is horse detected? then
      start sound Horse
      say That's a horse for 2 seconds
```



**Tasks:** Program the AI with animal images, display animal names, and test the system's accuracy across different species.

# Image Description

Students will explore **image description**, where the AI analyzes photos and matches them with stored data to identify content.

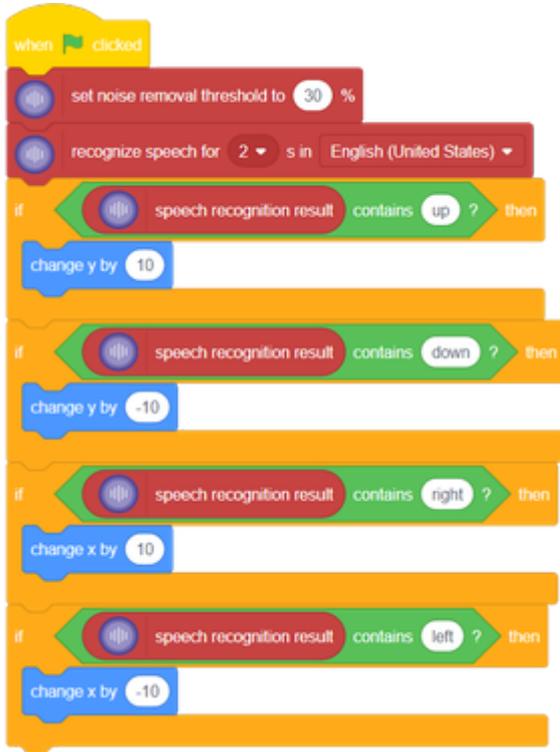


```
when clicked
  turn on video on stage with 0 % transparency
  recognize image description in image after 2 seconds
  say image description recognition result
```

**Tasks:** Program the system to recognize images, provide feedback on matches, and test it with multiple pictures for precision.

# Speech Recognition

This lesson introduces **speech recognition** in AI. Students will program the system to convert spoken words into text and trigger responses accordingly.

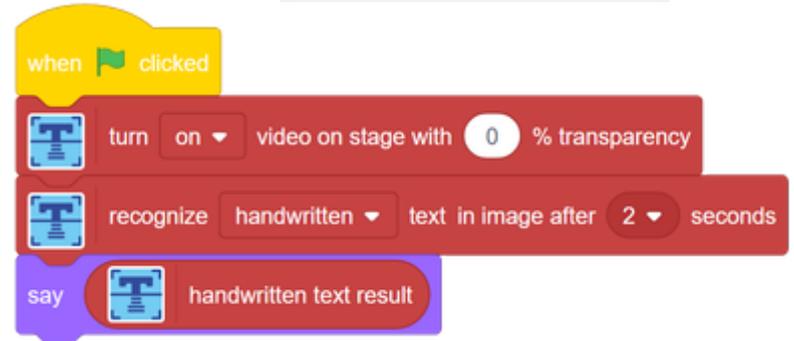
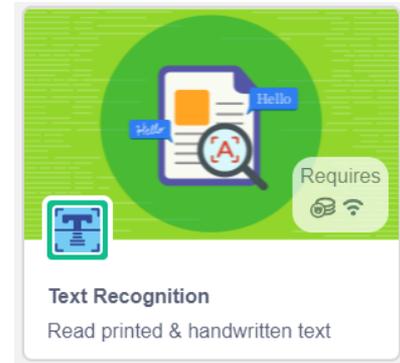


```
when clicked
  set noise removal threshold to 30 %
  recognize speech for 2 s in English (United States)
  if speech recognition result contains up ? then
    change y by 10
  if speech recognition result contains down ? then
    change y by -10
  if speech recognition result contains right ? then
    change x by 10
  if speech recognition result contains left ? then
    change x by -10
```

**Tasks:** Capture speech with the microphone, convert it into text, and test how accurately the system understands spoken commands.

# Text Recognition

Students will learn **text recognition**, enabling the system to read and identify text from scanned images or live camera input.

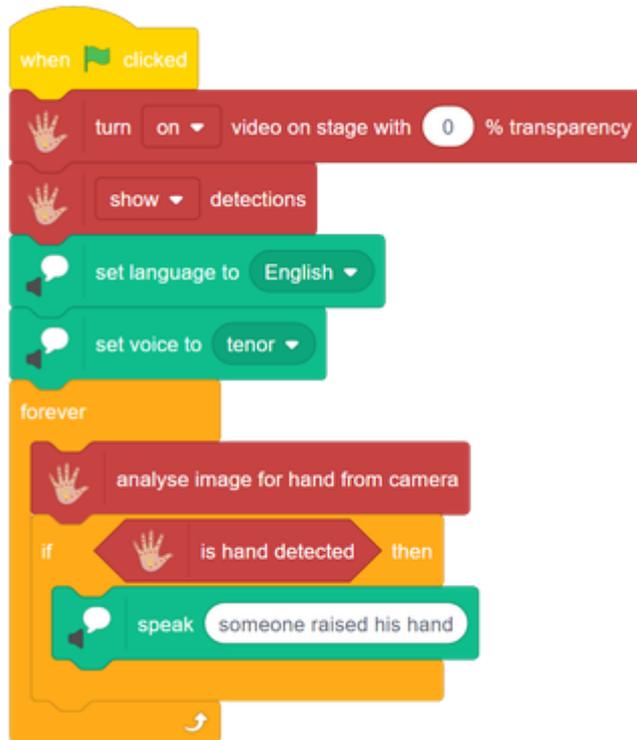


```
when clicked
  turn on video on stage with 0 % transparency
  recognize handwritten text in image after 2 seconds
  say handwritten text result
```

**Tasks:** Program the AI to detect text, display it on screen, and test the system's accuracy with various text samples.

# Text to Speech

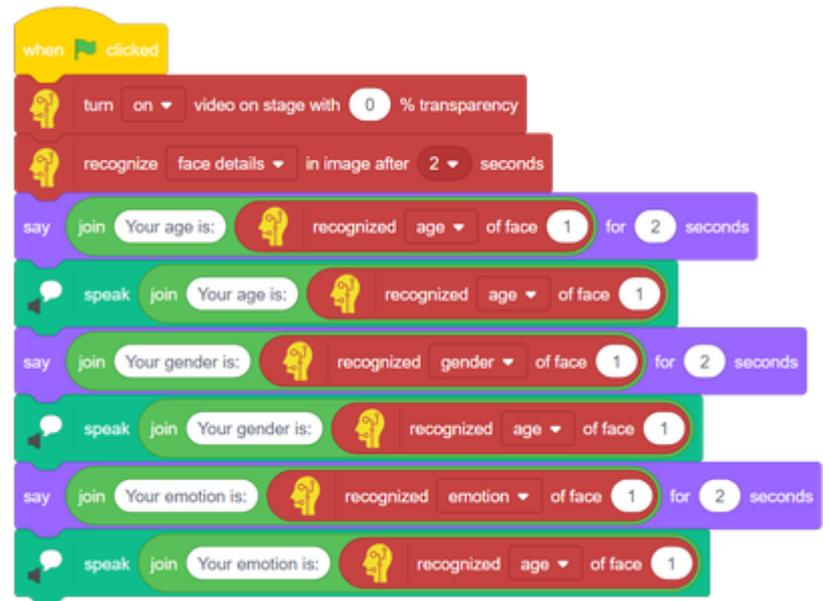
This lesson covers how to implement **text-to-speech (TTS)** conversion. Students will write or capture text and make the computer speak it aloud.



**Tasks:** Program TTS, adjust voice settings, and test the project with different texts for smooth and natural output.

# Face Features

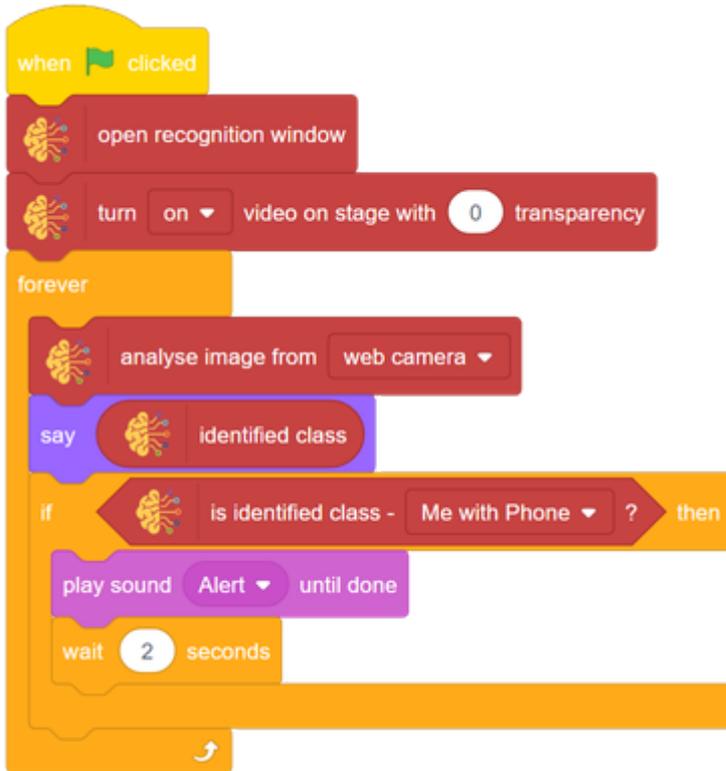
Students will learn to analyze **specific facial features** like eyes or mouths to create interactive effects based on detected attributes.



**Tasks:** Detect and highlight features, apply animations, and test with friends for precise identification.

# Machine Learning

This project introduces **machine learning**, where students train the AI to recognize patterns and improve accuracy over time.

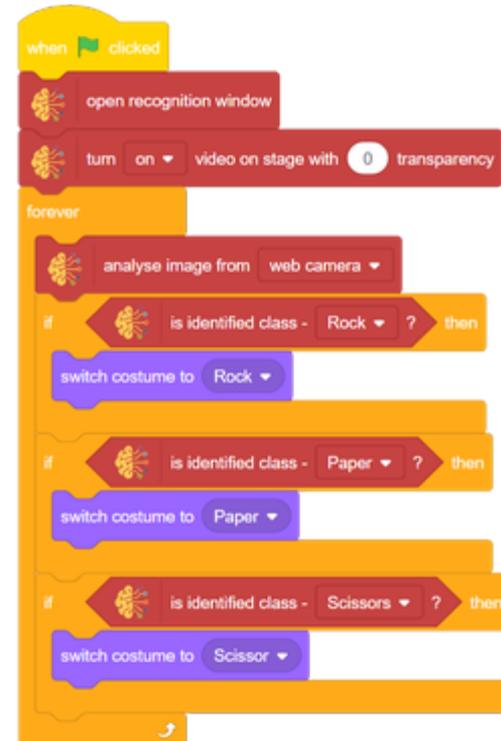


```
when clicked
  open recognition window
  turn on video on stage with 0 transparency
  forever
    analyse image from web camera
    say identified class
    if is identified class - Me with Phone ? then
      play sound Alert until done
      wait 2 seconds
```

**Tasks:** Train the AI with sample data, evaluate predictions, and test how well it learns from new inputs.

# Machine Learning (Hand)

In this hands-on lesson, students will build a project where the AI learns to recognize specific **hand movements** through training and practice.



```
when clicked
  open recognition window
  turn on video on stage with 0 transparency
  forever
    analyse image from web camera
    if is identified class - Rock ? then
      switch costume to Rock
    if is identified class - Paper ? then
      switch costume to Paper
    if is identified class - Scissors ? then
      switch costume to Scissor
```

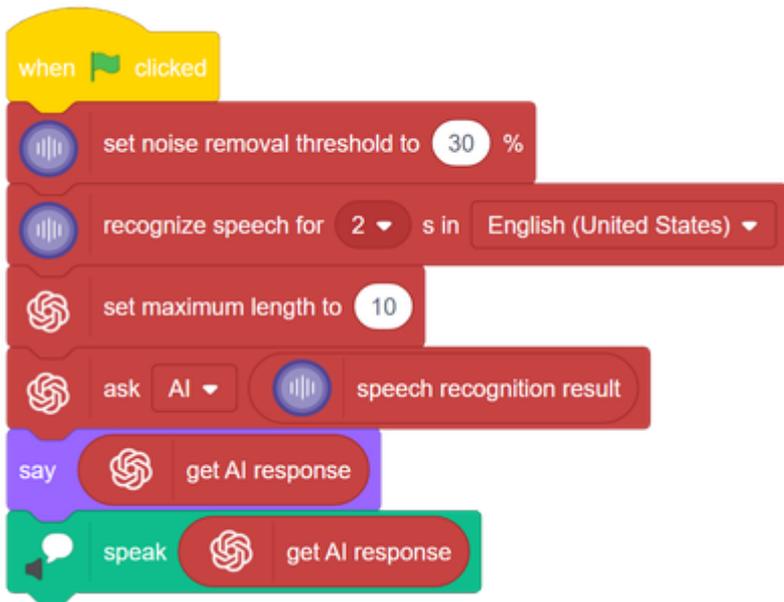


**Tasks:** Detect and highlight features, apply animations, and test with friends for precise identification.

# ChatGPT

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Students will explore **ChatGPT integration**, allowing them to build conversational bots that interact intelligently with users.

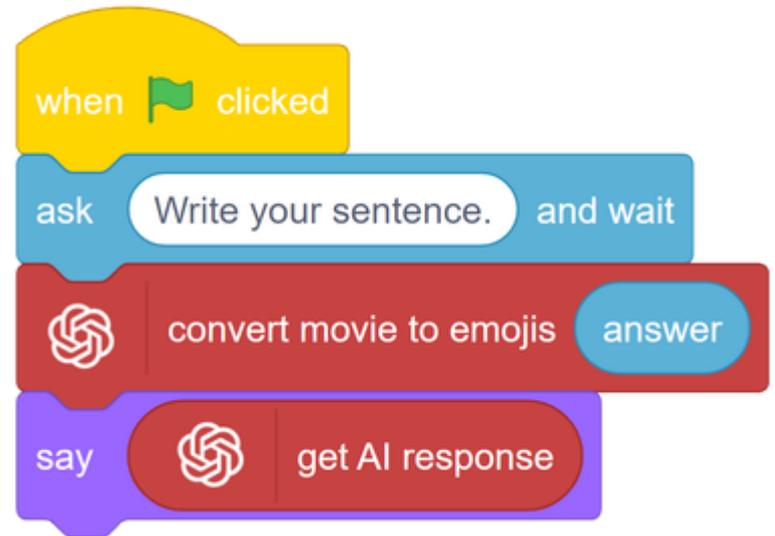


**Tasks:** Program TTS, adjust voice settings, and test the project with different texts for smooth and natural output.

# ChatGPT (Emojis)

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In this creative lesson, students will extend their ChatGPT project by integrating **emoji-based responses**, making conversations more engaging.



**Tasks:** Program ChatGPT to use emojis, design fun interactions, and test the chatbot for expressive communication.