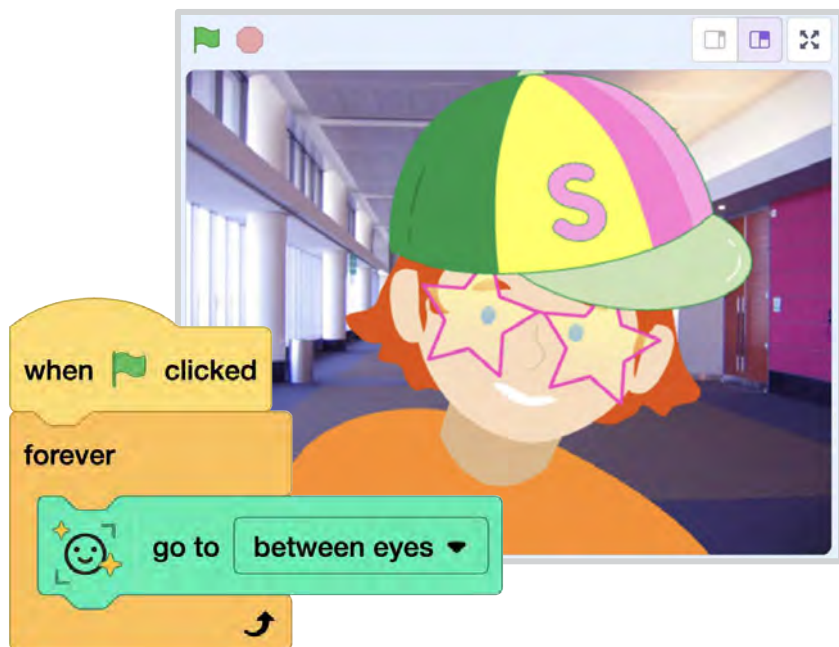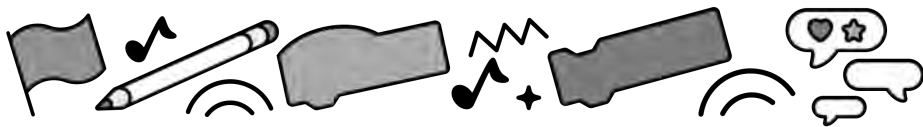# Scratch and AI: Face Sensing

Use AI face detection to make interactive Scratch projects

Cards in This Pack

- Try Out Face Sensing

- Create a Face Filter

- Create a Face Sensing Game

- Create a Face Sensing Sound Board

- Use Your Nose As a Pen

- Say It and Spray It

- Fool the AI

Face Sensing blocks use a device's camera, so you may be prompted to give permission to use the camera in your browser. ***These blocks do not record or store your video.***

Try Out Face Sensing

This AI-powered extension uses a machine learning model to detect if it sees a face and where a nose, eyes, ears, mouth, etc., are. The model was trained using a large data set of images of faces.

Click a "go to nose" block while your face is visible on the stage. Did the sprite go to your nose? What happens if you choose another feature?
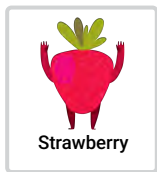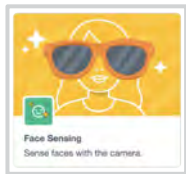
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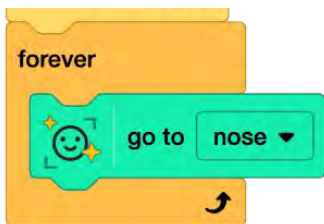# Try Out Face Sensing

GET READY

Choose any sprite.

Strawberry

Add the Face Sensing Extension.

Face Sensing
Sense faces with the camera.

ADD CODE

```
when [green flag] clicked
[face] go to [nose ▼]
```

1. Add a "go to [nose]" block. Click it to see the result.

```
forever
  [face] go to [nose ▼]
```

2. Next, add a "forever" loop to have the sprite stick to your chosen feature.

```
forever
  [face] go to [nose ▼]
  turn ↻ (15) degrees
```
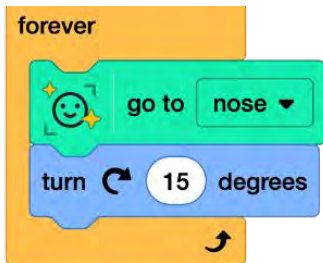
3. Try adding additional blocks from the Motion or Looks category to animate the sprite.

What if more than one face is on screen? The blocks can only interact with one face at a time.

Create a Face Filter
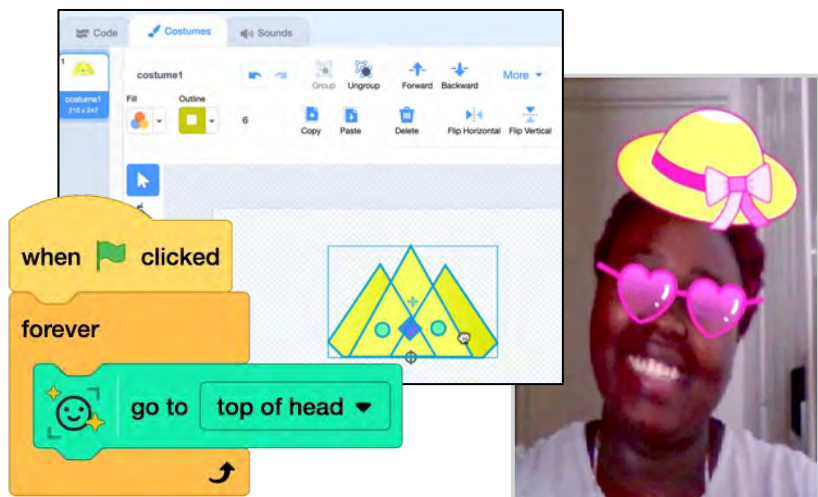
- Use the Fashion sprites in the sprite library or draw your own hat, glasses, or other accessory with the **Scratch Paint Editor** tools.

- **Code a face filter** that follows your face as you move it around the stage.

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Face Filter

scratch.mit.edu

GET READY

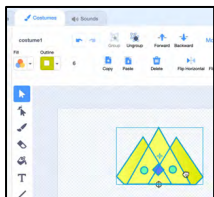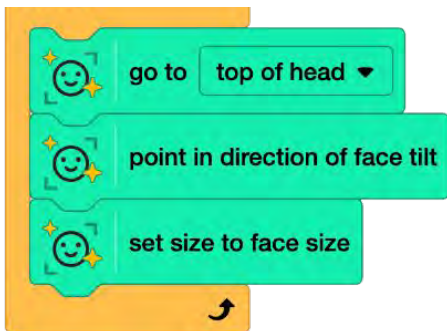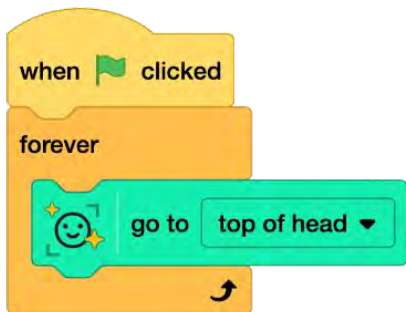Choose any sprite.

Hat

Or use "Paint" to create your own costume or two.

ADD CODE

```
when [flag] clicked
forever
    go to [ top of head ▼ ]
```

```
go to [ top of head ▼ ]
point in direction of face tilt
set size to face size
```

1. Add code so it sticks to a feature of your face, like the top of the head.

2. Experiment with other blocks to make the sprite scale to match the size of your face and point in the direction of your face.

Need to adjust the sprite's position on your face? Try moving on the Costumes tab relative to the costume center. You could also add code to switch costumes.

Create a Face Sensing Game
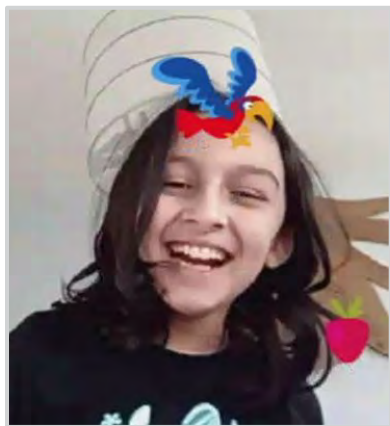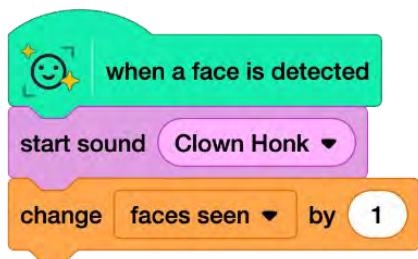
- Create a **face detection counter**

- Code a game that uses your face to **score points**, like a clicker game that uses your nose instead of a mouse

- Code a game that uses your face to **control a player sprite**, triggering jumps or helping it move around the stage or point in a direction

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Face Sensing Game
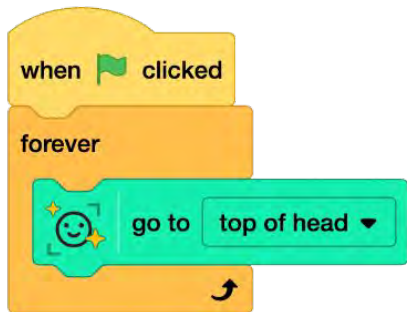
GET READY
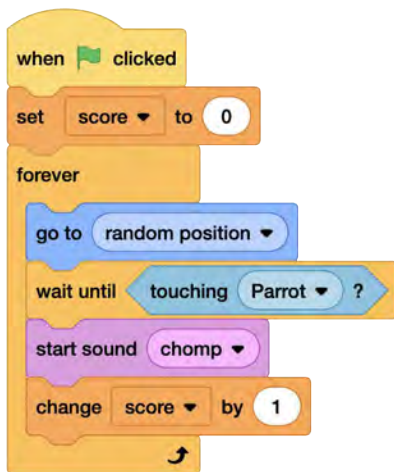
Choose a
first sprite.

Parrot

Choose a
second sprite.

Strawberry

ADD CODE

1. Add code to the first
   sprite so you can control
   it with your face. This will
   be the player.

```
when 🏳 clicked
forever
    😊 go to  top of head ▼
```

2. Create a score variable to
   track points. Don't forget
   the program will need to
   reset it each time a new
   game is started.

3. Add code to the second
   sprite so it moves to a
   random position on the
   stage and gives the player
   a point when sprites touch.

```
when 🏳 clicked
set  score ▼  to  0
forever
    go to  random position ▼
    wait until  touching  Parrot ▼  ?
    start sound  chomp ▼
    change  score ▼  by  1
```

*Try making the game harder by moving the second sprite
after a time, if not touched yet.*

Create a Face Sensing Sound Board
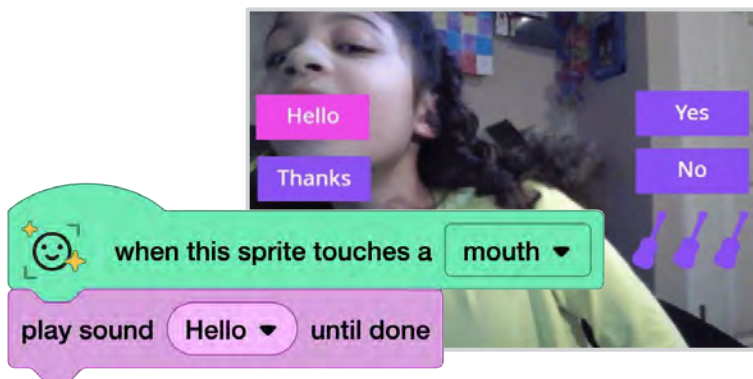
- **Choose a variety of fun sounds** or record your own.

- **Code a sound board** that uses parts of your face to play sounds.

- **Code effects** that add visual confirmation, like color changes.

- Create a **mystery button** that picks a sound to play at random.

Sound Board

GET READY

Choose a few sprites, or draw your own.
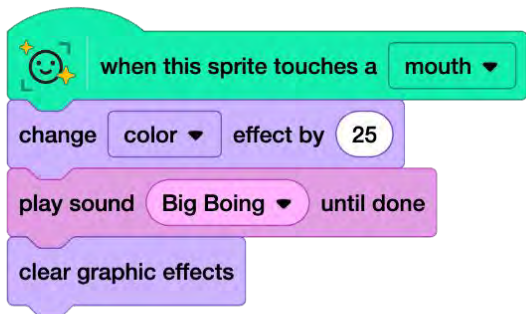
Sprite 1

Choose a sound from the sound library for each sprite, or record your own.

Choose a Sound

ADD CODE

1. Add code to each sprite to play a sound, change an effect, or perform another animation when parts of your face touch them.

```
when this sprite touches a   mouth ▼

change   color ▼   effect by   25

play sound   Big Boing ▼   until done

clear graphic effects
```

2. Try adding multiple sounds to a sprite. Use the "pick random" operator so each time is a surprise.

```
play sound   pick random   1   to   10   until done
```

Use Your Nose As a Pen

- Combine blocks from the Face Sensing and the **Pen Extension** for a wild way to draw!

- Stick a sprite to your nose or eyes, put the **pen down**, and move it around the stage to create a unique art piece.

- Want more control? Try using your head **tilt to put the pen up and down**. Or try adjusting the **pen size based on your face size.**
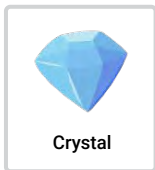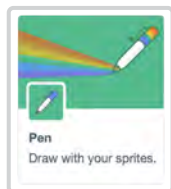
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Use Your Nose As a Pen

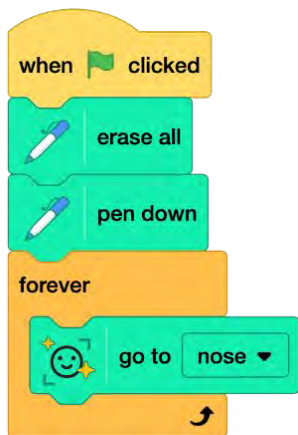## GET READY

Choose any sprite to act as the Pen.

Crystal

Add Pen Extension.

Pen
Draw with your sprites.

ADD CODE

1. Add a Pen block to put the pen down. Then have the pen follow your nose.

2. Try variations like changing the pen color or setting the pen size based on your face size.

```
when [flag] clicked
erase all
pen down
forever
    go to [nose ▼]
```

```
change pen [color ▼] by (10)
```

```
set pen size to ( [face] face size / 10 )
```

3. Want more control? Use "when face tilts" to control when the pen is up and when it is down.

```
when face tilts [left ▼]
pen down
```

```
when face tilts [right ▼]
pen up
```

Say It and Spray It


```
when I start as a clone
go to  mouth ▼
set size to  loudness  %
show
repeat until  < touching  edge ▼  ? >
    move  10  steps
delete this clone
```
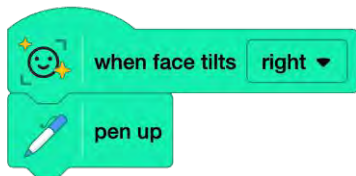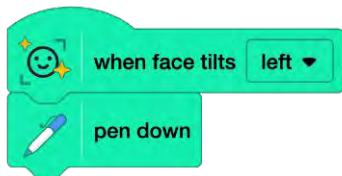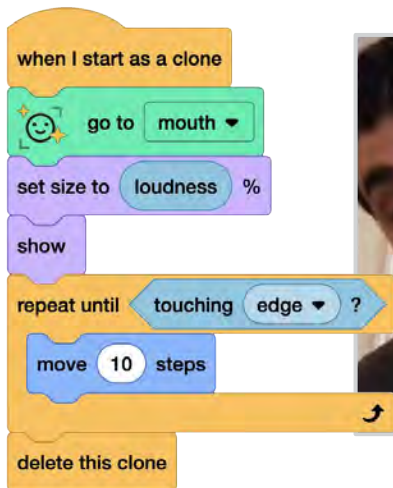
- Code sprite **clones** to spray from your mouth!

- Control the size and visibility of clones using the "**loudness**" block.

- For even more fun, set up different sprite **costumes that are chosen at random**, so what sprays out is a continual surprise.

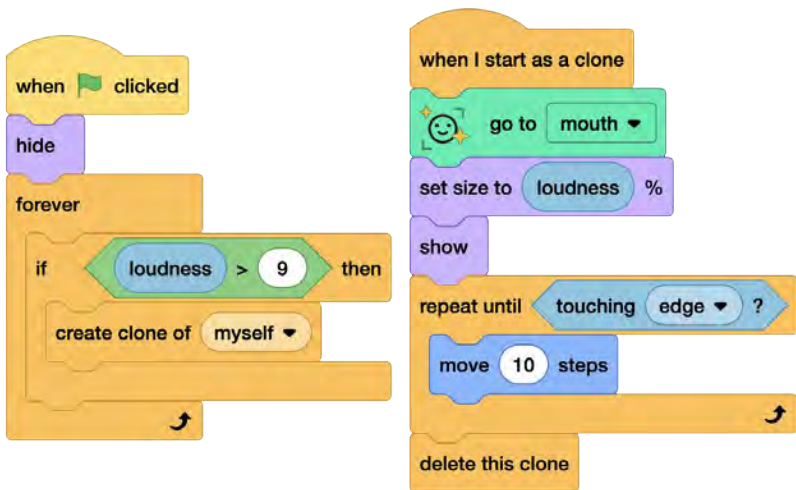SCRATCH

Say It and Spray It

GET READY

Choose any sprite.

Bananas

ADD CODE

1. To have multiple copies of a sprite spray from your mouth, you can create clones and use "loudness" to trigger their creation.

2. Have clones go to your mouth, then move repeatedly. You could delete clones when they reach the edge of the stage, and set or change size based on loudness.

```
when [flag] clicked
hide
forever
    if < loudness > 9 > then
        create clone of [ myself ▼ ]
```

```
when I start as a clone
go to [ mouth ▼ ]
set size to ( loudness ) %
show
repeat until < touching ( edge ▼ ) ? >
    move ( 10 ) steps
delete this clone
```

Fool the AI

Face Sensing blocks try to detect if a face exists, but they are not able to identify who the face is, or even if it is a human face! That means sometimes the AI makes interesting mistakes. Identifying these mistakes can help us see the difference between our own human intelligence and AI.

Can the AI find the parts of a face if:

- you are in disguise, your face is covered, or your face is tilted or upside down?
- the lighting in the room is very bright or very dark?
- you step out of frame and hold up a drawing of a smiley face? a stuffed animal? a pet? two googly eyes attached to fingertips? or another facelike object made of different materials or from nature?
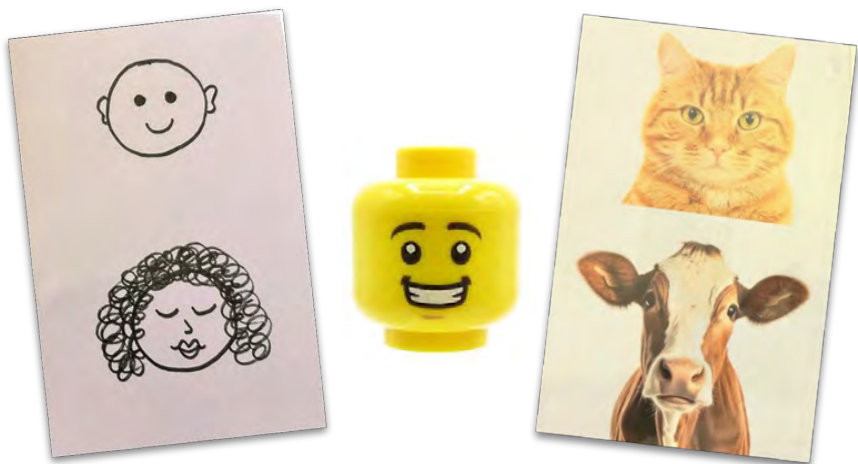
What variables can you change to try to fool it into thinking it sees a face? What limitations can you find?

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Fool the AI

The AI that we're using is trained to detect human faces.

False positives are things that are not actually a human face (false) that it detects as a face (positive). What are some false positives you can find?

Why might some animal faces (like cats) be recognized while others (like cows or dogs) may not be seen as a face? Think about the proportions of a human face and how those are different from a cow's longer snout.

A **false negative** when working with the Face Sensing blocks is when a human face is in the frame, but the AI does not detect it (perhaps because it is too small or upside down). What are some false negatives you can find? What might be causing their detection failure?