



**TITLE:** Programing face detection in Scratch

### LEARNING SCENARIO

<b>School:</b>	<b>Duration (minutes):</b>	90
<b>Teacher:</b>	<b>Students' age:</b>	13-14

**Essential Question:**

How to program face detection in Scratch

**Topics:**

- Programing face detection in Scratch

**Aims:**

- To learn to program face detection with uploaded examples

**Outcomes:**

- Knowing how to write a program for face detection using Scratch

**Work forms:**

- work in pairs, group work

**Methods:**

- presentation, talk, discussion, interactive exercise

### ARTICULATION

#### Course of action (duration in minutes)

#### INTRODUCTION

*We will review what we learned about face detection in the last class.  
Ask your students about their experiences with face detection.  
Before you lead them in, ask them if they know how to make a face detection program.*

The teacher introduces students to programing face detection in Scratch.





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Let's walk through a few simple examples of face detection programming in Scratch and Scratch based application.  
You've probably noticed that some applications on your smartphone draw a rectangle around the face as a result of face detection. It is also possible to do that in Scratch.

**Defining the goal of the lesson:**

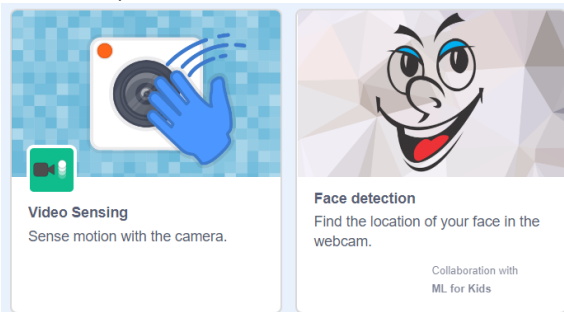
Understanding face detection program and its usage by going through specific examples.

**MAIN PART**

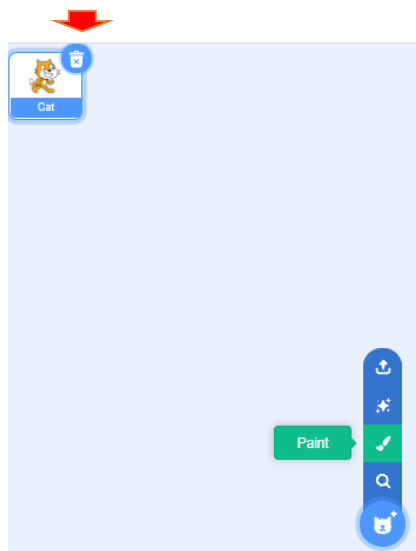
**First project - SCRATCH (ML4KIDS):**

Step 1: Open your Chrome web browser and go to: <https://machinelearningforkids.co.uk/scratch3/>

Step 2: Load Video Sensing and face detection extensions and plug in your web camera (if you don't have a built in one)



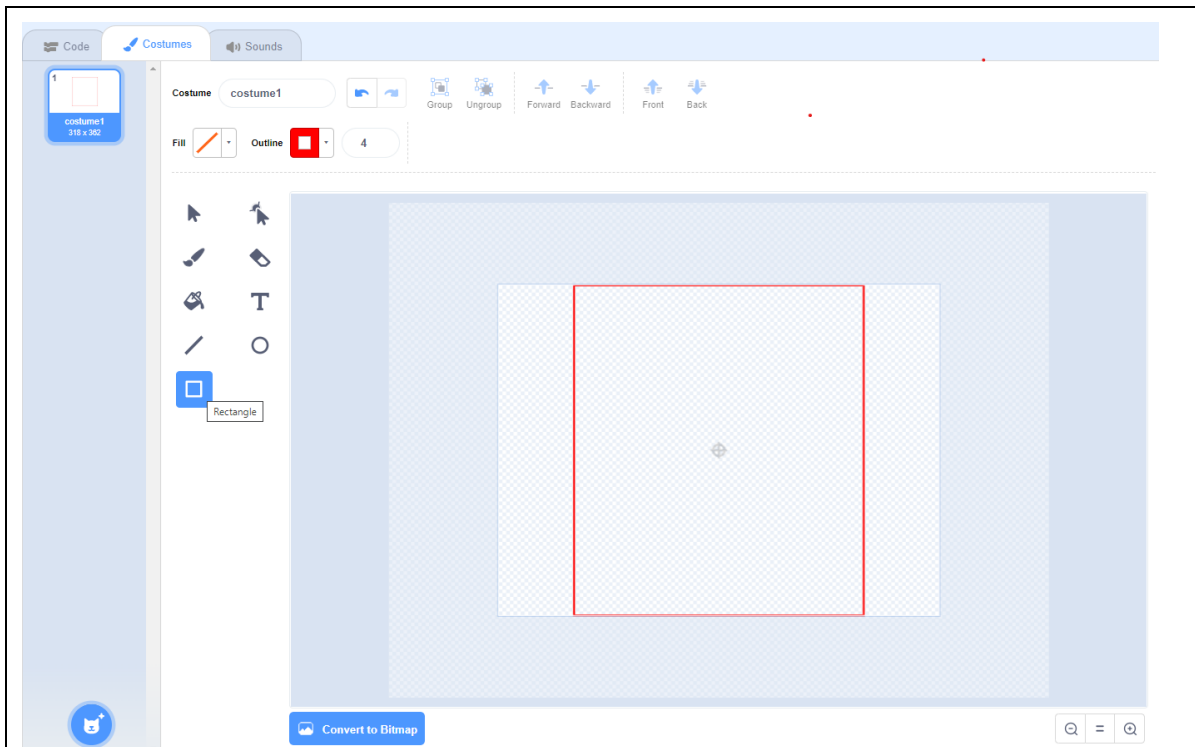
Step 3: **Delete Cat sprite** by clicking on trashcan icon (upper right corner) and choose the option to **Paint** a new sprite



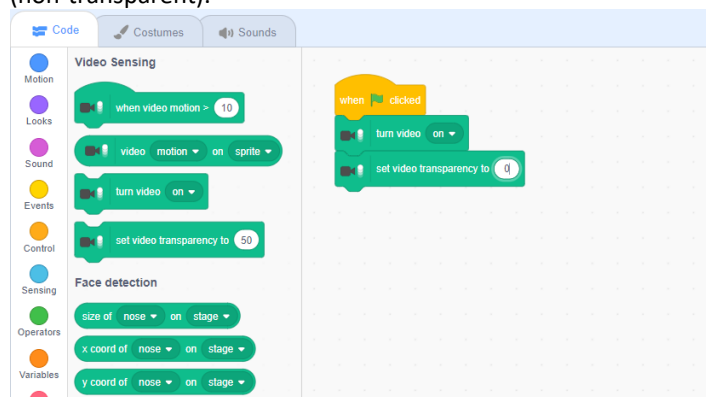
Step 4: Draw a rectangle (it will be used as a bounding box) with no fill and set the outline to red (4) as in picture below



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Step 5: Switch to Code tab and start programming. First, we turn on the video and set the transparency to 0 (non-transparent).

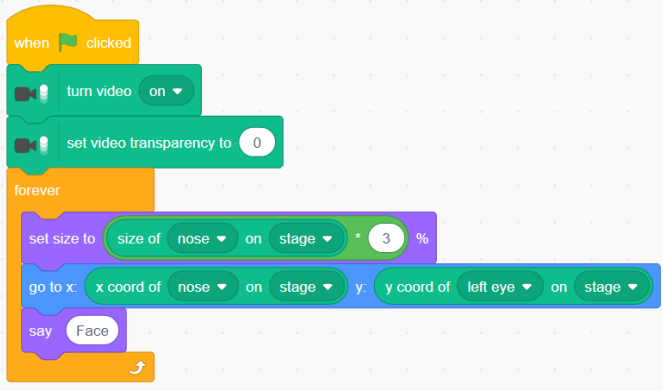


Step 6: Next, there is a loop (forever) with 3 blocks in it to set the size of a rectangle (nose size multiplied by 3) and its x and y coordinates. You may want to adjust the value of a multiplier from 4 to some other number, especially if you switch to a bigger stage (1.5 is better).





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### Second project - face detection combined with augmented reality

Step 1: Open Scratch at <https://machinelearningforkids.co.uk/scratch3/>

Step 2: Add extension "Face detection"

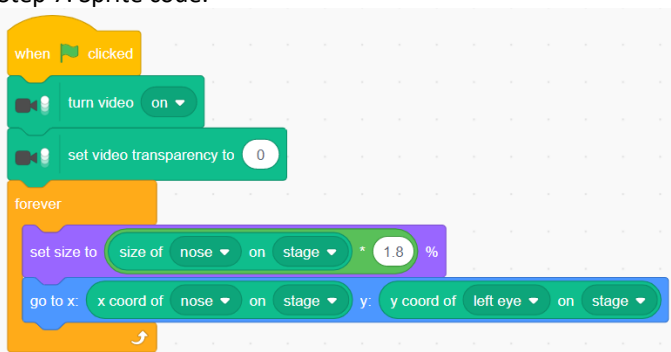
Step 3: Add extension "Video sensing" and plug in your web camera (if you don't have built in one)

Step 4: Delete Cat sprite

Step 5: Download picture from link [https://toppng.com/transparent-glasses-PNG-free-PNG-Images\\_110945](https://toppng.com/transparent-glasses-PNG-free-PNG-Images_110945)

Step 6: Upload picture to Scratch as sprite, rename it to "glasses"

Step 7: Sprite code:



Step 8: Start the program and move your head

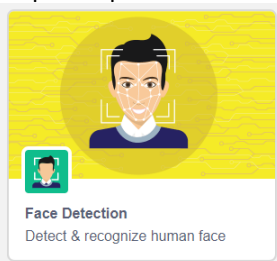
Step 9: Discuss the accuracy of the algorithm and how to improve it.

### Third project with PICTOBLOX (Desktop application):

Step 1a: Since there is no online GUI available you have to install PictoBlox from:

<https://thestempedia.com/product/pictoblox/download-pictoblox/> (427 Mb)

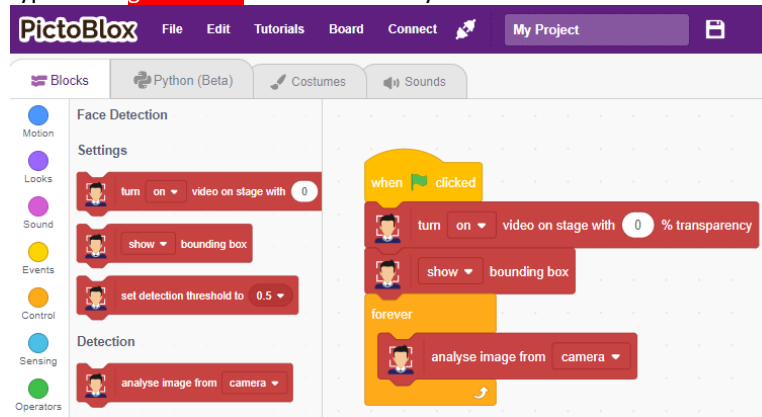
Step 2a: Open PictoBlox and choose Face detection expansion



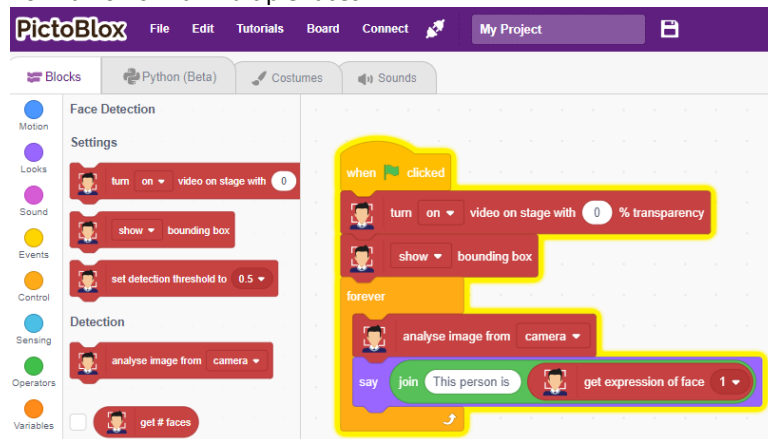


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Step 3a: Use blocks as in the picture below and it's very simple to figure out how it works. Now we have a bounding box as a block and there's no need to draw a rectangle. But the main feature is that **it can detect multiple faces**. Call someone to join you in front of the camera to see how it works. Check the reporter type block **get # faces** to see how many faces are detected.



Step 4a: And let's spice it up using join operator to display a person's face expression. You can further explore how it works with multiple faces.



### CONCLUSION

Nowadays face detection software is used in almost every field from mobile devices to snap chat face filters to various security applications. Face detection helps you recognize faces, their age, expressions, gender, location, and many other features. Face detection is a broader term given to any system that can identify the presence of a human face in a visual image. Face detection has numerous applications, including in people-counting, online marketing, and even the auto-focus of a camera lens. Its core purpose is to flag the presence of a face. Face recognition has become more significant and relevant in recent years due to its potential applications. Since faces are highly dynamic and pose more issues and challenges to solve, researchers in the domain of pattern recognition, computer vision and artificial intelligence have proposed many solutions to reduce such difficulties so as to improve the robustness and recognition accuracy.

Today, face detection is used in:

- Real-world applications (*Amazon Rekognition: features include user verification, people counting and content moderation, often used by media houses, market analytics firms, ecommerce sites and credit solutions, BioID: GDPR-compliant solution used to prevent online fraud and identity*)





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*theft, Cognitec: recognizes faces in live video streams, with clients ranging from law enforcement to border control, FaceFirst: a security solution which aims to use DigitalID to replace cards and passwords, Trueface.ai: services span to weapon detection, and are utilized by numerous sectors including education and security...)*

- Medical diagnoses
- Criminal capture
- Surveillance and compliance

Give students the opportunity to develop their own face detection program.  
Do the K.W.L. (Know, Want, Learned) chart with your students.

What I Know	What I Want to Know	What I Learned

**Methods**

*presentation  
interactive exercise / simulation on the computer*

**Work forms**

*work in pairs  
group work*

**Material:**

- <https://machinelearningforkids.co.uk/scratch3/>
- [https://toppng.com/transparent-glasses-PNG-free-PNG-Images\\_110945](https://toppng.com/transparent-glasses-PNG-free-PNG-Images_110945)
- <https://thestempedia.com/product/pictoblox/download-pictoblox/>

**Literature**

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PERSONAL OBSERVATIONS, COMMENTS AND NOTES





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