



愛動智教育系統

CUHK iCar Experiment Manual

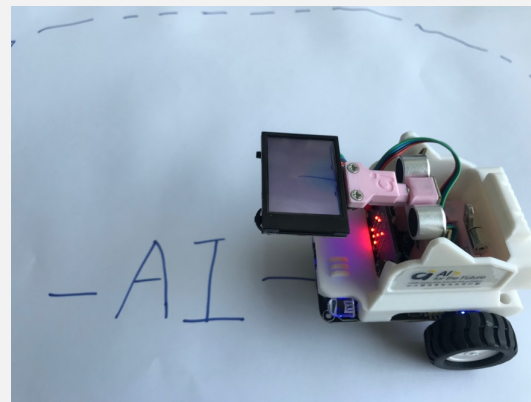
Experiment 1: Face Following Experiment

Write Your Own Code

CUHK iCar



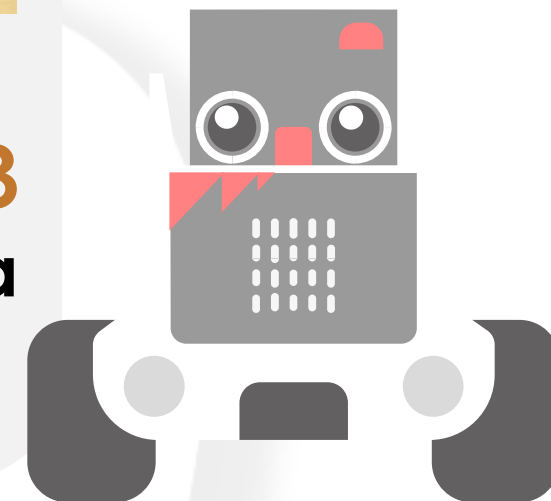
Experiment 1
Face Following



Experiment 2
Line Tracking



Experiment 3
Moral Dilemma



Face Following Experiment

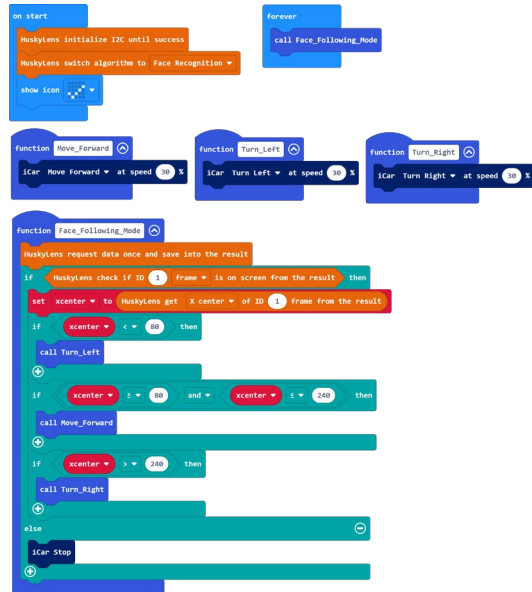
Introduction Of The Experiment

This experiment showcases how the self-driving car follows a specific face.



Download Program To micro:bit

Face_following.hex



Method 1

Clone the .hex to micro:bit directly

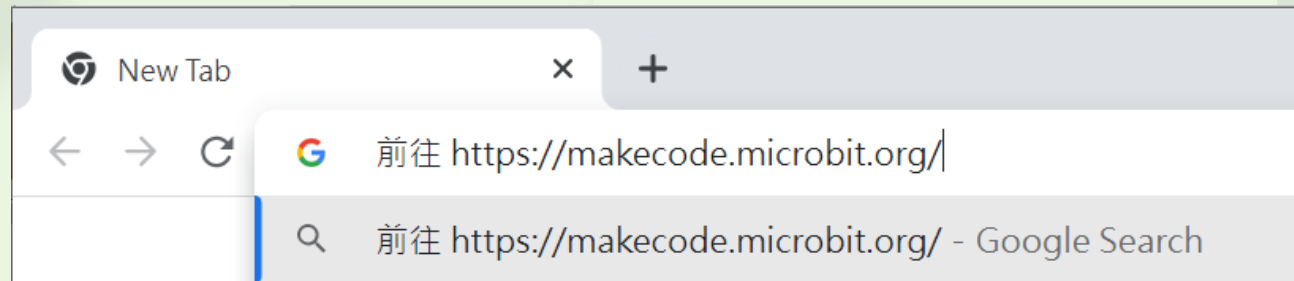
Method 2

Write your own code on MakeCode

Code On MakeCode

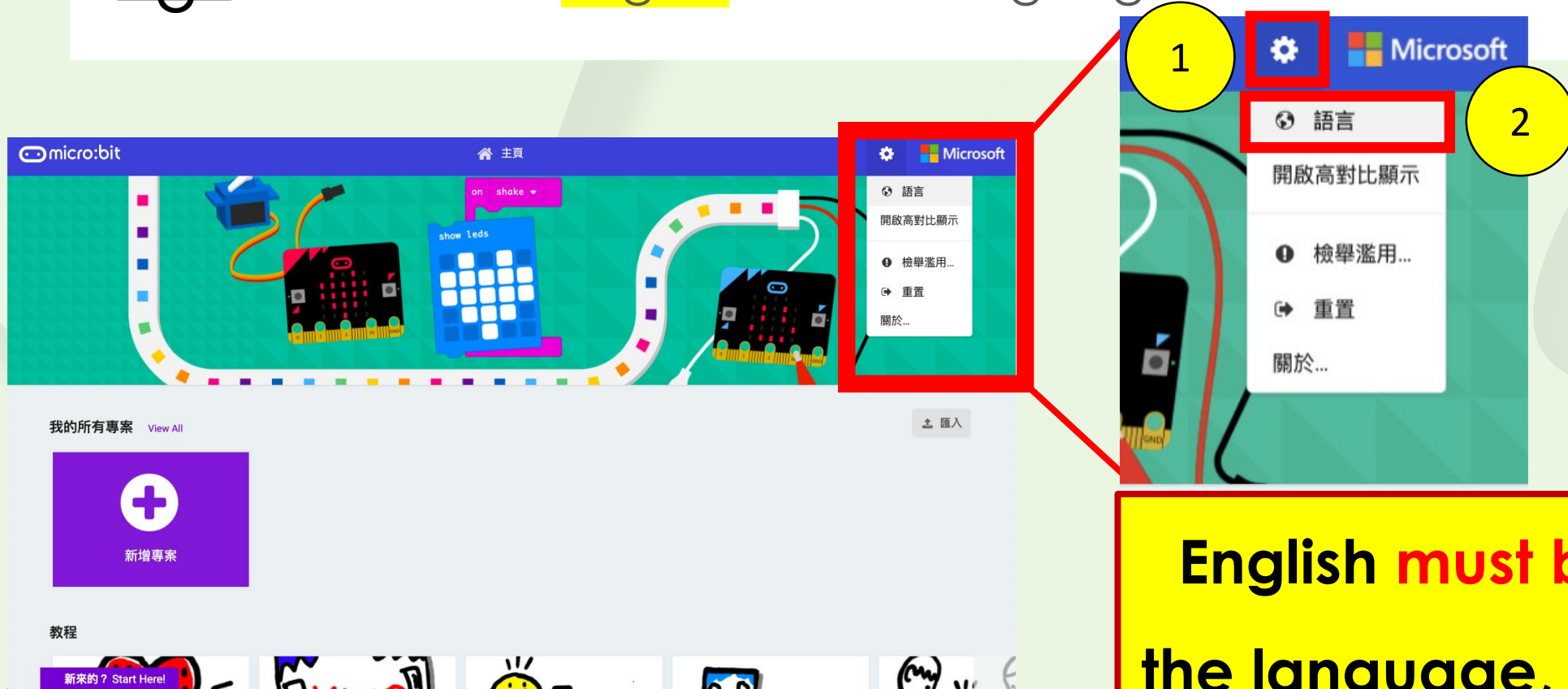


Browse <https://makecode.microbit.org/>





Caution
Please Set **English** As The Language!



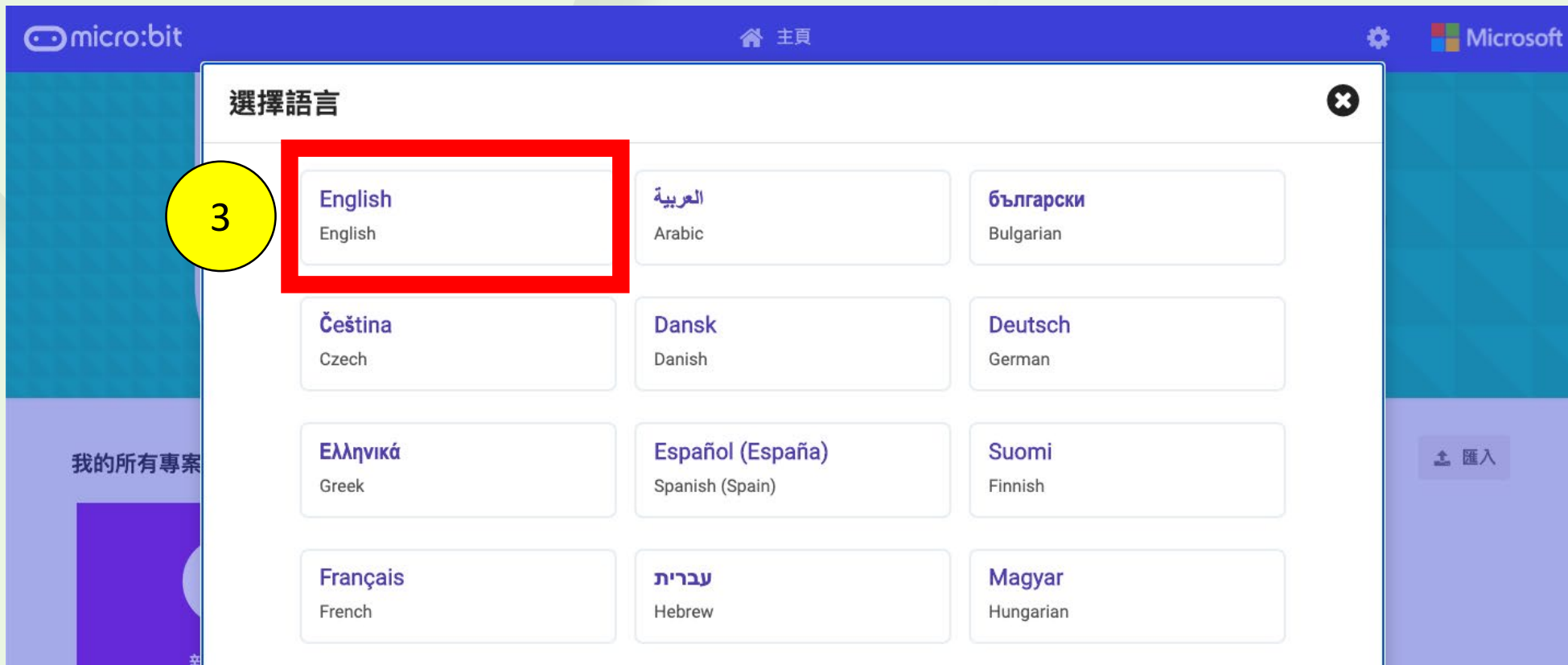
1. Click



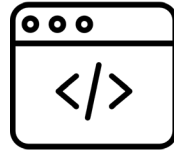
2. Click

語言

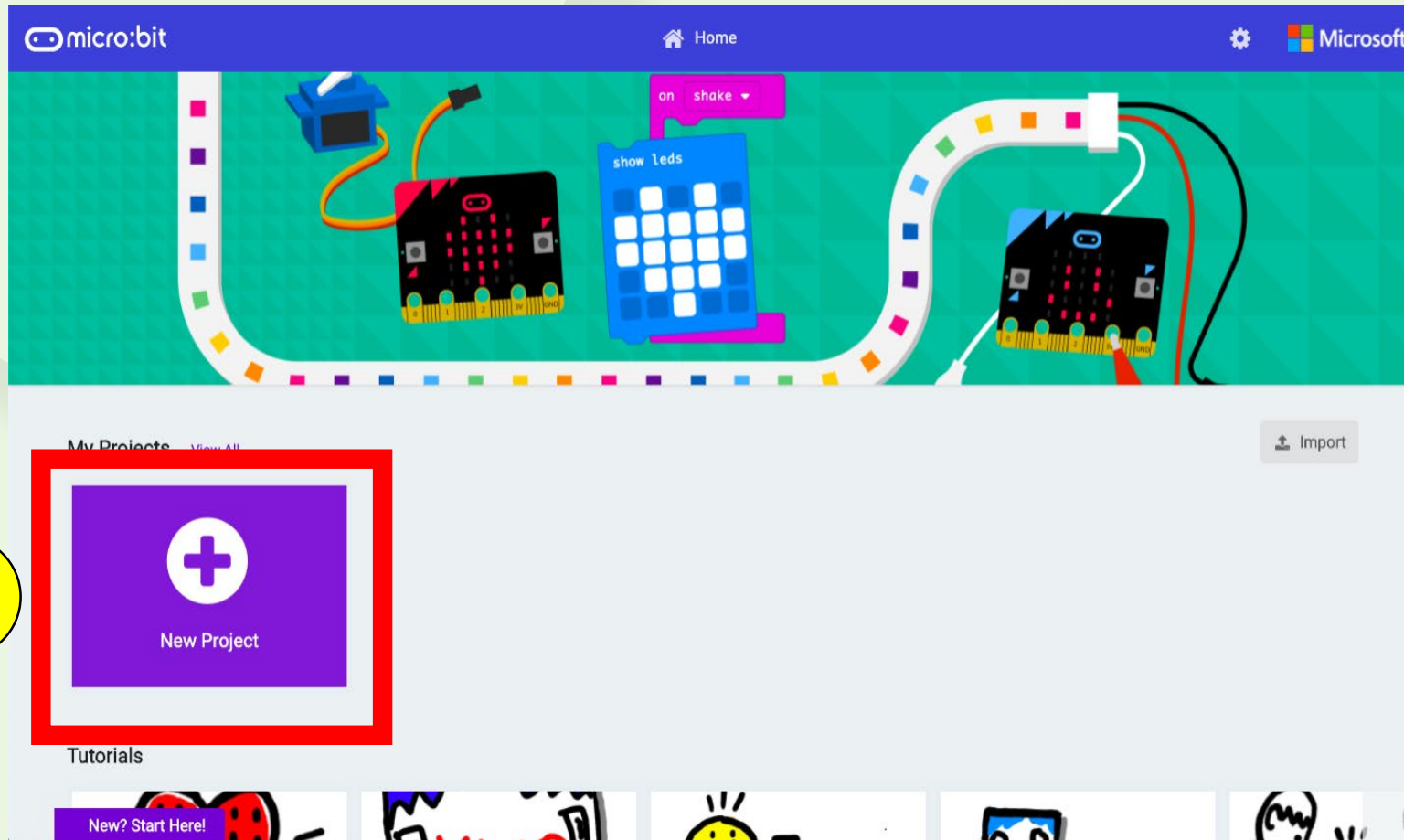
English must be set as the language, otherwise the program may fail.



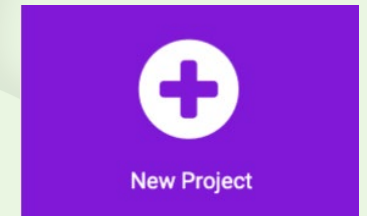
3. Click English

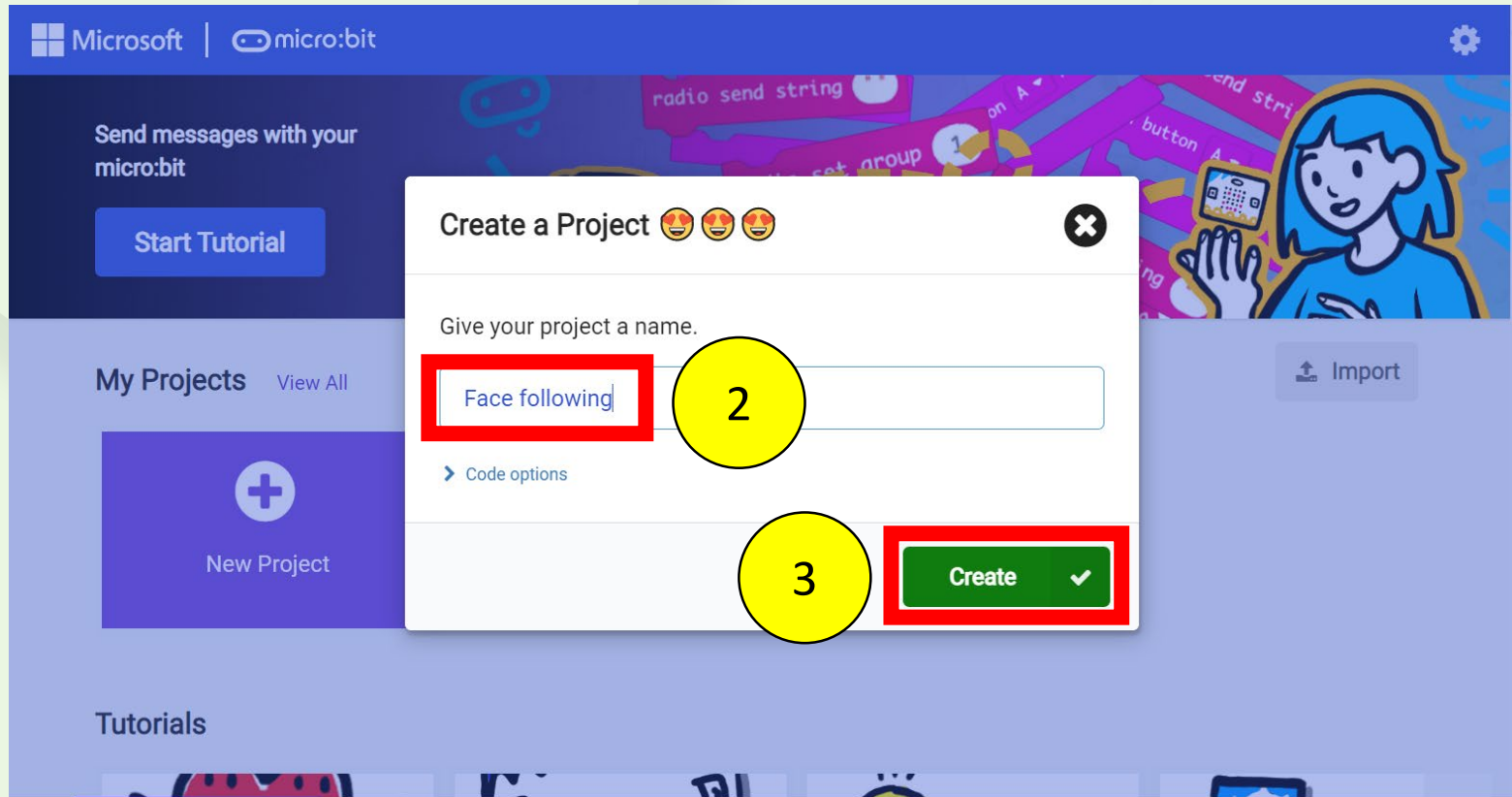


New Project



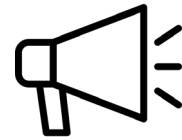
1. Click New Project



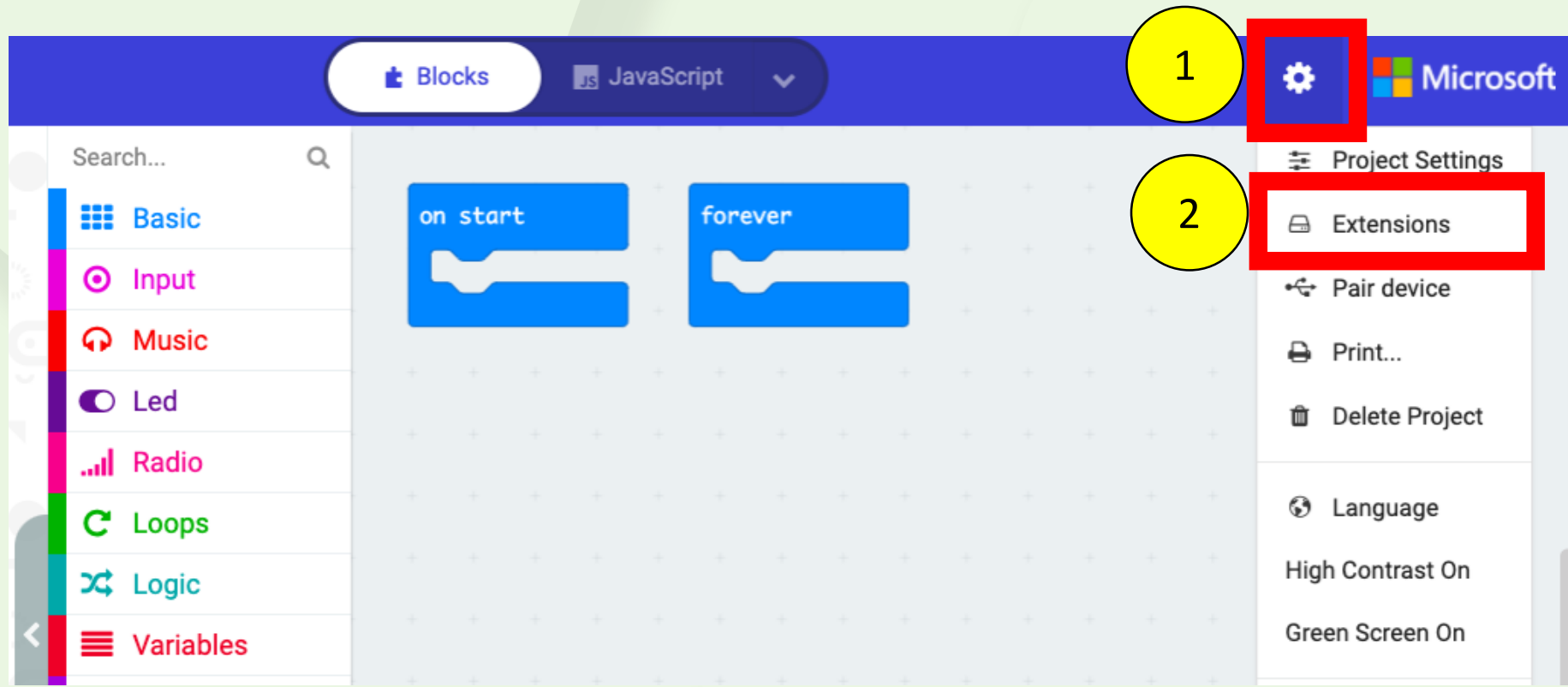


2. Enter “Face following”

3. Click 



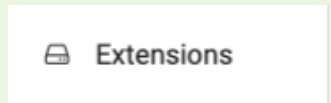
Prepare CUHK-JC-iCar Extension

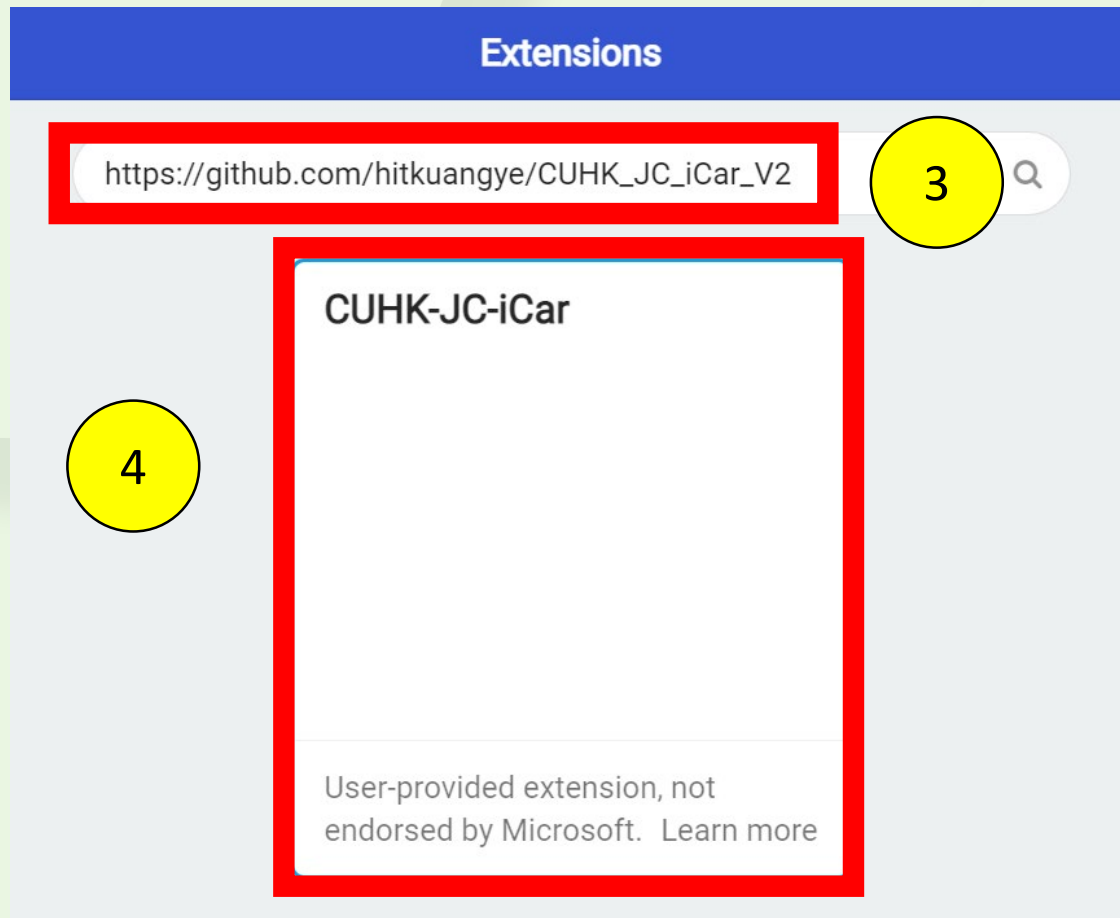


1. Click

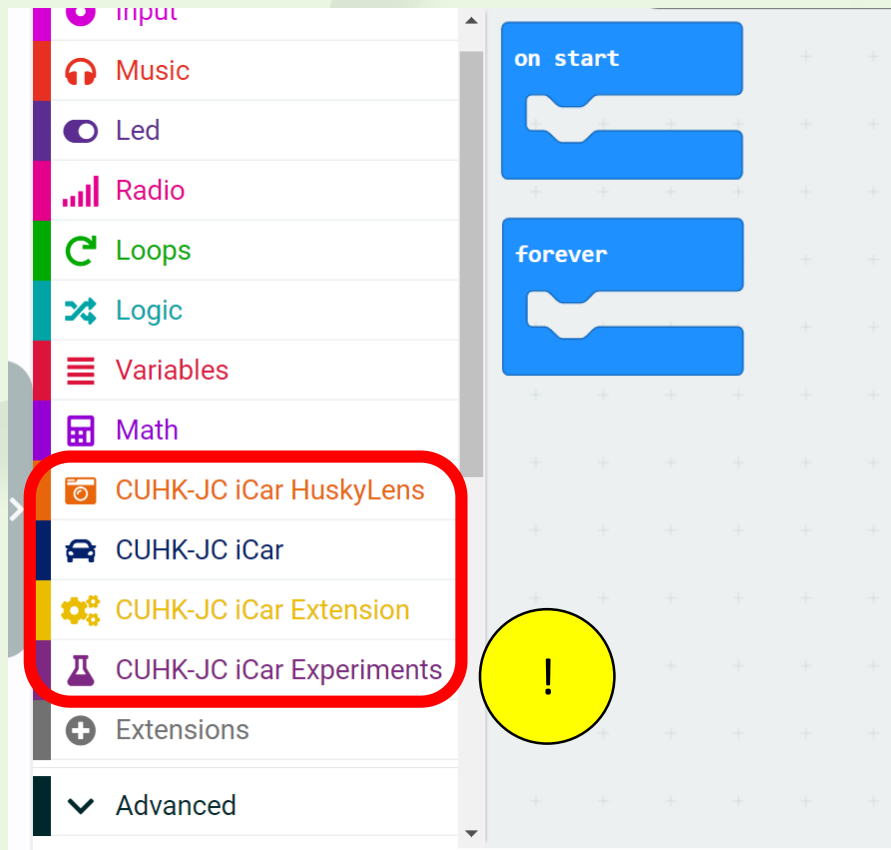


2. Click





3. Paste the following link
https://github.com/hitkuangye/CUHK_JC_iCar_V2
4. Click CUHK-JC-iCar extension



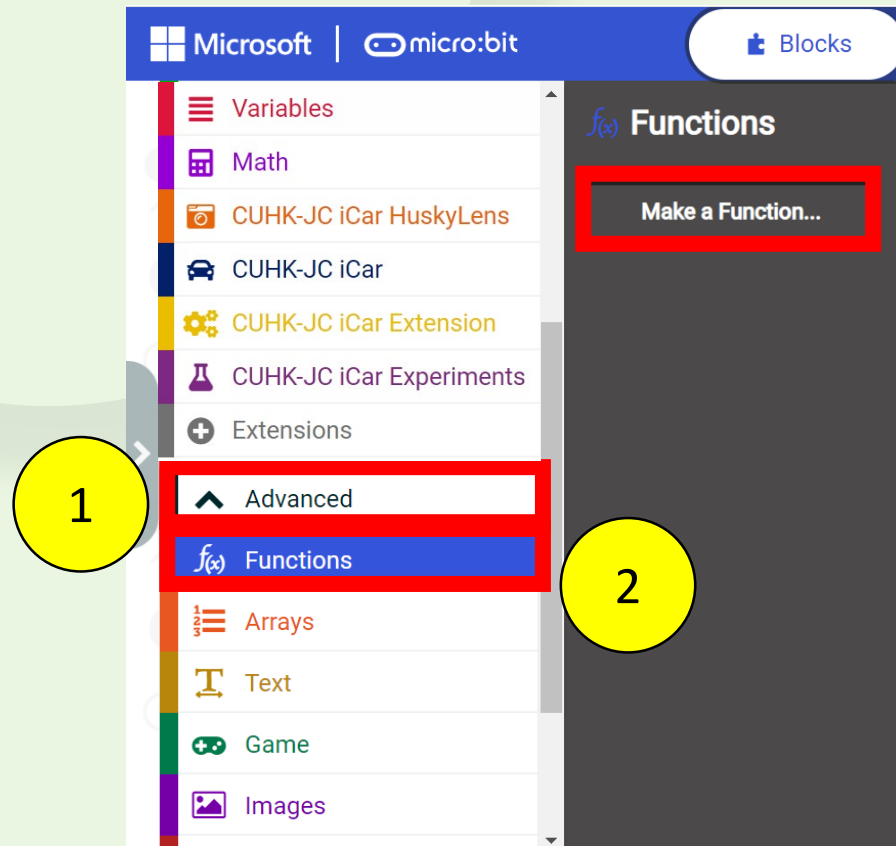
Extensions are included!

Introduction To micro:bit



Before we start programming, let's learn more about micro:bit!

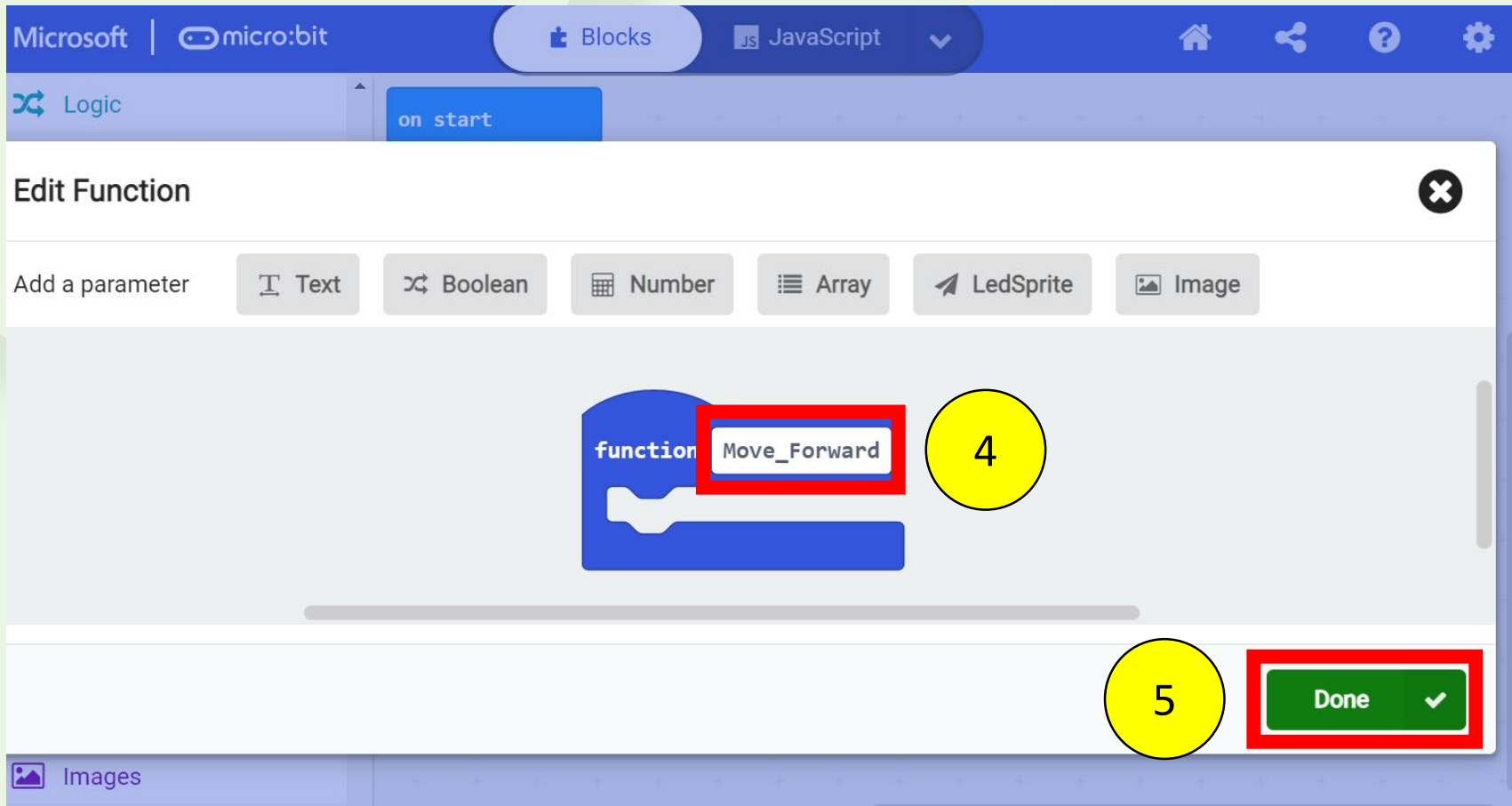
Functions Modules



1. Scroll to the bottom of module list and click **Advanced**

2. Click **Functions**

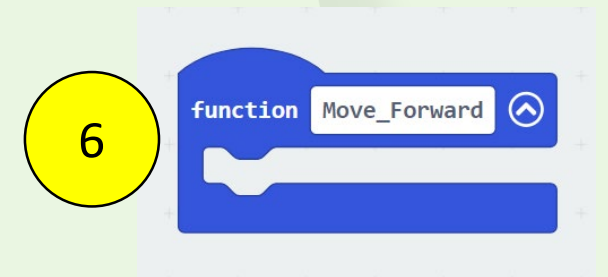
3. Click **Make a Function...**



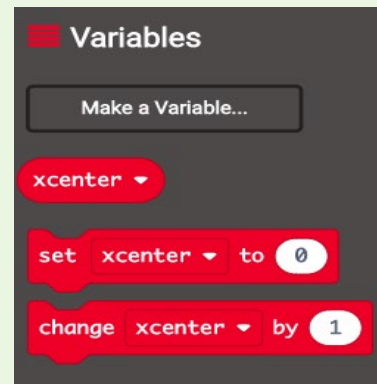
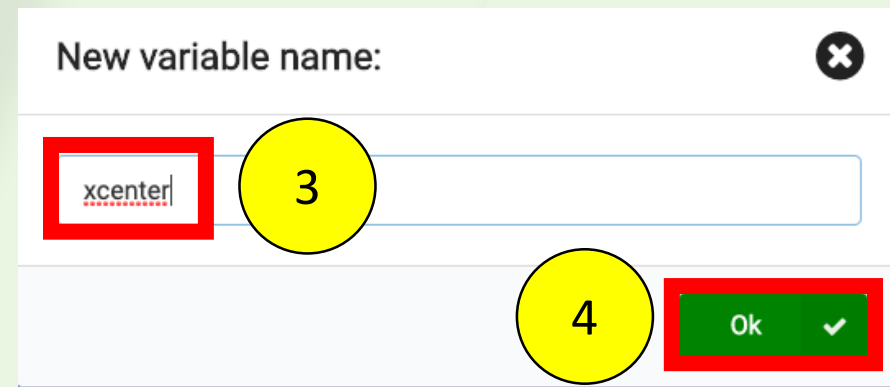
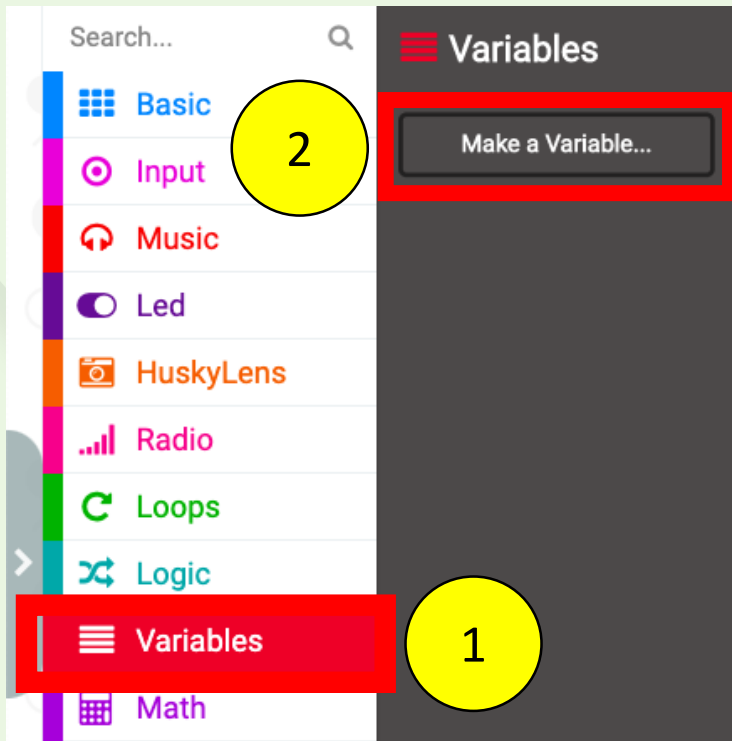
4. Name the function
"Move_Forward"


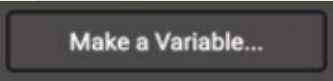
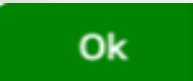
5. Click 

6. "Move_Forward"
function will appear
on the screen

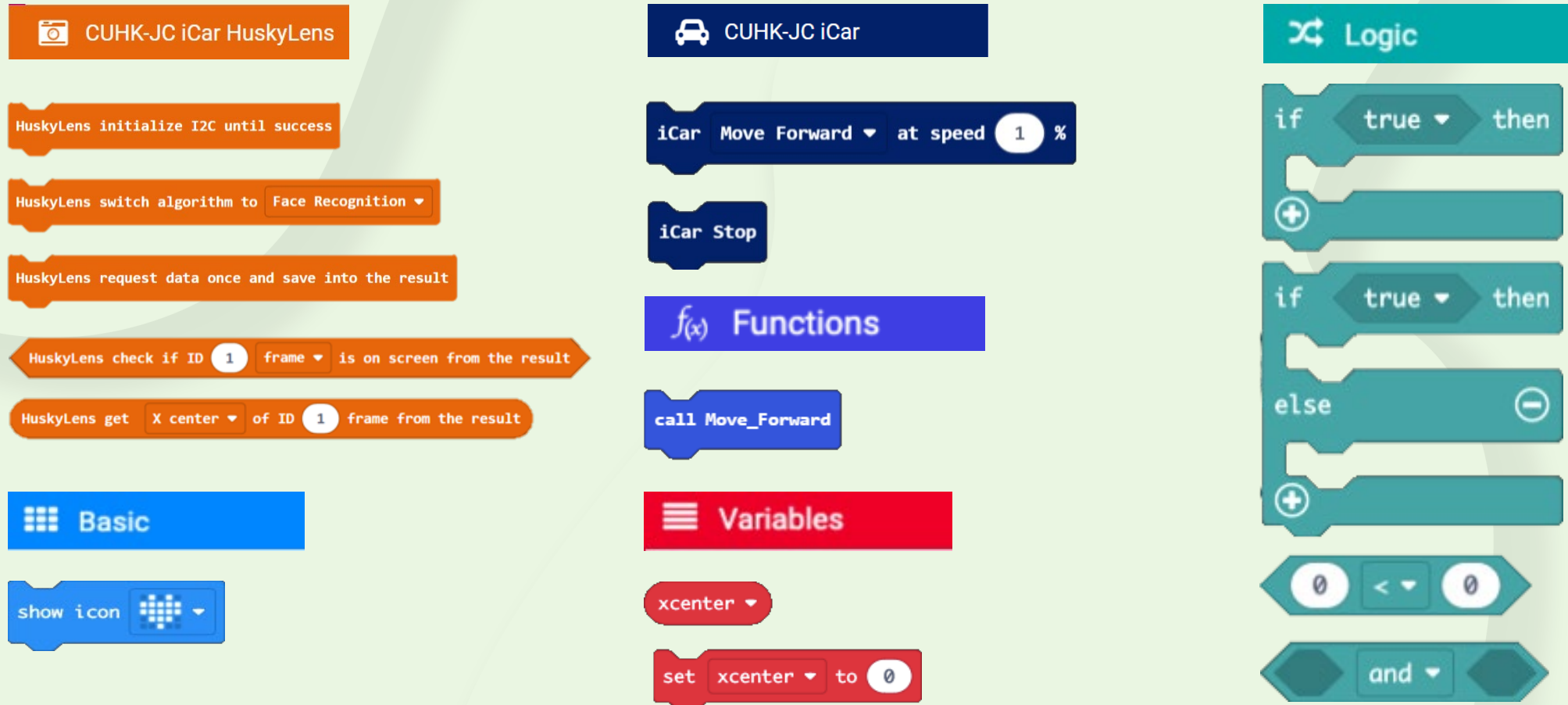


Variables Modules



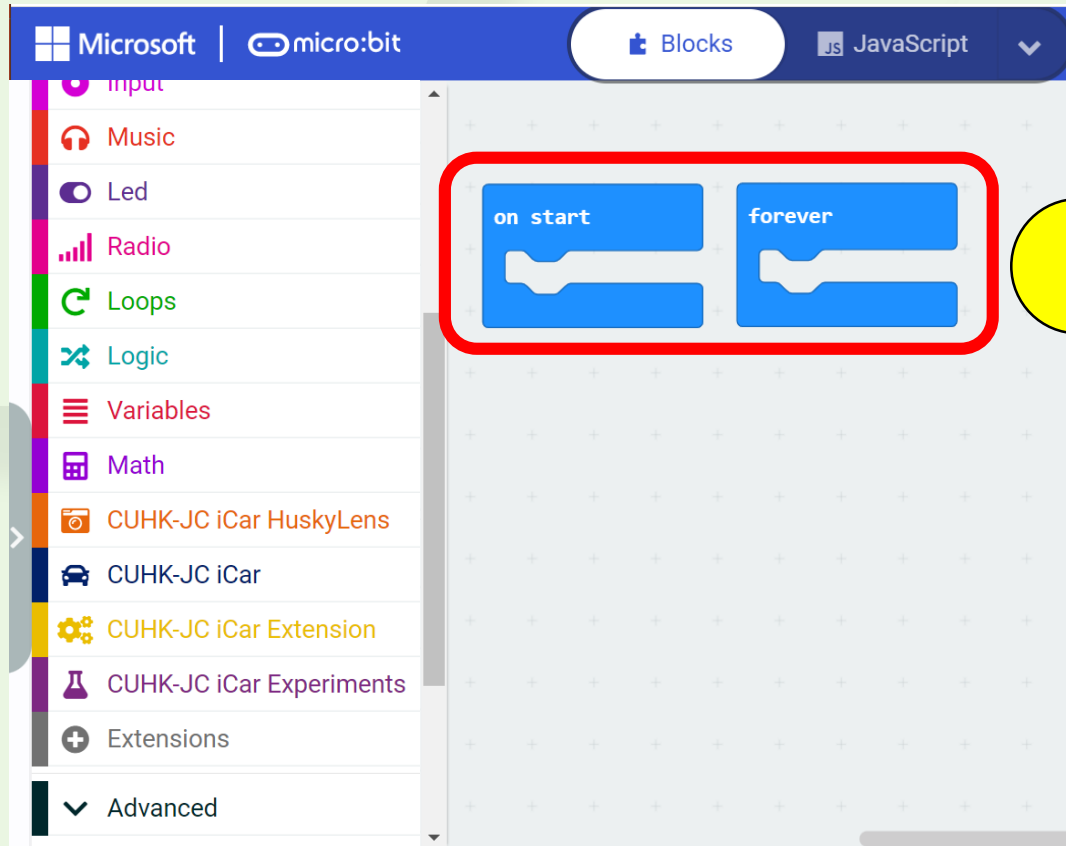
1. Click 
2. Click 
3. Name the variable "xcenter"
4. Click 
5. Programming blocks related to "xcenter" will appear on the list

The Remaining Modules





Let's start coding!

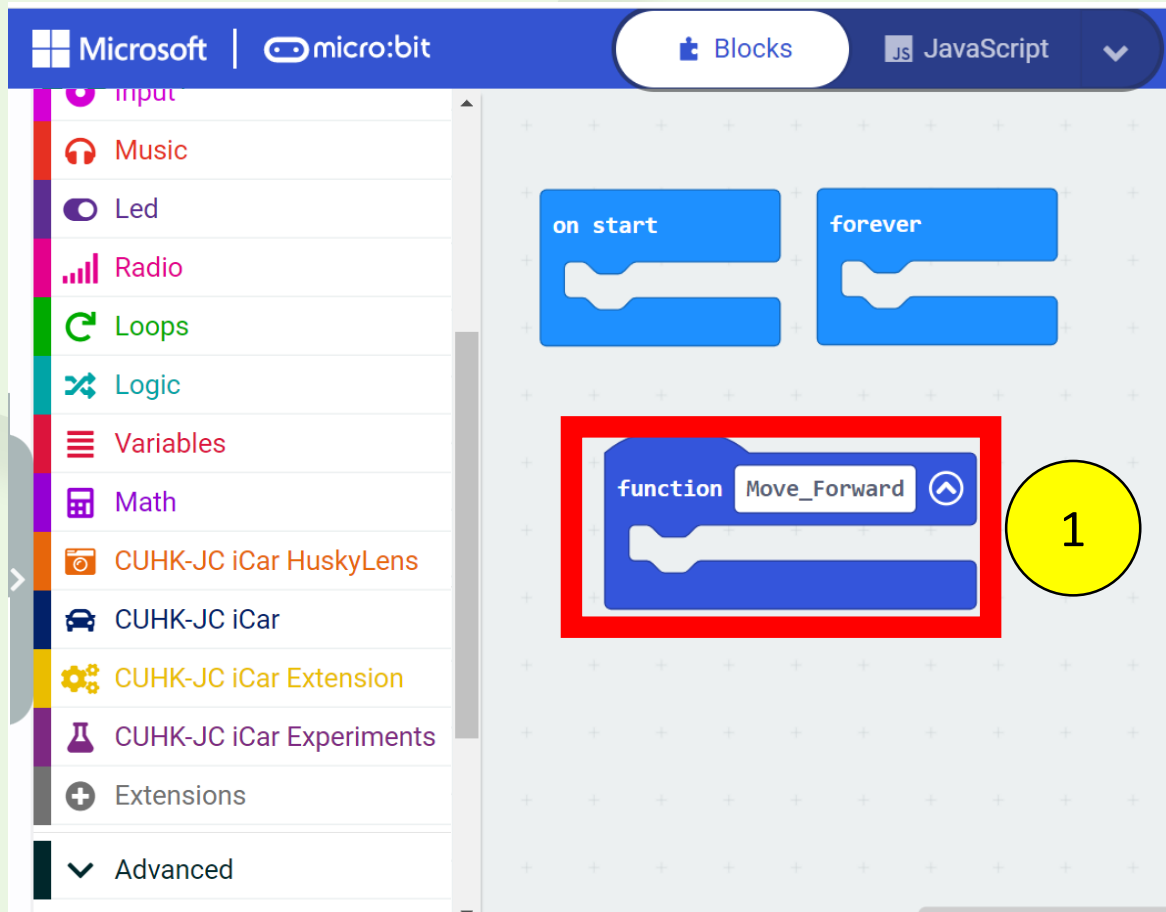


The program will pre-set “on start” and “forever” at the beginning.

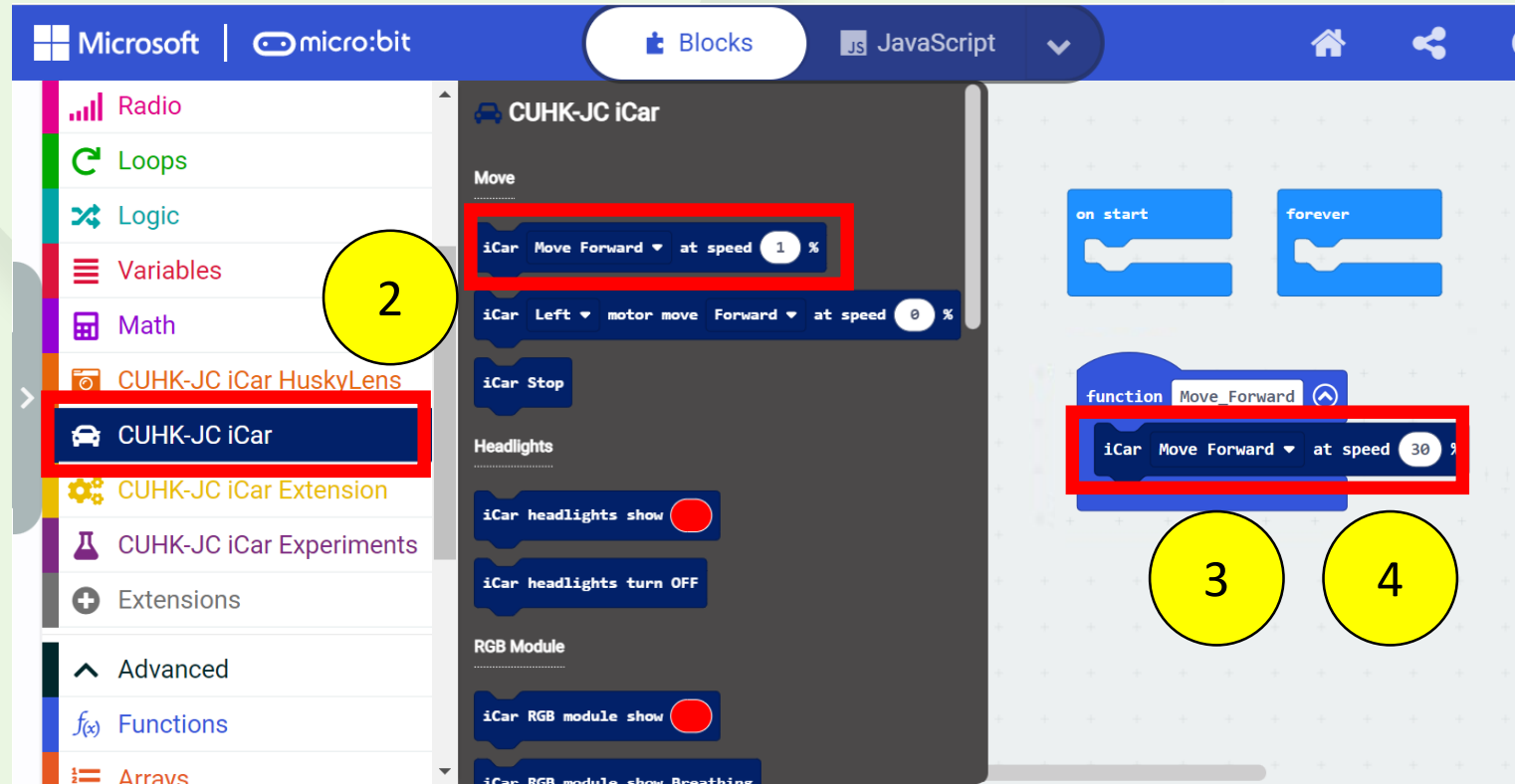
We can ignore them for now.
Please don't delete!

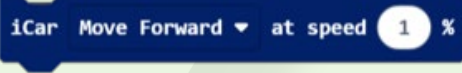
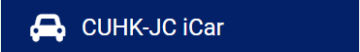


Step 1: Adding The “Move_Forward” Function



1. Add “Move_Forward” function



2. Drag  from  into "Move_Foward" function

3. Inside  set to "Move Forward"

4. Inside  set the speed to "30"



Step 2: Adding The “Turn_Left” Function

The screenshot shows the Microsoft micro:bit Blocks editor interface. On the left, a sidebar lists various categories: Input, Music, Led, Radio, Loops, Logic, Variables, Math, CUHK-JC iCar HuskyLens, CUHK-JC iCar, CUHK-JC iCar Extension, CUHK-JC iCar Experiments, Extensions, and Advanced. The main workspace contains a script starting with an 'on start' block followed by a 'forever' loop. Inside the loop, there is a 'function Move_Forward' block with the code 'iCar Move Forward at speed 30 %'. To the right of this, a new 'function Turn_Left' block is being added, highlighted with a red rectangular border. A yellow circle with the number '1' is positioned to the right of the 'Turn_Left' block, indicating the first step in the process.

1. Add “Turn_Left” function

1



2. Drag **iCar Move Forward** at speed 1 %
from **CUHK-JC iCar**
into "Turn_Left" function

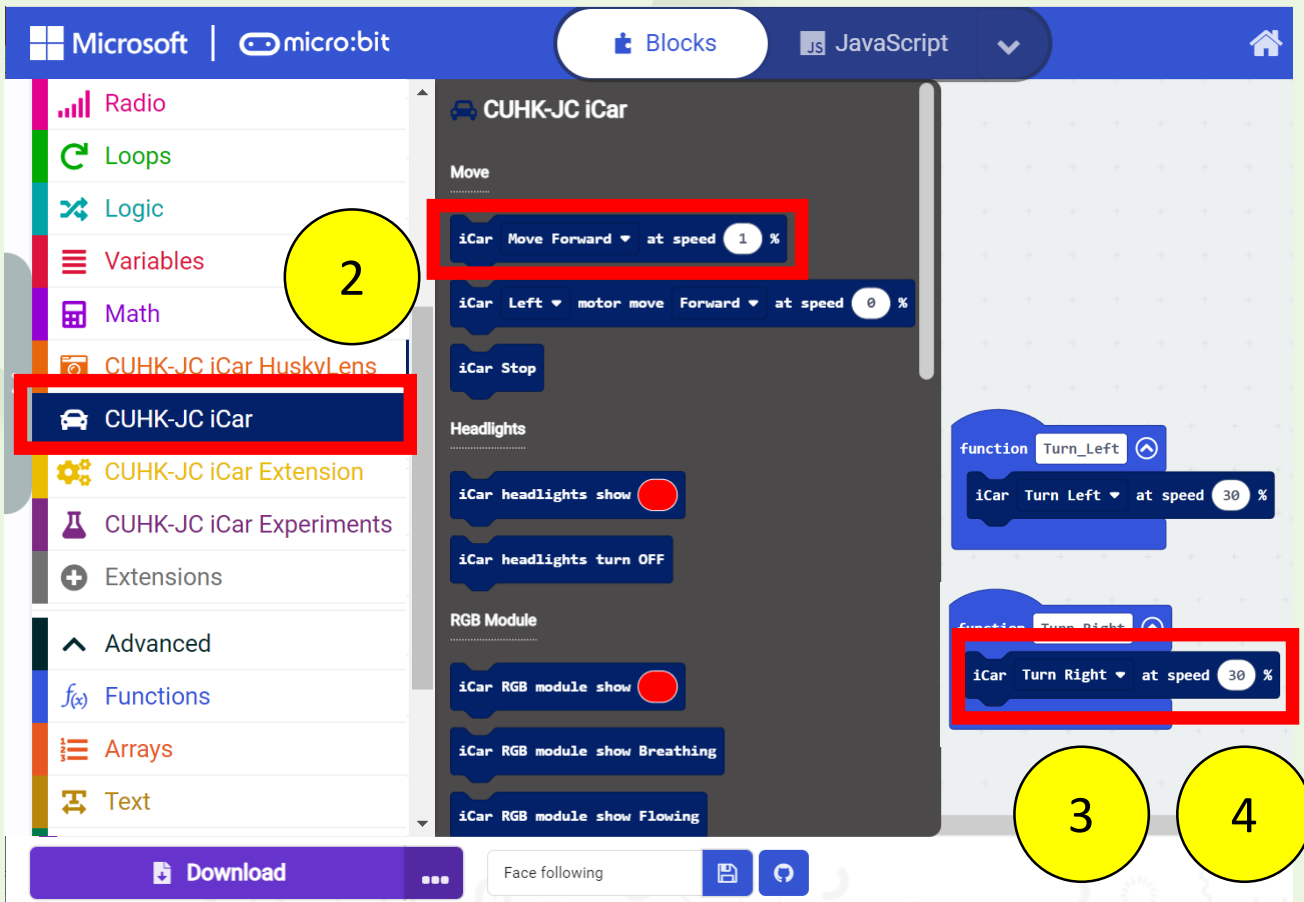
3. Inside **iCar Move Forward** at speed 1 %
set to "Turn Left"

4. Inside **iCar Move Forward** at speed 1 %
set the speed to "30"



Step 3: Adding The “Turn_Right” Function

1. Add “Turn_Right” function



2. Drag 
from 
into "Turn_Right" function

3. Inside 
set to "Turn Right"

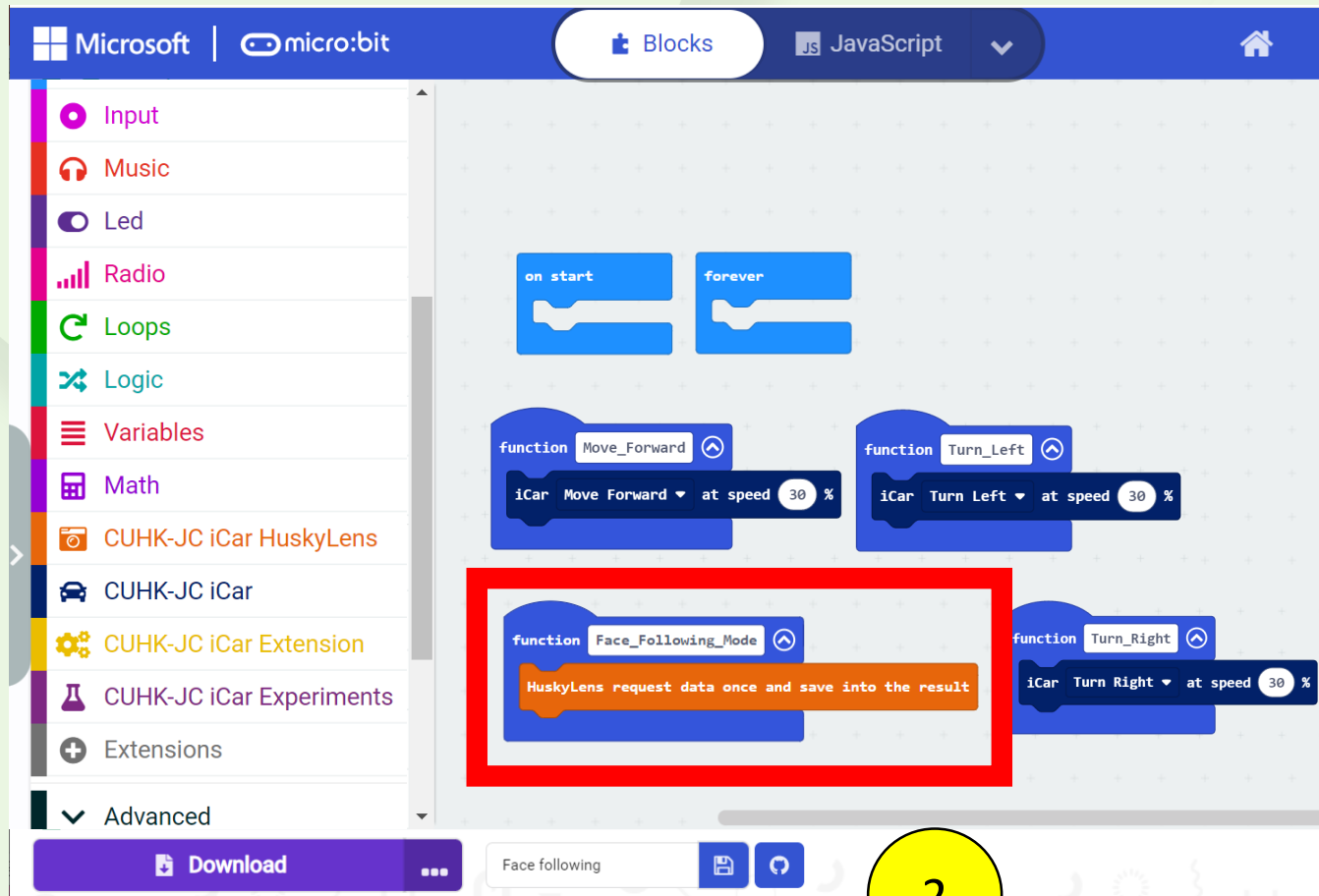
4. Inside 
set the speed to "30"



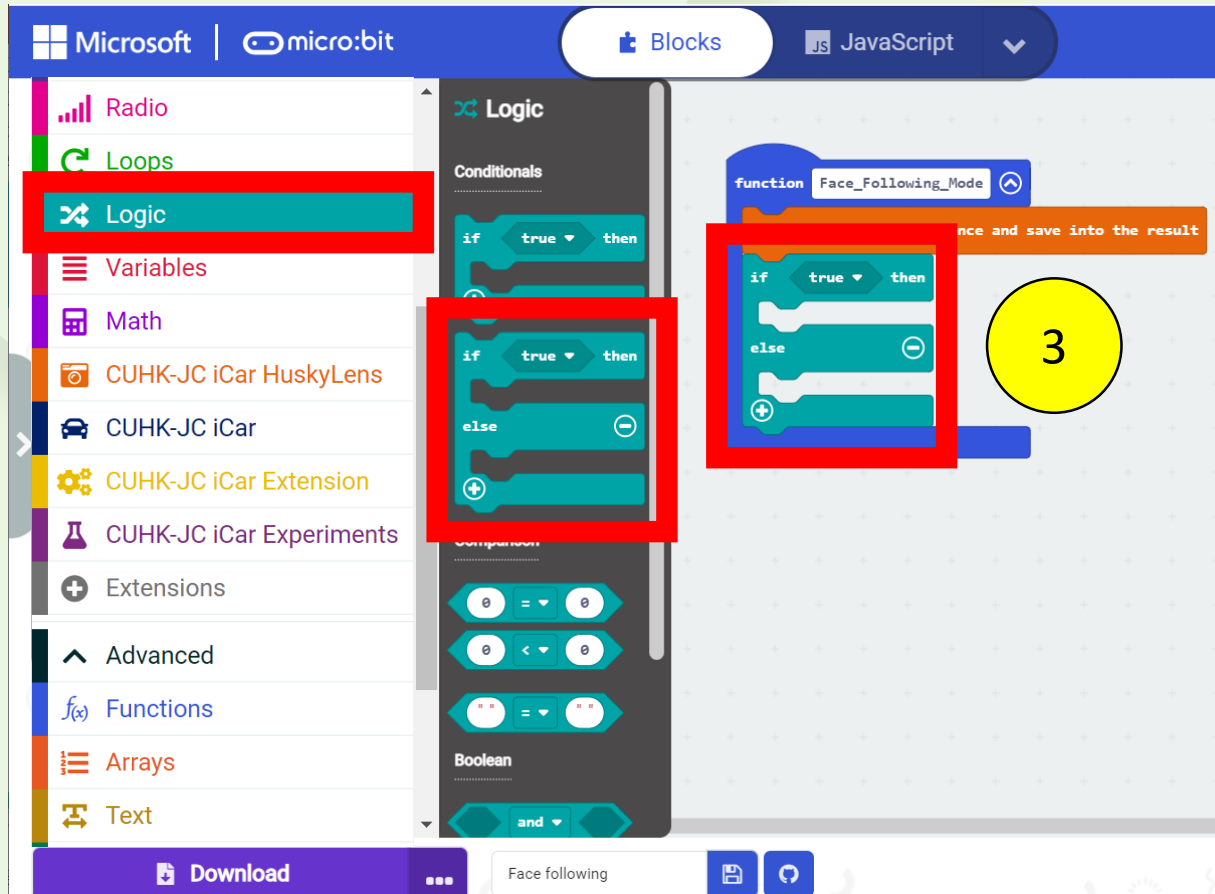
Step 4: Adding The “Face_Following_Mode” Function



1. Add “Face_Following_Mode” function



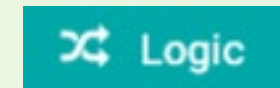
2. Drag HuskyLens request data once and save into the result from CUHK-JC iCar HuskyLens into "Face_Following_Mode " function



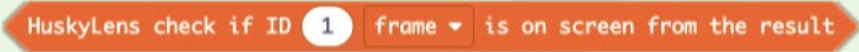

3. Drag

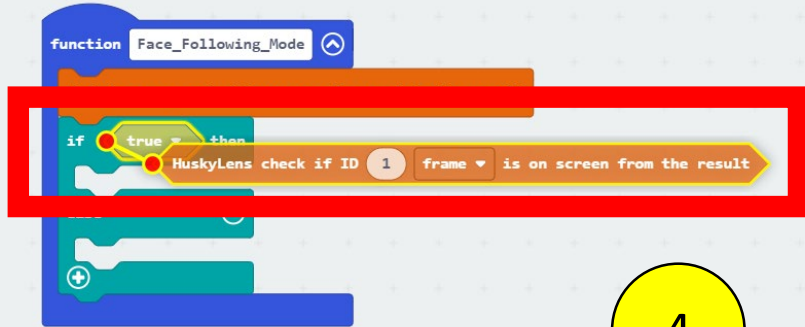


from



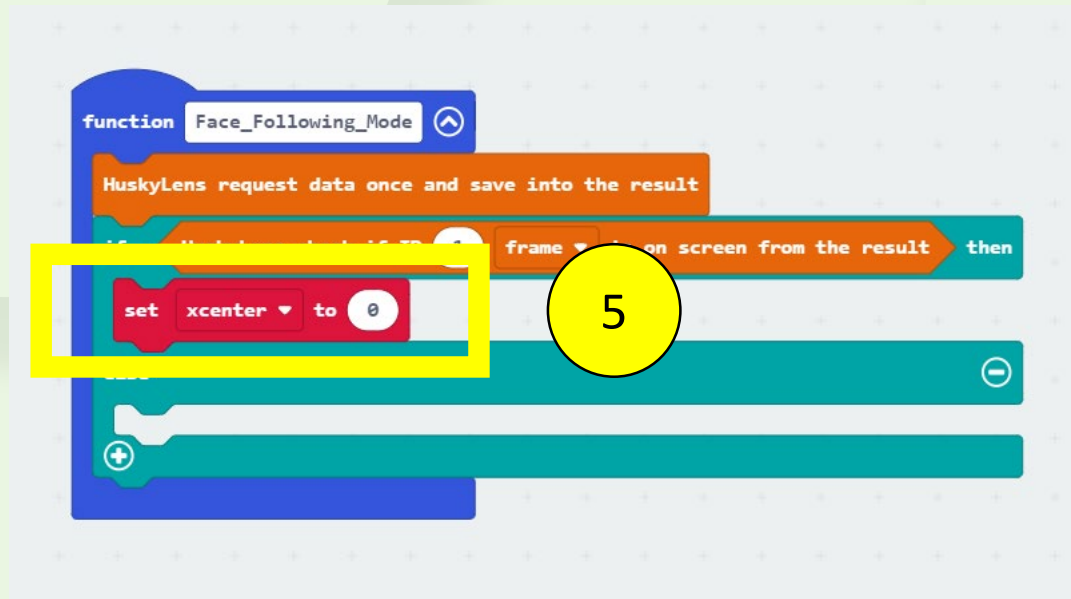
into "Face_Following_Mode" function



4. Drag  from  into "if then else"

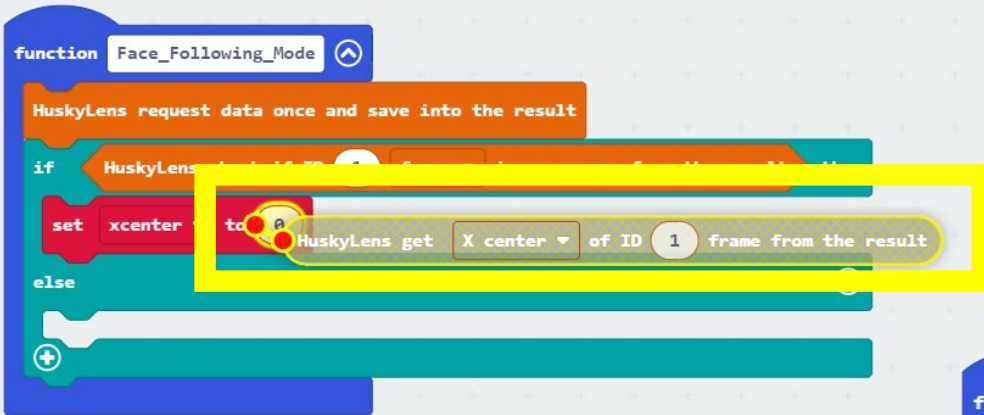


4



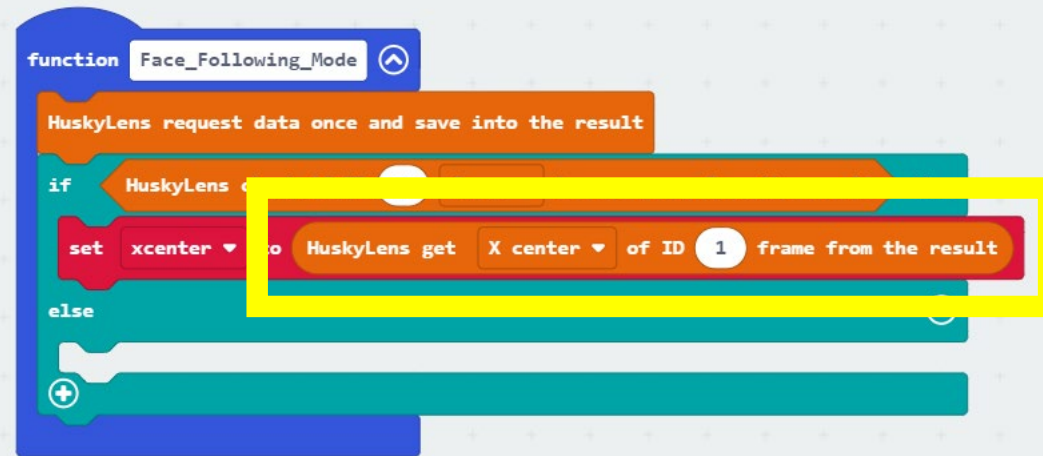


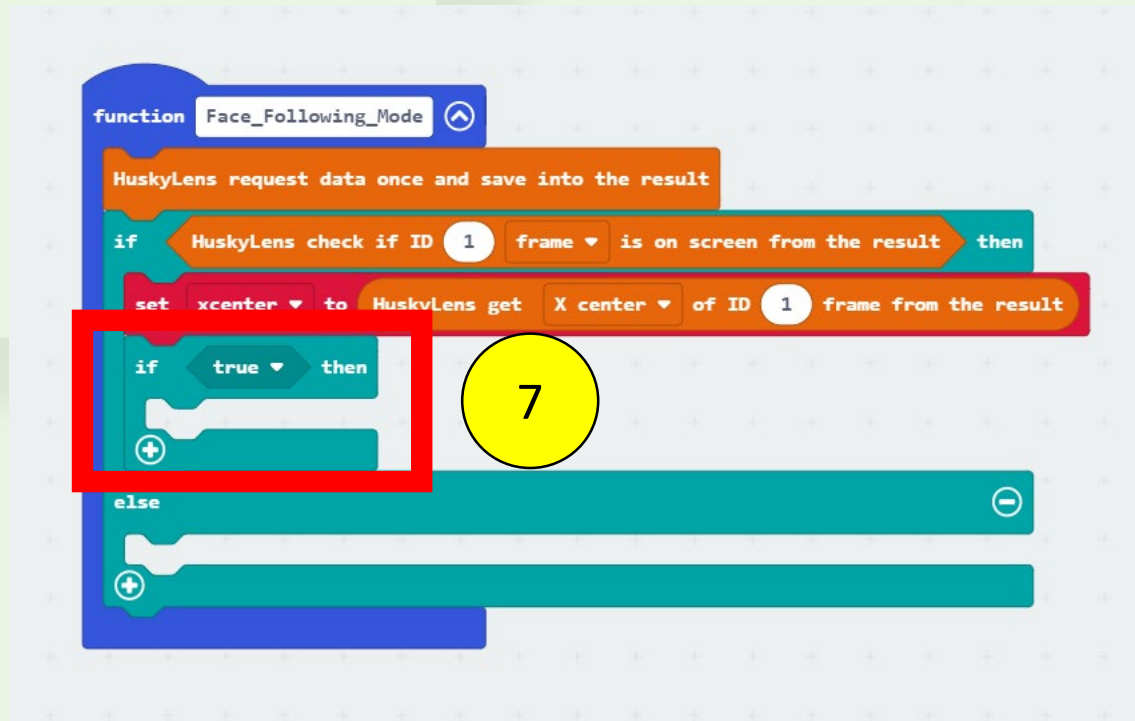
5. Drag 
from 
into "if then else"



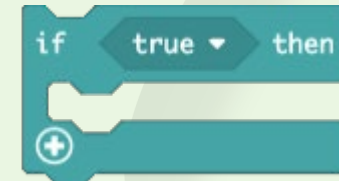
6

6. Drag **HuskyLens get X center of ID 1 frame from the result**
 from **CUHK-JC iCar HuskyLens**
 into **set xcenter to 0**

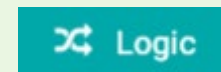




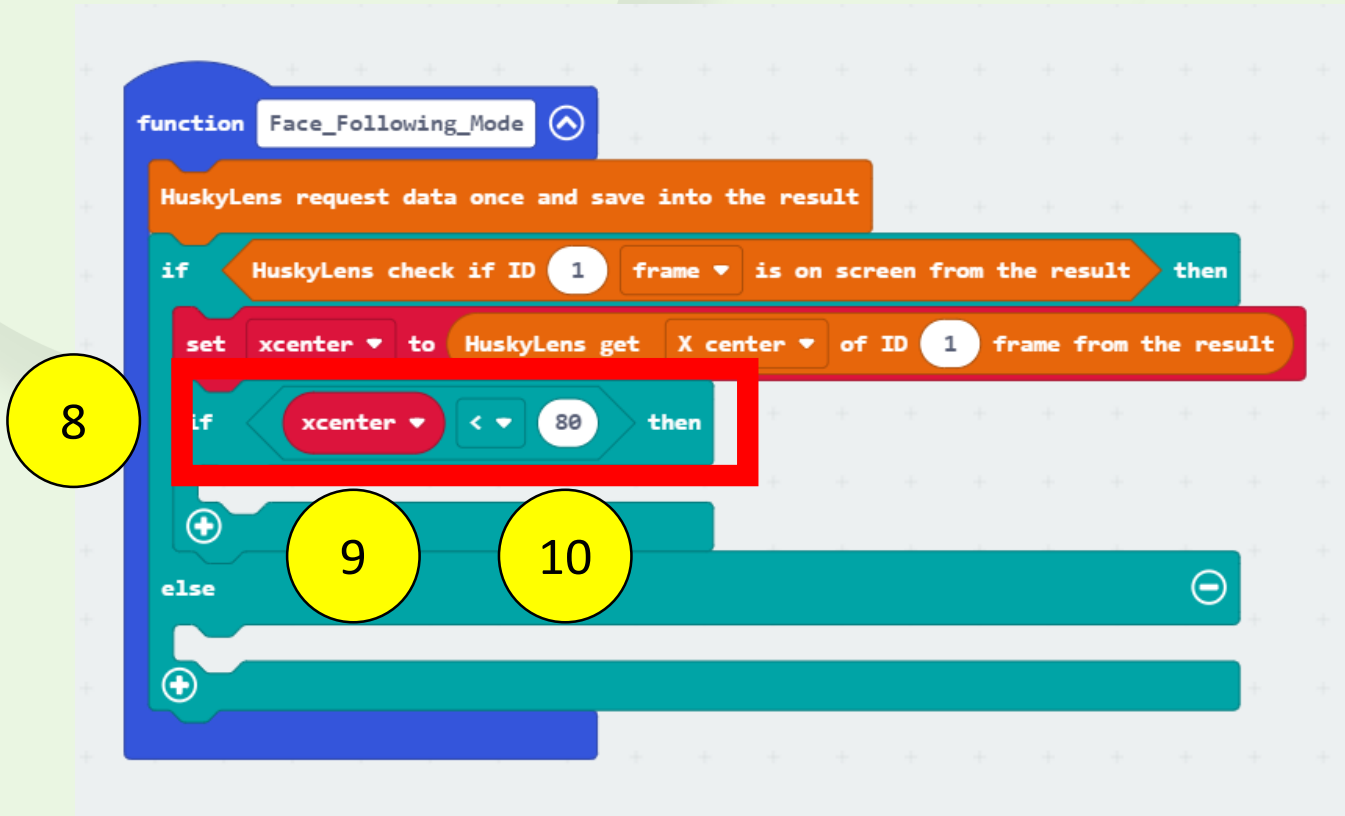
7. Drag







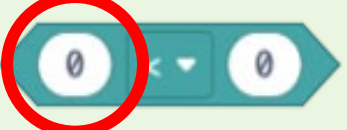
from

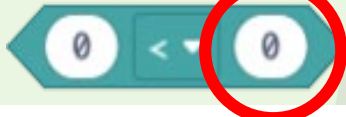


into "if then else"

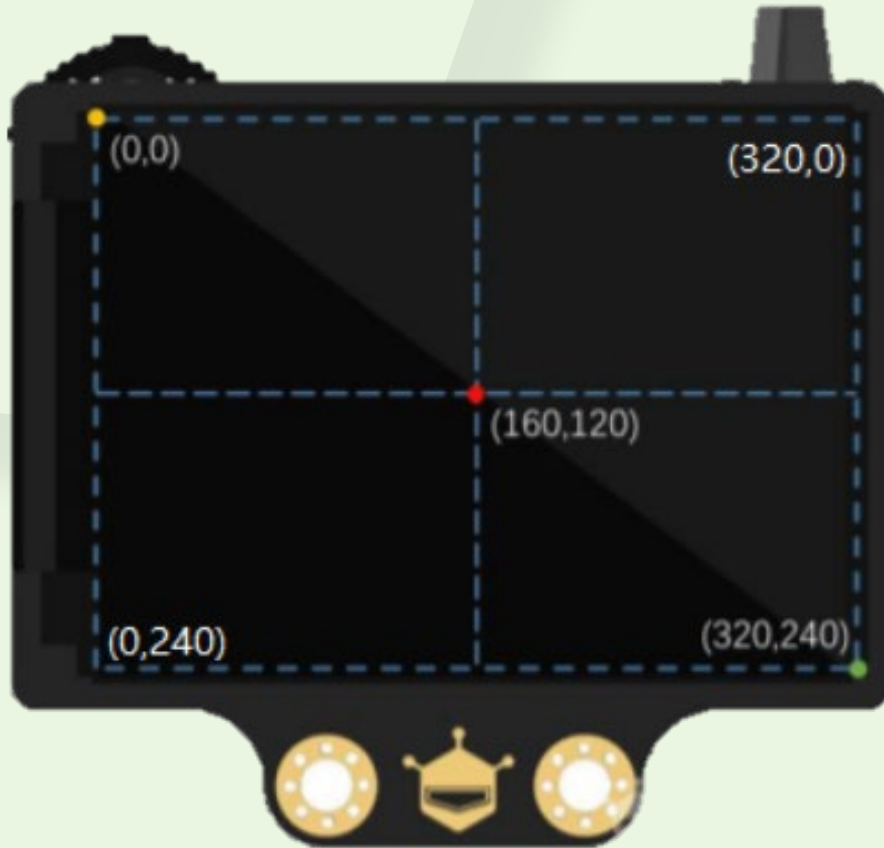


8. Drag 
from 
into "if then"

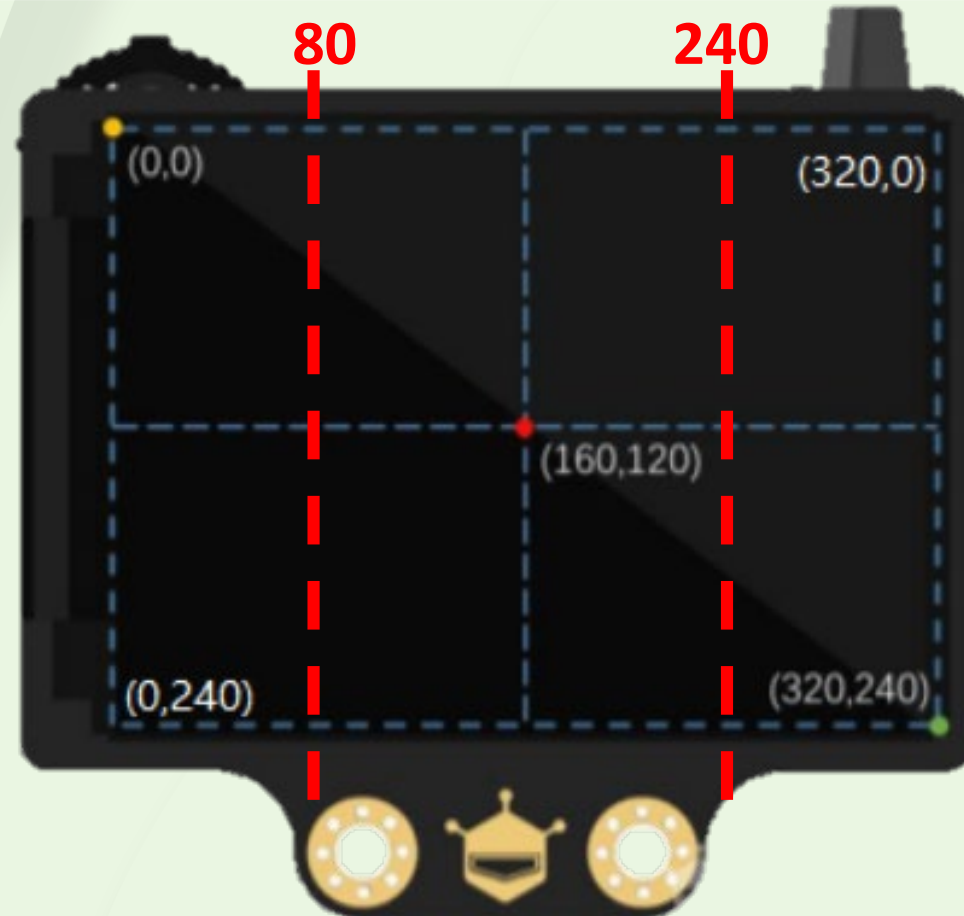
9. Drag 
from 
into 

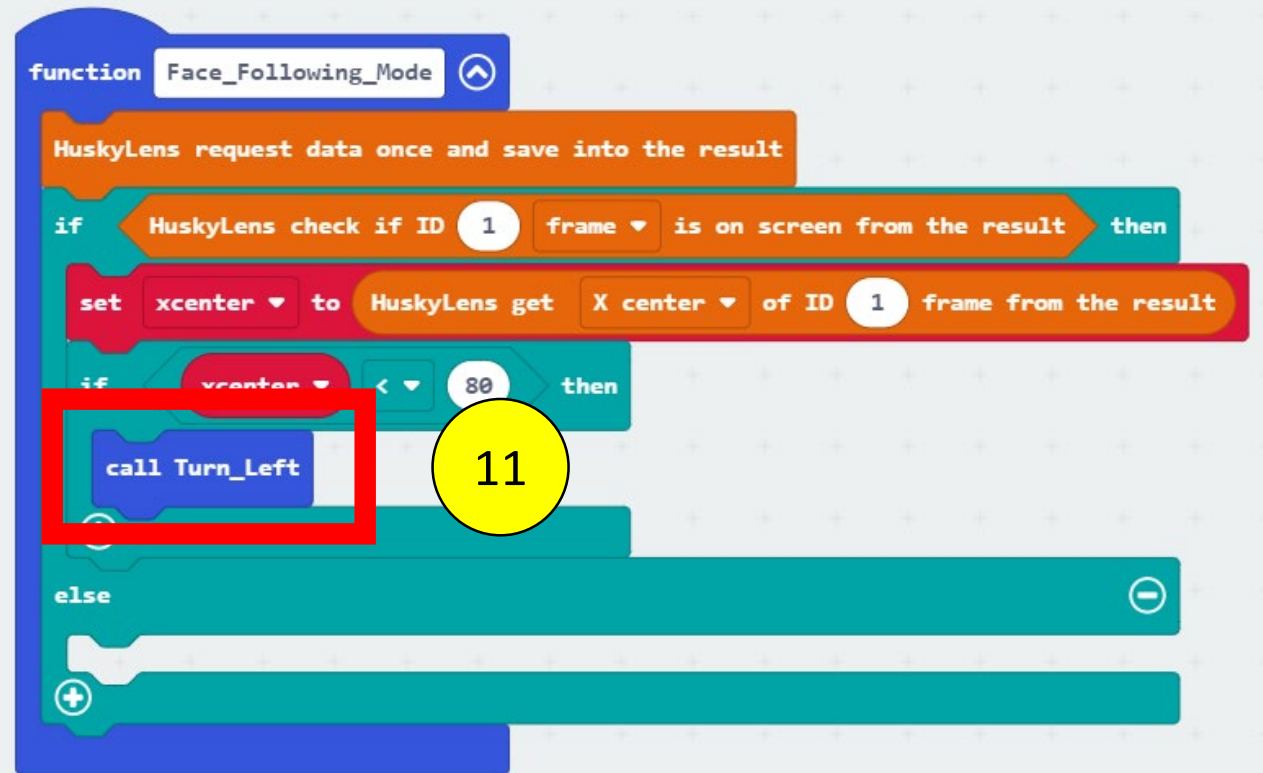
10. Inside  enter "80"

Remark: HuskyLens' coordinates

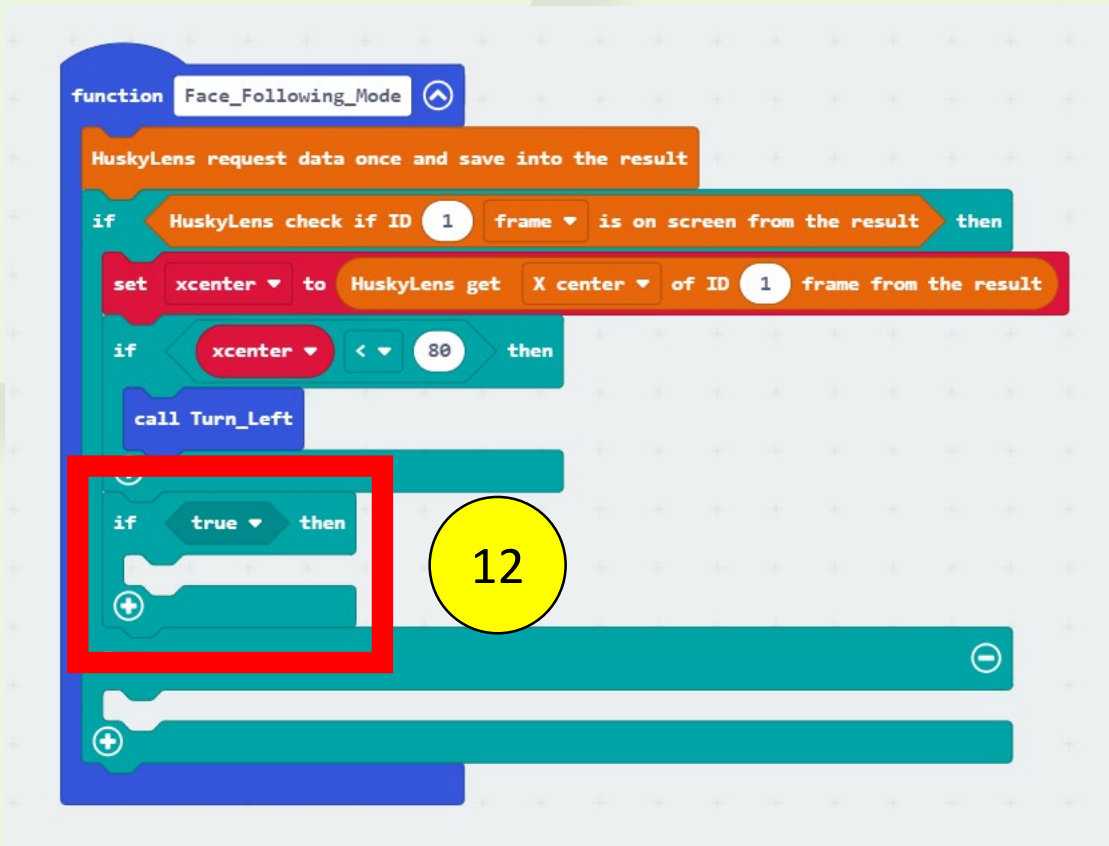


- The object's coordinates will be displayed when HuskyLens detects an object
- Format: (x, y)





11. Drag **call Turn_Left**
from **$f(x)$ Functions**
into "if then"



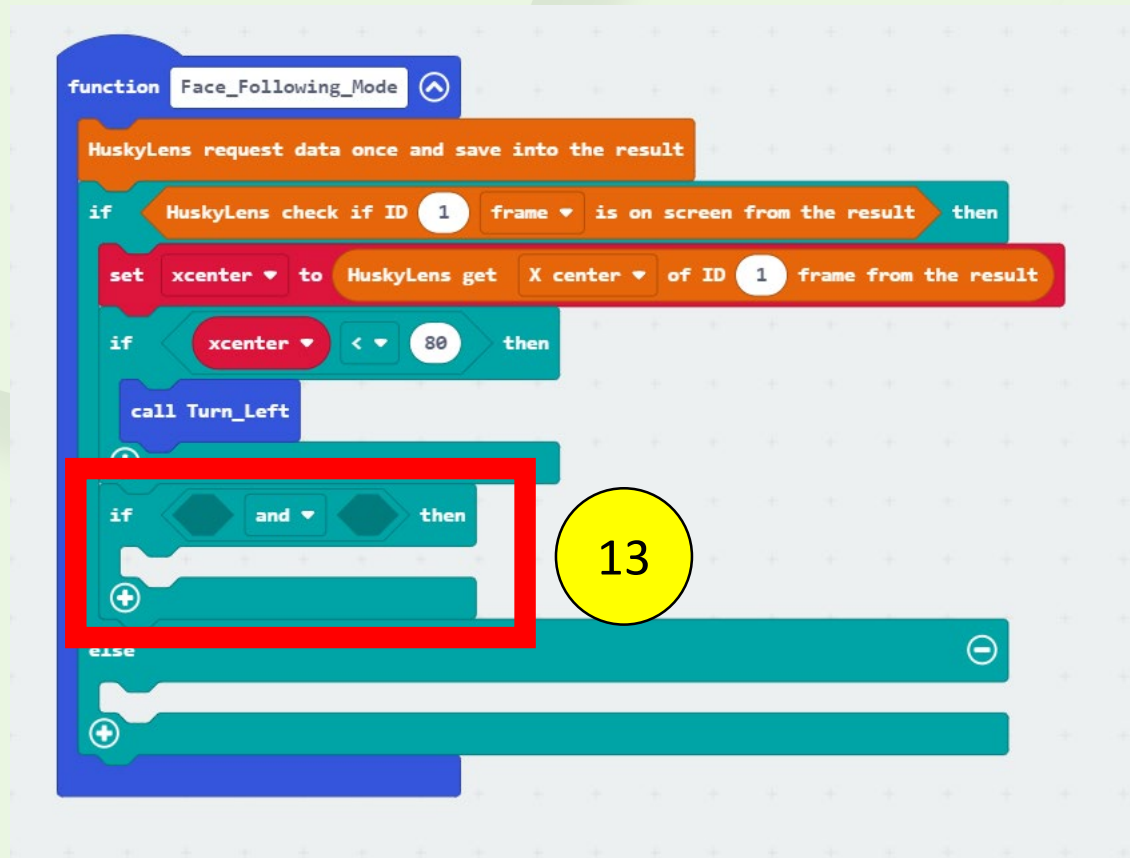
12. Drag





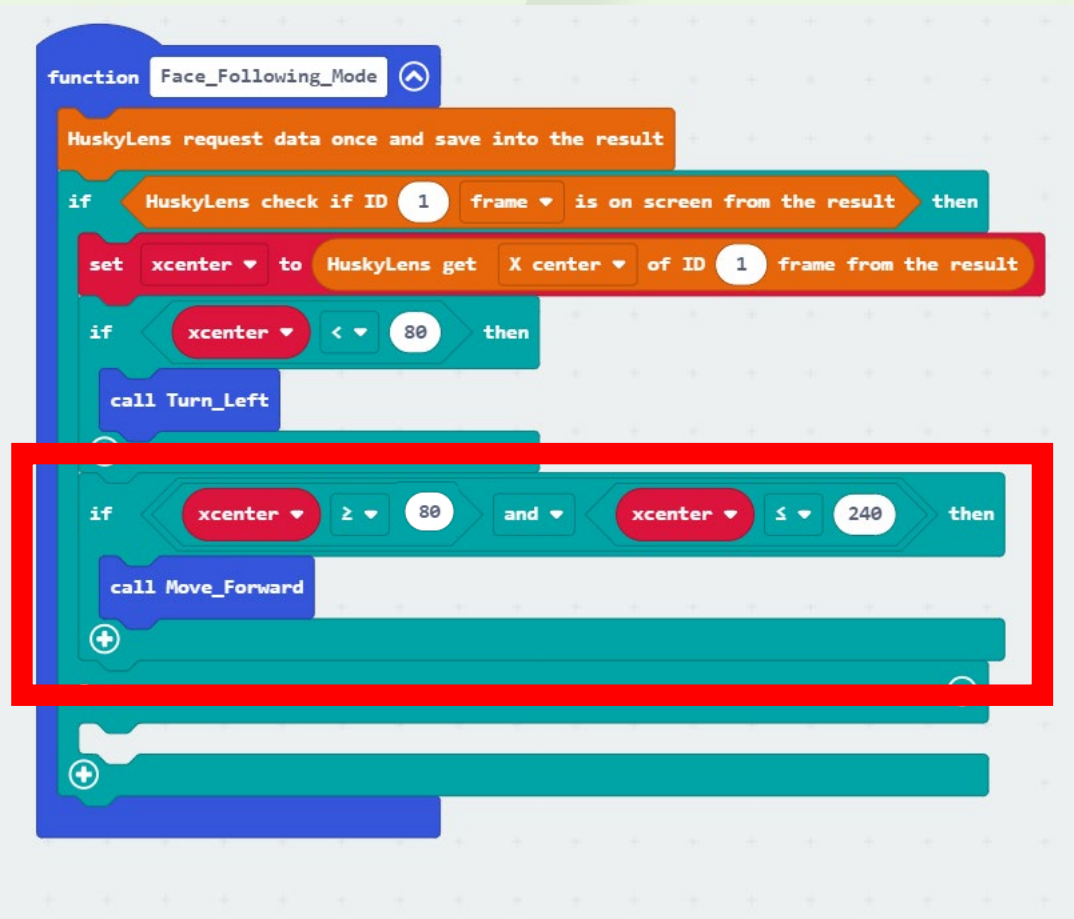
from



into "if then else"

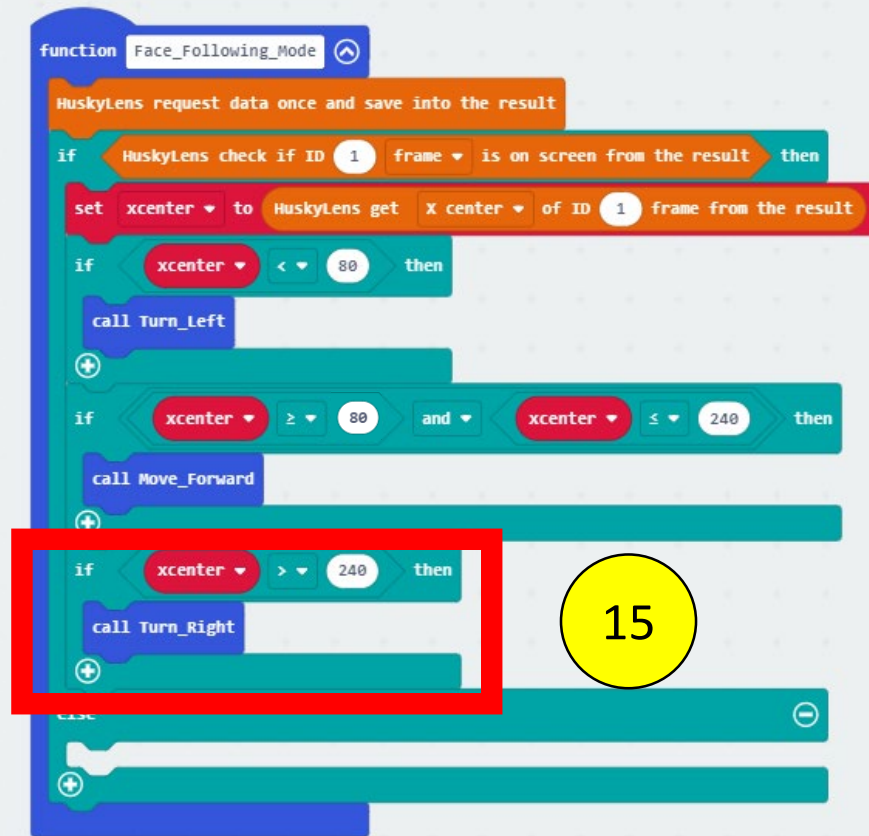


13. Drag 
from 
into "if then"

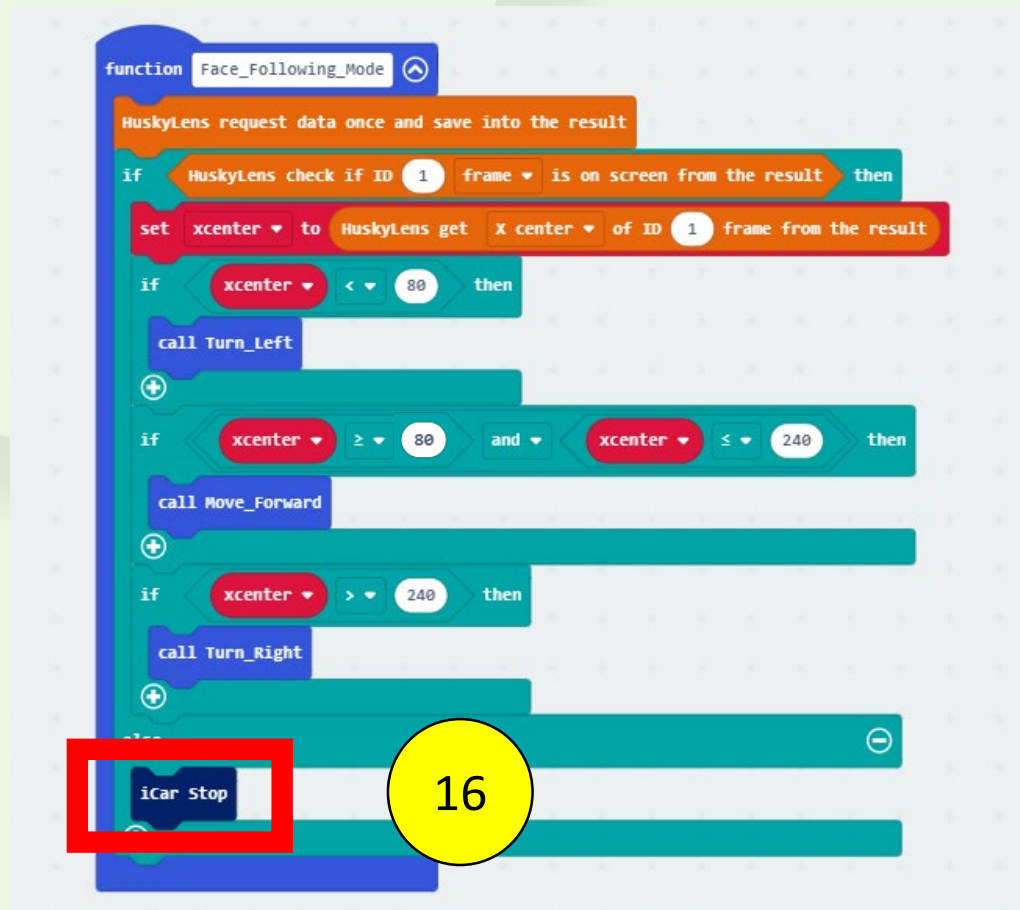


14. Set as follows

14



15. Set as follows



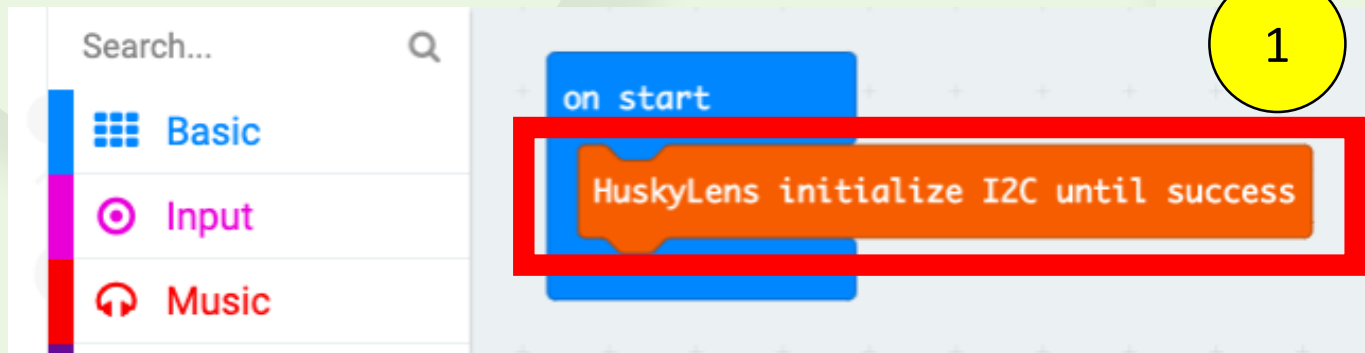
16. Drag **iCar Stop**

from **CUHK-JC iCar**

into "if then else"



Step 5: Setting Up The “on start”



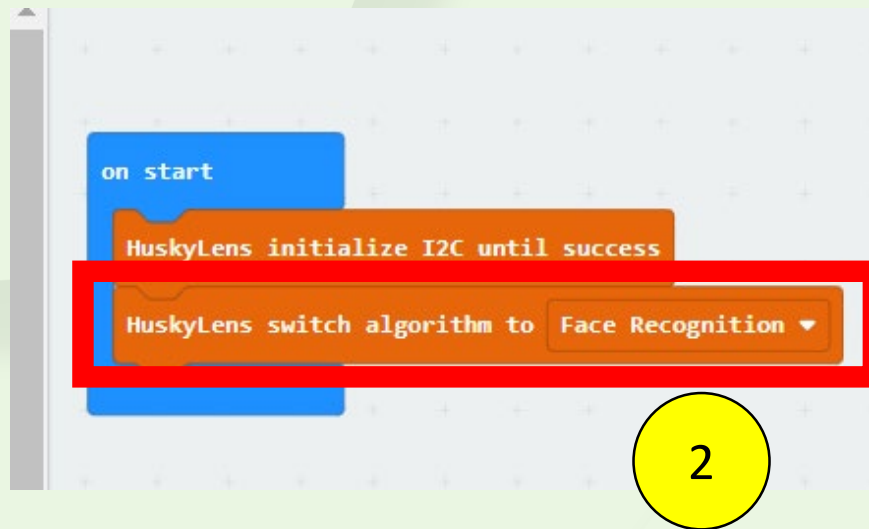
1. Drag



HuskyLens initialize I2C until success

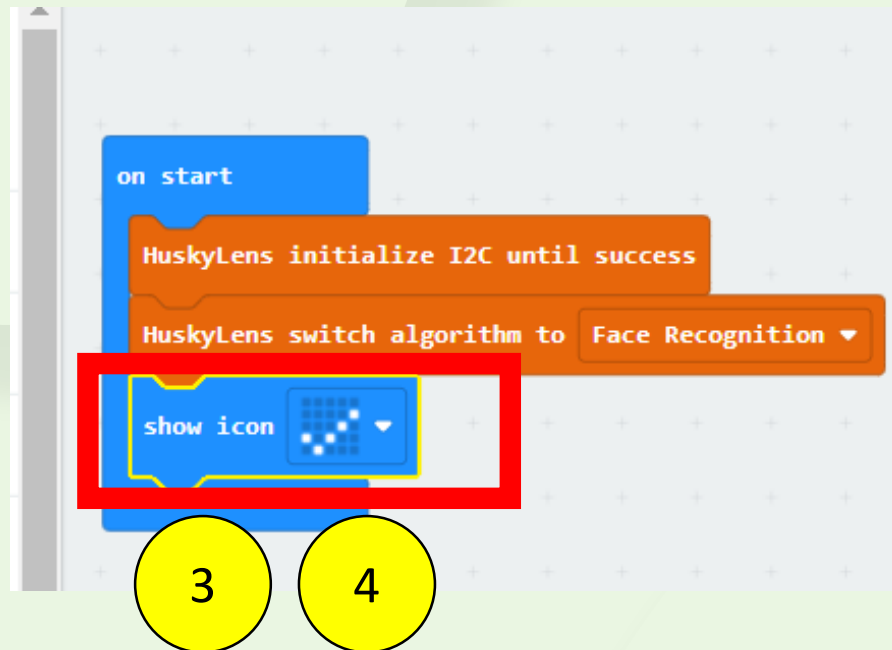
from

CUHK-JC iCar HuskyLens

into “on start”



2. Drag  from  into "on start".



3. Drag 

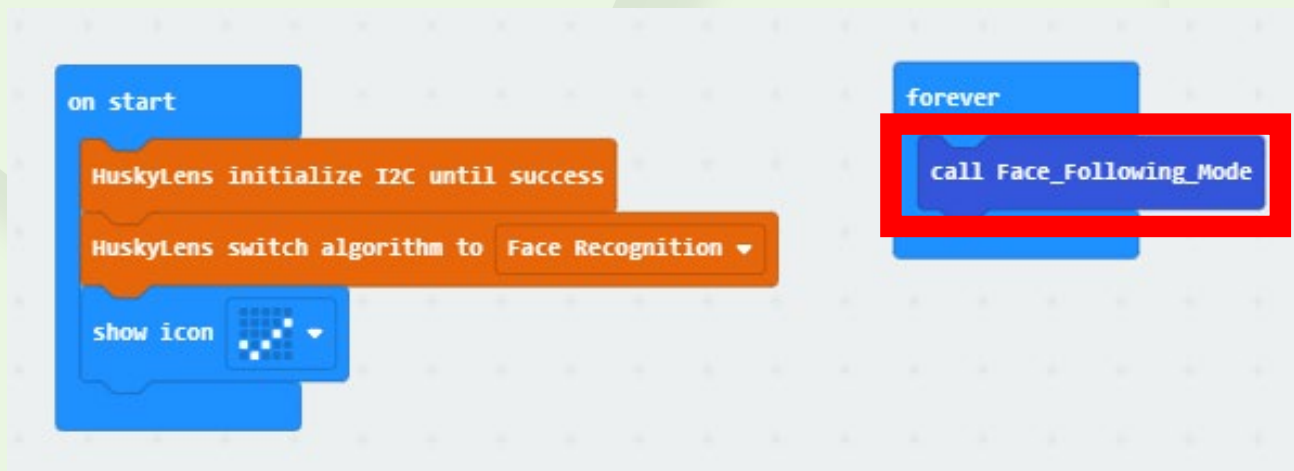
from  Basic

into "on start"

4. Click 



Step 6: Setting Up The “forever”



1. Drag

call Face_Following_Mode

from

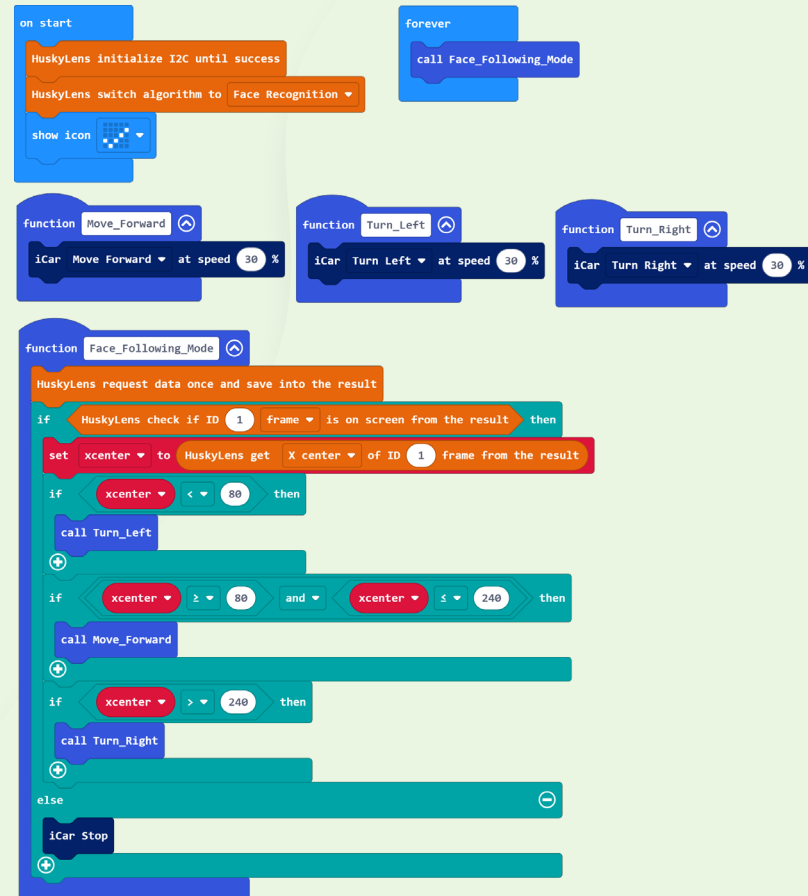
$f(x)$ Functions

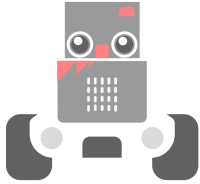
into “forever”

1



Finished!





Step 7: Download The Program To CUHK iCar

Microsoft | micro:bit

Blocks JavaScript

Search...

- Basic
- Input
- Music
- Led
- Radio
- Loops
- Logic
- Variables
- Math
- CUHK-JC iCar HuskyLens
- CUHK-JC iCar

on start

- HuskyLens initialise I2C until success
- HuskyLens switch algorithm to Face Recognition
- show icon

forever

- call Face_Following_Mode

function Move_Forward

- iCar Move Forward at speed 30 %

function Turn_Left

- iCar Turn Left at speed 30 %

function Turn_Right

- iCar Turn Right at speed 30 %

function Face_Following_Mode

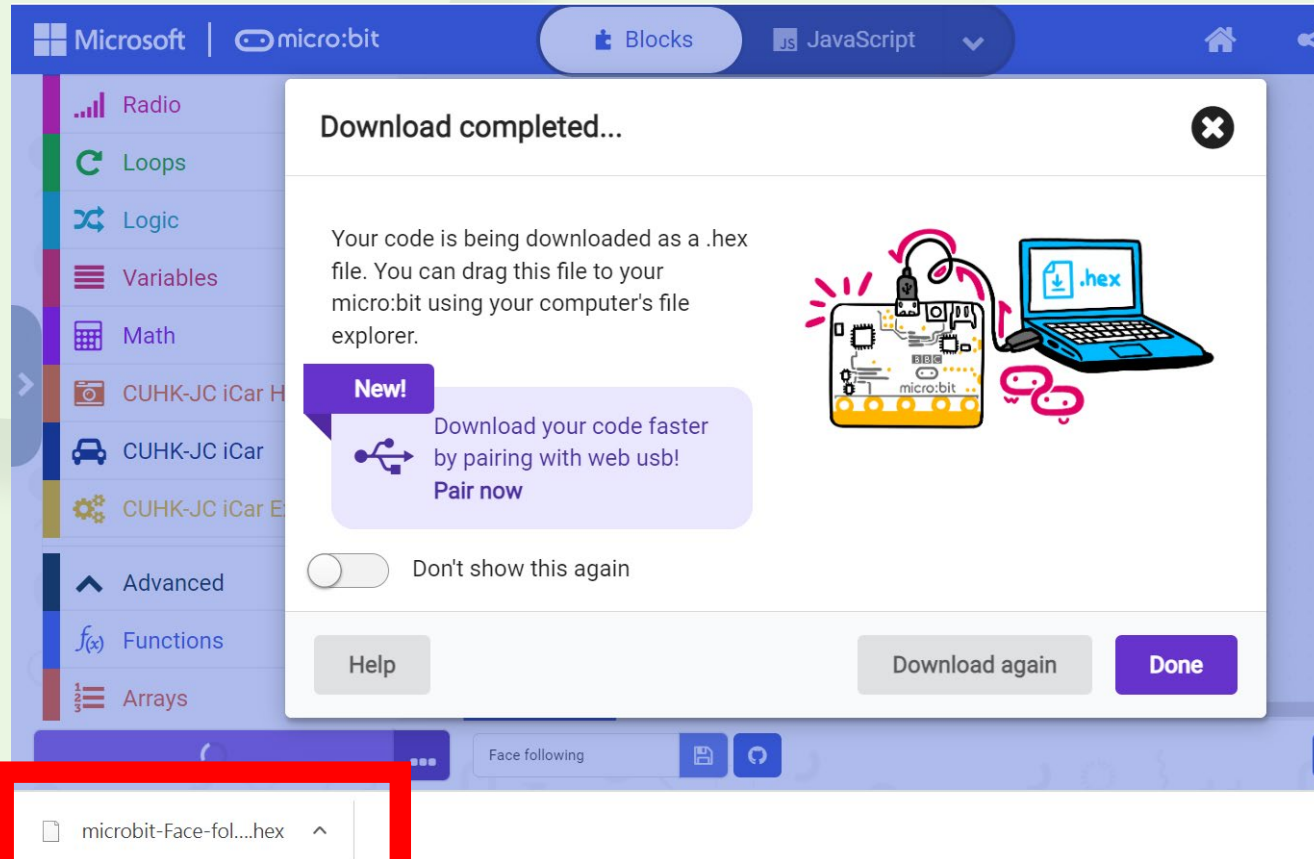
- HuskyLens request data once and save into the result
- if HuskyLens check if ID 1 frame is on screen from the result then
- set xcenter to HuskyLens get X center of ID 1 frame from the result
- if xcenter < 80 then
- call Turn_Left
- if xcenter >= 80 and xcenter <= 240 then
- call Move_Forward
- if xcenter > 240 then
- call Turn_Right
- else
- iCar Stop

Download

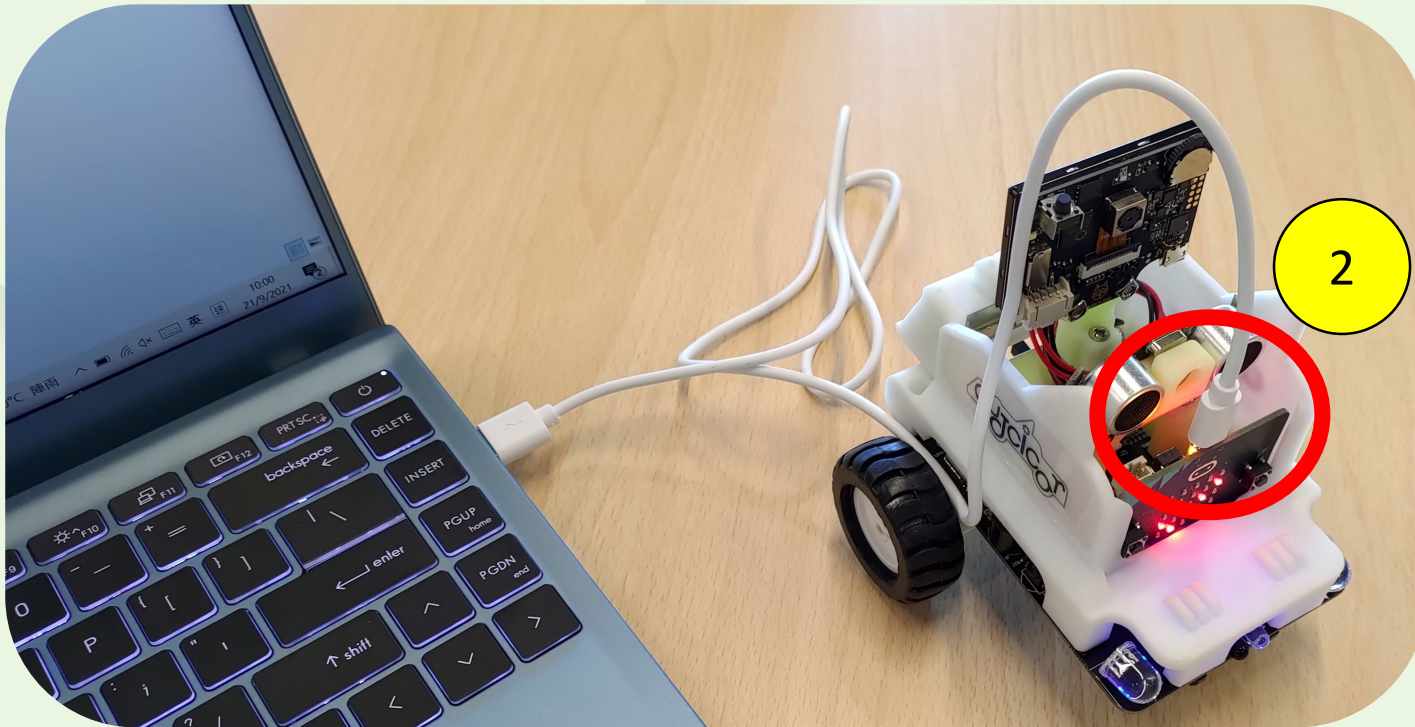
1. Click

Download

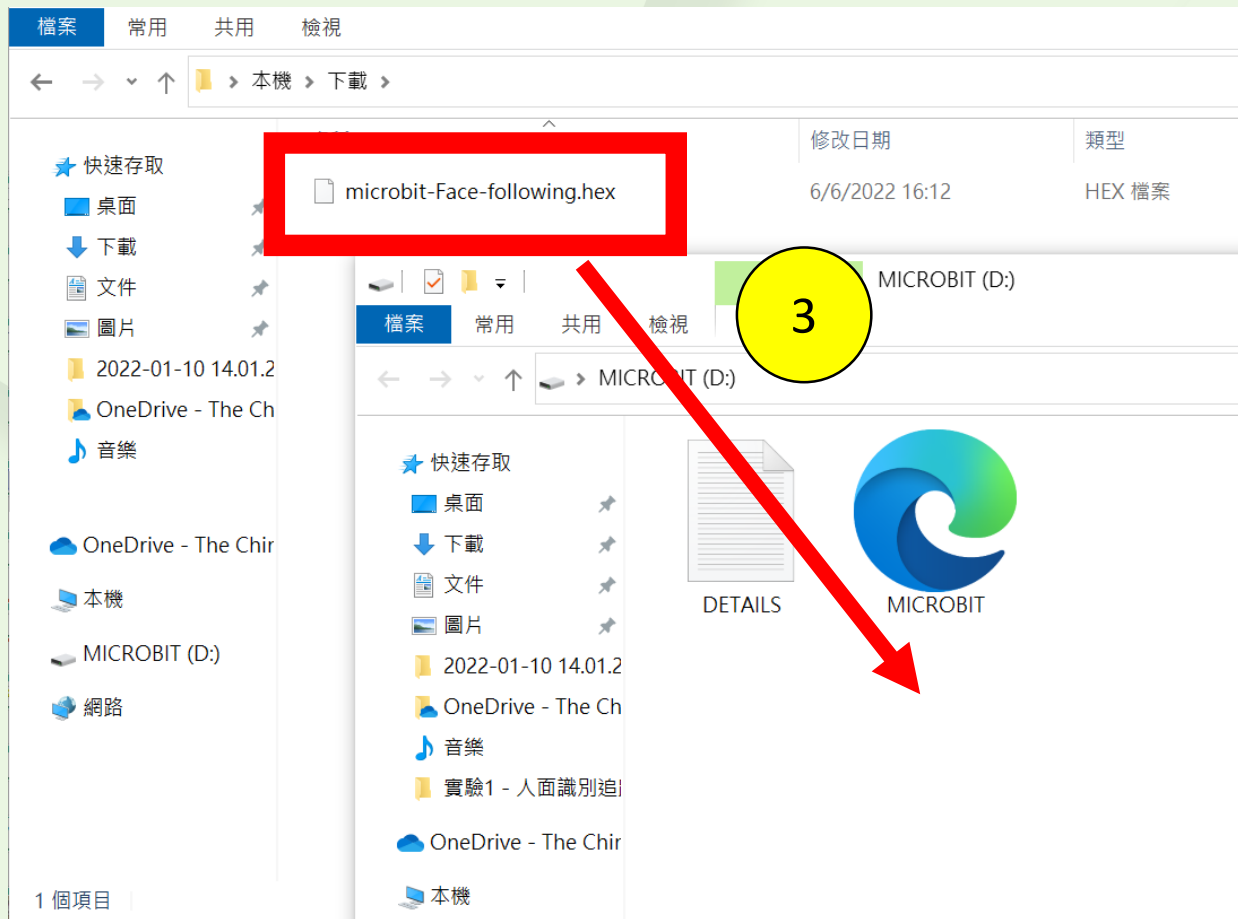
1



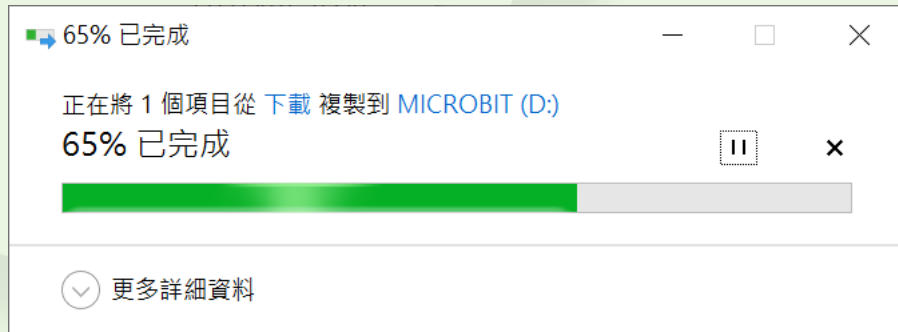
The hex file is downloaded!



2. Connect the micro:bit to computer by a micro USB cable



3. Drag the downloaded hex file into the micro:bit window



4. Wait for the completion of cloning process

Caution:

- The micro:bit window will potentially disappear after the completion
- After the completion of cloning process, the hex file will not be displayed in the micro:bit window

5. Disconnect the micro:bit from your computer

If the connection between CUHK iCar and the computer is failed:

- Restart the computer
- Try another USB port
- Change the micro USB cable

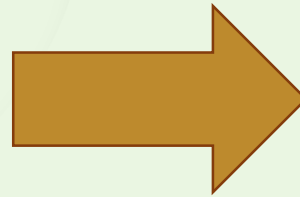


You have finished programming!

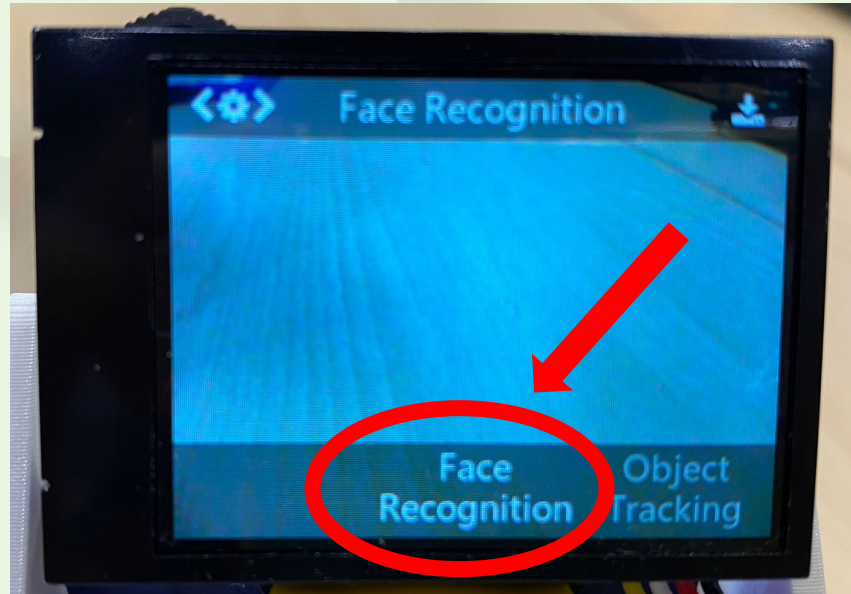
Let's start the experiment!



Switch On Your CUHK iCar



Once it is switched on,
the HuskyLens will automatically
adjust to Face Recognition Mode.

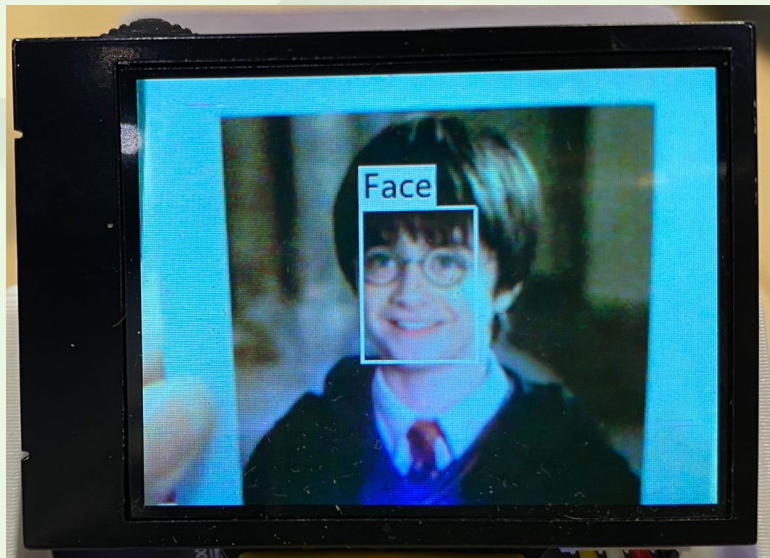


Clear The Previous Data

Press the learning button.
Then, press the button again when the confirmation box is appeared to “Forget” the data.



When a portrait photo is placed before the HuskyLens, a white frame will be displayed to indicate the position of the face.



Press the learning button to record the face. The frame will turn from white to blue, adding a label of "ID1".

Then, CUHK iCar will track and follow the face labelled as "ID1".



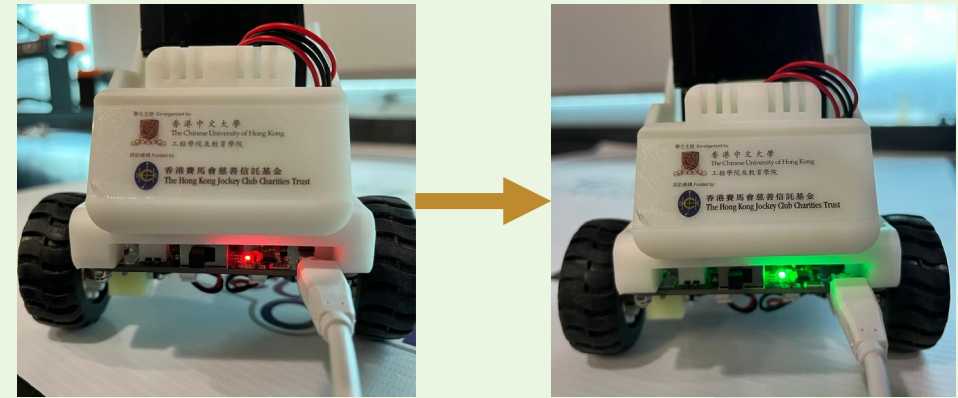
If another face is shown, a white frame will be displayed, as HuskyLens has not yet “learned” such person’s face.

If you would like the CUHK iCar to track and follow another face, you are required to clear the previous recorded face by pressing the learning button twice.

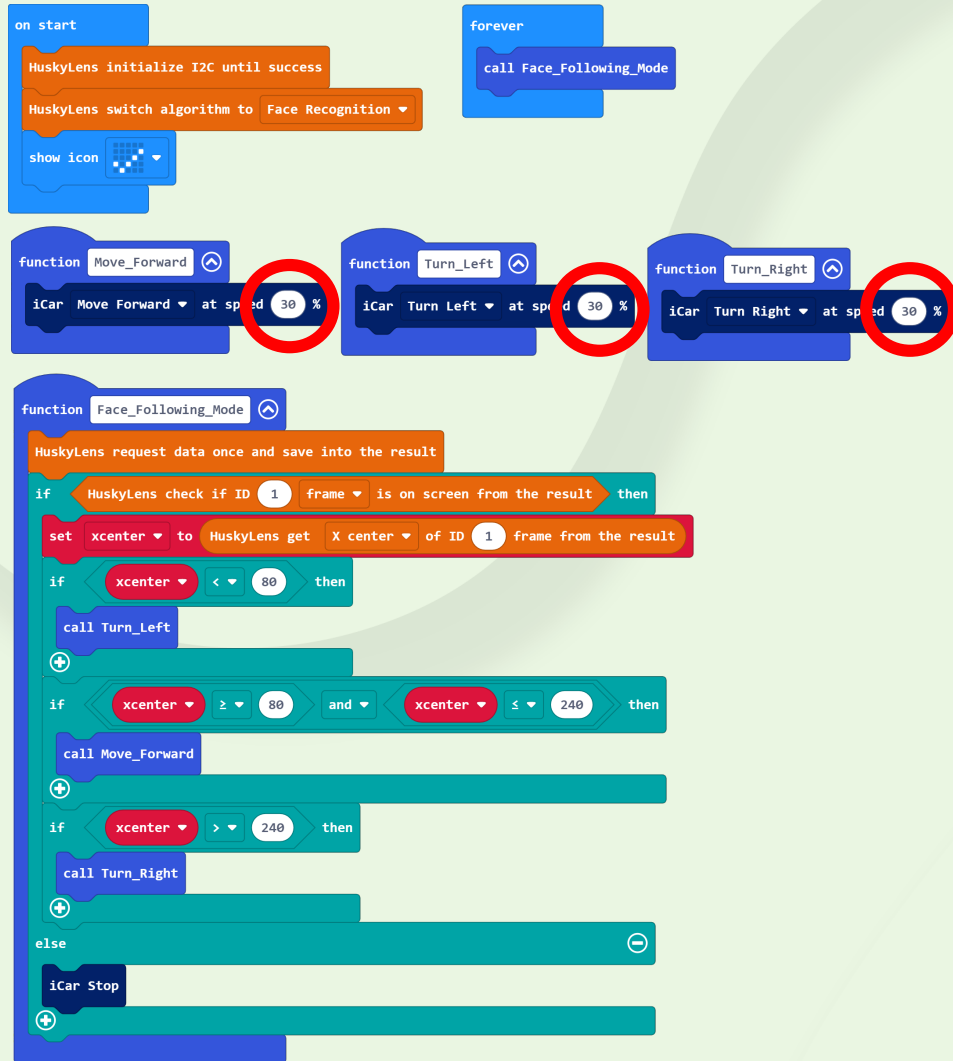


If CUHK iCar does not work as expected:

- Try to fully charge the CUHK iCar



- If the CUHK iCar still does not work as expected, then you can try to revise the provided program by yourself. For details, please refer to the next slide



The numbers circled in red are the recommended speeds when the battery is fully charged

- Please adjust the speed gradually by +/- 5 according to the battery capacity or battery age, then re-enter the adjusted value to the position marked by the red circle
- After the adjustment, download the program to the micro:bit again. For details, please refer to slide 46