3.7 Face Detection

1. Learning Objectives

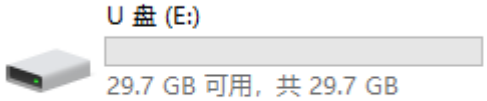
In this course, we will learn how to make k210 vision module performs face detection.

When no face is detected, the Micro:bit led displays a sleeping pattern; when a face is detected, the car dances.

2. Preparation for class

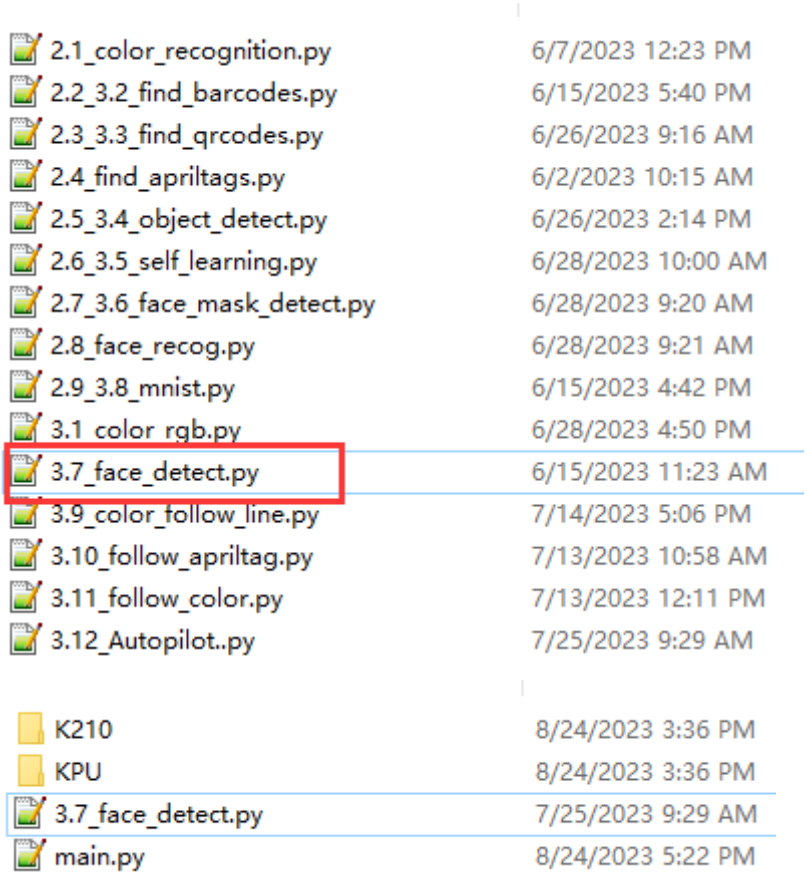
1. Remove the TF card from the k210 vision module and insert it into the card reader.

2. Plug the card reader into the computer, and wait for the computer to recognize the USB disk.



3. Then, enter the TF card. You will see following content.

4. Go to the k210 folder, find the **3.7_face_detect.py** file from the folder and copy it to the root directory.



5. Delete the original **main.py** file.

   Then, re-name the **3.7_face_detect.py** file as the **main.py** file.

6. After re-name, pull out the card reader, remove the TF card and insert it back into the k210 vision module.

3. Programming Methods

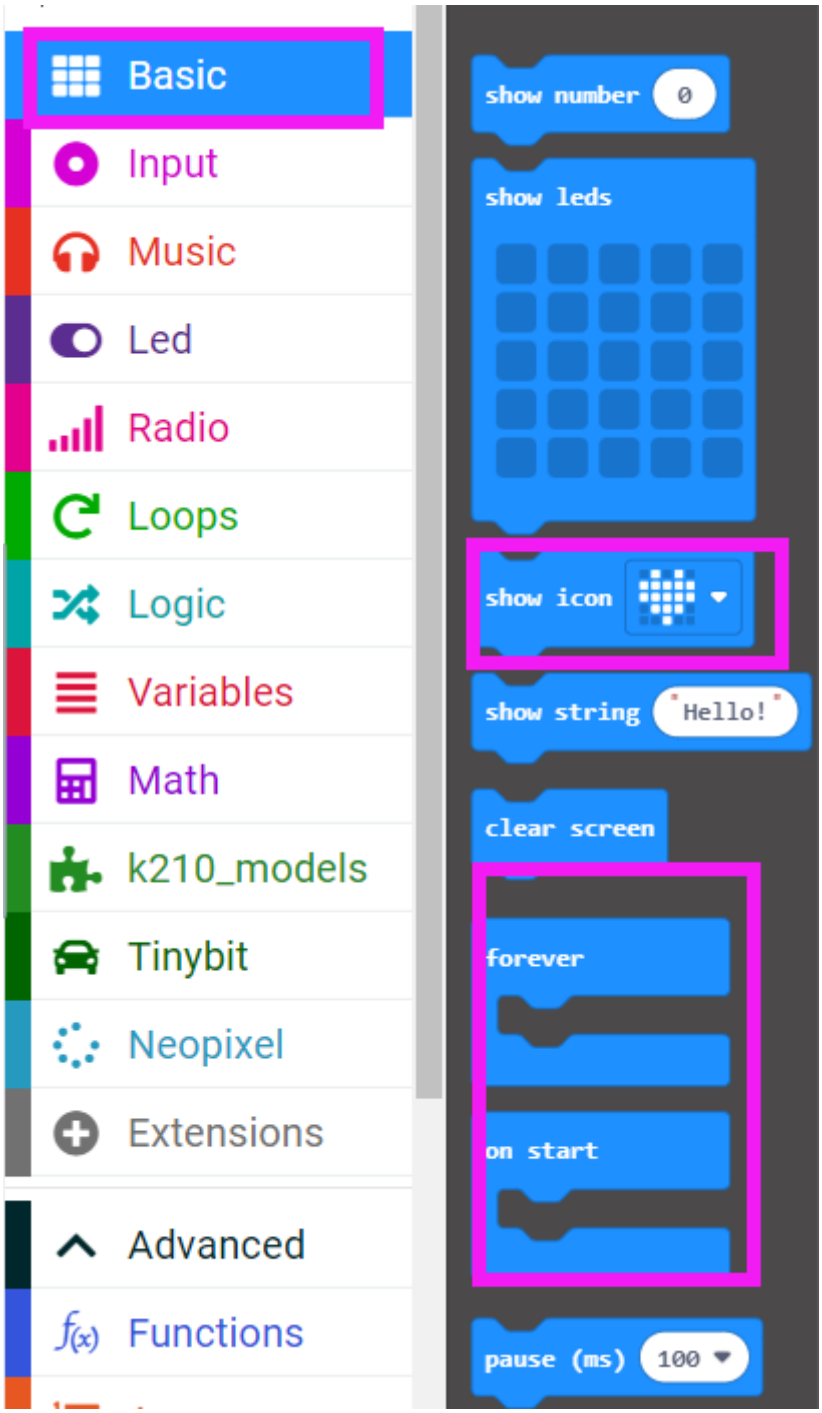
Online programming: first copy this URL https://makecode.microbit. and enter the online programming interface.

Click Extension, copy the package URL: https://github.com/YahboomTechnology/K210-Module.git to the input field, click Confirm to add package,

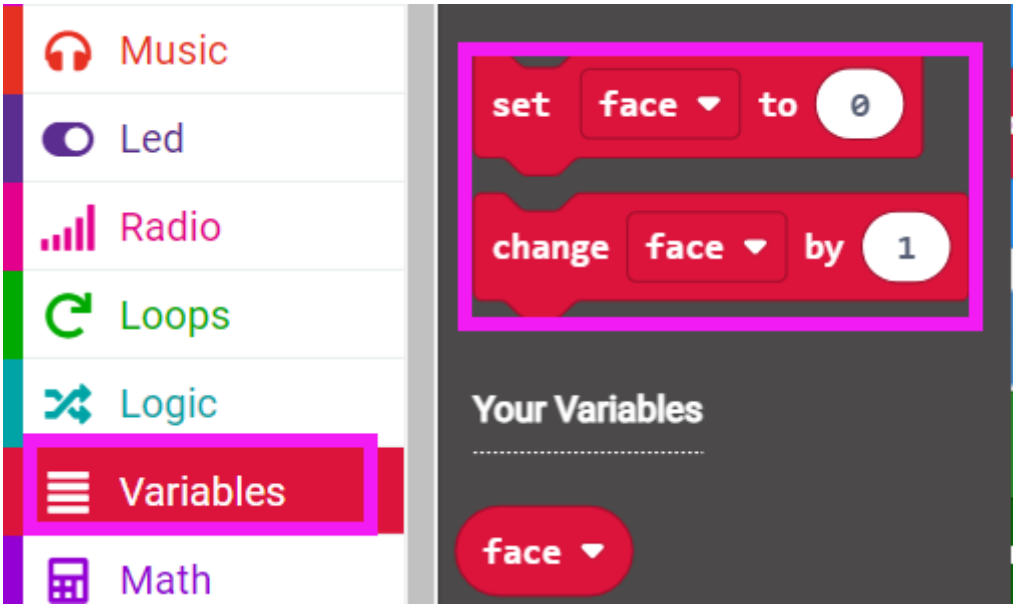
Click Extension again, copy the package URL: https://github.com/YahboomTechnology/Tiny-bitLib to the input field, click Confirm to add the package.

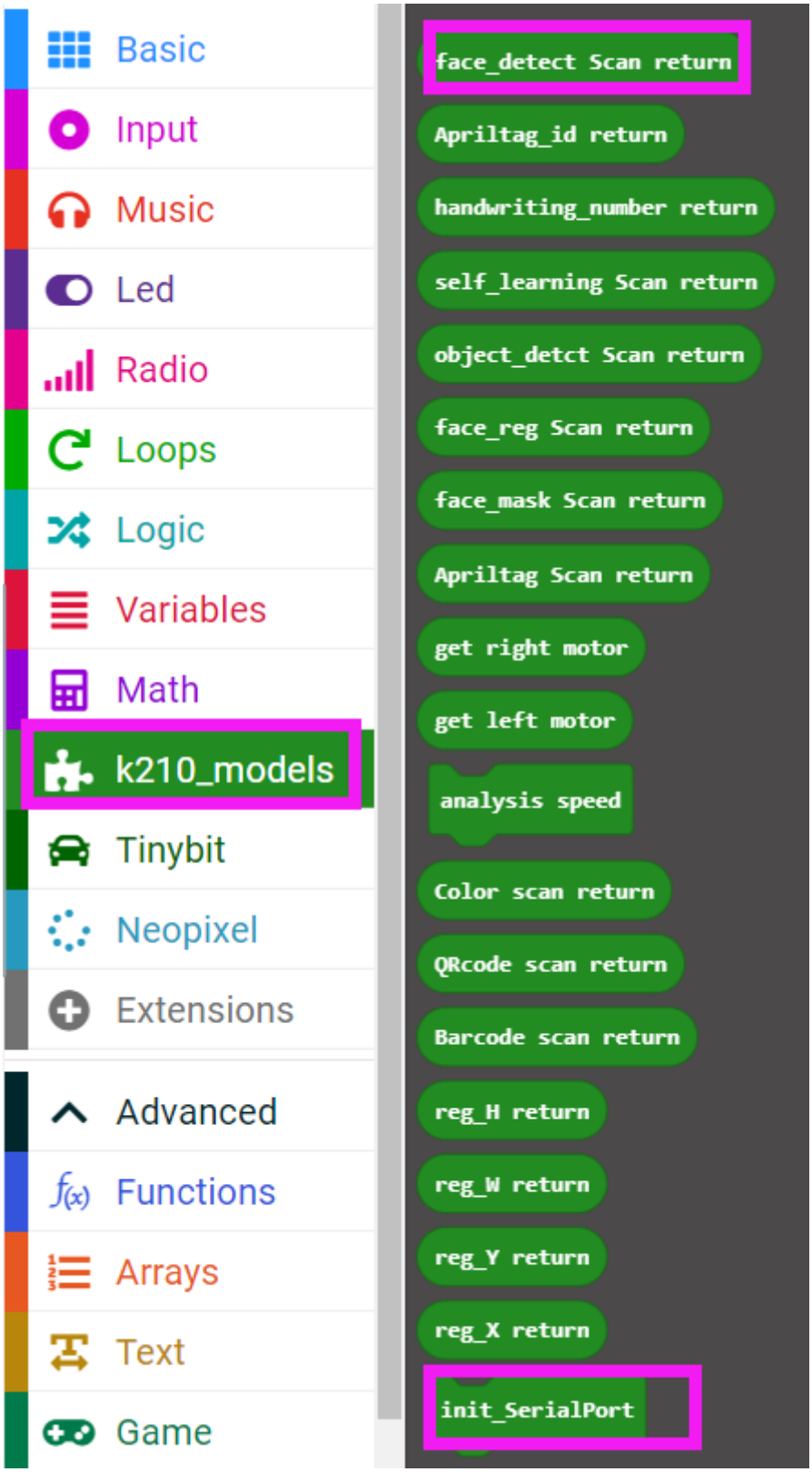
Finally you can use the K210 Vision Module package and Tinybit's building blocks.

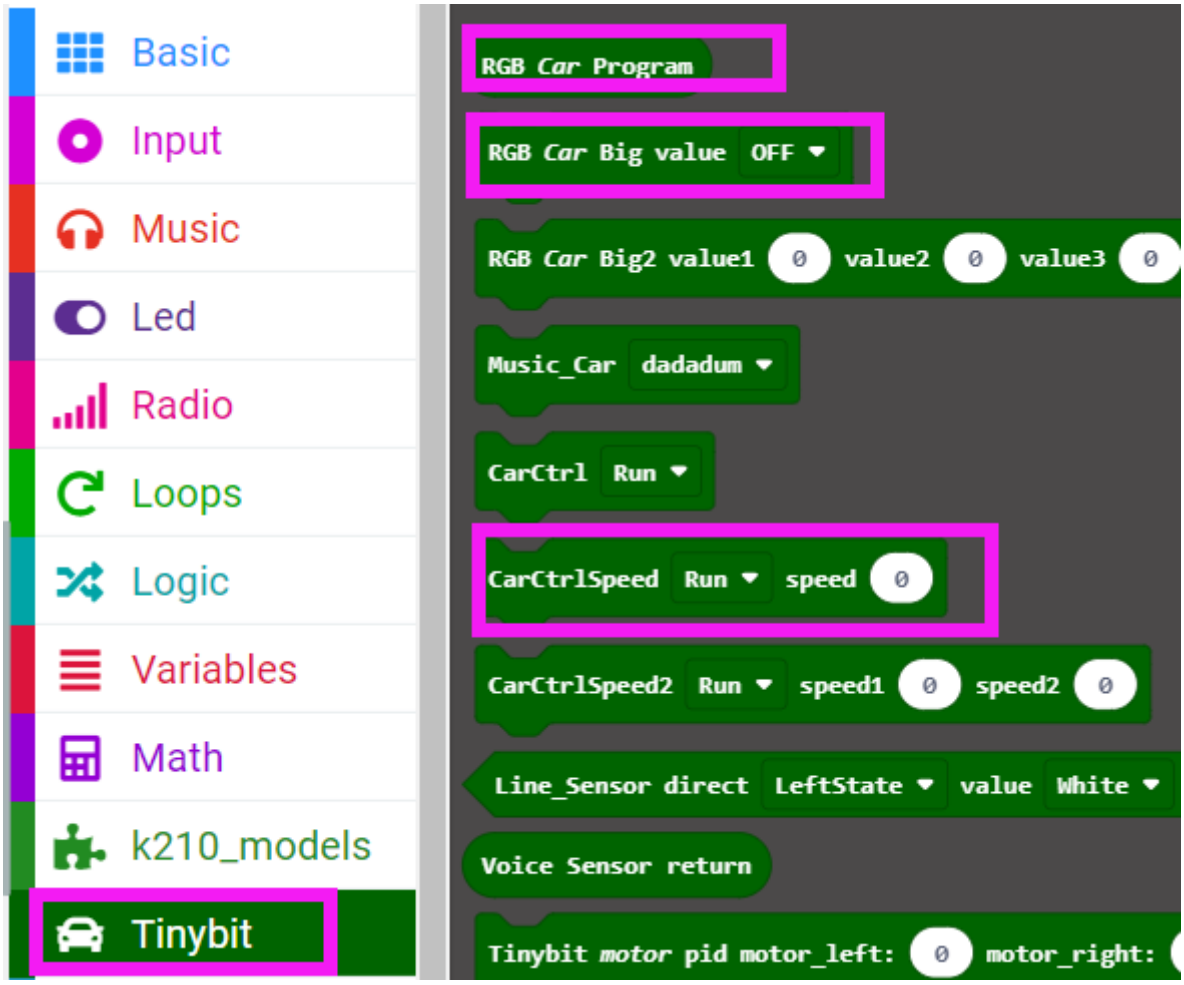
4. Blocks




Music
Led
Radio
Loops
Logic
Variables
play melody at tempo 120 (bpm)
Tone
play tone Middle C for 1 beat until done
ring tone (Hz) Middle C
rest for 1 beat

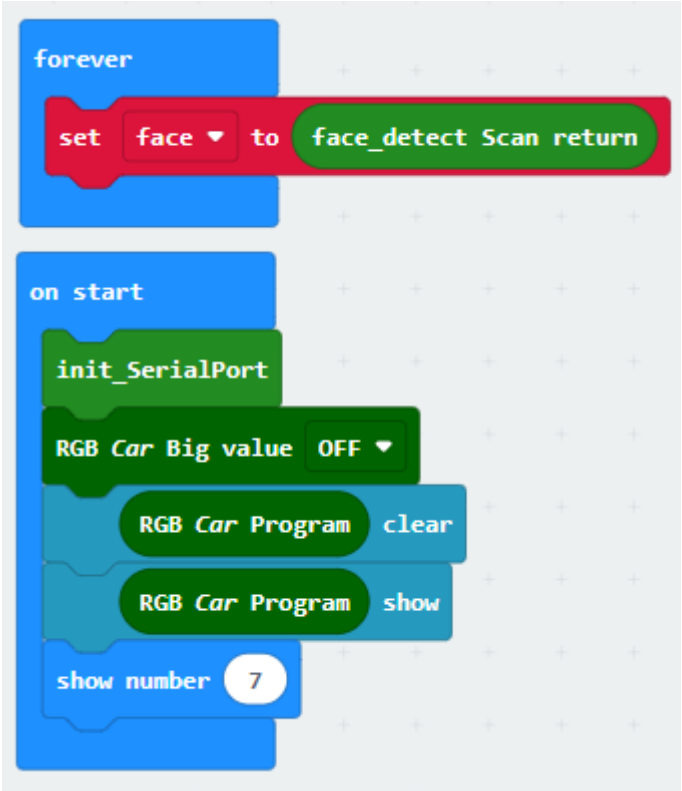

Music
Led
Radio
Loops
Logic
Variables
Math
set face to 0
change face by 1
Your Variables
face

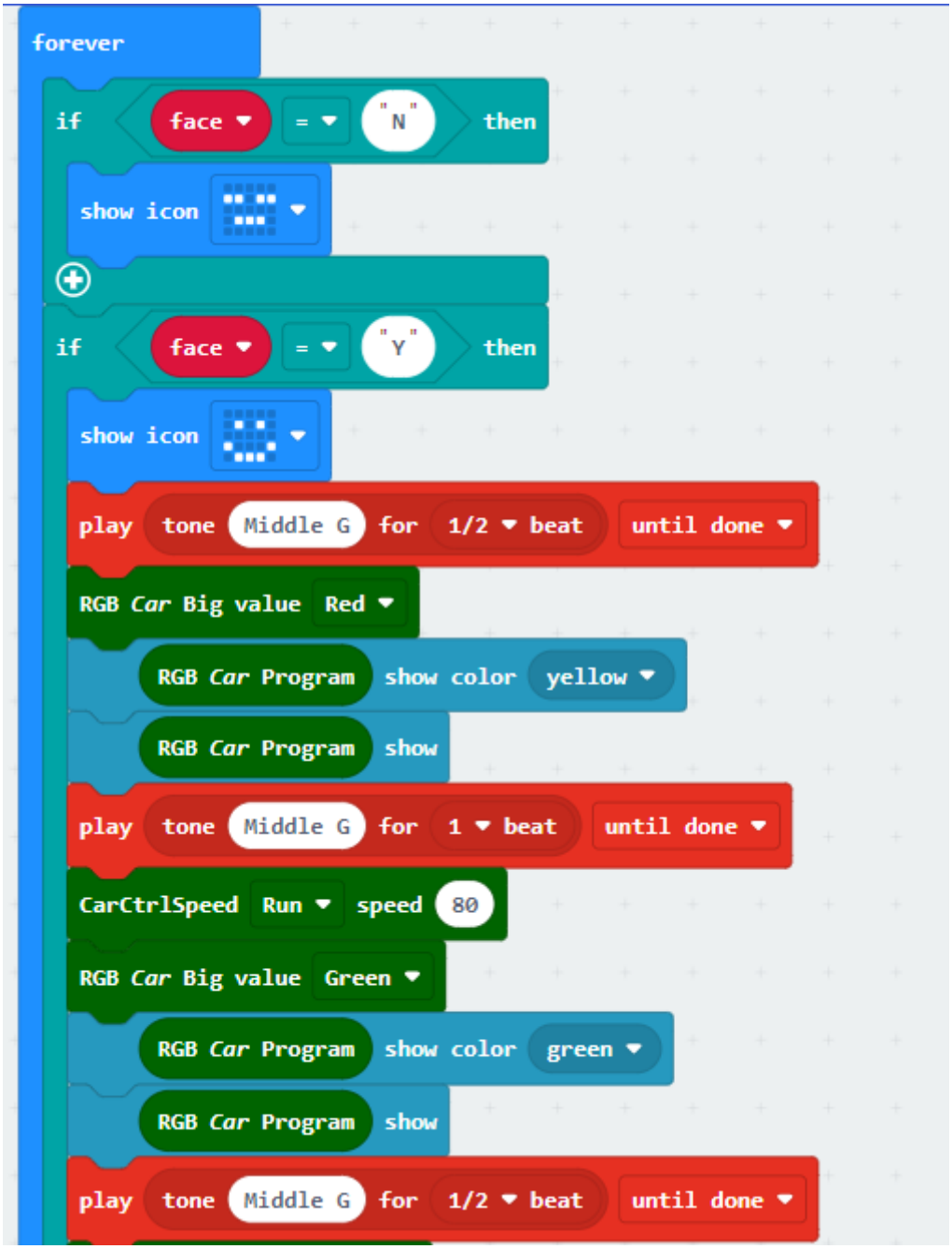

Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
k210_models
Tinybit
Neopixel
Extensions
Advanced
Functions
Arrays
Text
Game
face_detect Scan return
Apriltag_id return
handwriting_number return
self_learning Scan return
object_detct Scan return
face_reg Scan return
face_mask Scan return
Apriltag Scan return
get right motor
get left motor
analysis speed
Color scan return
QRcode scan return
Barcode scan return
reg_H return
reg_W return
reg_Y return
reg_X return
init_SerialPort

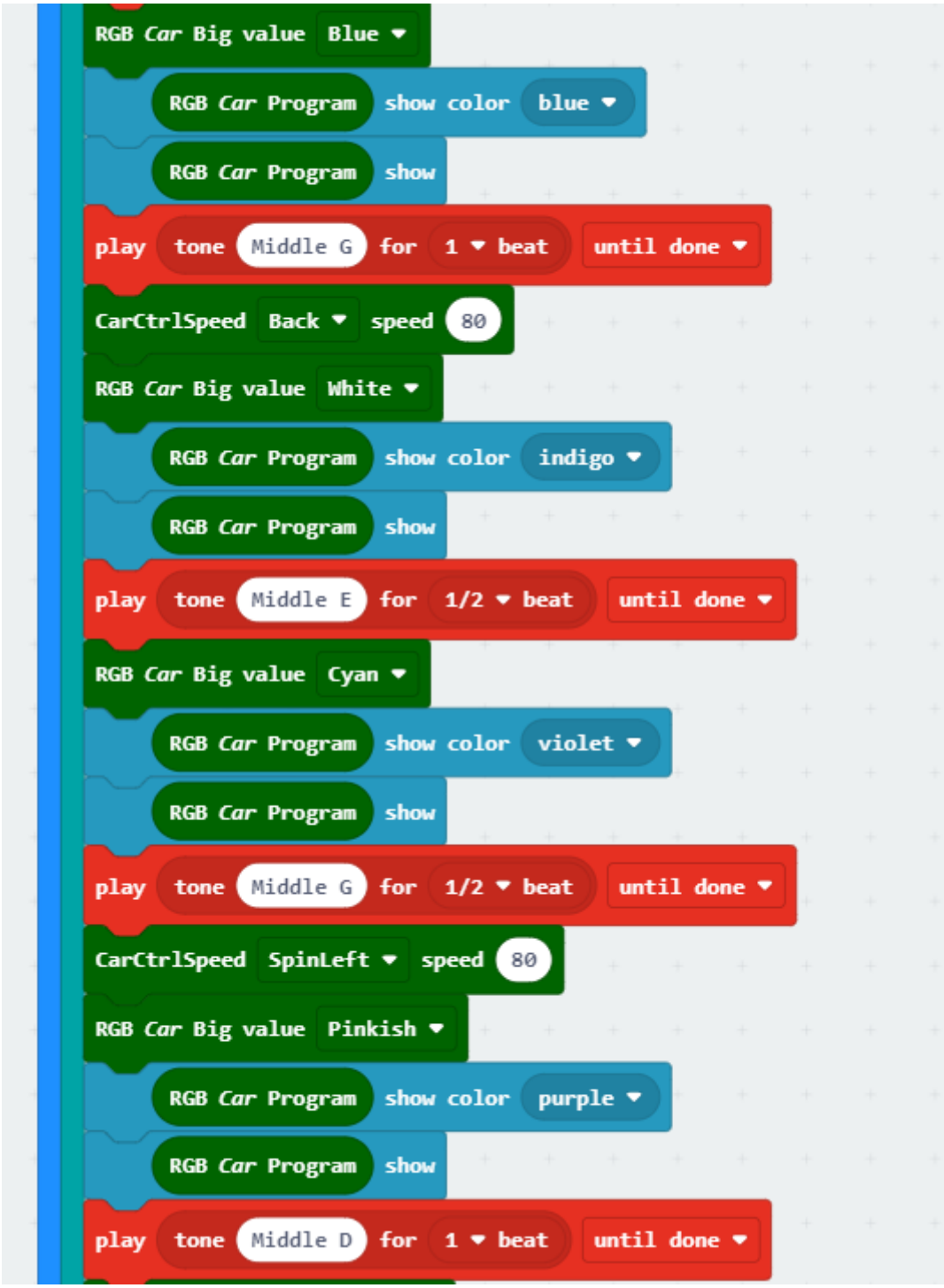

Basic
Input
Music
Led
Radio
Loops
Logic
Variables
Math
k210_models
Tinybit
RGB Car Program
RGB Car Big value OFF
RGB Car Big2 value1 0 value2 0 value3 0
Music_Car dadadum
CarCtrl Run
CarCtrlSpeed Run speed 0
CarCtrlSpeed2 Run speed1 0 speed2 0
Line_Sensor direct LeftState value White
Voice Sensor return
Tinybit motor pid motor_left: 0 motor_right:

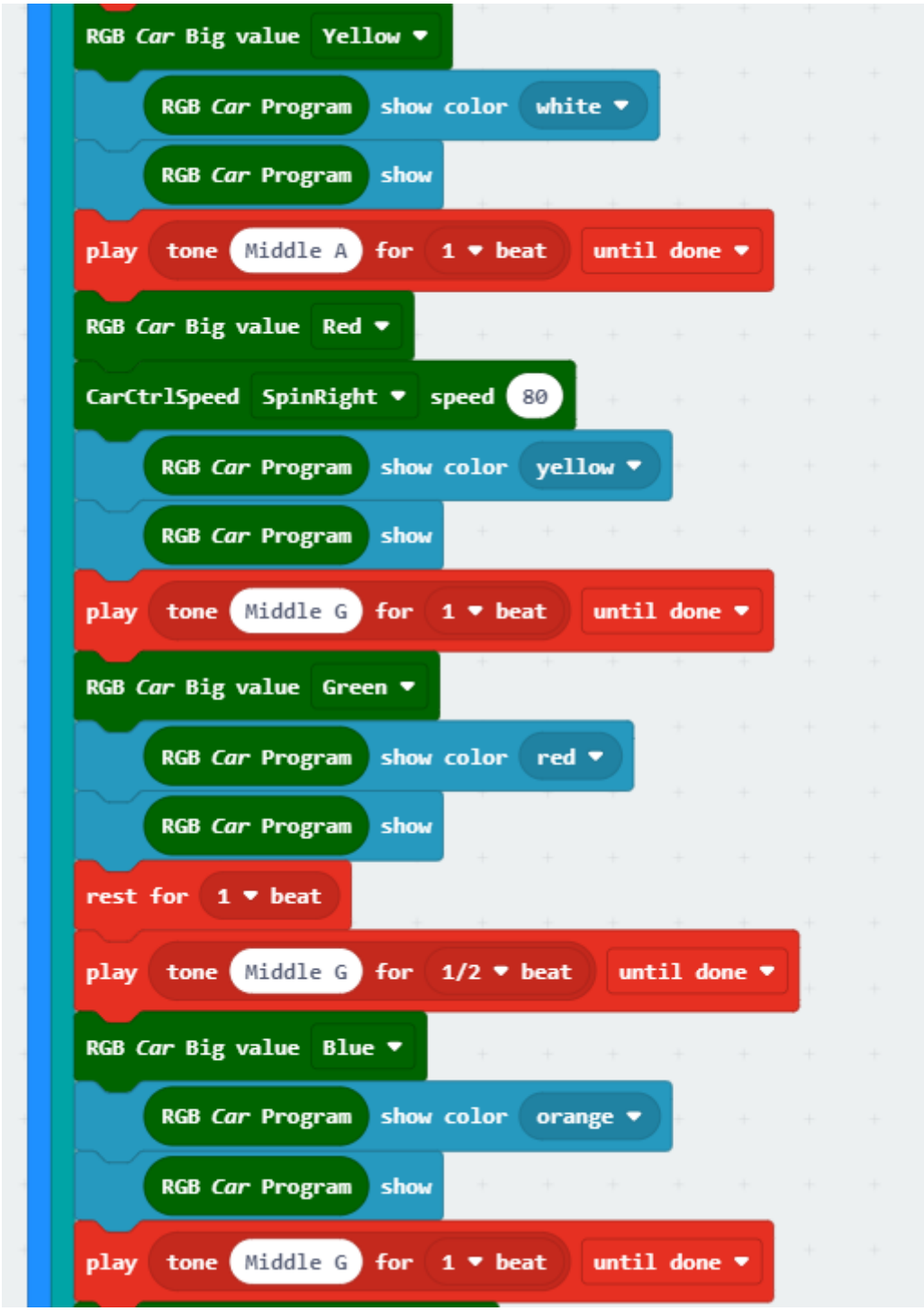

Radio
Loops
Logic
Variables
Math
k210_models
Tinybit
Neopixel
strip show color red
strip show bar graph of 0 up to 255
strip show
strip clear
hue 0 saturation 0 luminosity 0
strip shift pixels by 1
strip rotate pixels by 1

5. Code

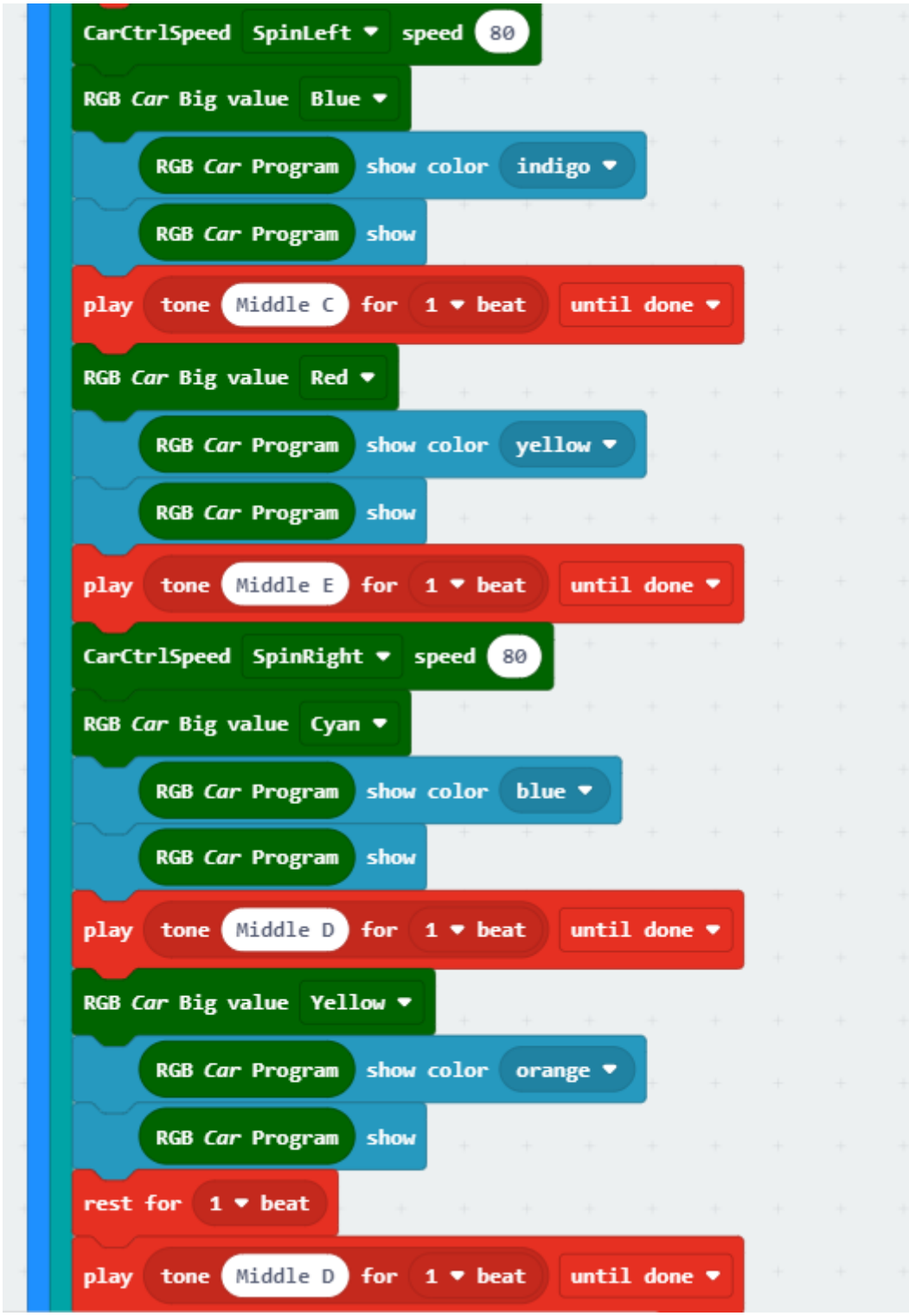

forever
set face to face_detect Scan return
on start
init_SerialPort
RGB Car Big value OFF
RGB Car Program clear
RGB Car Program show
show number 7

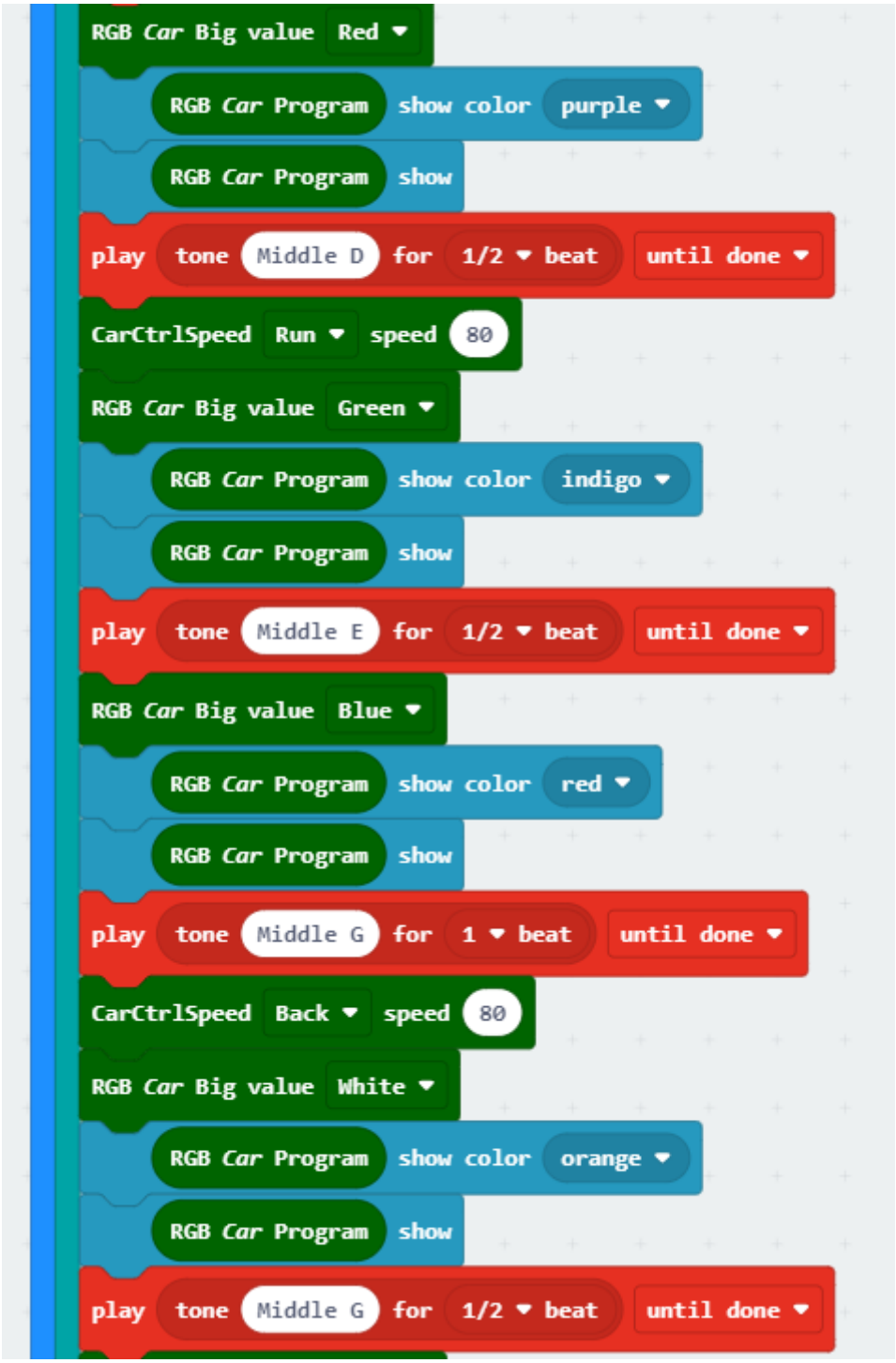

forever
if face = "N" then
show icon
if face = "Y" then
show icon
play tone Middle G for 1/2 beat until done
RGB Car Big value Red
RGB Car Program show color yellow
RGB Car Program show
play tone Middle G for 1 beat until done
CarCtrlSpeed Run speed 80
RGB Car Big value Green
RGB Car Program show color green
RGB Car Program show
play tone Middle G for 1/2 beat until done

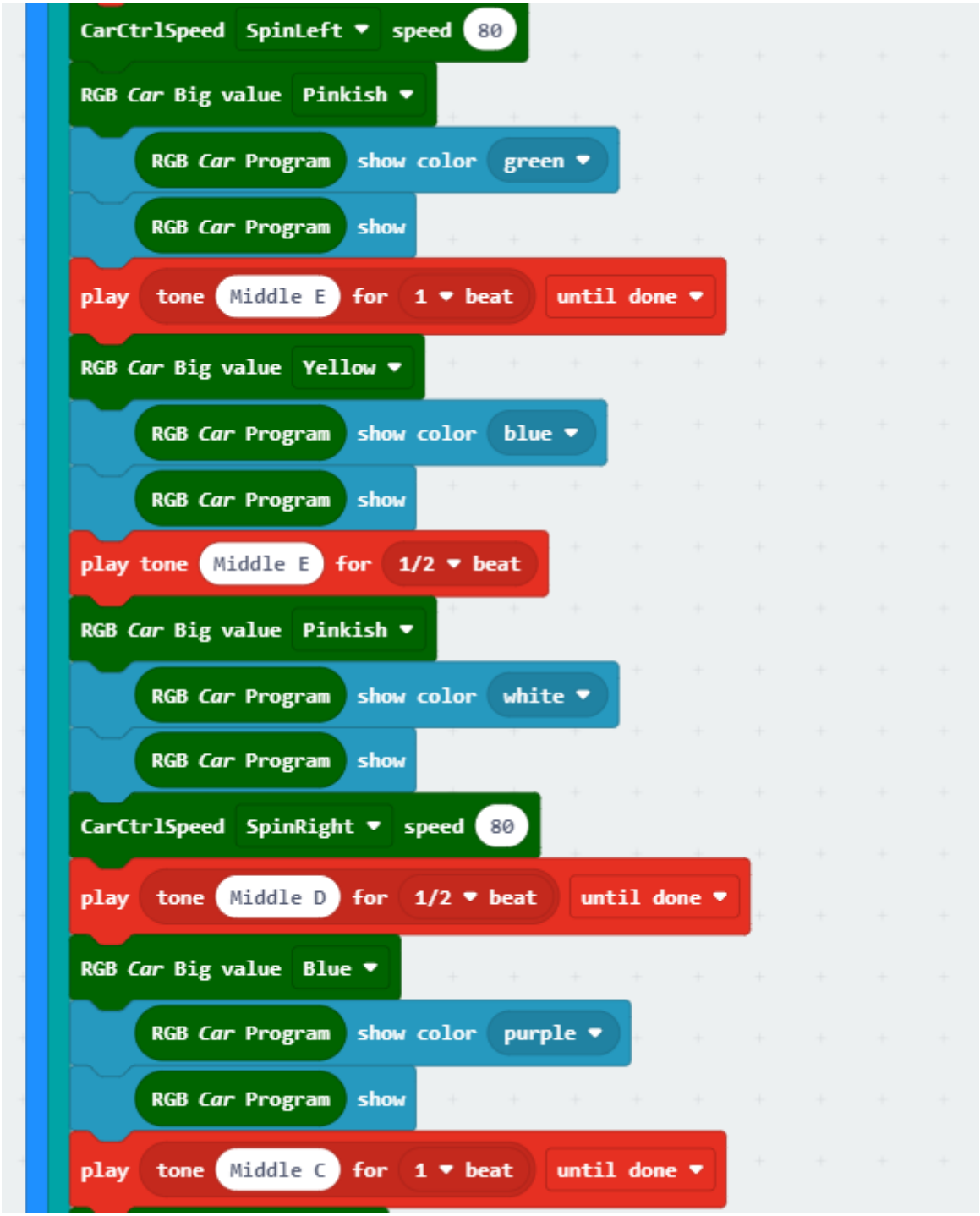

RGB Car Big value Blue
RGB Car Program show color blue
RGB Car Program show
play tone Middle G for 1 beat until done
CarCtrlSpeed Back speed 80
RGB Car Big value White
RGB Car Program show color indigo
RGB Car Program show
play tone Middle E for 1/2 beat until done
RGB Car Big value Cyan
RGB Car Program show color violet
RGB Car Program show
play tone Middle G for 1/2 beat until done
CarCtrlSpeed SpinLeft speed 80
RGB Car Big value Pinkish
RGB Car Program show color purple
RGB Car Program show
play tone Middle D for 1 beat until done

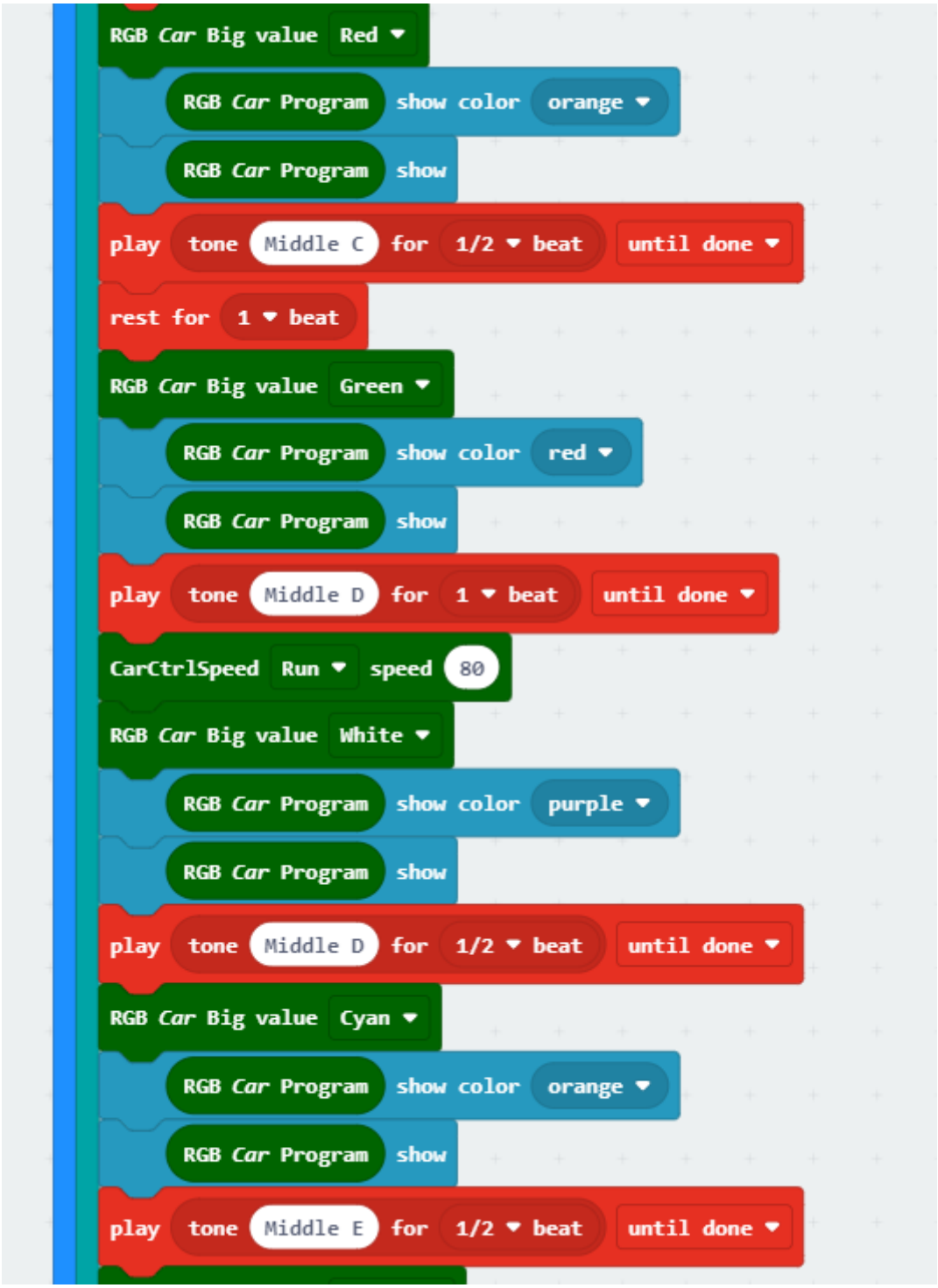

RGB Car Big value Yellow
RGB Car Program show color white
RGB Car Program show
play tone Middle A for 1 beat until done
RGB Car Big value Red
CarCtrlSpeed SpinRight speed 80
RGB Car Program show color yellow
RGB Car Program show
play tone Middle G for 1 beat until done
RGB Car Big value Green
RGB Car Program show color red
RGB Car Program show
rest for 1 beat
play tone Middle G for 1/2 beat until done
RGB Car Big value Blue
RGB Car Program show color orange
RGB Car Program show
play tone Middle G for 1 beat until done


CarCtrlSpeed Run speed 80
RGB Car Big value White
RGB Car Program show color yellow
RGB Car Program show
play tone Middle G for 1/2 beat until done
RGB Car Big value Cyan
RGB Car Program show color green
RGB Car Program show
play tone Middle G for 1 beat until done
CarCtrlSpeed Back speed 80
RGB Car Big value Pinkish
RGB Car Program show color violet
RGB Car Program show
play tone Middle E for 1/2 beat until done
RGB Car Big value Yellow
RGB Car Program show color white
RGB Car Program show
play tone Middle D for 1/2 beat until done

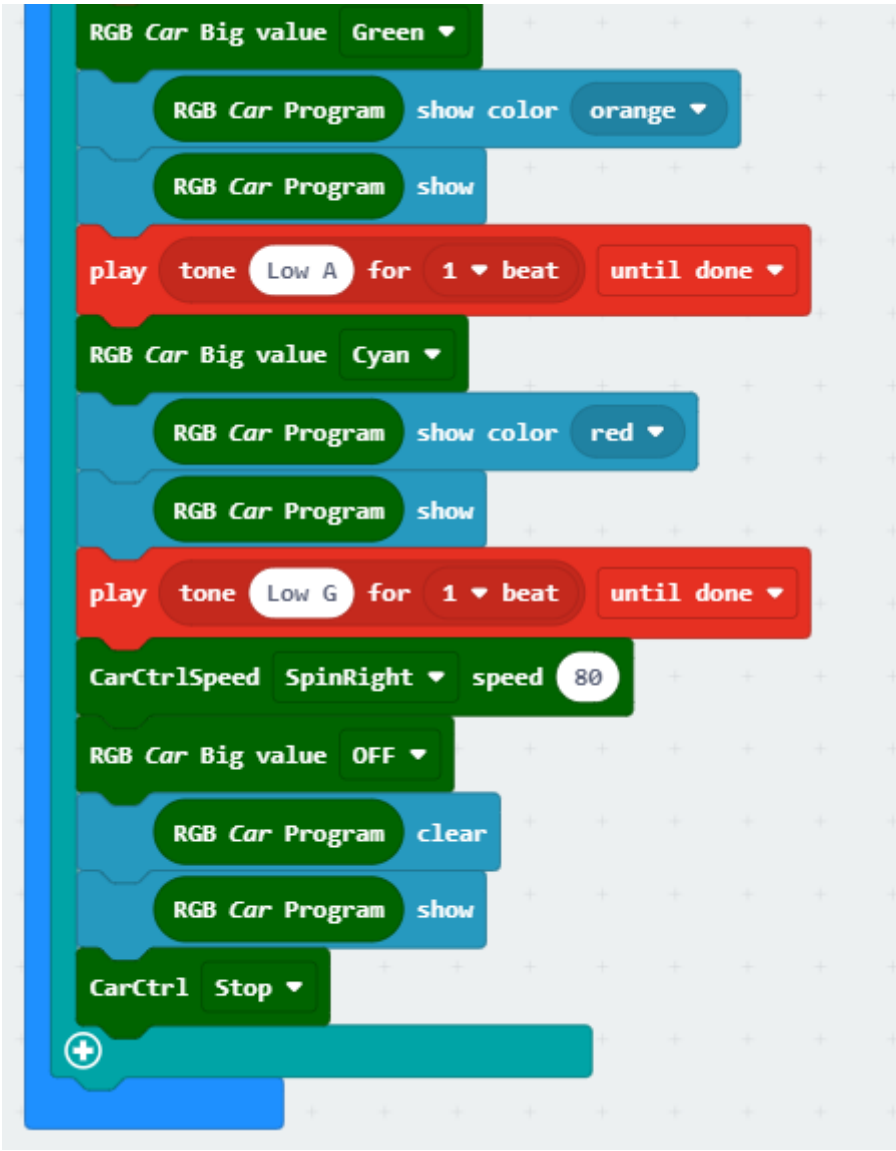

CarCtrlSpeed SpinLeft speed 80
RGB Car Big value Blue
RGB Car Program show color indigo
RGB Car Program show
play tone Middle C for 1 beat until done
RGB Car Big value Red
RGB Car Program show color yellow
RGB Car Program show
play tone Middle E for 1 beat until done
CarCtrlSpeed SpinRight speed 80
RGB Car Big value Cyan
RGB Car Program show color blue
RGB Car Program show
play tone Middle D for 1 beat until done
RGB Car Big value Yellow
RGB Car Program show color orange
RGB Car Program show
rest for 1 beat
play tone Middle D for 1 beat until done


RGB Car Big value Red
RGB Car Program show color purple
RGB Car Program show
play tone Middle D for 1/2 beat until done
CarCtrlSpeed Run speed 80
RGB Car Big value Green
RGB Car Program show color indigo
RGB Car Program show
play tone Middle E for 1/2 beat until done
RGB Car Big value Blue
RGB Car Program show color red
RGB Car Program show
play tone Middle G for 1 beat until done
CarCtrlSpeed Back speed 80
RGB Car Big value White
RGB Car Program show color orange
RGB Car Program show
play tone Middle G for 1/2 beat until done


CarCtrlSpeed SpinLeft speed 80
RGB Car Big value Pinkish
RGB Car Program show color green
RGB Car Program show
play tone Middle E for 1 beat until done
RGB Car Big value Yellow
RGB Car Program show color blue
RGB Car Program show
play tone Middle E for 1/2 beat
RGB Car Big value Pinkish
RGB Car Program show color white
RGB Car Program show
CarCtrlSpeed SpinRight speed 80
play tone Middle D for 1/2 beat until done
RGB Car Big value Blue
RGB Car Program show color purple
RGB Car Program show
play tone Middle C for 1 beat until done


RGB Car Big value Red
RGB Car Program show color orange
RGB Car Program show
play tone Middle C for 1/2 beat until done
rest for 1 beat
RGB Car Big value Green
RGB Car Program show color red
RGB Car Program show
play tone Middle D for 1 beat until done
CarCtrlSpeed Run speed 80
RGB Car Big value White
RGB Car Program show color purple
RGB Car Program show
play tone Middle D for 1/2 beat until done
RGB Car Big value Cyan
RGB Car Program show color orange
RGB Car Program show
play tone Middle E for 1/2 beat until done


RGB Car Big value Yellow
RGB Car Program show color purple
RGB Car Program show
play tone Middle C for 1 beat until done
CarCtrlSpeed Back speed 80
RGB Car Big value Blue
RGB Car Program show color white
RGB Car Program show
play tone Middle C for 1/2 beat until done
RGB Car Big value Red
RGB Car Program show color blue
RGB Car Program show
play tone Low A for 1/2 beat until done
RGB Car Big value White
RGB Car Program show color violet
RGB Car Program show
CarCtrlSpeed SpinLeft speed 80
play tone Low G for 1 beat until done



6. Download code

Connect the Micro:bit board to the computer via microusb cable, the computer will pop up a USB stick.

Then, select the **k210_Face_detection.hex** code and right click to send it to the Micro:bit U disk.

Wait until sending is complete and unplug the Micro:bit usb cable. Plug the Micro:bit board into the car.

7. Experimental phenomena

After the car starts, the dot matrix display of the microbit scrolls to display the number 7.
Wait for the camera image to appear on the screen, then point the camera at the face.
When a human face is detected, the LED dot matrix of the microbit will display a smiling face, and the car will start singing and dancing.
When a human face is not detected, the LED dot matrix of the microbit displays the "--__--" icon.