Flipbot AIoT

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Over 25 years teaching

FlipRobot Instructor

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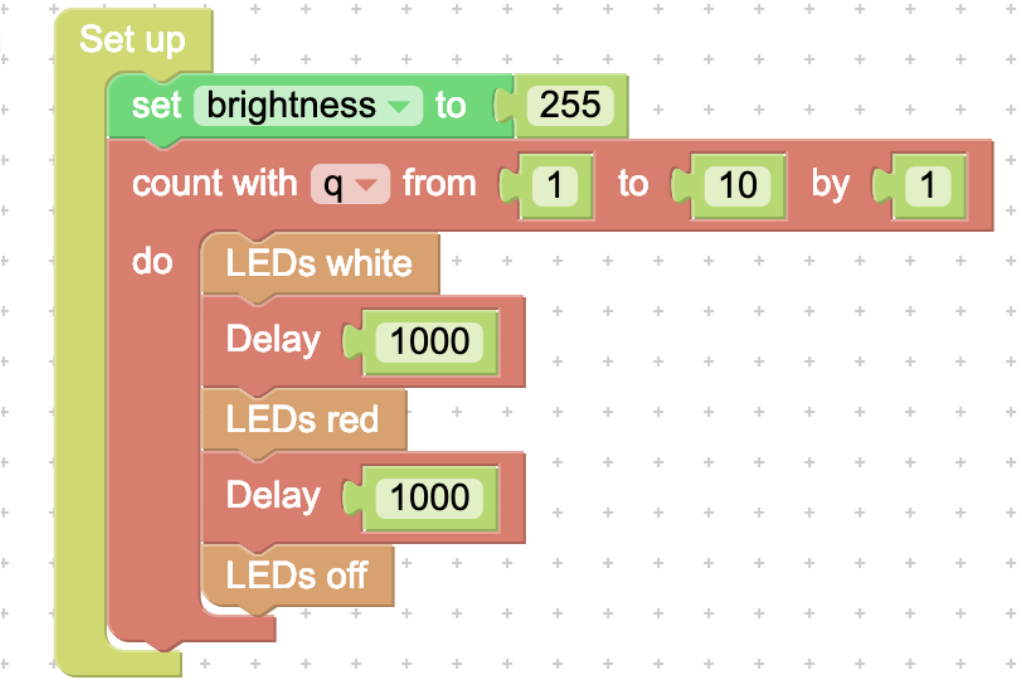
FlipCode Hands-on Workshop Demo

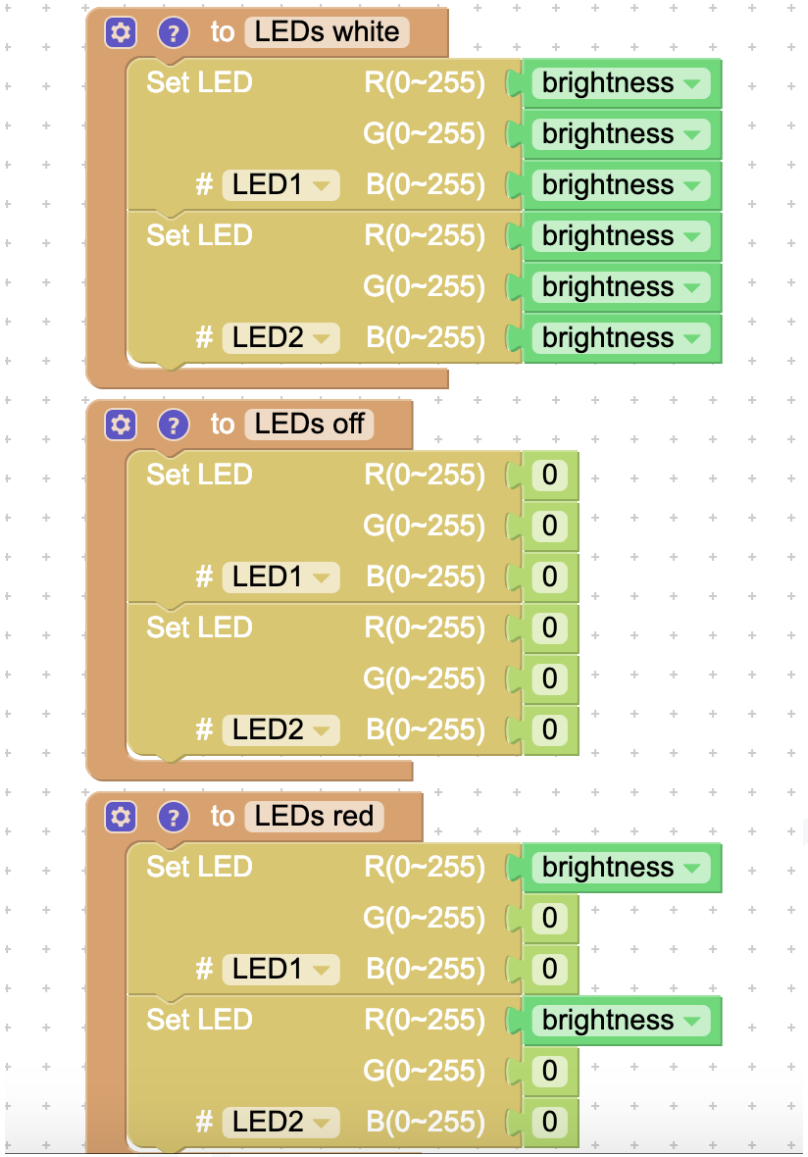


'Set up' is the run block that will only run one time.

Create a variable and call it: 'brightness'

Count from 1 to 10 by 1's, save the current count to the variable called 'q'

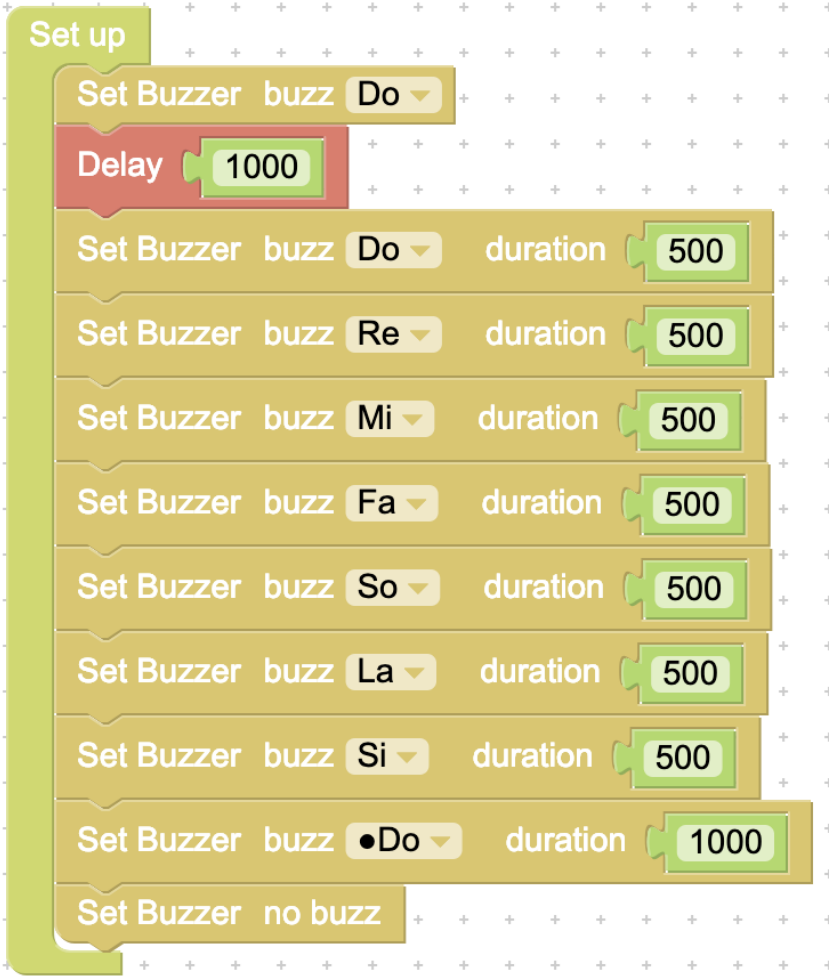
Delay (1000 = 1 sec)
Allows the previous action to continue for delay duration.



3 functions are defined here, one for each LED setting. Functions are useful and can be called again and again and can work with other functions.

Both LEDs have a range of 0-255
R=Red
G=Green
B=Blue

This solid red for both LED lights only uses the setting
R=255

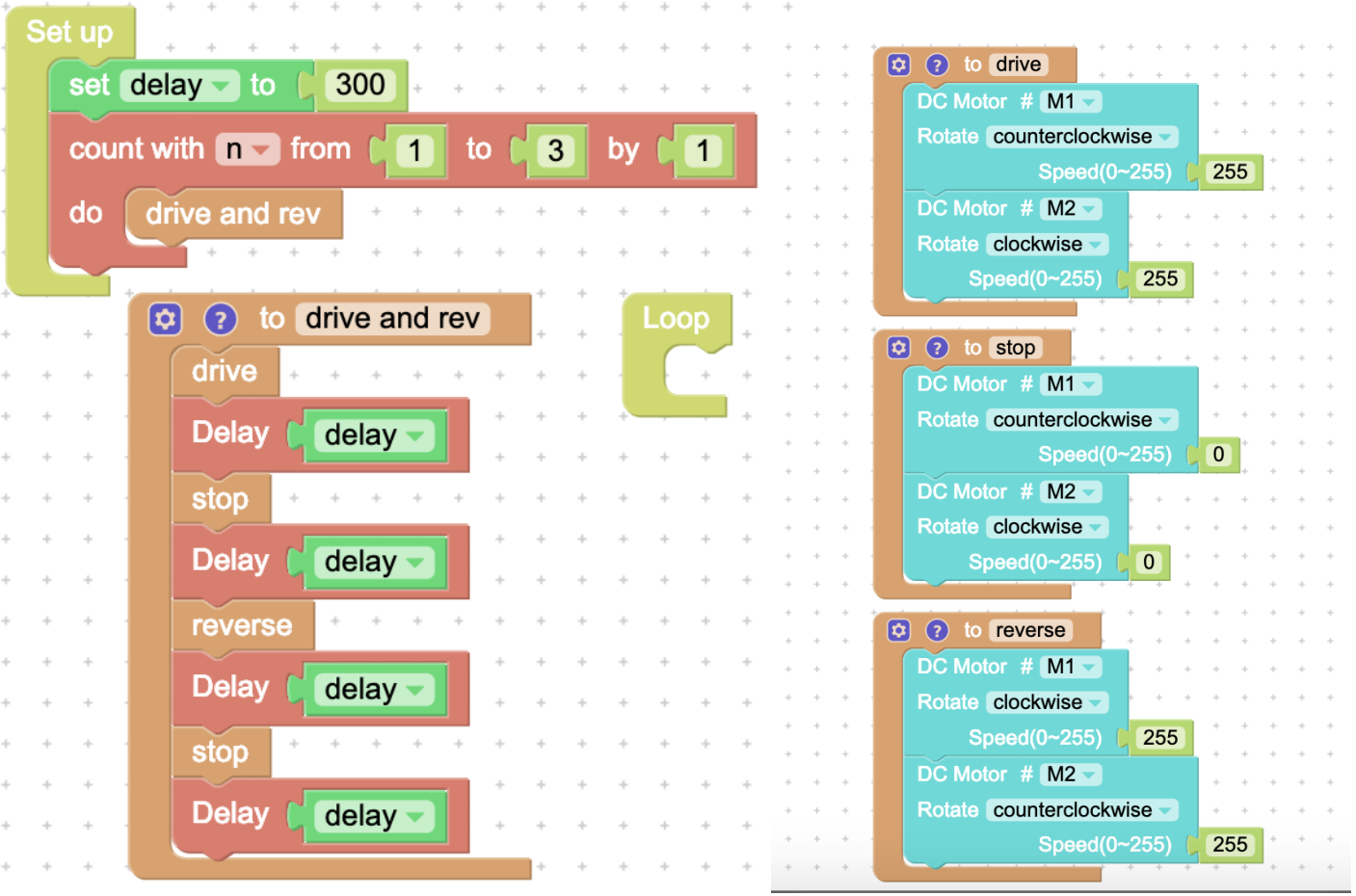


'Set up' is the run block that will only run one time.

Buzzer functions are built in to FlipCode and can either use buzz frequency or the preset tones, as shown here.

These Buzzer functions have a duration setting. Similar the delay function in the first one.

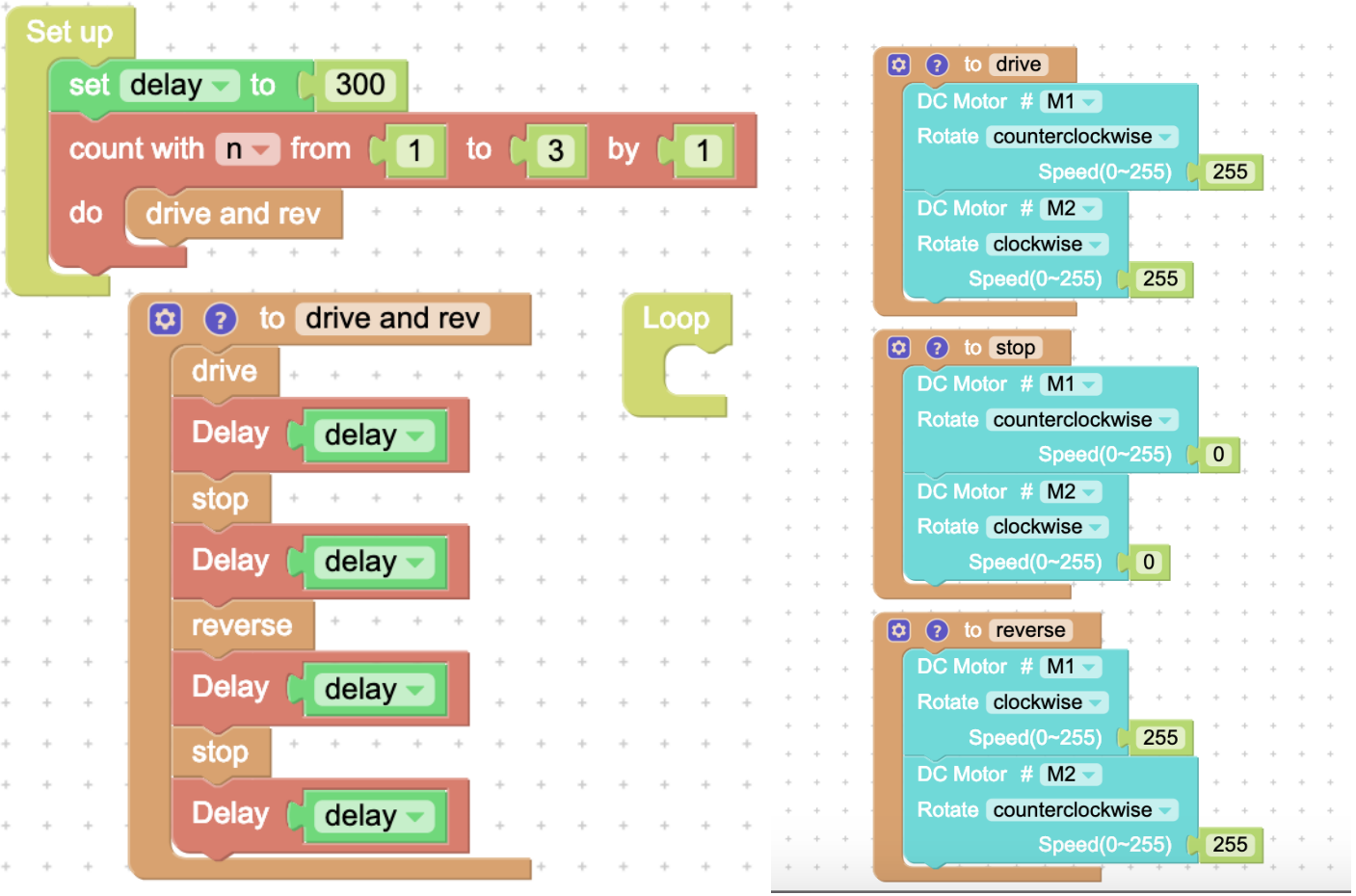
The Buzzer has a frequency range of very high to very low so you can test and find your own note.



'Loop' is the other run block that will run again and again, continuously, but only after the 'Set up' completes its single run.
We are not using the 'Loop' this time.
You must use one or both of these run blocks to make the code and robot work.

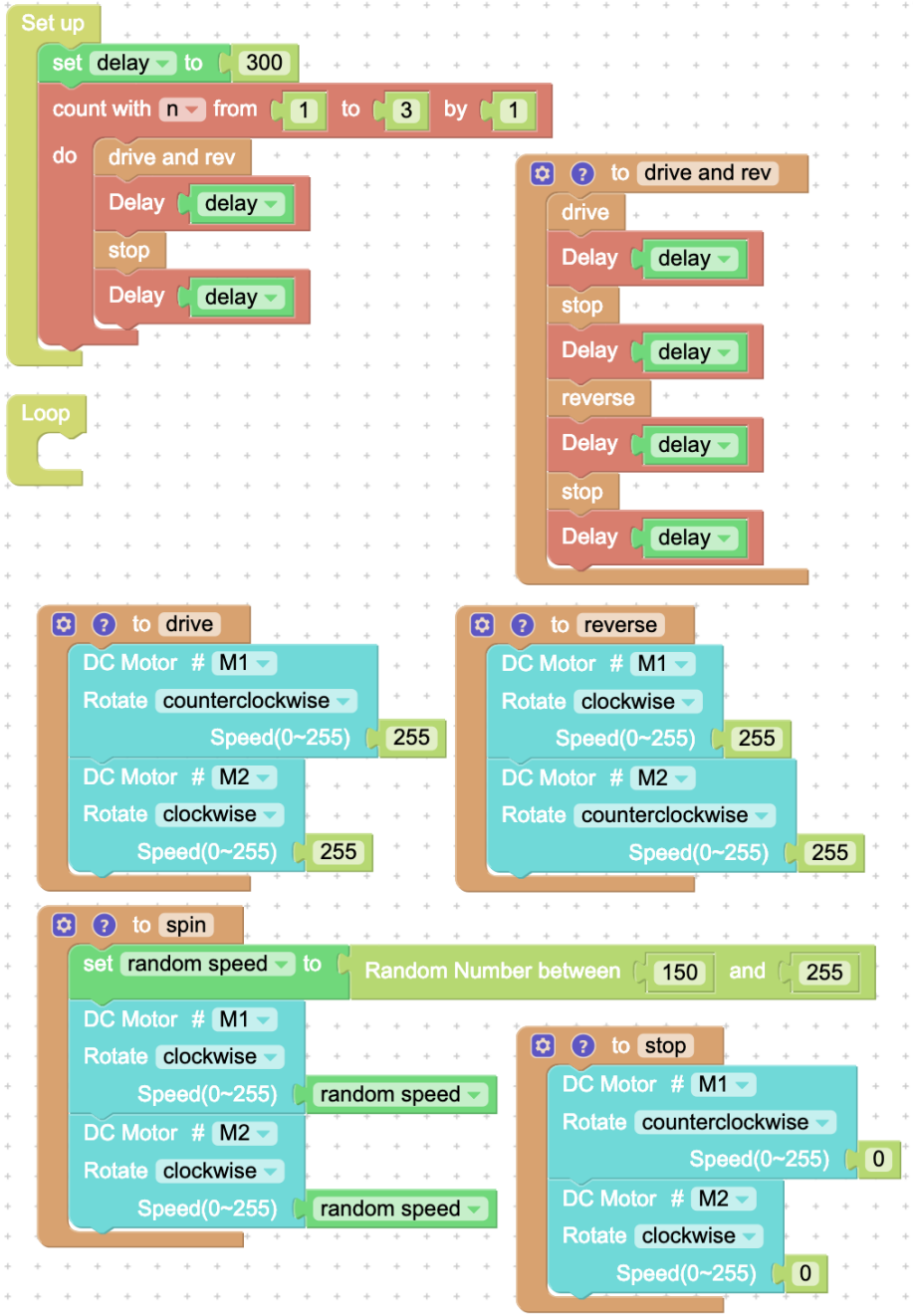
This 'drive and rev' function will call each of the other functions.

The 'Delay' function is set to the 'delay' variable value of 300 to allow the robot to move.



DC motors on the bottom of the FlipRobot are set up facing opposite directions so their direction must be set accordingly.

Note:
Speed is also in a range of 0-255. DC motors require enough power to turn, so I usually set it between 100-255.
Each motor may need to be adjusted here by setting the individual power of each side. This may be necessary to make the FlipRobot drive in a straight line.

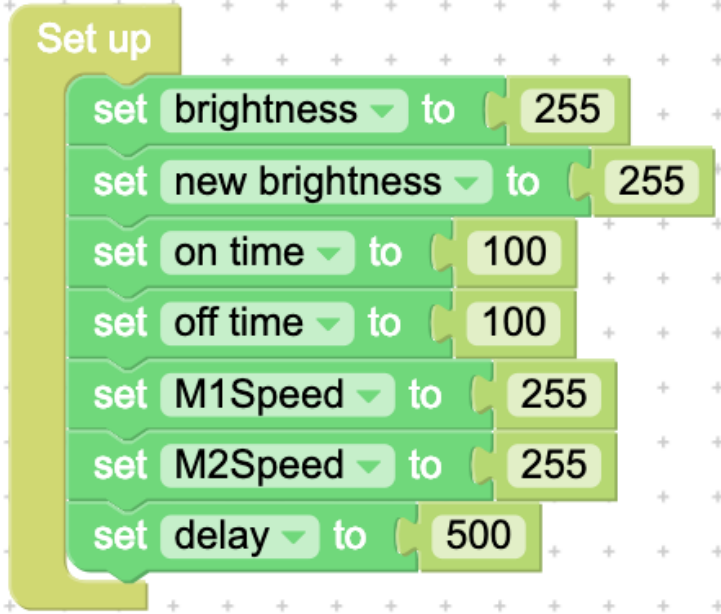


The 'reverse' function sets both DC motors' directions opposite of the 'drive' directions.

The 'spin' function sets both the wheel DC motors to clockwise. Because the motors are mounted facing the opposite directions, the FlipRobot should spin in a tight circle.

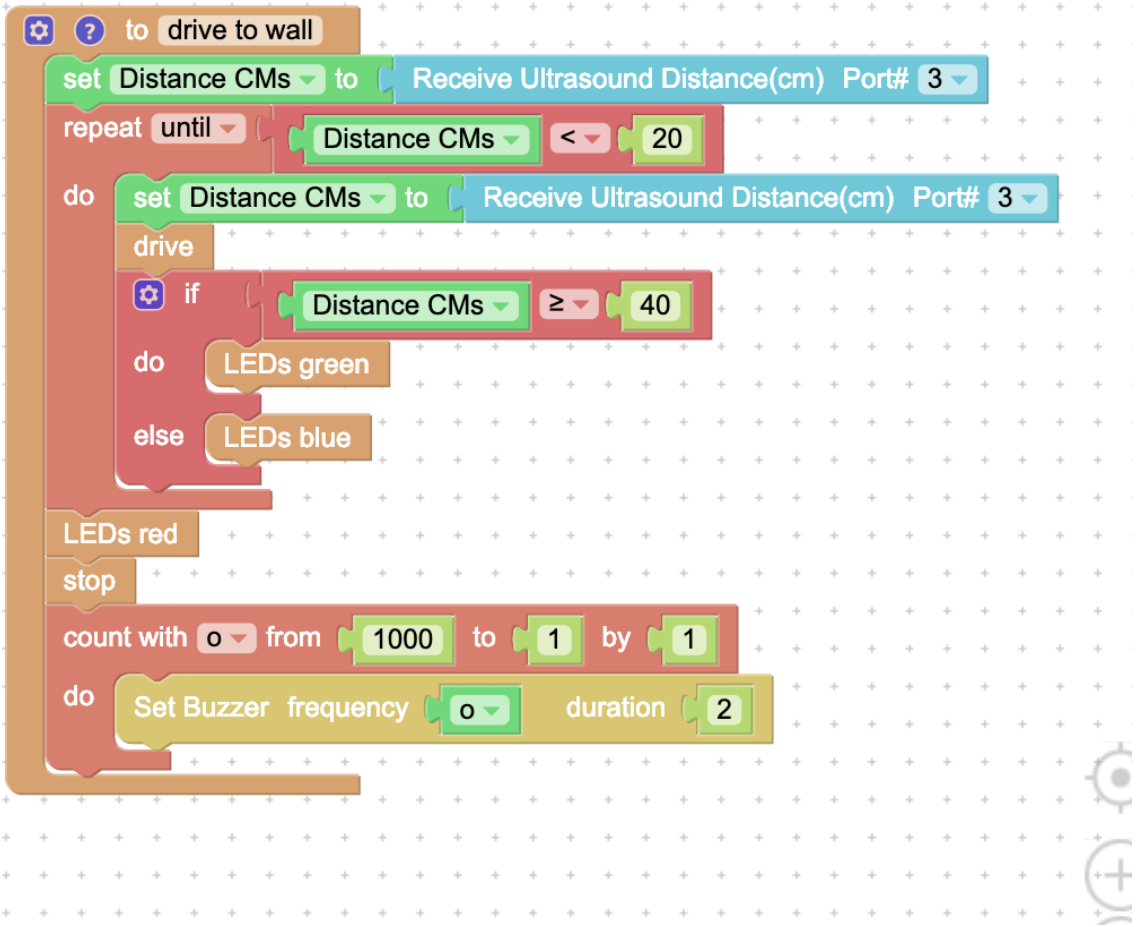
The 'stop' function sets both the wheel DC motors values to 0.

Random Number is a fun function. Here it is choosing a random turn time for the FlipRobot to turn



Let's put it all together and add some bells and whistles.

'Set up' will only run one time so we are using it to initialize the variable values.
The code is in the 'Loop' block so it will run again and again.



UltraSound Sensors located in the FlipRobots eyes sence the distance(cm) to the object in front of them. We are saving this value in the 'Distance CMs' variable

The FlipRobot will change LED ligh colors when it is less then 40cms, and continue to drive until it is closer than 20cm, then stop.

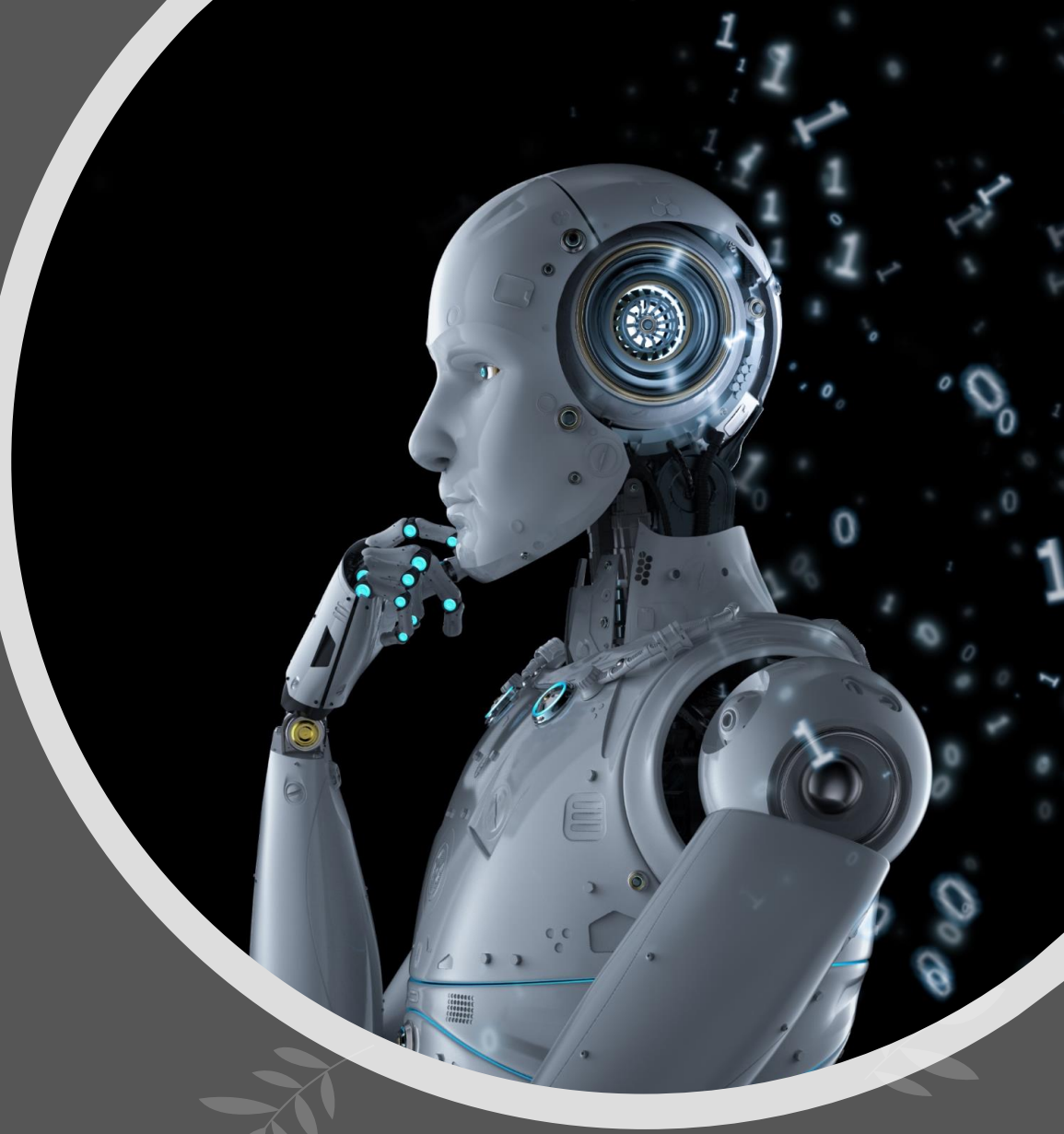
This Buzzer function changes the freuency of the buzz giving it a falling tone.

Last Week's Homework

How could image recognition AI create solution to a daily problem.

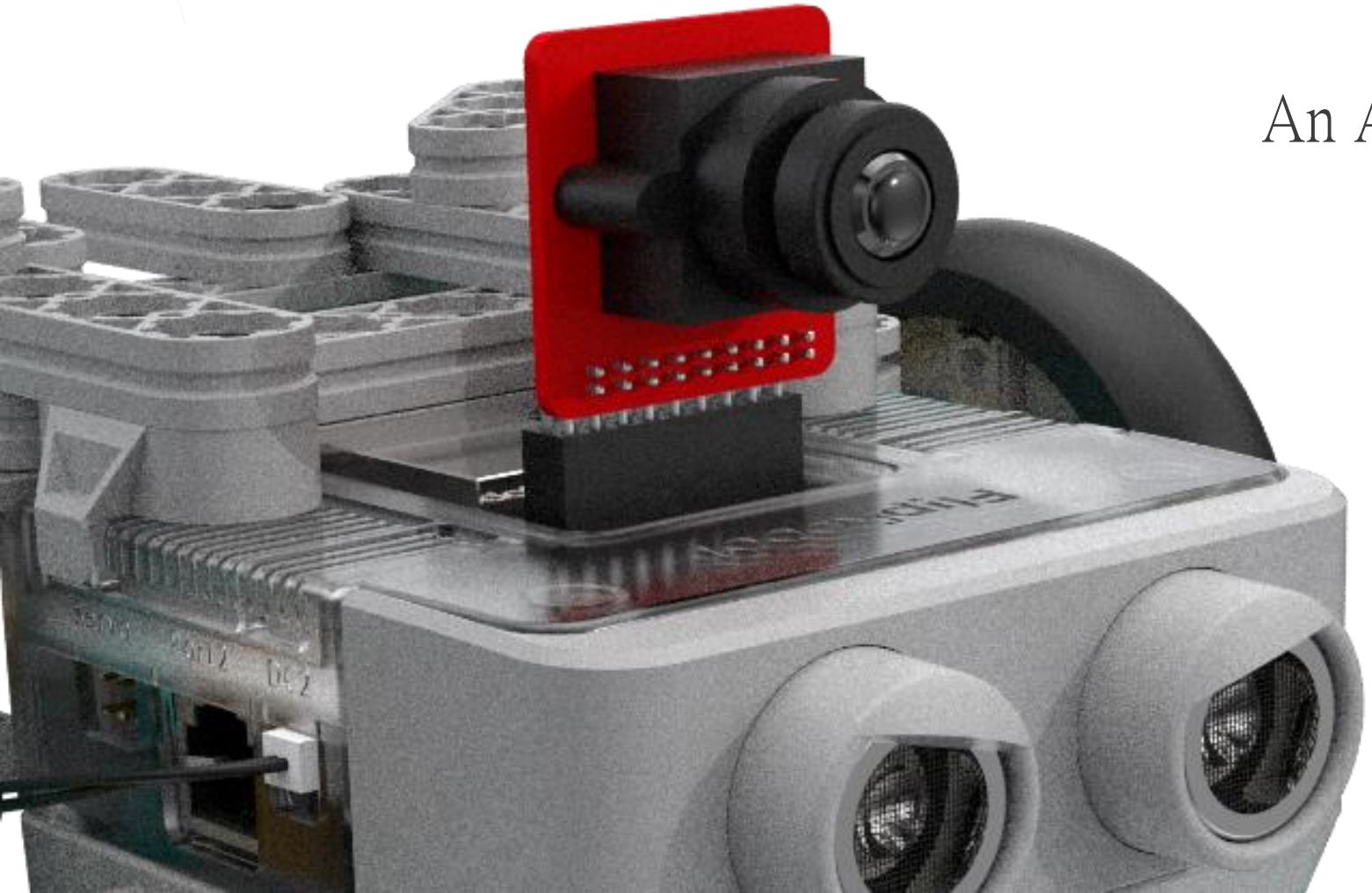
Project Format

- Problem description
- Solution (explain which kind of images need to be collected, and what action will be activated when robot recognize specific images.)



FlipAIoT Intro

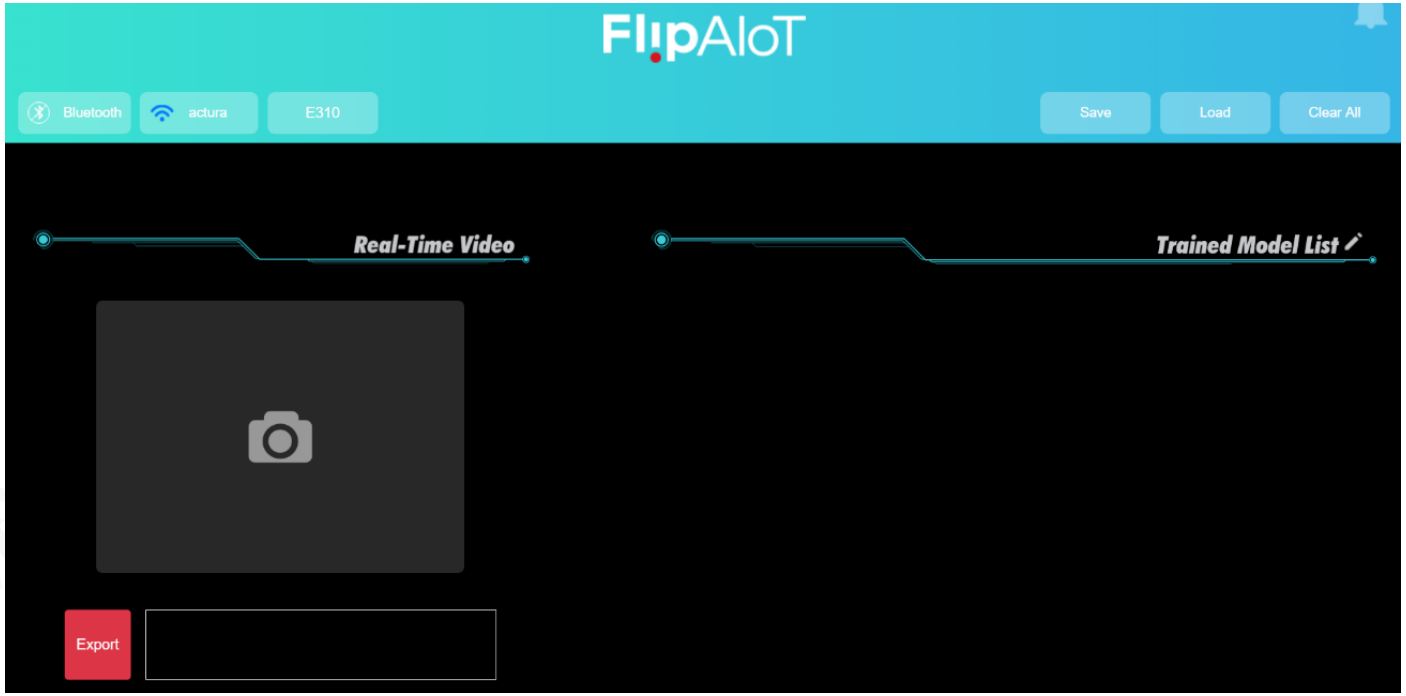
FlipAIoT Demo and Walkthrough



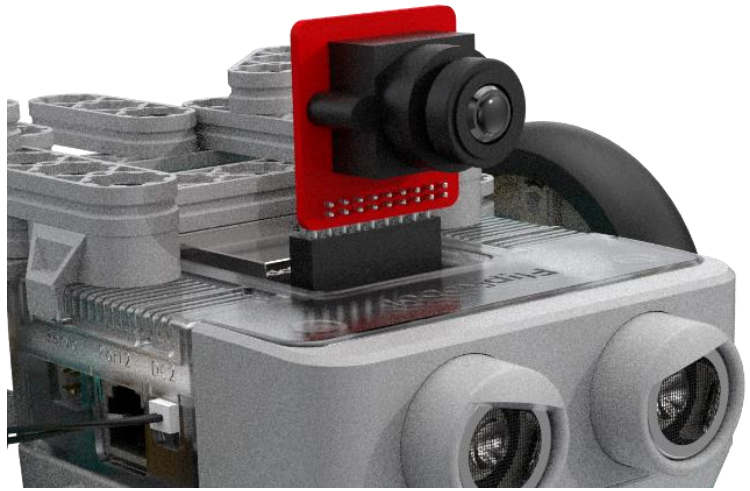
An AI that recognizes your Paper, Scissors, Stone...

...and then plays you!

FlipAIoT–Image Module Training and Image Recognition Tool



- FlipAIoT can analyze images taken from robot’s WIFICamera.
- Train modules by taking a large number of photos through the robot's camera.
- FlipAIoT can identify which image module that a new image belongs to.



WIFI Camera

- WIFICamera consists of WIFICamera Receiver and WIFIBoard.
- The chip on the robot can't quickly analyze large amounts of data, so it is needed to transmit images back to FlipAIoT on computer for analysis by WIFI wireless transmission.

FlipAIoT Demo

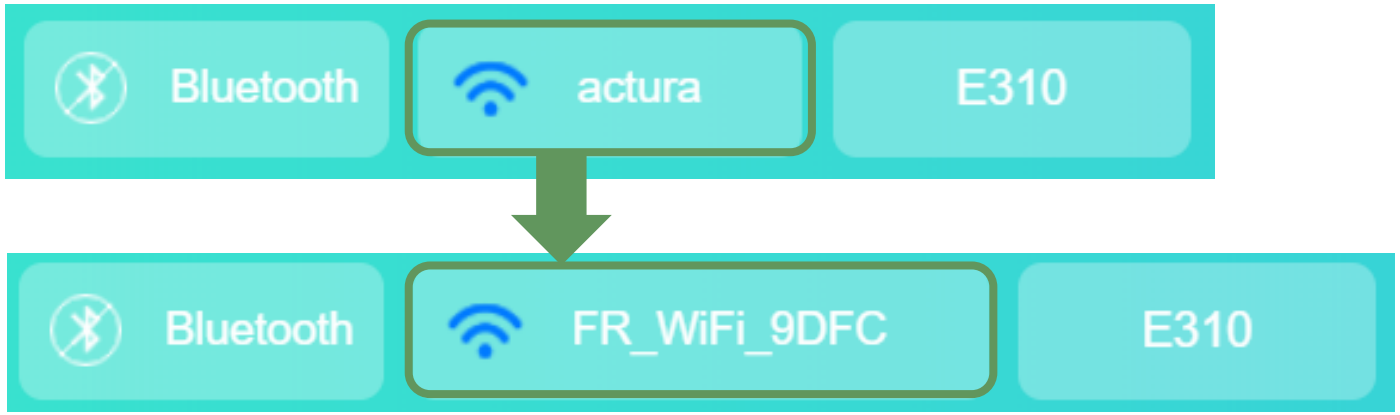
Requirements

- Windows PC or Laptop running Windows 10
- Flipbot E310plus kit
- WiFiCamera & Bluetooth dongle add-on kit

Setup

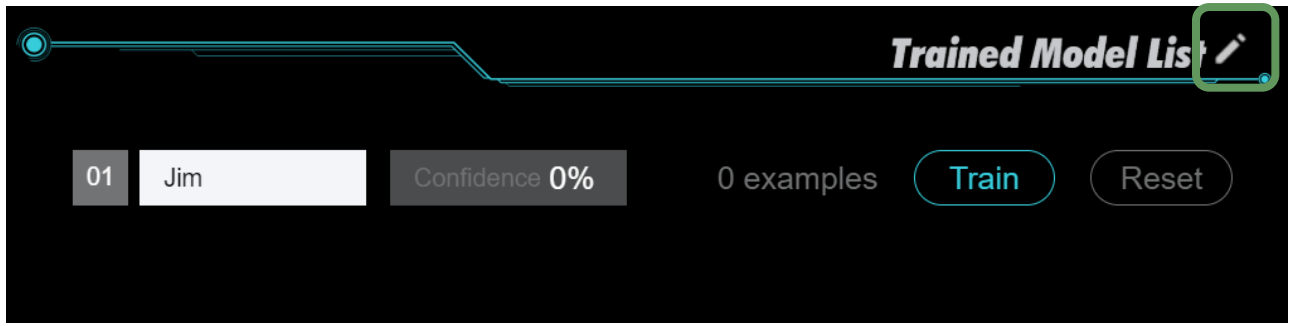
1. Download and install :
    1. FlipAIoT
    2. FlipCode (stand-alone version)
    3. Any necessary drivers (if not connecting to port)
2. Build FlipRobot
3. Attach camera to FlipRobot
4. Insert Bluetooth Dongle into a USB port
5. Your E310 with WIFICameraBoard can connect directly to your laptop with WIFI.
   (Use code: ilikerobot)
6. Remember the 4 digit device number on the bottom of your WifiCameraBoard.

Image Module Training Process - Setting Environment



- Connect FlipAIoT to the robot's WIFI receiver via Wi-Fi (The WiFi serial number is on the WiFi board)
- When the connection is complete, the WiFi connection block at the top of FlipAIoT shows the serial number.
- The image area will begin showing the current Camera shot

Image Module Training Process – Adding New Module



Enter the module list to edit.

In the edit screen, modules can be added, removed, and named.

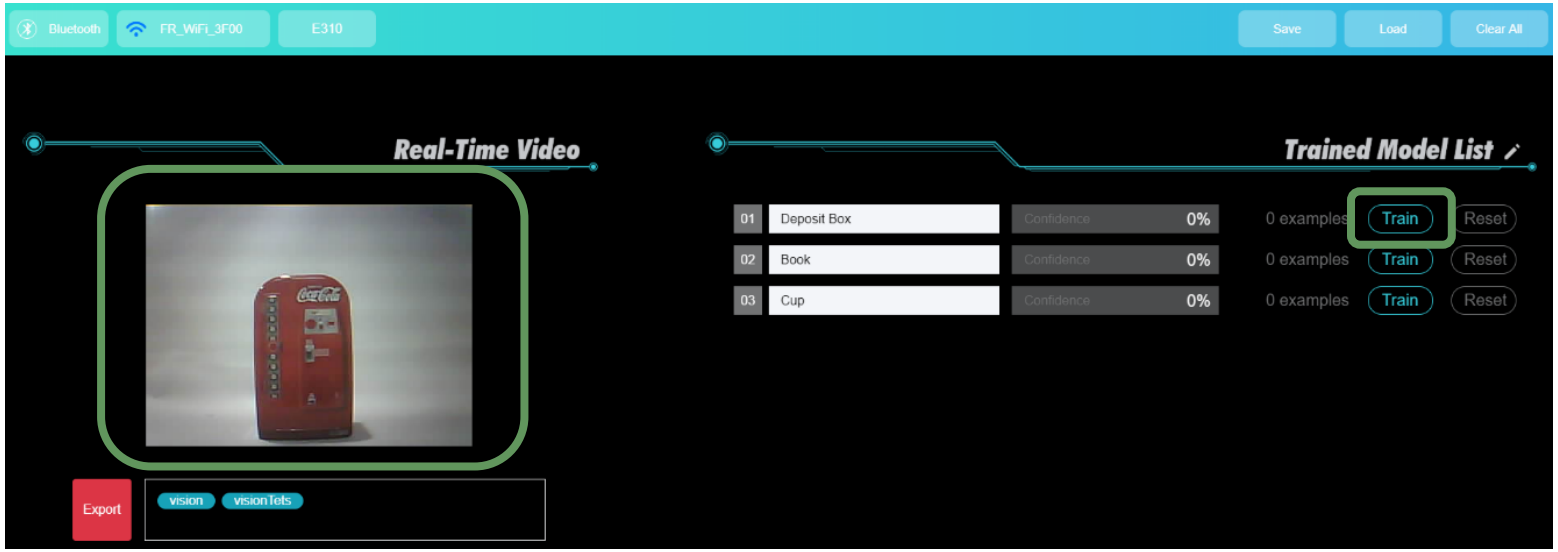
Store the modules

Return to the image training screen.

FlipAIoT Operation

1. Open the FlipAIoT application.
2. Click the pen icon.
3. For this example:
   - we will add 3 classifications and...
   - name the classifications.
4. Click the disk icon to save the updated changes.
5. Click the camera screen on left side.
6. the image received by robot’s camera will show on screen.

Image Module Training Process - Training Module

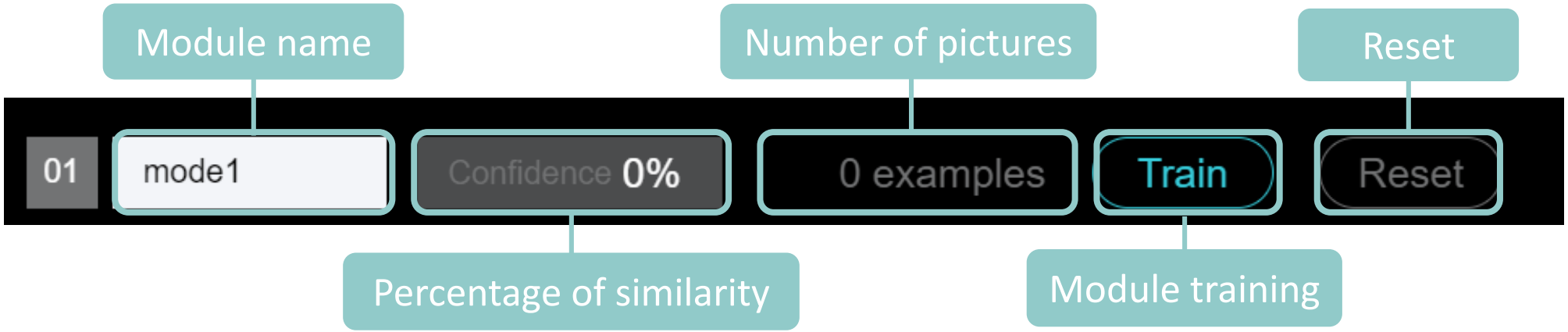


- After adjusting camera to the item or environment, press the "Train" button next to the image module to start adding images
- Each image module must consist of a large number of photos, and the more photos provided, the more complete the new image will be able to identify which module it belongs to.

Training : Gathering Images

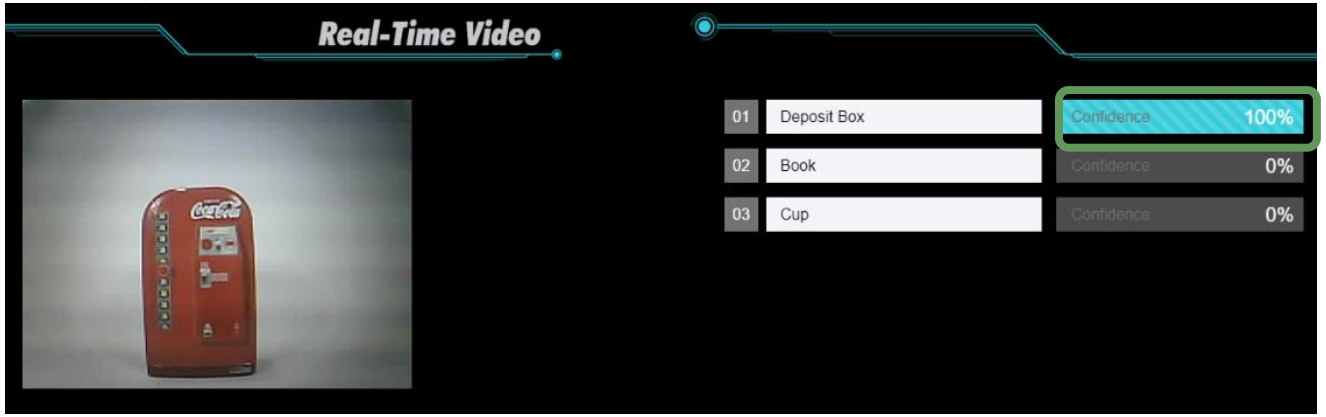
- Choose a sample object to begin to define a classification
- Point the camera at the object
- Tips for better sample object images:
  - Well-lit
  - Simple plain backgroud
- Take many pictures
  - Different sizes
    - Move the object closer and farther from FlipRobot camera
  - Different angles
    - Rotate and turn the object
- Add the images in corresponding classification by clicking “train”

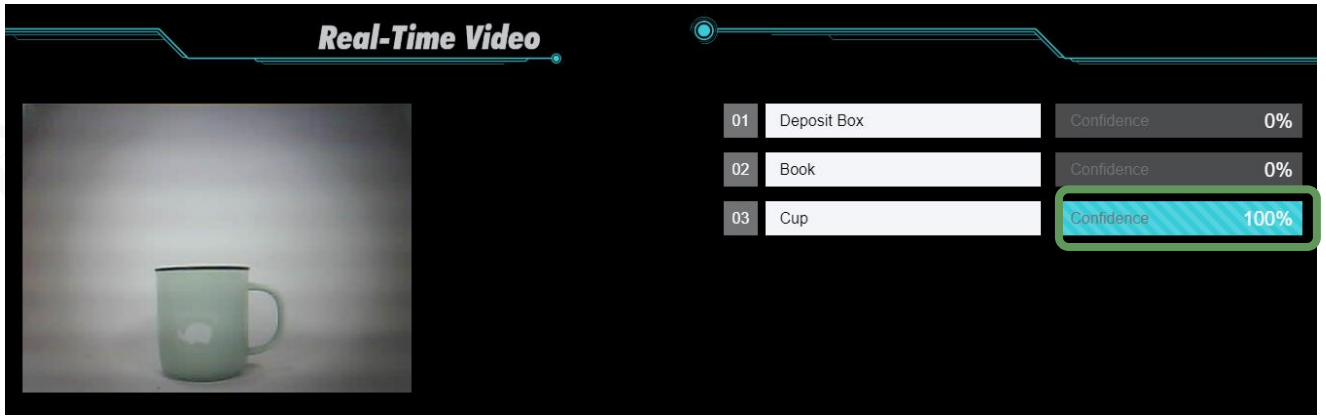
Recognition of the Image Process - Picture Description



- Percentage of similarity - Show percentage of similarity between new images and modules and the higher the percentage ratio, the higher the similarity between the image and this module.

Recognition of the Image Process – Example





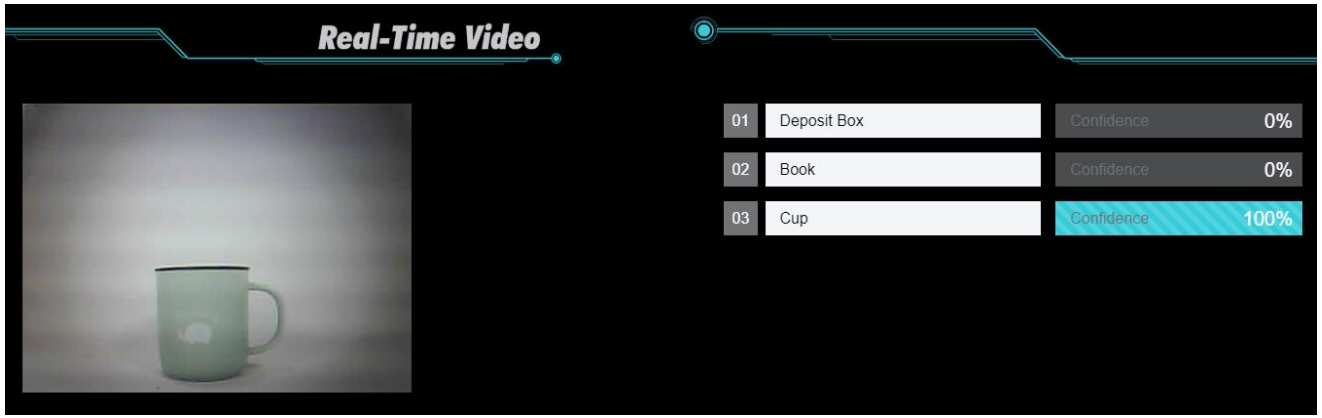
- The percentage of similarity, you can tell what kind of module the current image of the robot belongs to.
- From the upper picture, the percentage of the ”coin bank module" is 100%, representing the detected image as the coin bank.
- From the lower picture , the percentage of the ”cup module" is 100%, representing the detected image as the cup.

Save and Export

After adding images, save the file.

Click 'export' button to export the file to FlipAIot (programming section).

Recognition of the Image Process – Example



- If identifying an image, the picture shows that the image is similar to multiple modules and cannot easily identify which module belongs to, indicating that the module training is incomplete and needs to continue training.

Note: You must carefully classify the new images in each module

Use FlipCode to write the code

- Programming the function in FlipCode for FlipAIoT.
  - Buzzer
  - LED
  - Motors (DC and Stepper)
- Save the FlipCode file so that it can be imported to FlipAIoT.

Summary of steps...

FlipAIoT (Image)

1. Download the FlipAIoT and FlipCode(Standalone version)
2. Connect Robot and laptop with WIFI. (WIFI password is ‘ilikerobot ‘)
3. Open FlipAIoT, click the **pen icon**.
4. Add 3 image classifications, and name them.
5. Click the **disk icon** to save the change.
6. Click the **camera view screen** on left side to view the robot’ s camera's image.
7. Add the images to the corresponding classification by clicking **'train’** .
8. After completing adding images, save the file.
9. Export the file to FlipAIoT (programming section) by clicking the button: export.

Summary of steps...

FlipCode

1. Programming the function in FlipCode. (Buzzer, LED or motors are available)
2. Save the FlipCode file so that it can be imported to FlipAIoT.

FlipAIoT (Programming)

1. Connect the robot and FlipAIoT with Bluetooth.
2. Import the FlipCode file by clicking the button + near the “Action”.
3. Drag the AI module and functions to the programming area.
4. Connect the Image classification and corresponding functions.
5. Choose the robot’s Bluetooth name in every function.
6. Click the icon with FlipEye to upload the program.
7. After finishing uploading, click the play (button with red triangle) to activate the program.

QUIZ 1

1. Which of the following components could make the sound for the robot’ s "voice"?

(a) Servo motor.
(b) Ultrasonic sensor.
(c) LED.
(d) The buzzer V

QUIZ 2

2. If Ricky wants to make the LED red, which RGB setting is correct?

(Hint: RGB = Red Green Blue)

a) R=0, G=0, B=0.
b) R=0, G=255, B=0.
c) R=255, G=0, B=0 V
d) R=255, G=255, B=0.

QUIZ 3

3. In FlipAIoT's Image Creator, if robot classifies the image incorrectly, what action can we take to improve the recognition?

a) Add more images to correct classification V
b) Reset all classifications.
c) Export the module.
d) Turn off the robot.

QUIZ 4

4. When we export the image recognition module, where can we find the module we made?

(a) FlipCode
(b) FlipRobot
(c) FlipDFP. V
(d) FlipRAS

QUIZ 5

5. Which work flow concept is used in the design of FlipDFP blockly design ?

a) IoT.
b) A.I.
c) AIoT.
d) IPO V

Homework & Question

Your Questions

Hi.
I'll be your chatbot today.
How can I help you?

Send your questions.

Thank You

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