App Inventor + IoT: Bouncing ball with BBC Micro:bit buttons

60 mins

(with Basic Connection tutorial completed)

Level: advanced

This tutorial will help you get started with App Inventor + IoT and the **BBC micro:bit** controller. Press the two buttons on micro:bit will make a ball on your app moving back and forth.

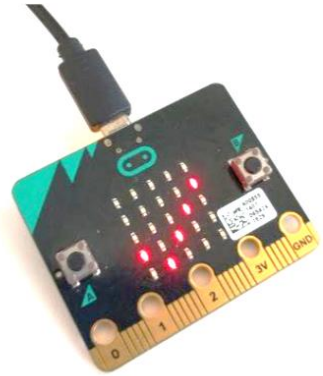
- source .aia

Hardware

You only need one **BBC micro:bit** to get started with this project.

Pairing with Micro:bit

First, you will need to pair your Android phone or tablet to the micro:bit controller, using these directions. Your device must be paired with the micro:bit in order for the app to work.



App Inventor

This app can let you control a ball in the app to move back and forth by pressing two Micro:bit buttons. Now log into **MIT App Inventor site** and create a new project.

You should complete the **App Inventor + IoT Basic Connection tutorial** to make a basic connection to the micro:bit device. If you prefer, you can download the completed .aia file **here**.

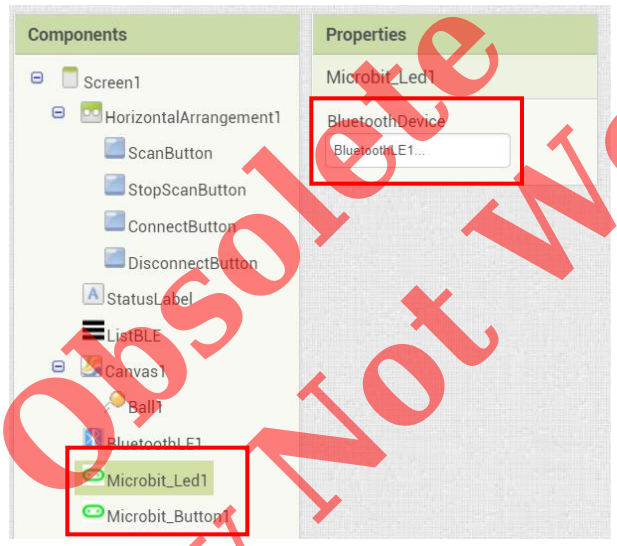
- App Inventor's micro:bit button component's document

The remaining steps all build off of the starter code for Basic Connection tutorial and its .aia source code.

Designer

First, we need to add the necessary extension.

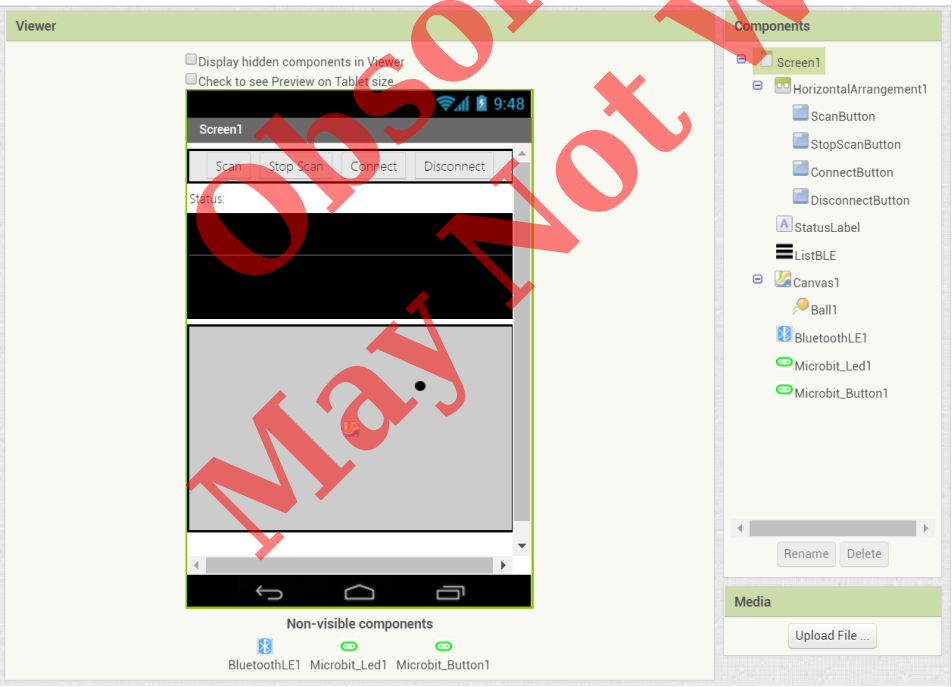
- In the Palette window, click on Extension at the bottom and then on "**Import extension**" and click on "URL".
    - Paste micro:bit extension URL: http://iot.appinventor.mit.edu/assets/com.bbc.microbit.profile.aix
- Add a **Microbit_Buttons** component to your app by dragging it onto the Viewer, set its **BluetoothDevice** property to "BluetoothLE1".
- Add a **Microbit_Led** extension, also set its **BluetoothDevice** property to "BluetoothLE1".



Let's add more components to our app to receive the micro:bit buttons' statuses.

- From the Drawing and animation drawer in the Palette, drag in a **Canvas** and a **Ball**. Set Canvas's height to 320 pixels, width to fill parent (or any parameters you like).
- Add a **Ball** component into the **Canvas** component, set it **X** and **Y** property to both **160**, which means we want this ball to be initially in the middle of the Canvas.

After some adjusting, your designer should look similar to this. It doesn't have to be exactly the same. Feel free to modify the component's background color, position and text size.

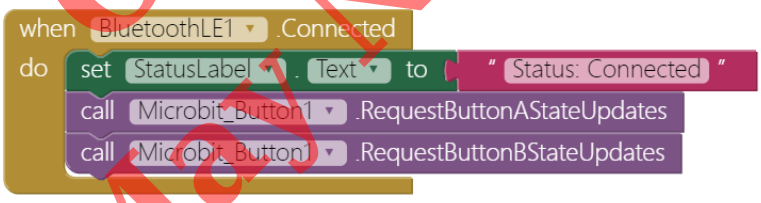


Blocks

We want to control Ball component's horizontal movement with the two buttons on out micro:bit controller. Let's begin:

STEP1: Request updates when connected

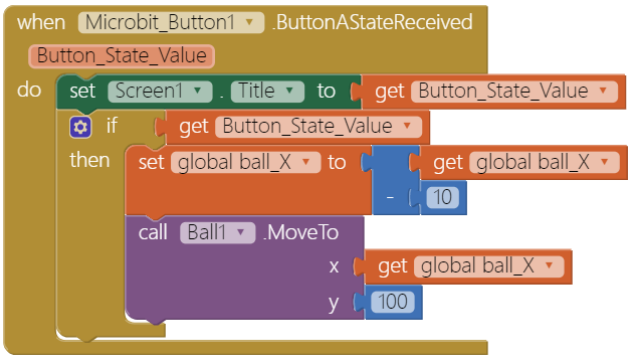
In the **BluetoothLE1.Connected** event, we show connection status on label and request that the micro:bit update the two buttons' statuses.



STEP2: Micro:bit's A button pressed

In **Microbit_Button1.ButtonAStateReceived** event:

- If A button is pressed (**Button_State_Value** is true), then we set the **ball_X** variable to decrease by 10.
- Make Ball1 component move to position (ball_X, 100) to make it move left by 10 pixels.



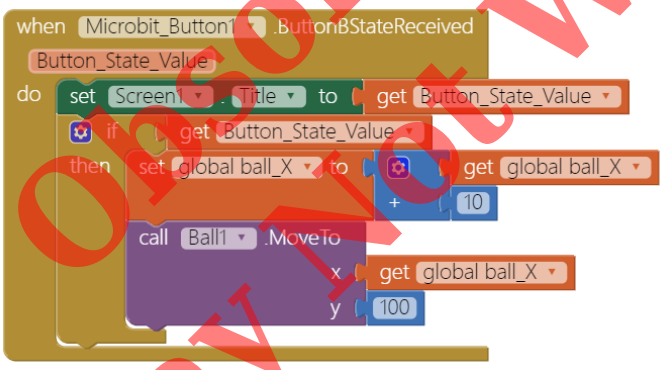
STEP3: Micro:bit's B Button pressed

For the **Micro:bit's B Button**, things are almost the same, just in the opposite direction.In **Microbit_Button1.ButtonBStateReceived** event:

- If user pressed Micro:bit's A button is pressed

(**Button_State_Value** will be **true**), then we set **ball_X** variable increase by10.

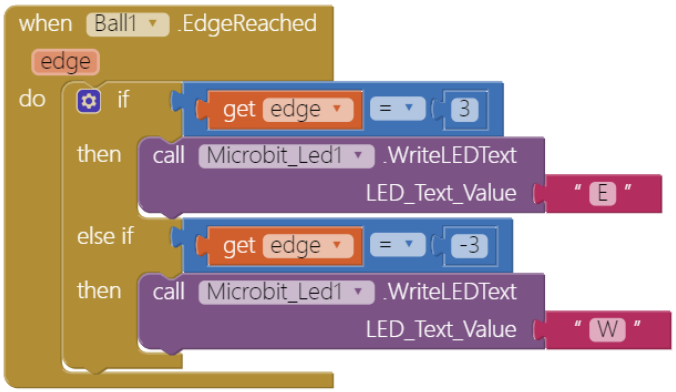
- Make Ball1 component move to position (ball_X, 100) to make it move left by 10 pixels.



STEP4: Ball reached canvas' edge

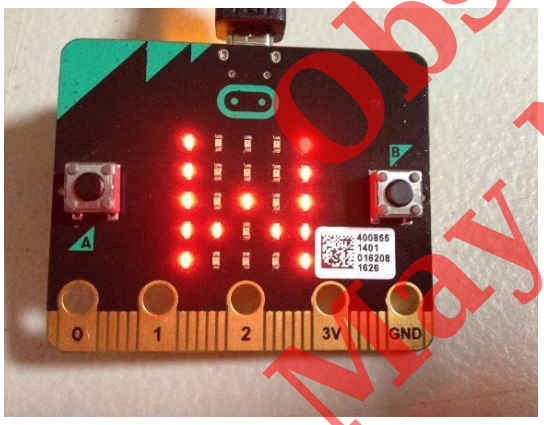
When Ball1 reached canvas' edges (**Ball1.EdgeReached** event), we will show corresponding text (single character) on micro:bit's Led matrix.

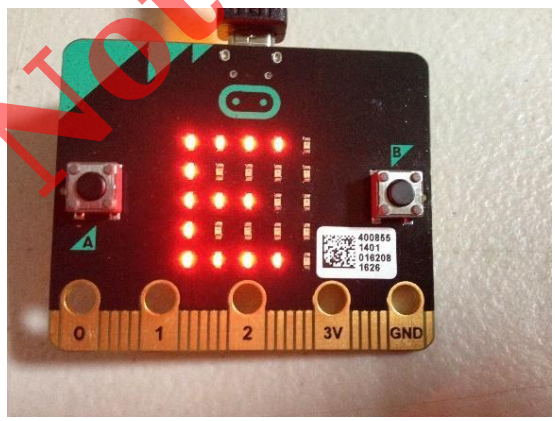
In **Ball1.EdgeReached** event, we use the if/else block if to check which edge is reached, then send '**E**' or '**W**' character (meaning **East** or **West**) to the micro:bit using the **Microbit_Led1.WriteLEDText** method.



Tips

Your app should now be working! Pair the Bluetooth on your Android device to test it out! Connect your micro:bit device using the MIT AI2 Companion (if you haven't already) or install the .apk. Press the two buttons on micro:bit, and the ball on the screen should move left and right.





Brainstorming

1. Try to move a Micro:bit LED dot back and forth by Micro:bit buttons (refer to our Micro:bit LED tutorial).