Internet of Things with NodeMCU and MIT App Inventor

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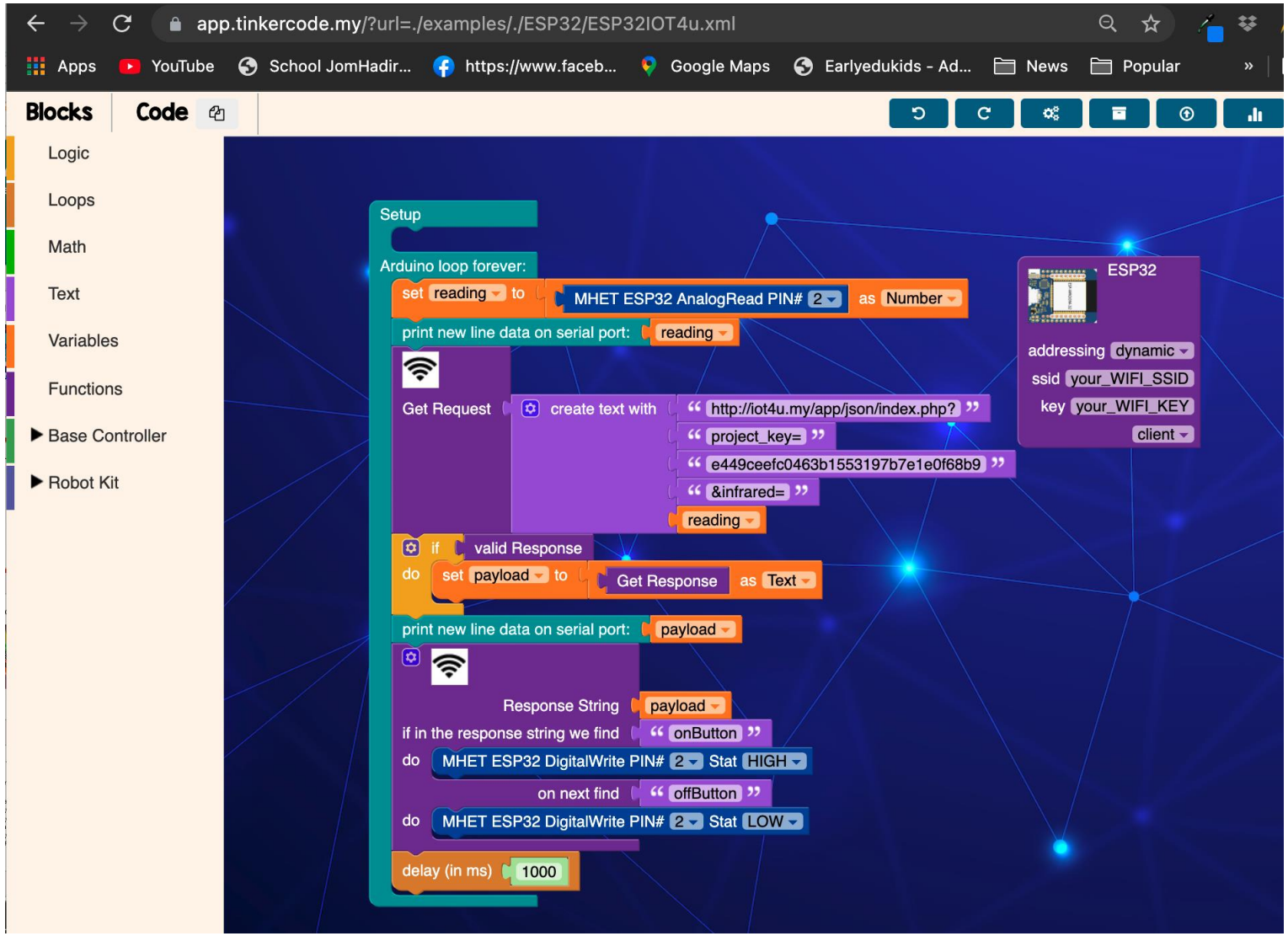
Tinkercode

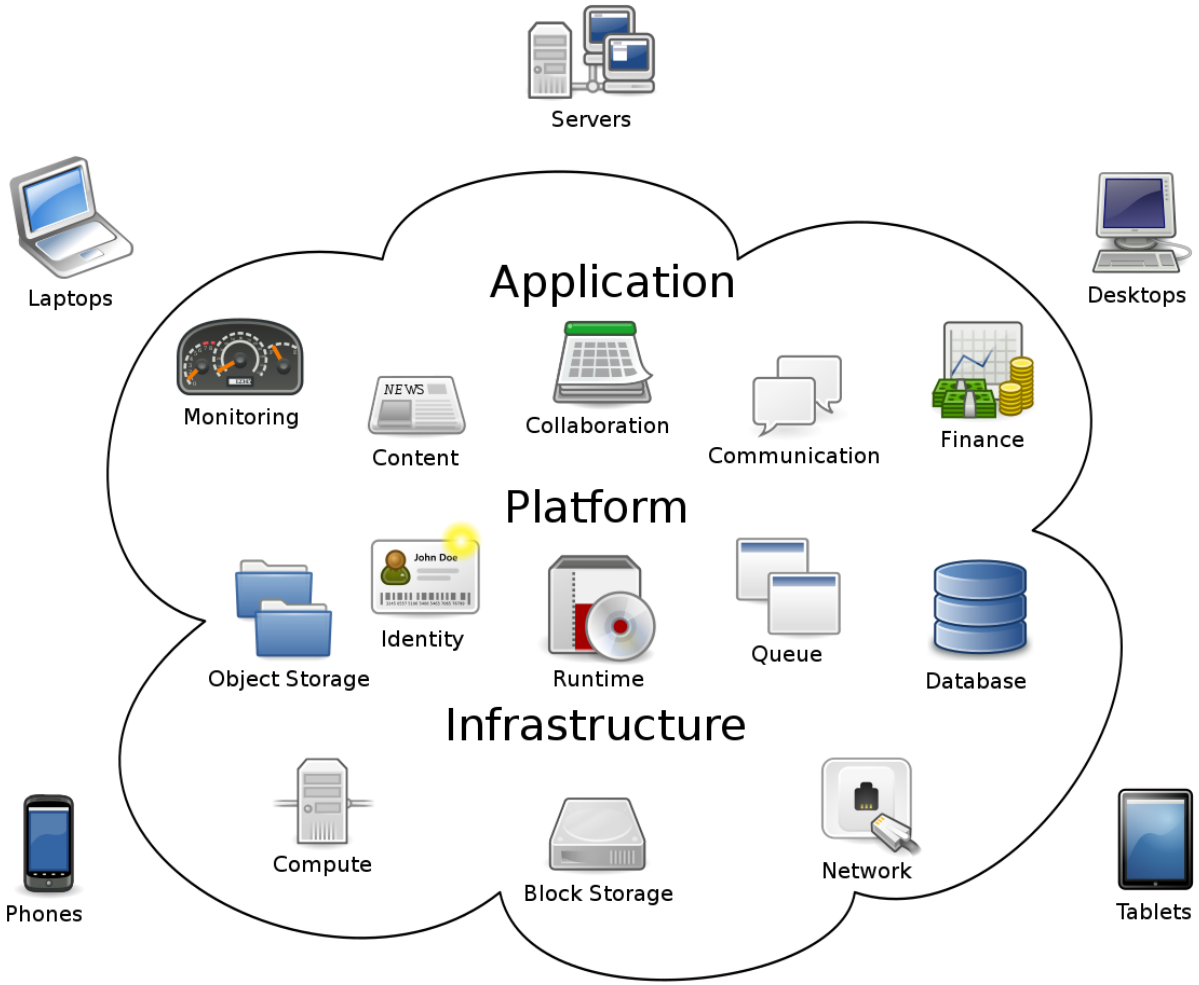
https://tinkercode.my/



Flow of Class

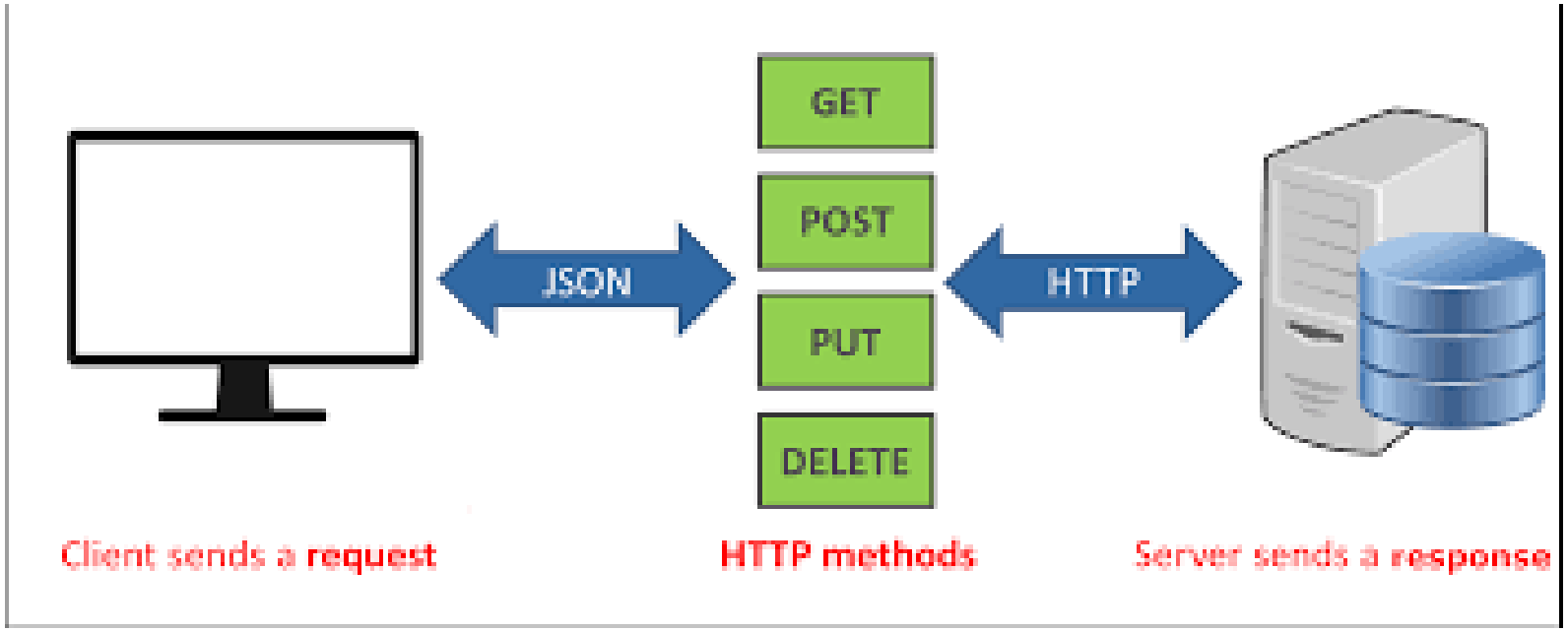
https://www.menti.com/bn2wbvg7nb

Introduction to Internet of Things

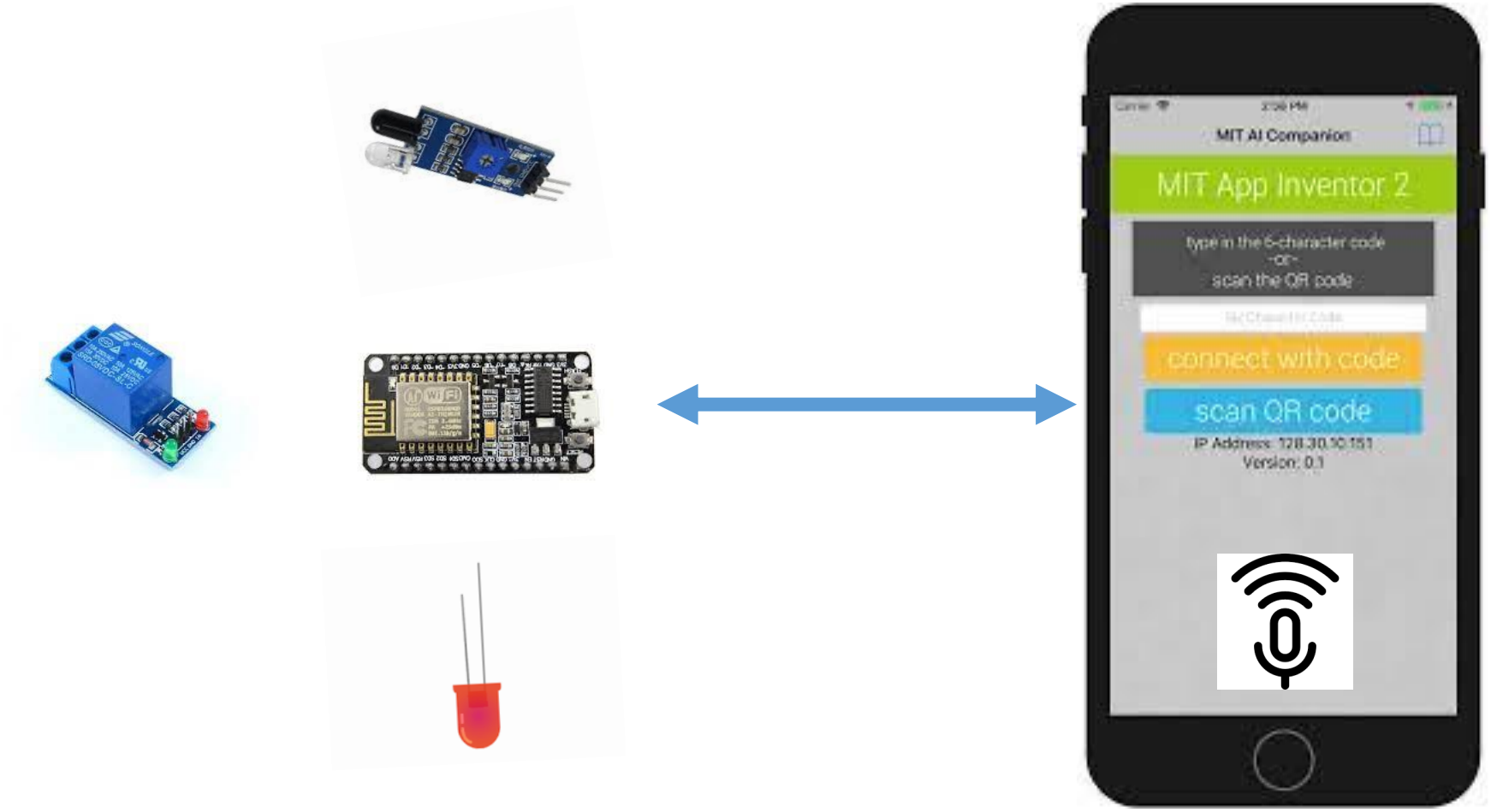


Computer and Server

Introduction to REST API



Today’s Task

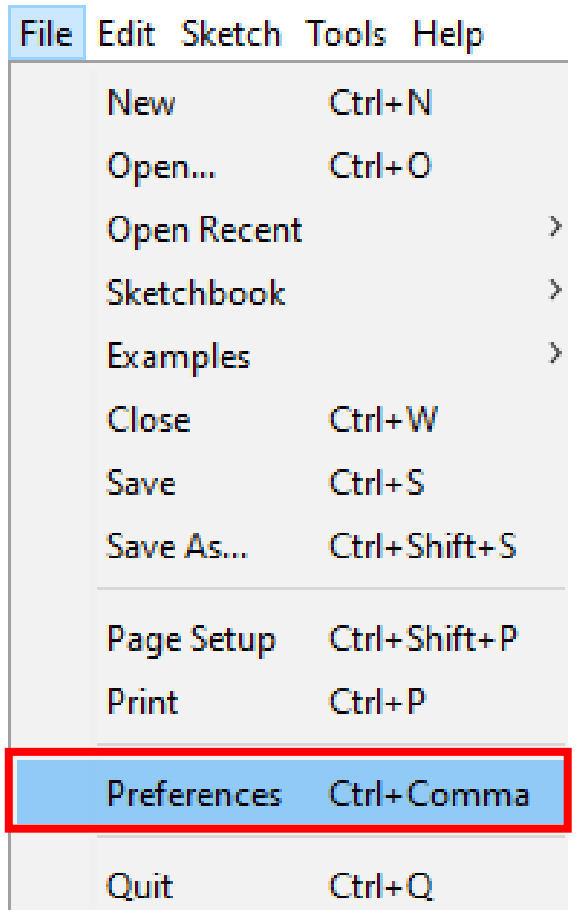

MIT AI Companion
MIT App Inventor 2
type in the 6-character code
-or-
scan the QR code
connect with code
scan QR code
IP Address: 128.30.10.151
Version: 0.1

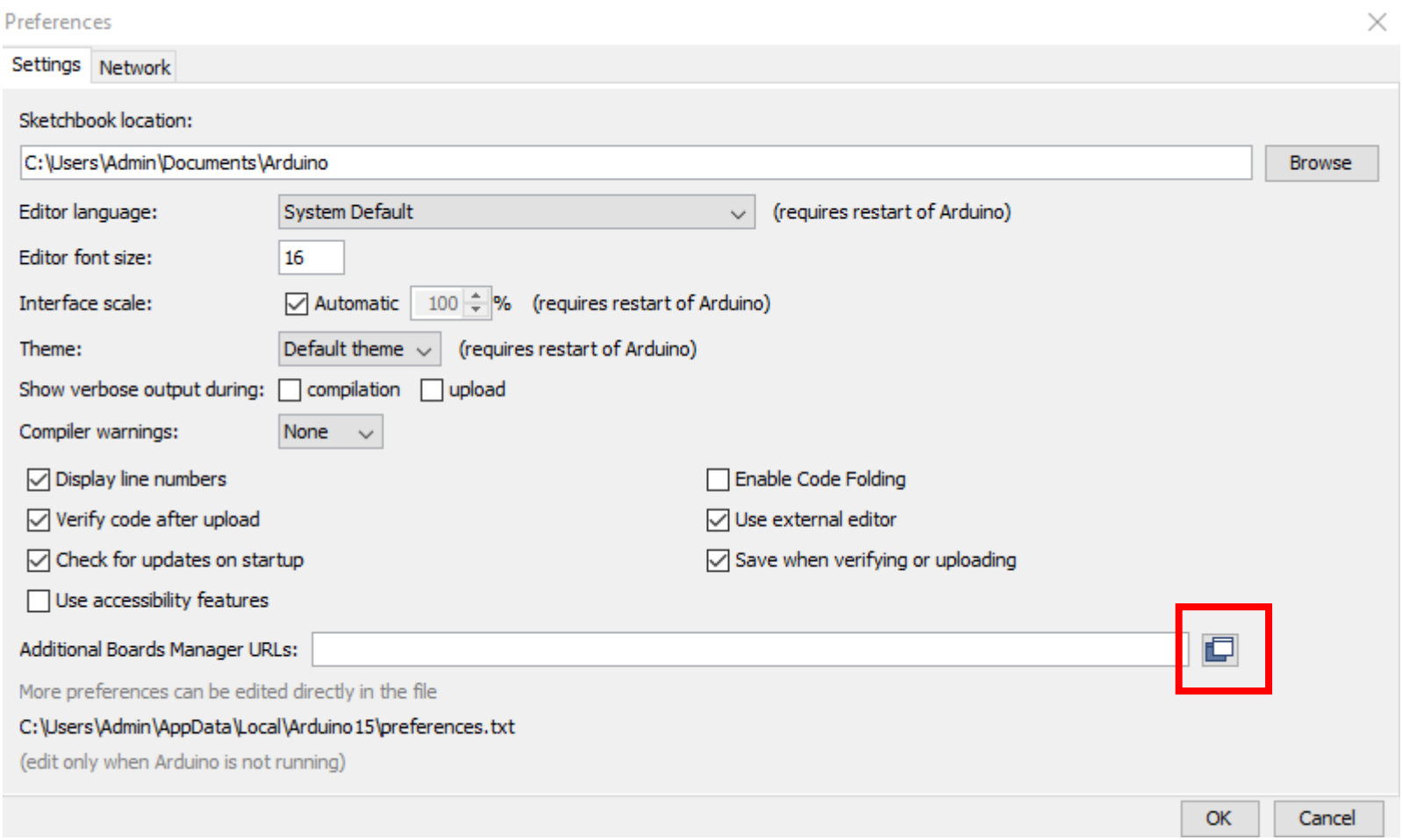
Arduino IDE Setup for ESP8266

Fauzan Khairi Che Harun

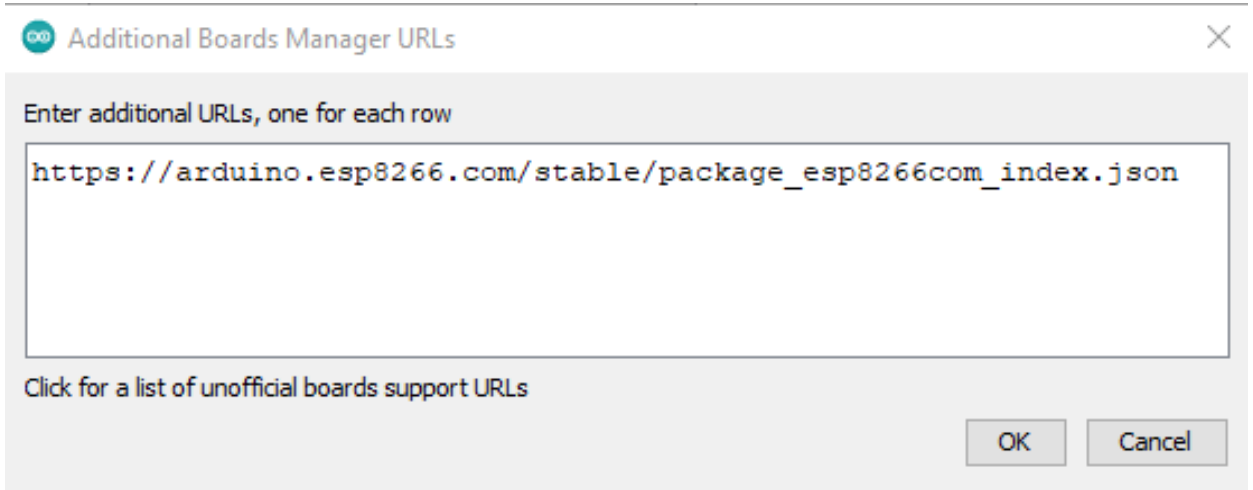
Add ESP8266 to Arduino IDE

Open File-> Preferences, and click the button to add Additional Board URLs.

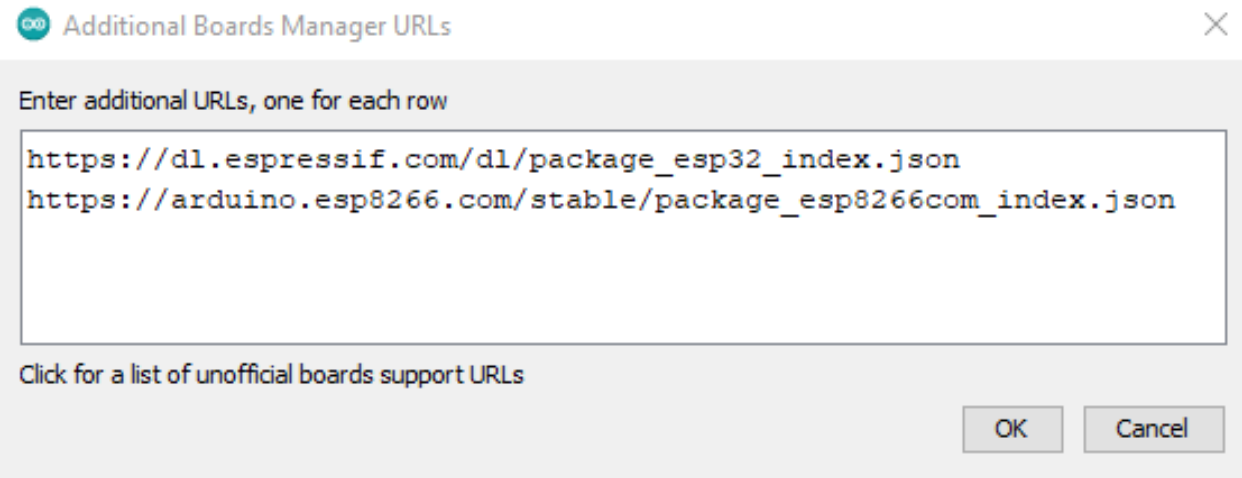




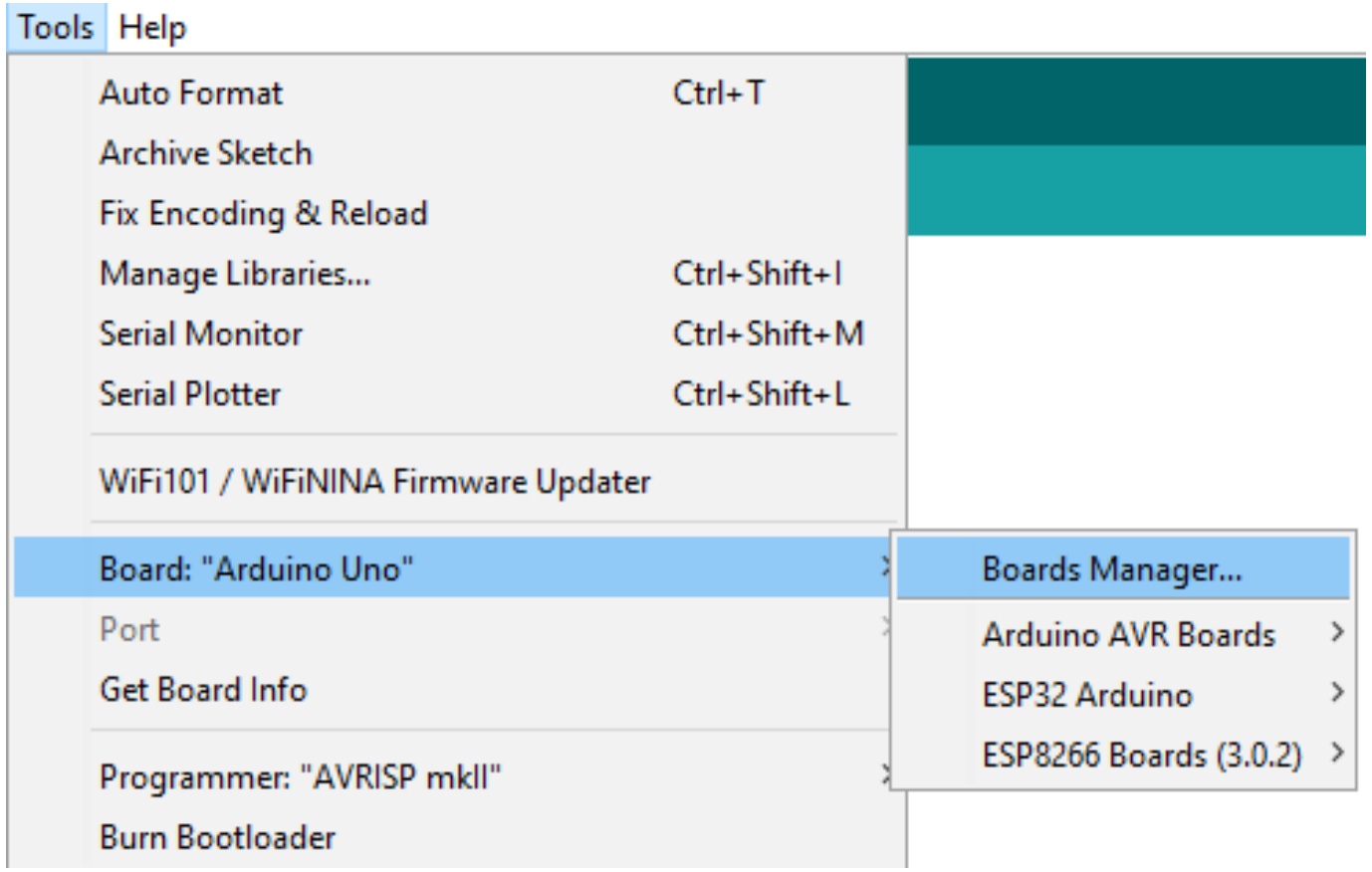
Copy this link https://arduino.esp8266.com/stable/package_esp8266com_index.json to Additional Board Manager URLs



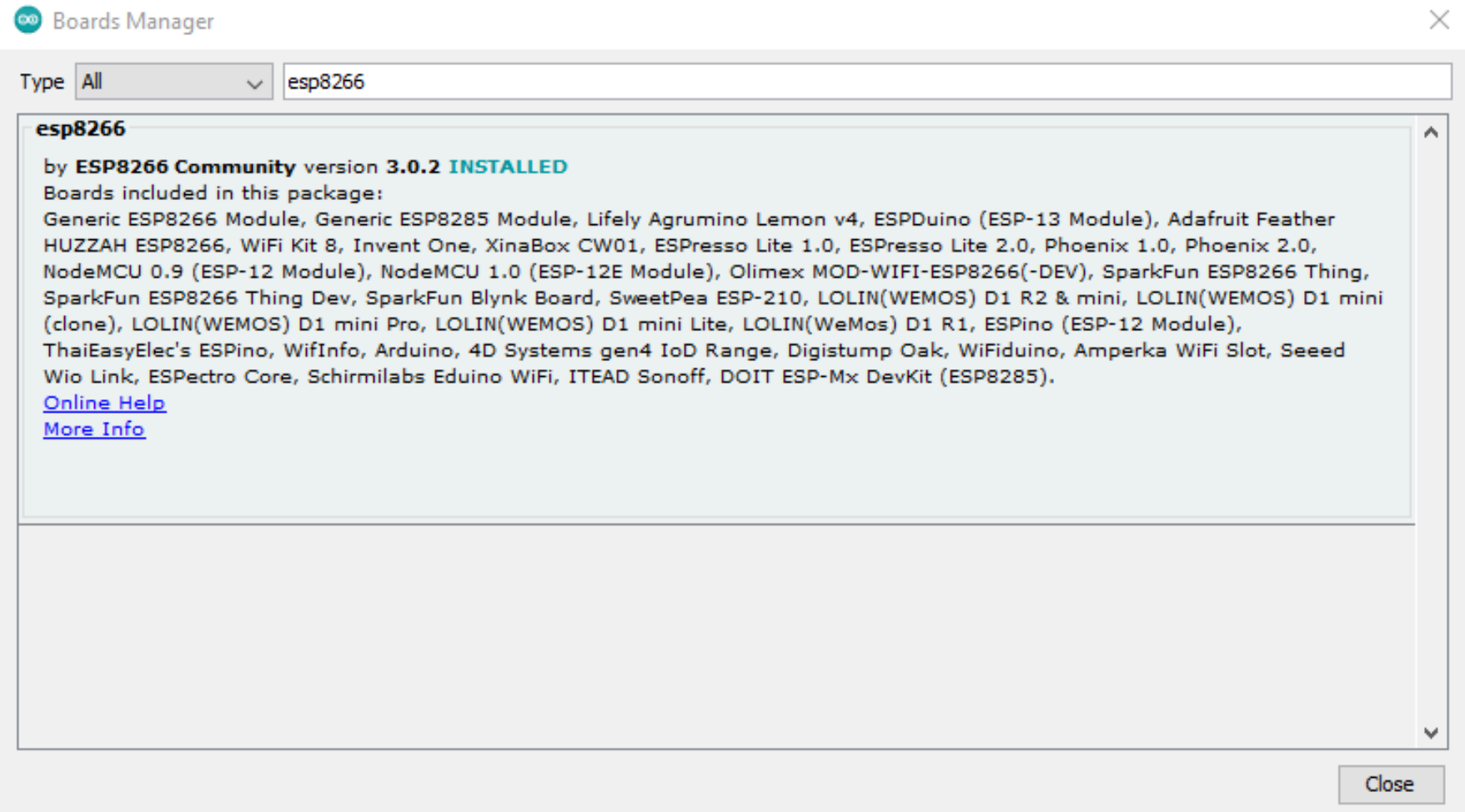
If you previously use ESP32 boards or any other boards, just press Enter and paste the link on new line



Select Tools-> Board -> Board Manager



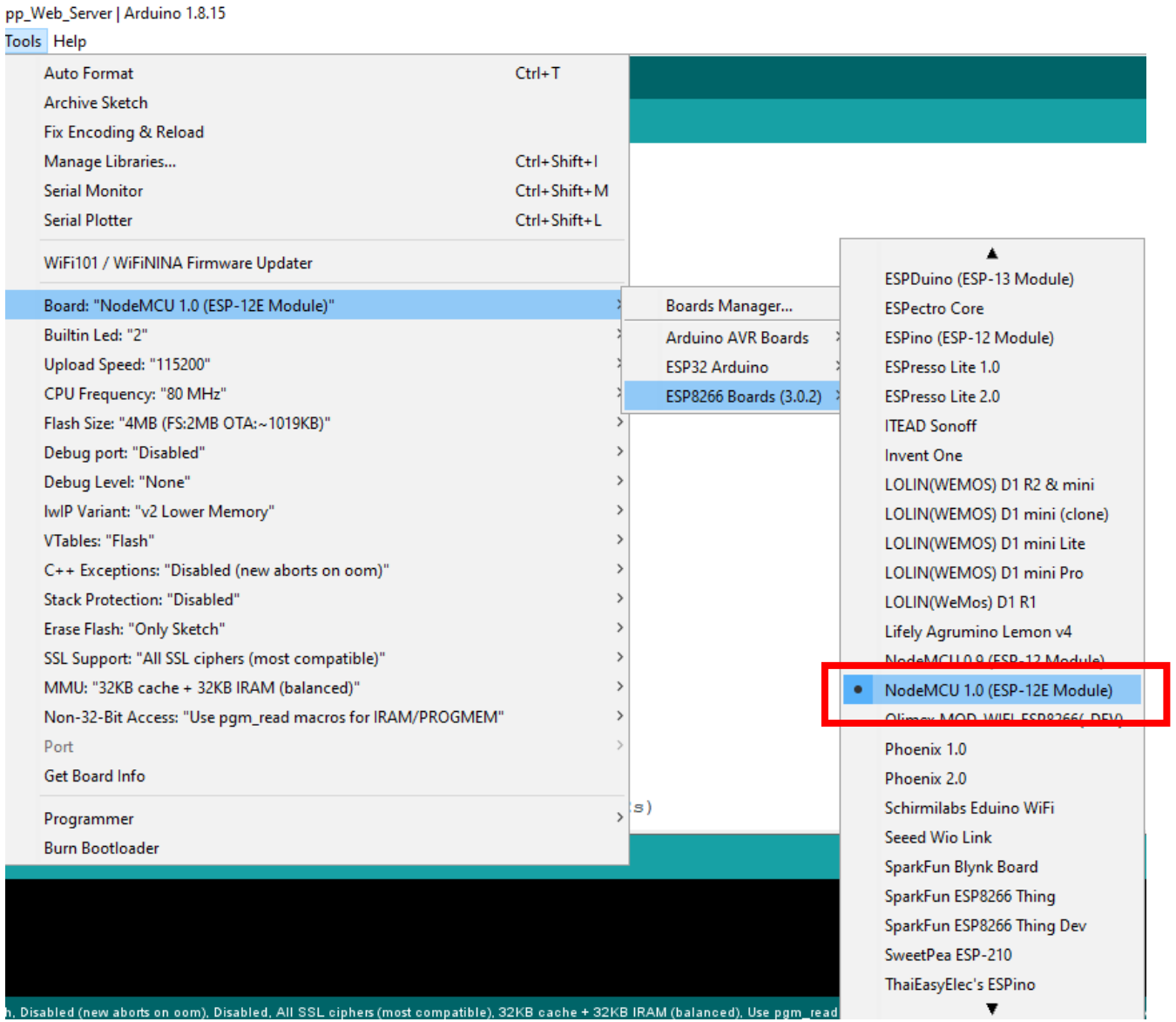
Search for ESP8266, then click install



Web Server With ESP8266

https://github.com/apauaie/esp8266_webserver

Copy the program from this link, select the correct board, and press upload



Copy the program from this https://github.com/apauaie/esp8266_webserver , fill in your Wifi name and password, then press upload

ESP8266_MIT_App_Web_Server §

```
// Load Wi-Fi library
#include <ESP8266WiFi.h>

// Replace with your network credentials
char ssid[] = "Your Wifi Name";
char password[] = "YourWifiPassowrd";

// Set web server port number to 80
WiFiServer server(80);

```

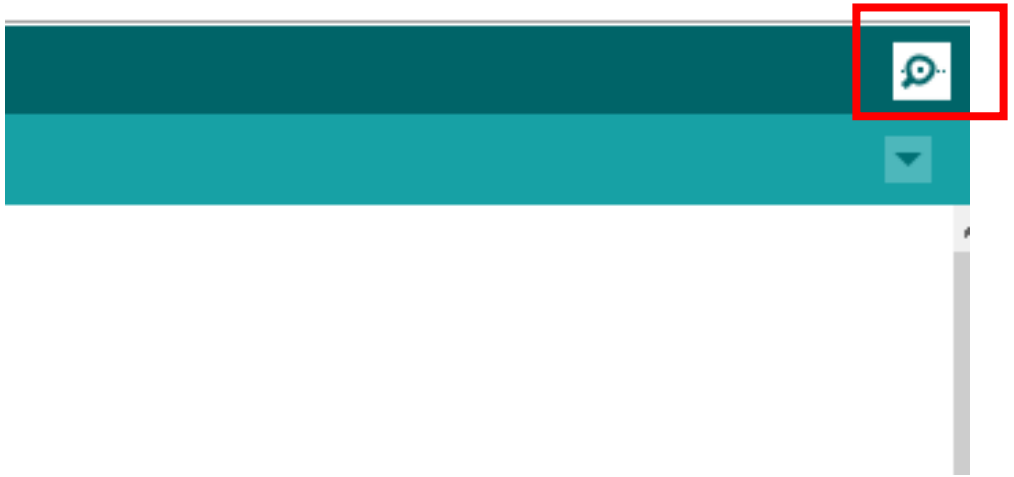
File Edit Sketch Tools Help

ESP8266_MIT_App_Web_Server §

```
// Load Wi-Fi library
#include <ESP8266WiFi.h

// Replace with your ne
```

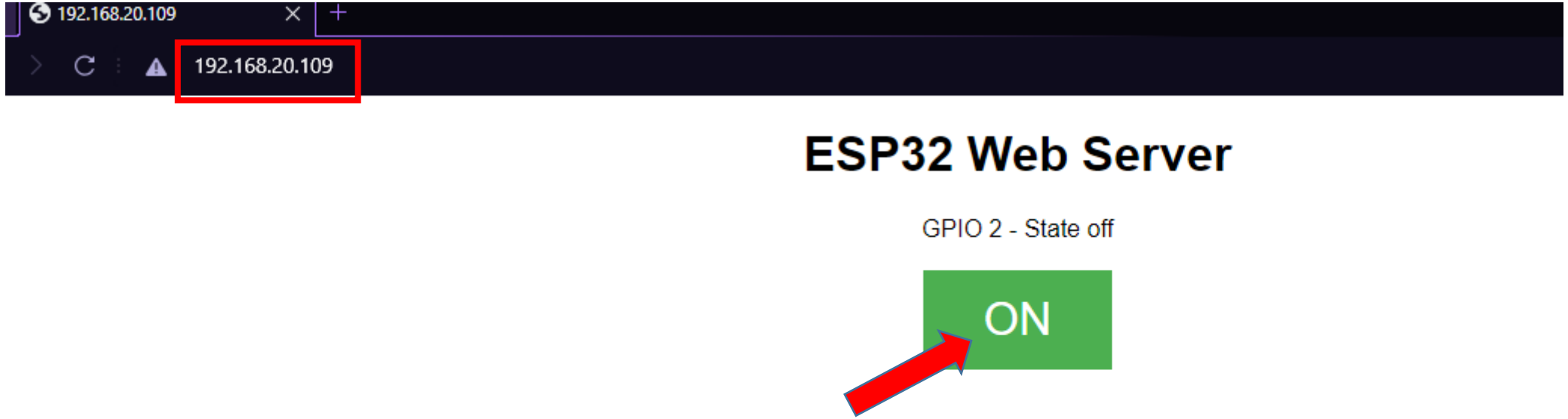
Open Serial Monitor, and copy the ip address



COM5

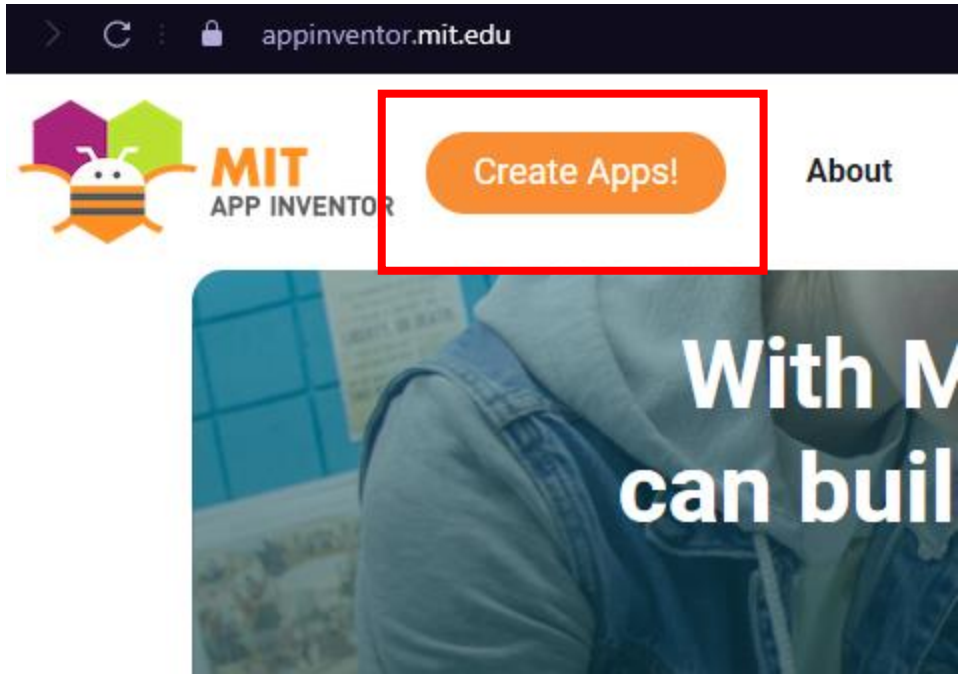
```
19:37:52.752 -> ...
19:37:53.776 -> WiFi connected.
19:37:53.776 -> IP address:
19:37:53.822 -> 192.168.20.109
19:37:53.822 -> Open this IP in a webbrowser to control the LED
```

Paste the ip address in your web browser, and now you can test the button to turn the LED on and off. Dont worry if you see a Sensor Value 0 there, you will learn about it later.

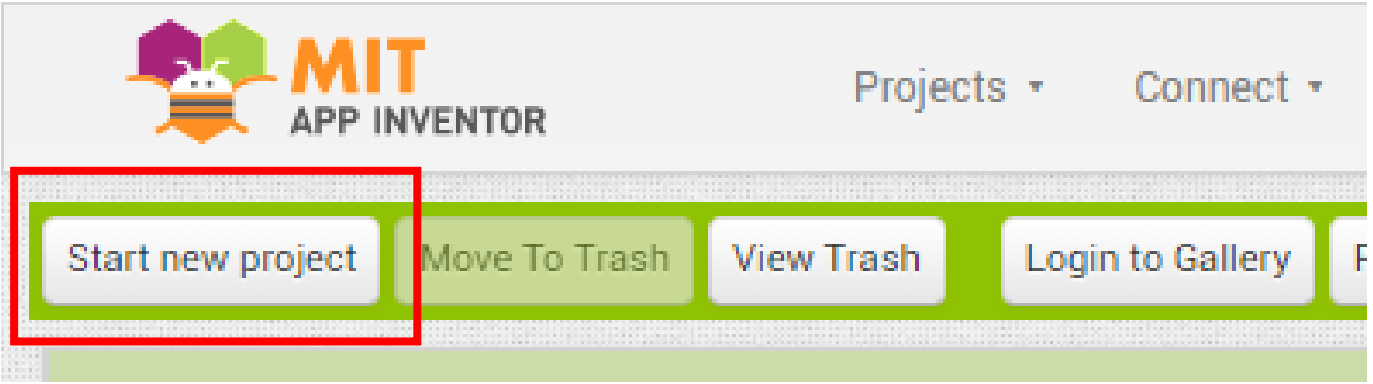


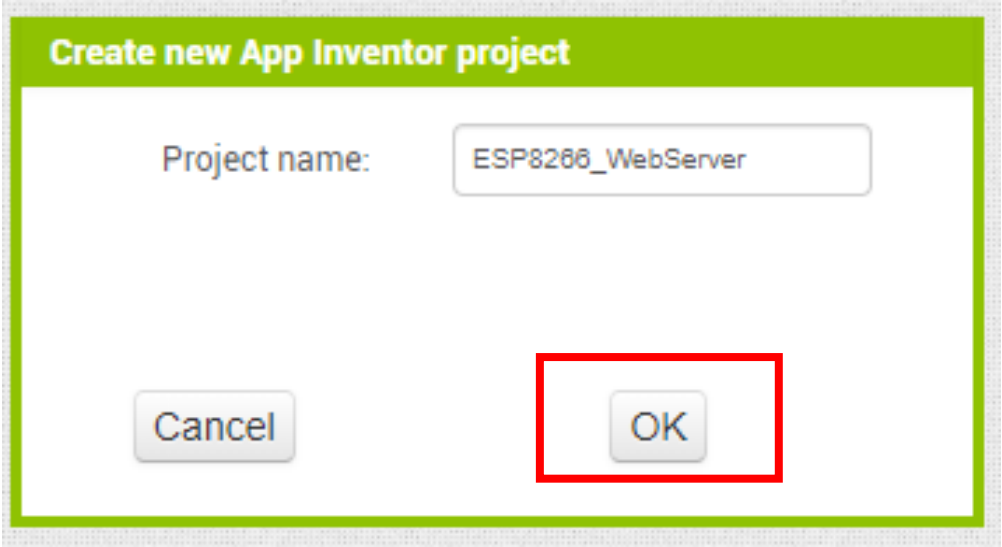
Using MIT App Inventor with the Web Server

Go to https://appinventor.mit.edu/ , press Create Apps and login with your email.

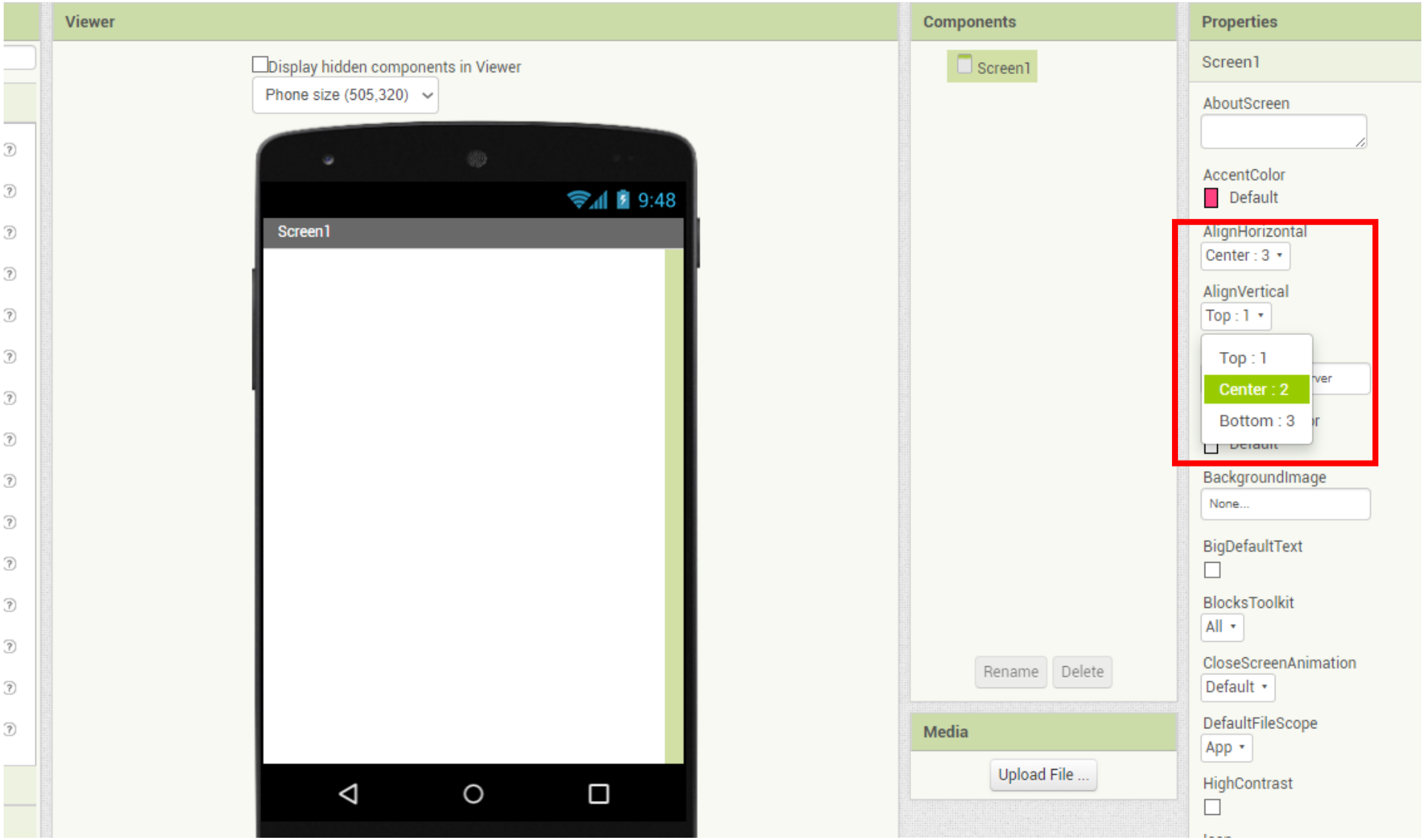


Give your project a nice name

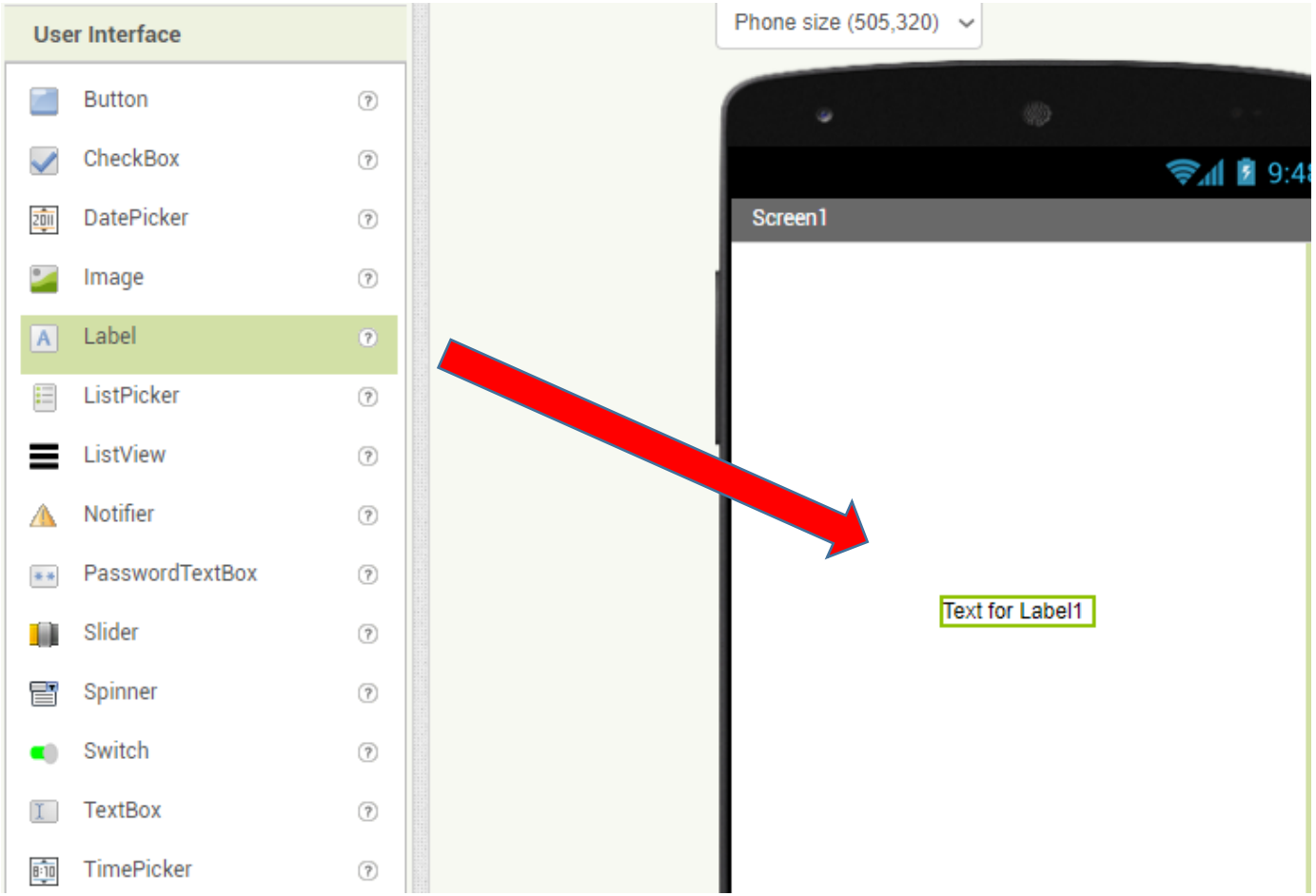


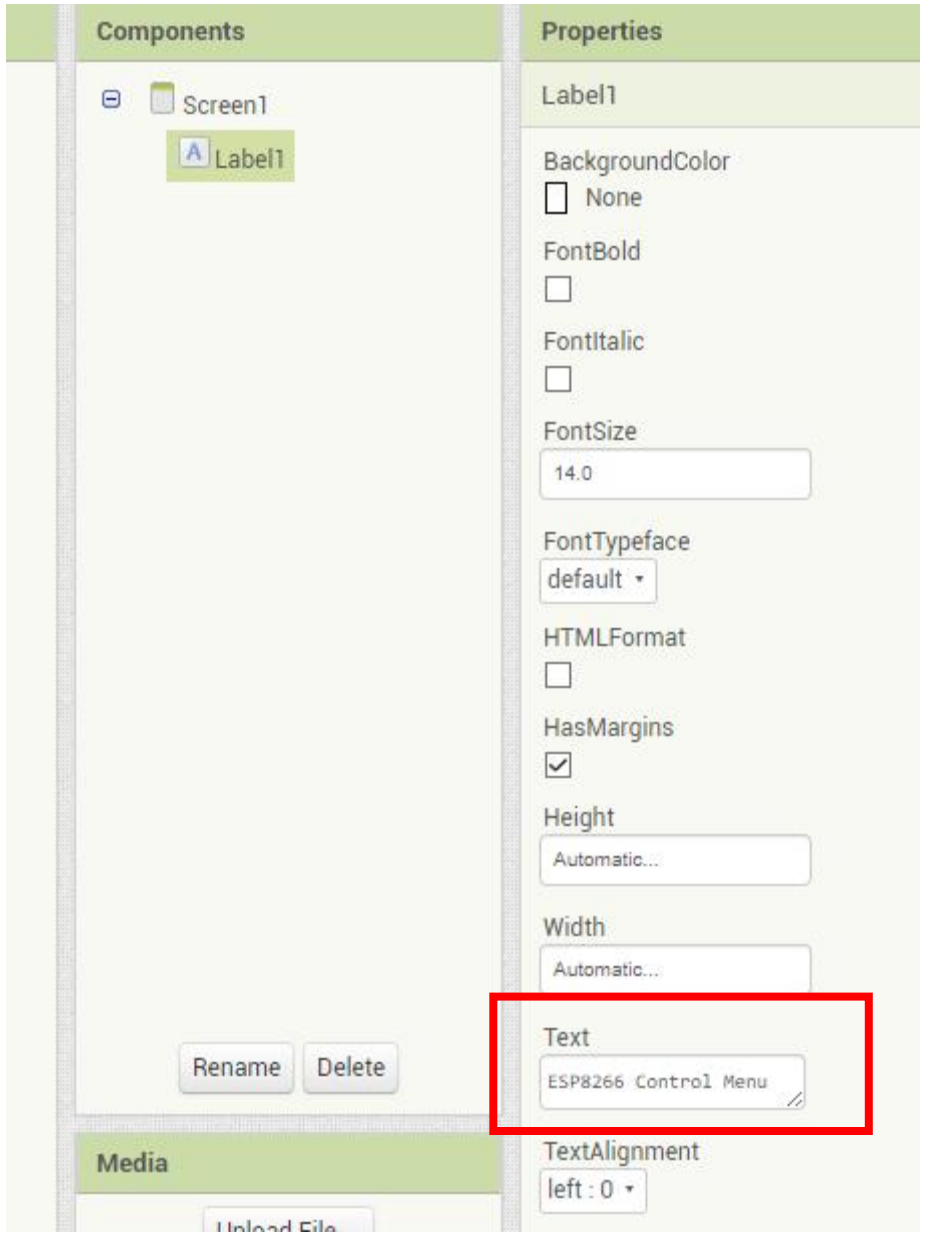


On the far right side of your screen, set these two to Center. This will make your app look nice.

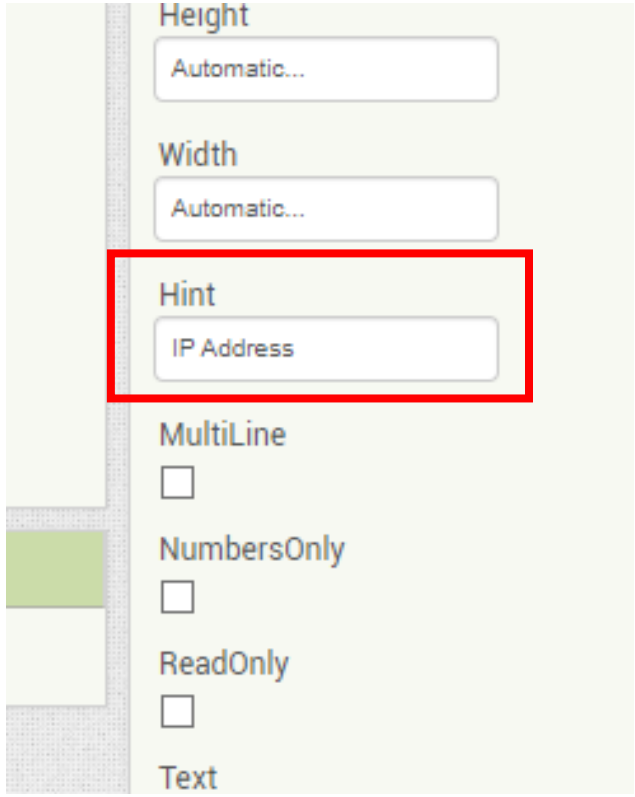


On User Interface Tab, drag a Label into your Virtual Phone Screen. Change the text to be displayed

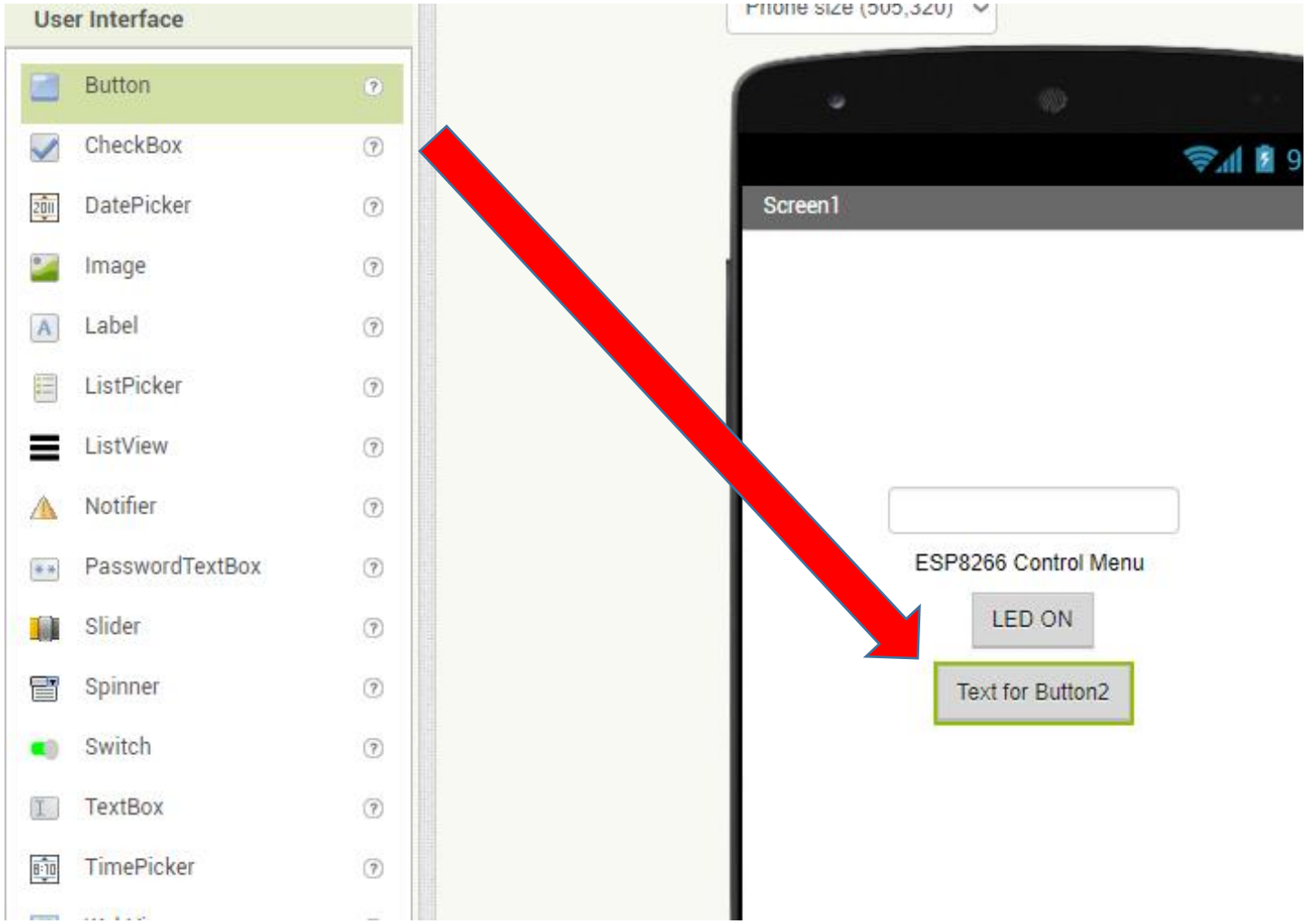


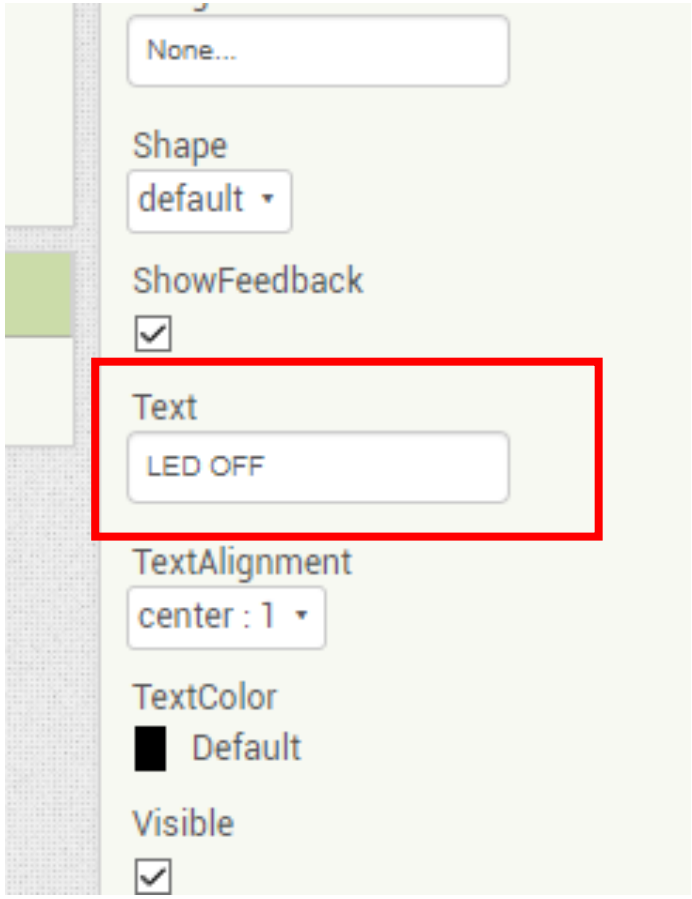


Drag a Textbox on top of your Label. Change the Hint to IP Address



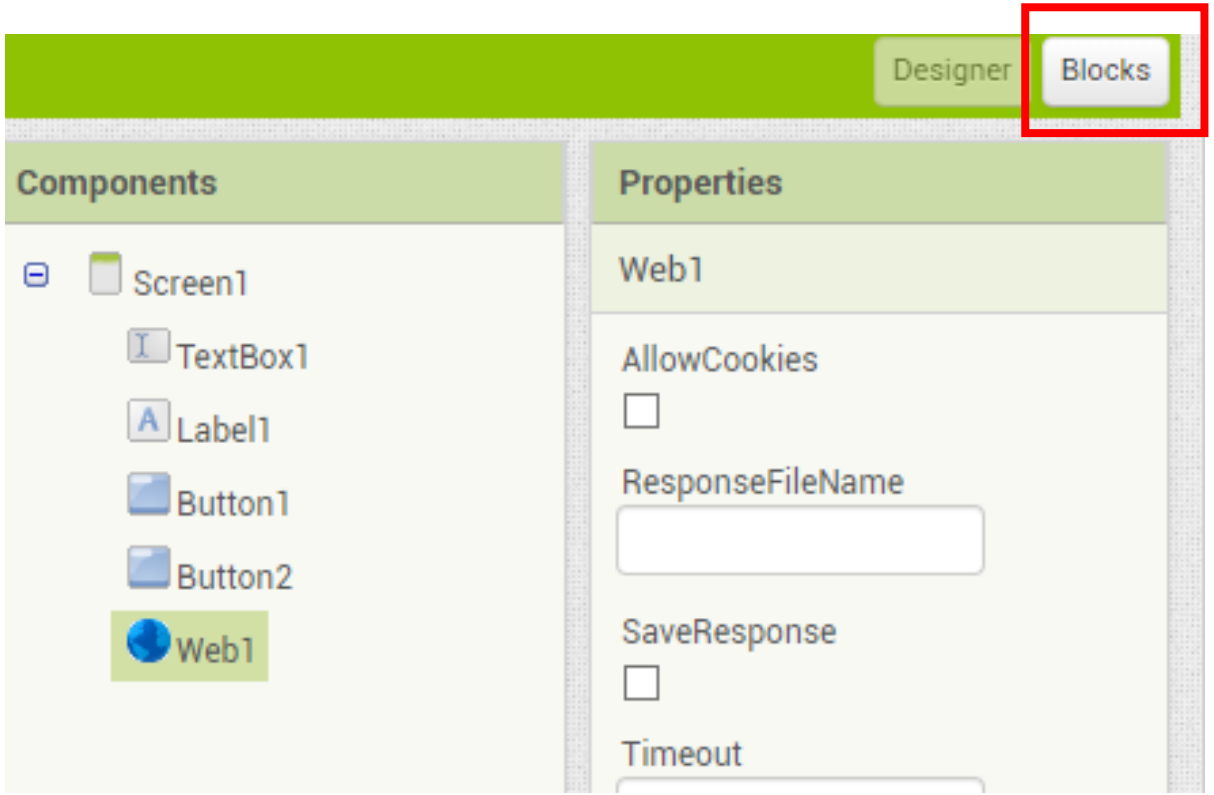
Drag a 2 Buttons into your screen. Change the Text to LED ON and LED OFF





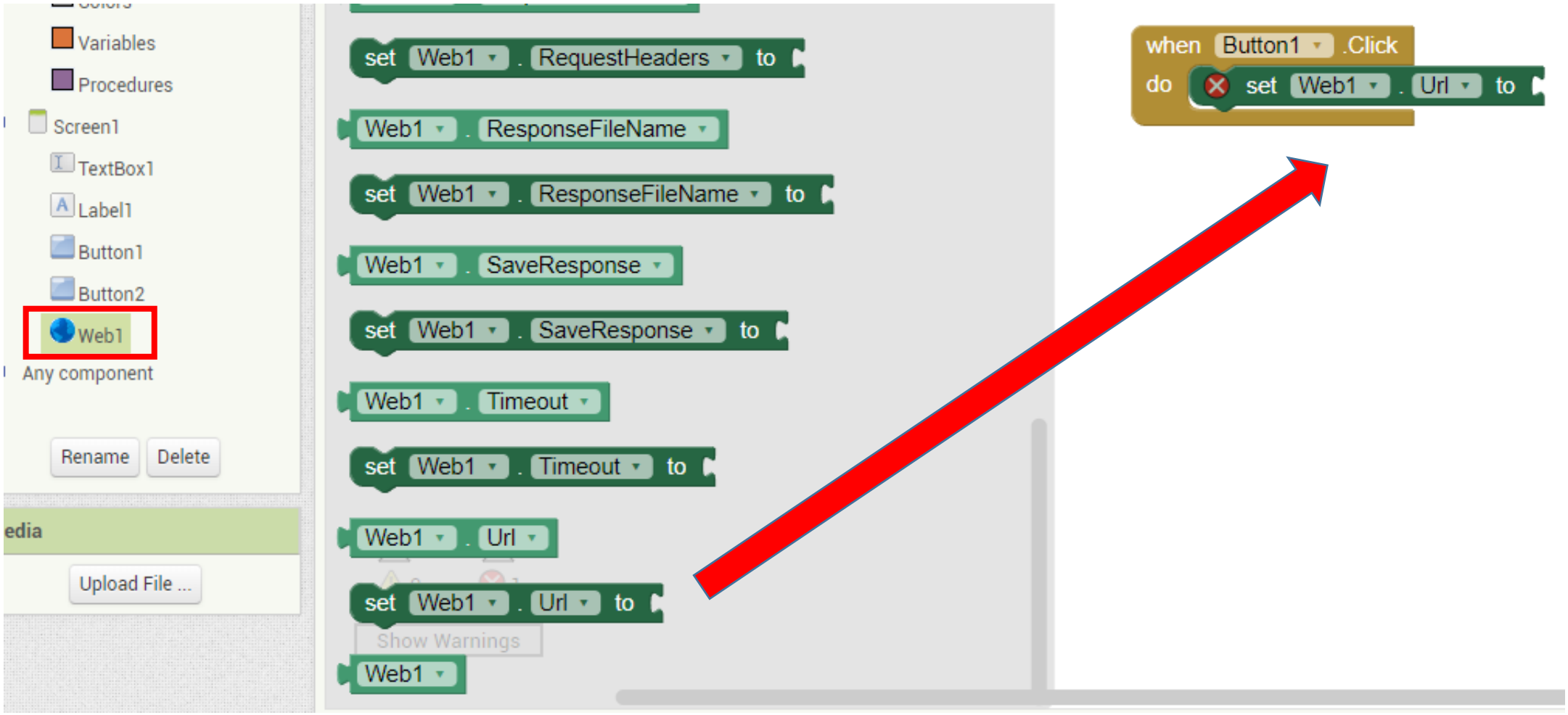
Scroll down to Connectivity Tab, drag a Web into your Screen. It will show nothing on your screen, but it will be listed in your Components Tab.

On the upper right corner, press Blocks to open up the programming interface. Lets program our apps!

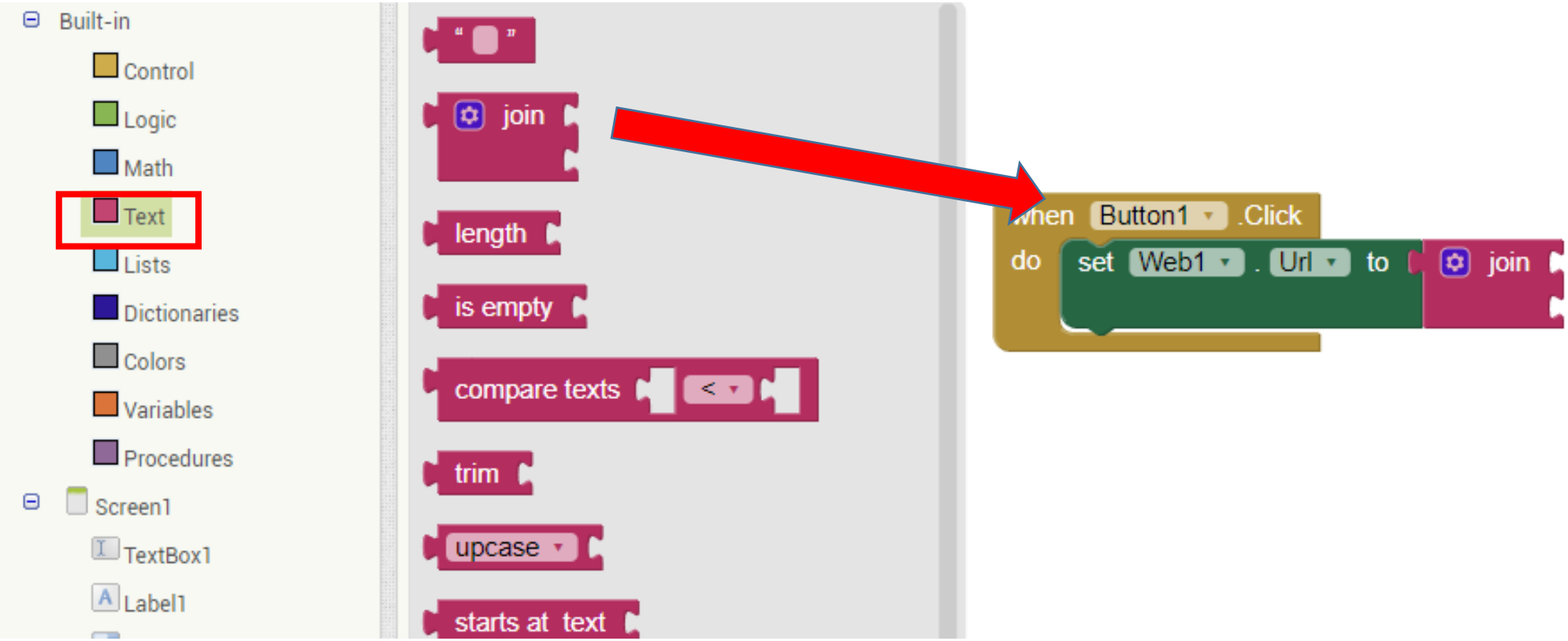


Click Button1. Drag when...Click block into the programming space.

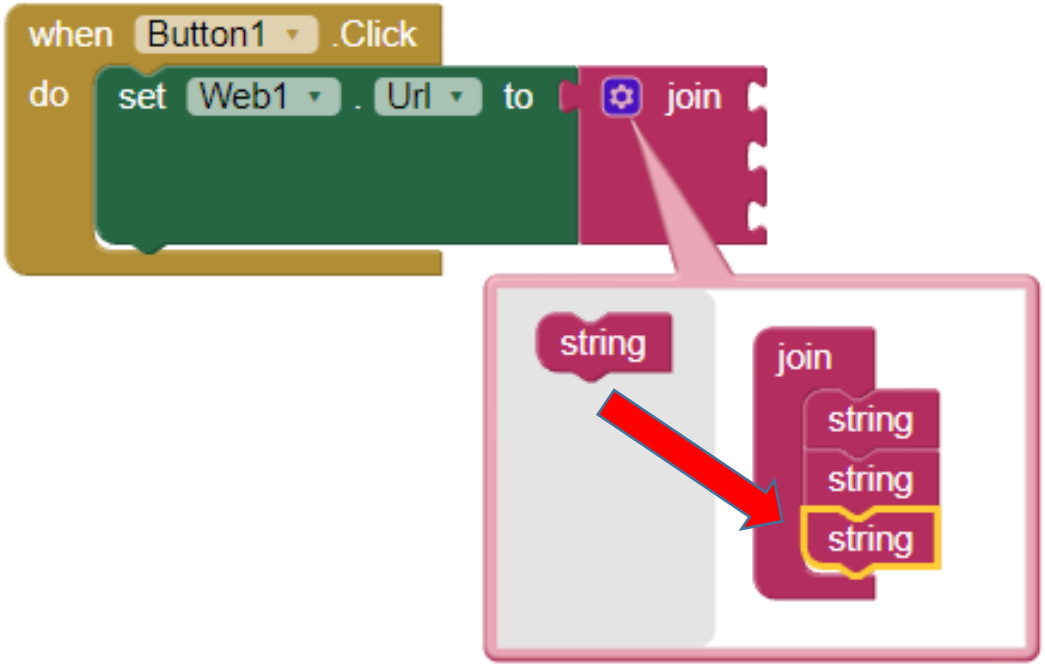
Click Web1. Scroll down, find the set..Url block, drag in into the code.



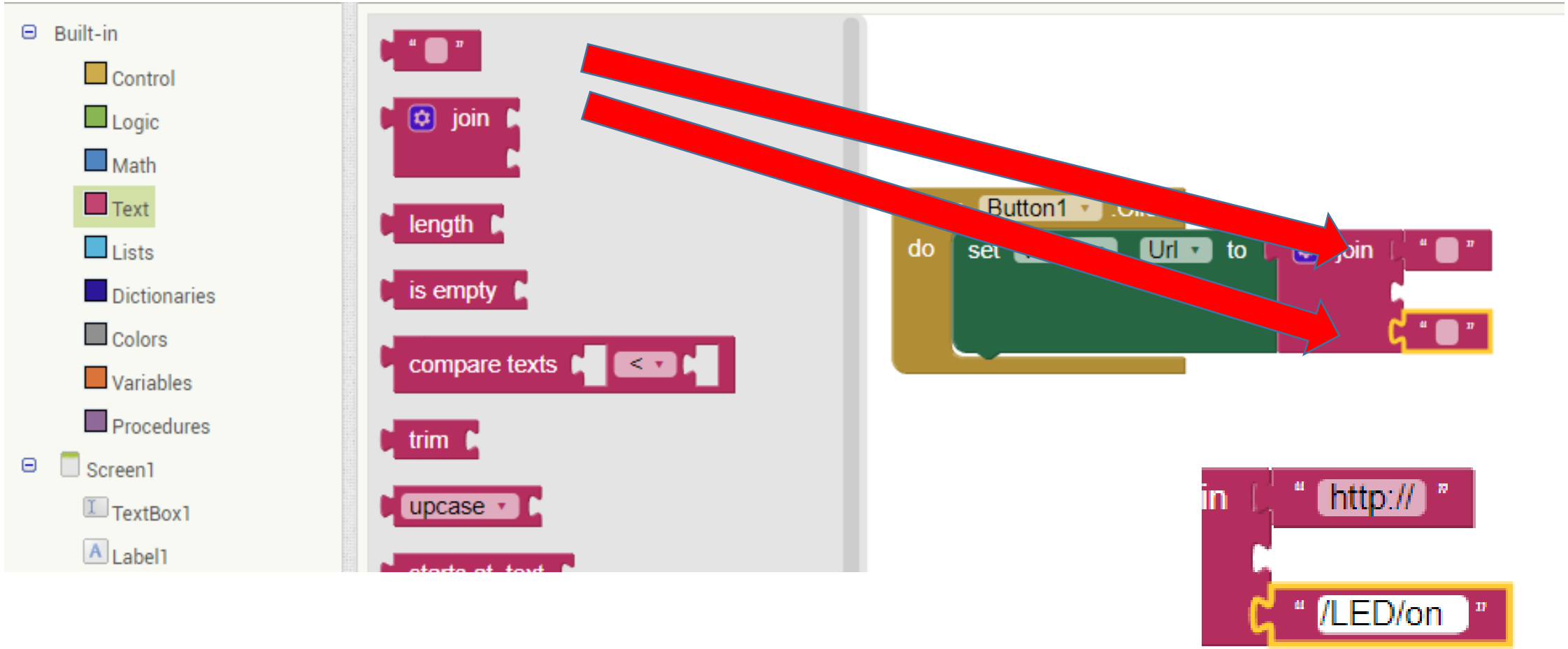
Click Text. Drag the join block.



Click the gear icon on the join block. Add a third string block into it.

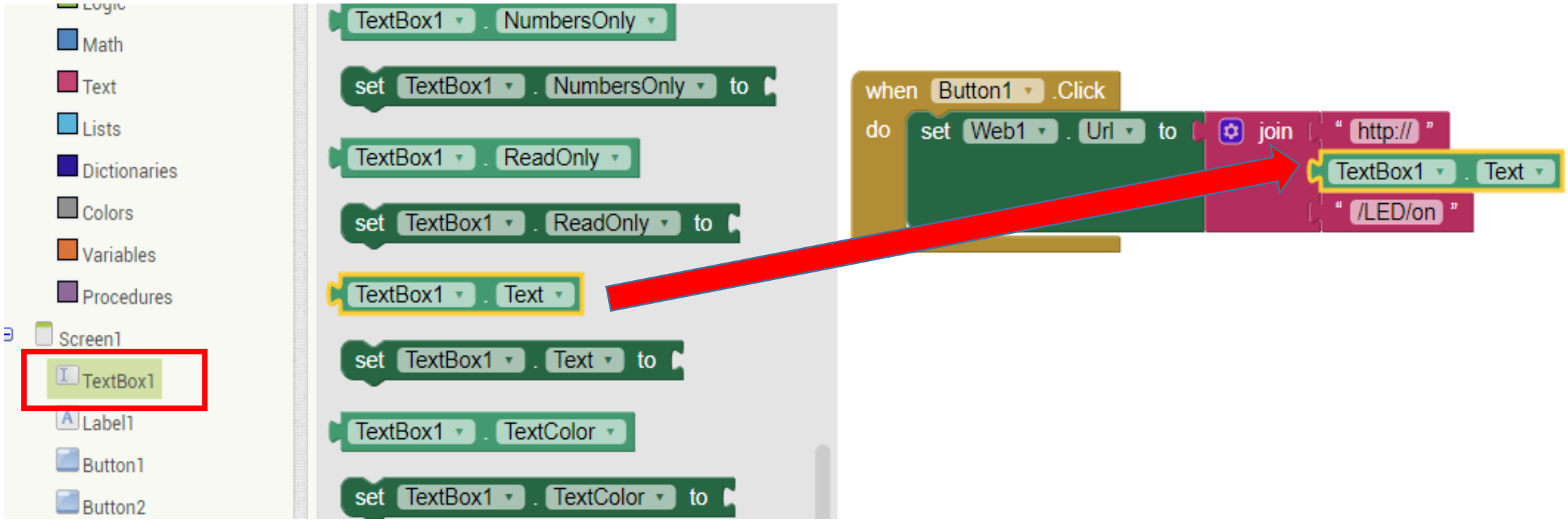


Still on Text Tab, drag the empty text blocks into the first and third position of the join block.

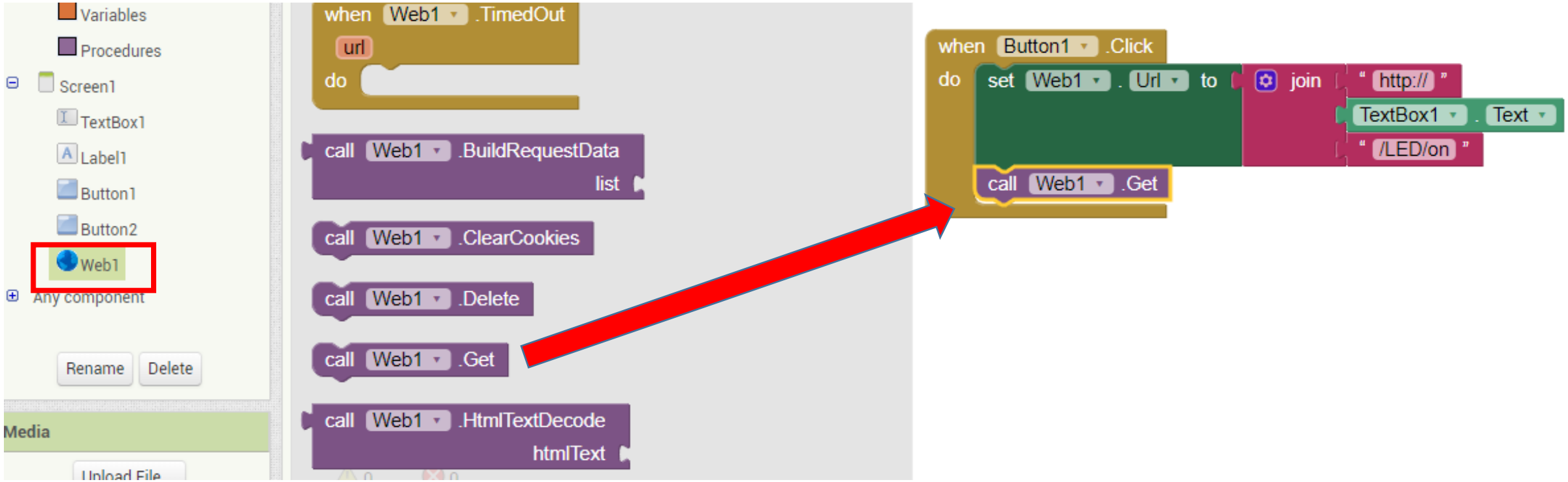


Write “http://” on the first box, and “/LED/on” on the third, without the double quotes “ simbols.

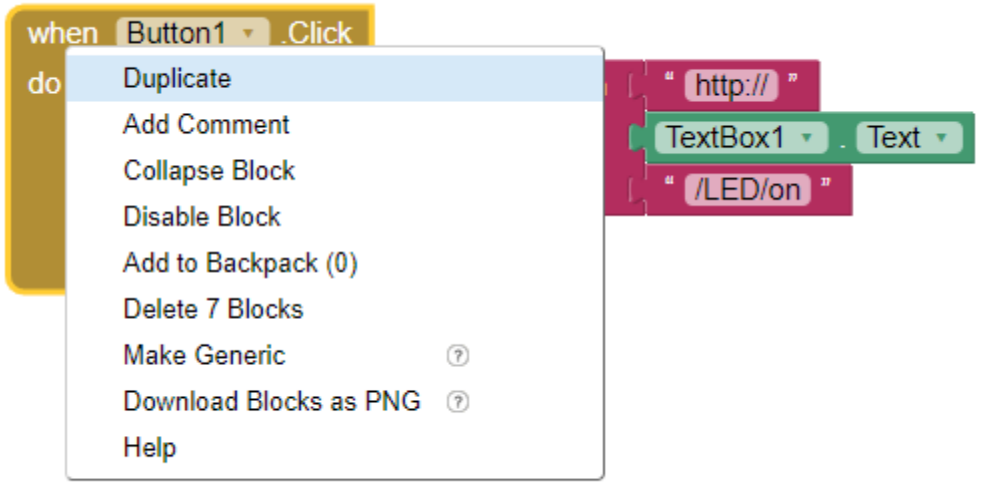
Click Textbox1, find Textbox1 Text block, and put it at the second position of the join block.

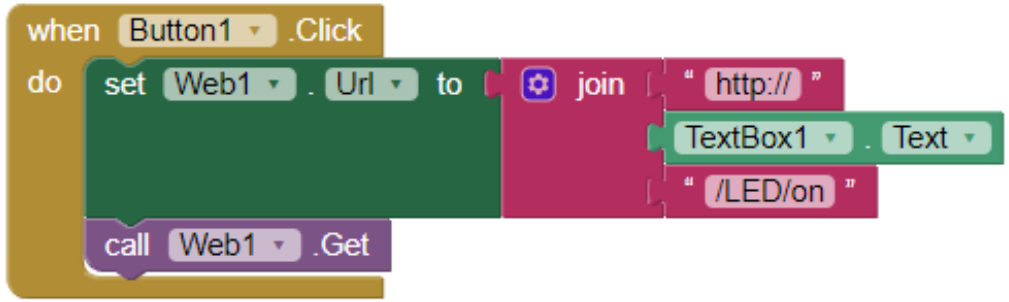


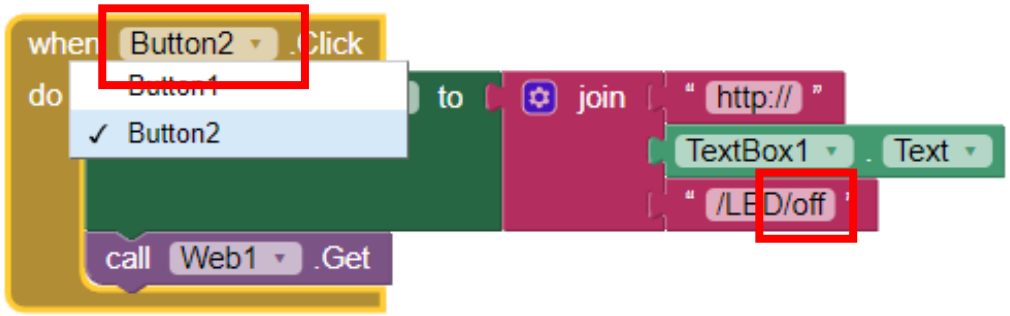
Click Web1, drag the call..Get block



Click on the when block, press Right Click on your mouse, duplicate the whole block.

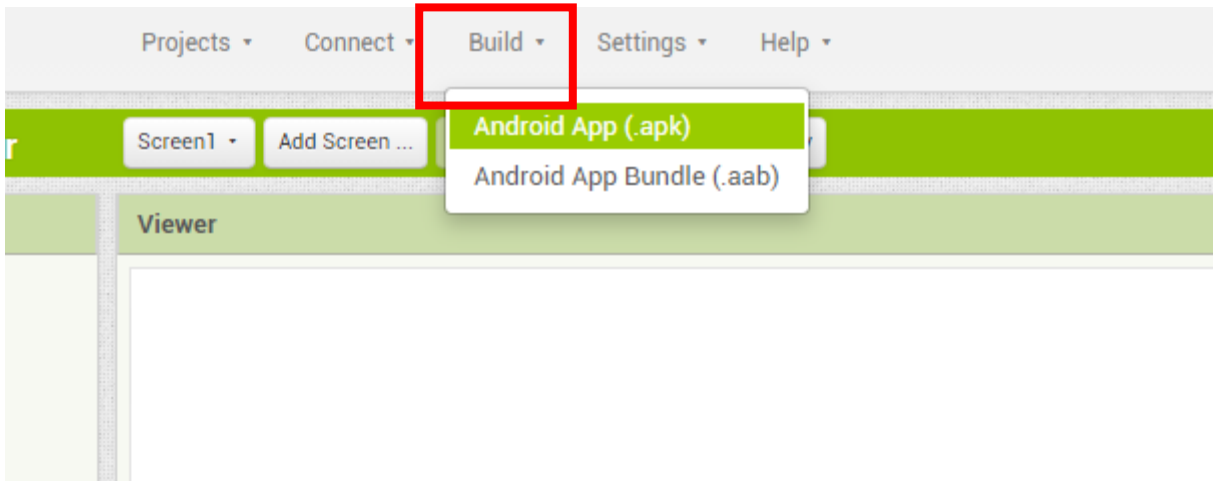


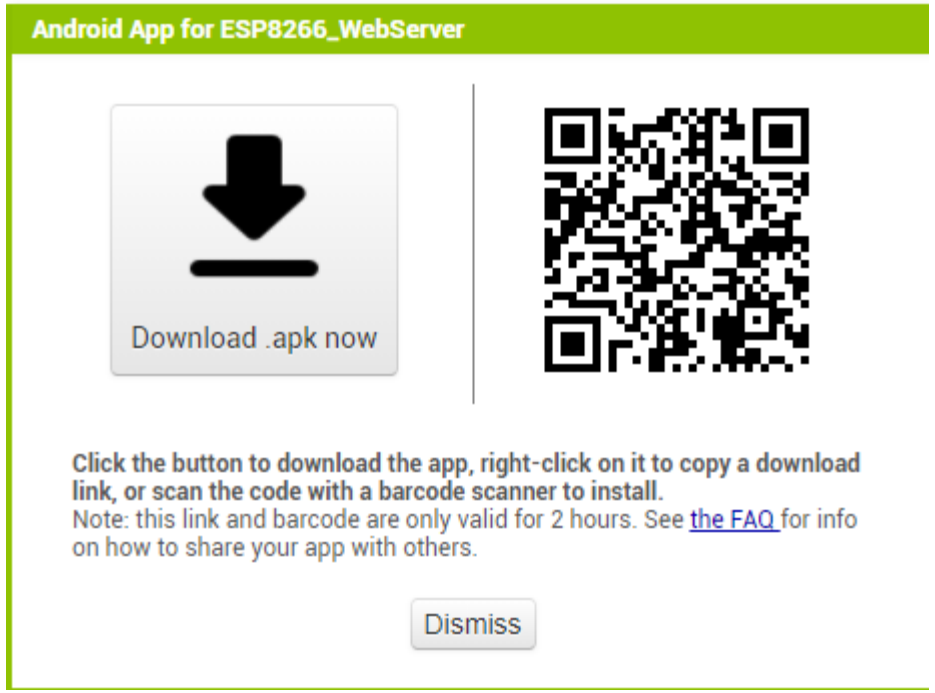




Drag the blocks to a suitable position. Change Button1 to Button2, and the “on” text, to “off”

Now you have finish building your apps. Let's install it on your phone. Select Build - Android App and scan the QR Code to download and install your app

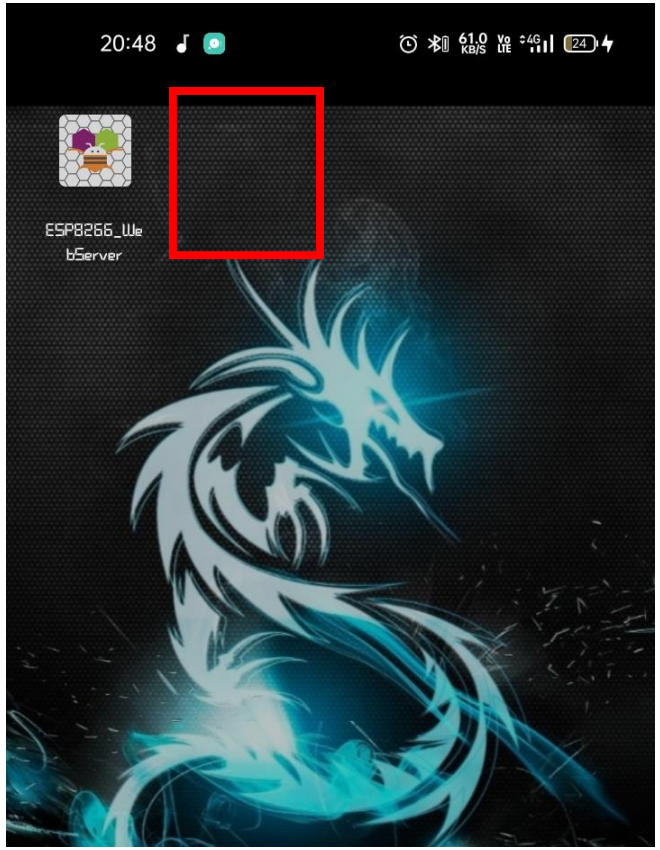


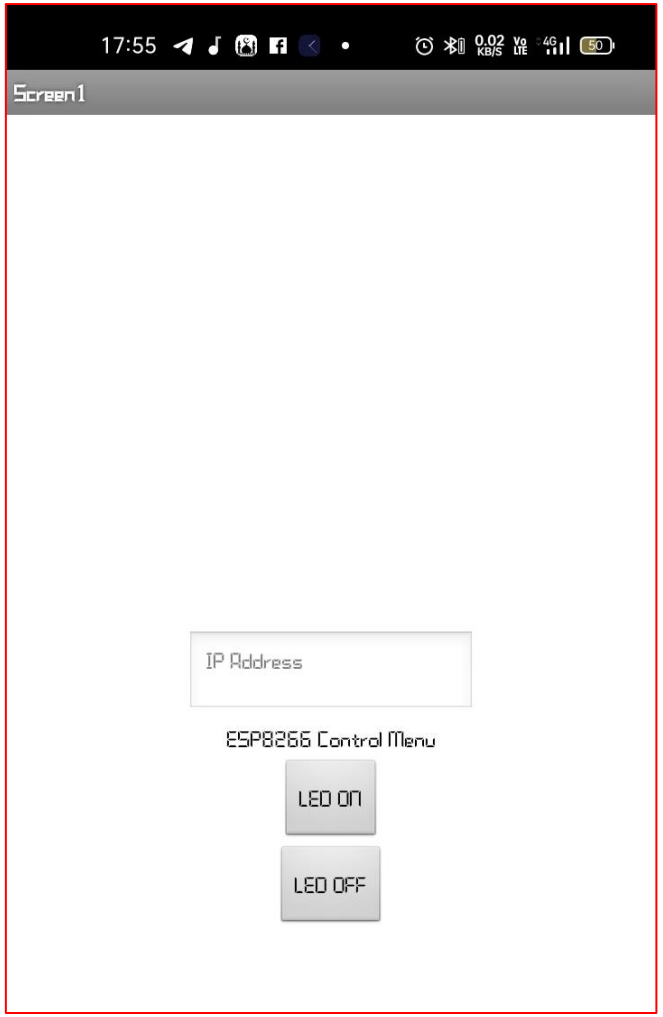


You might get some warning when installing on your phone. Its ok to ignore and proceed. You make your own apps, theres nothing to worry.

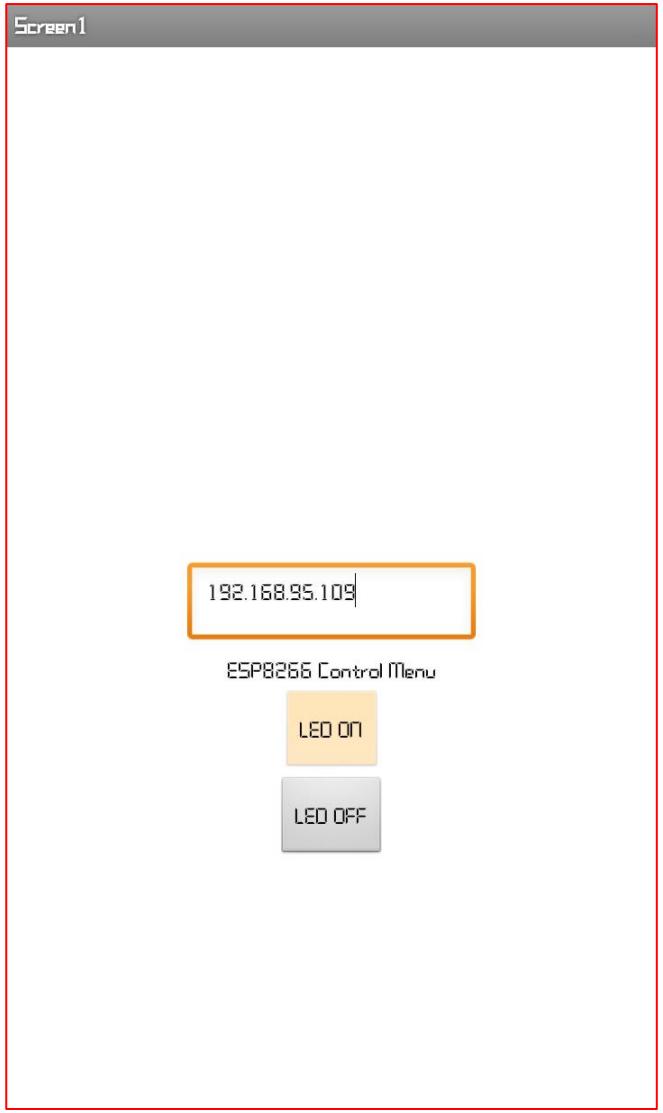
Now lets open your apps. Make sure your phone is connected to the same Wifi with your ESP8266 Board. Mobile Hotspot also works.

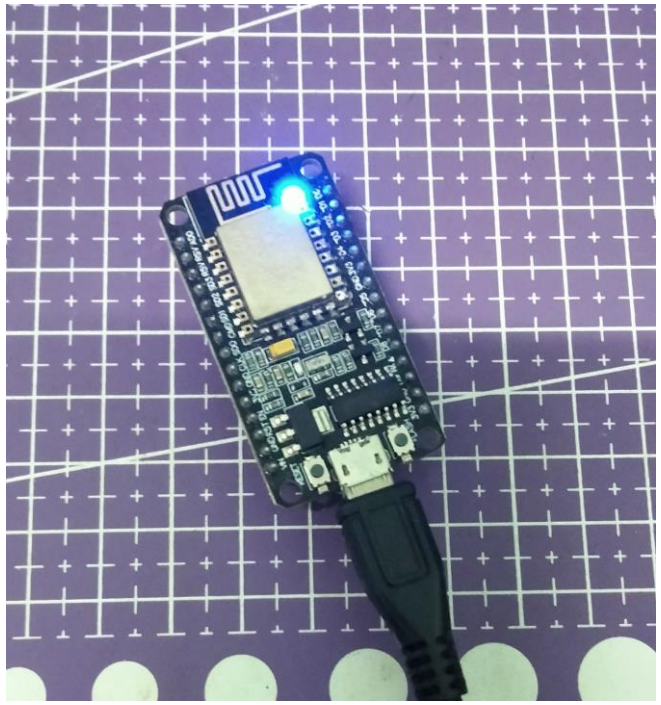
After you input your IP Address, you can straight away play with the buttons and see the built-in LED turns On and Off

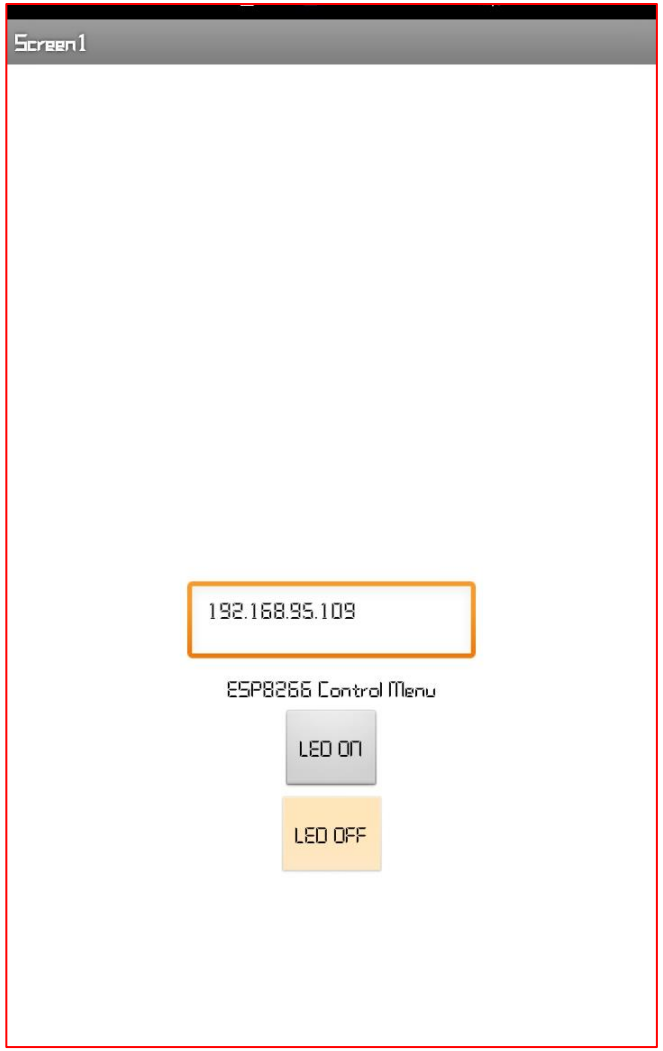




LED On



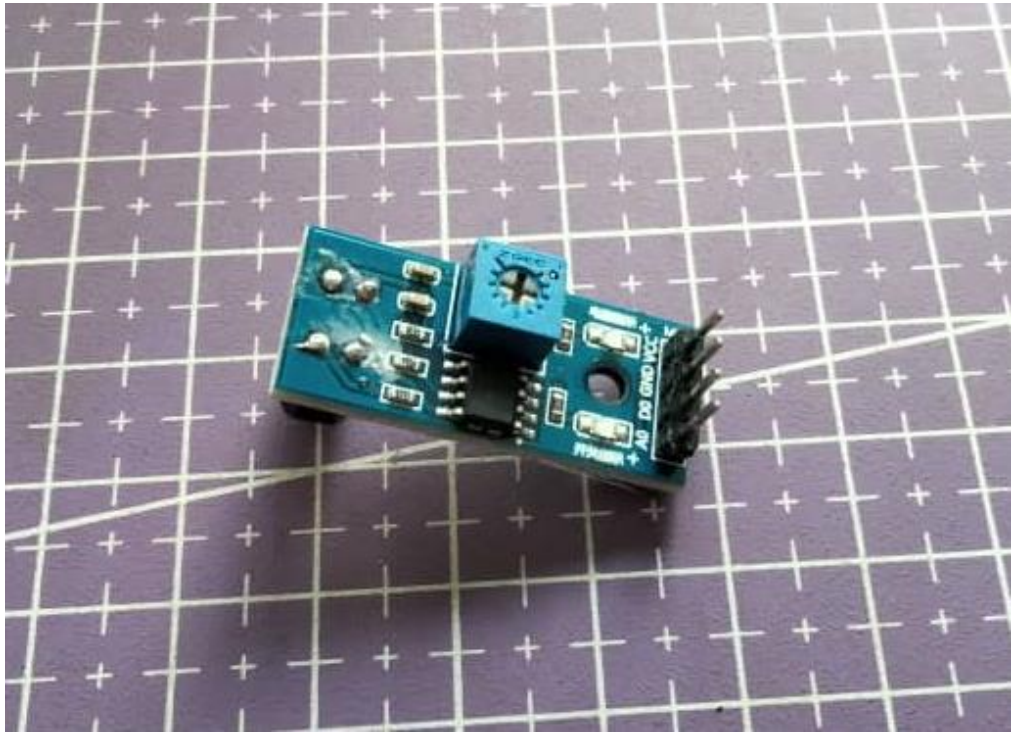




LED Off

Adding Analog Sensor Reading into your Project

We will use Infrared Line Sensor in this example. But you can use any basic analog sensors like obstacle sensors, ultrasonics, temperature sensors, or as simple as a potentiometer.

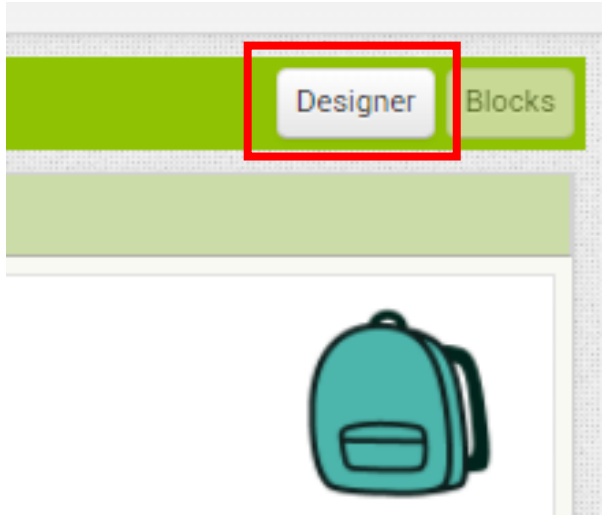


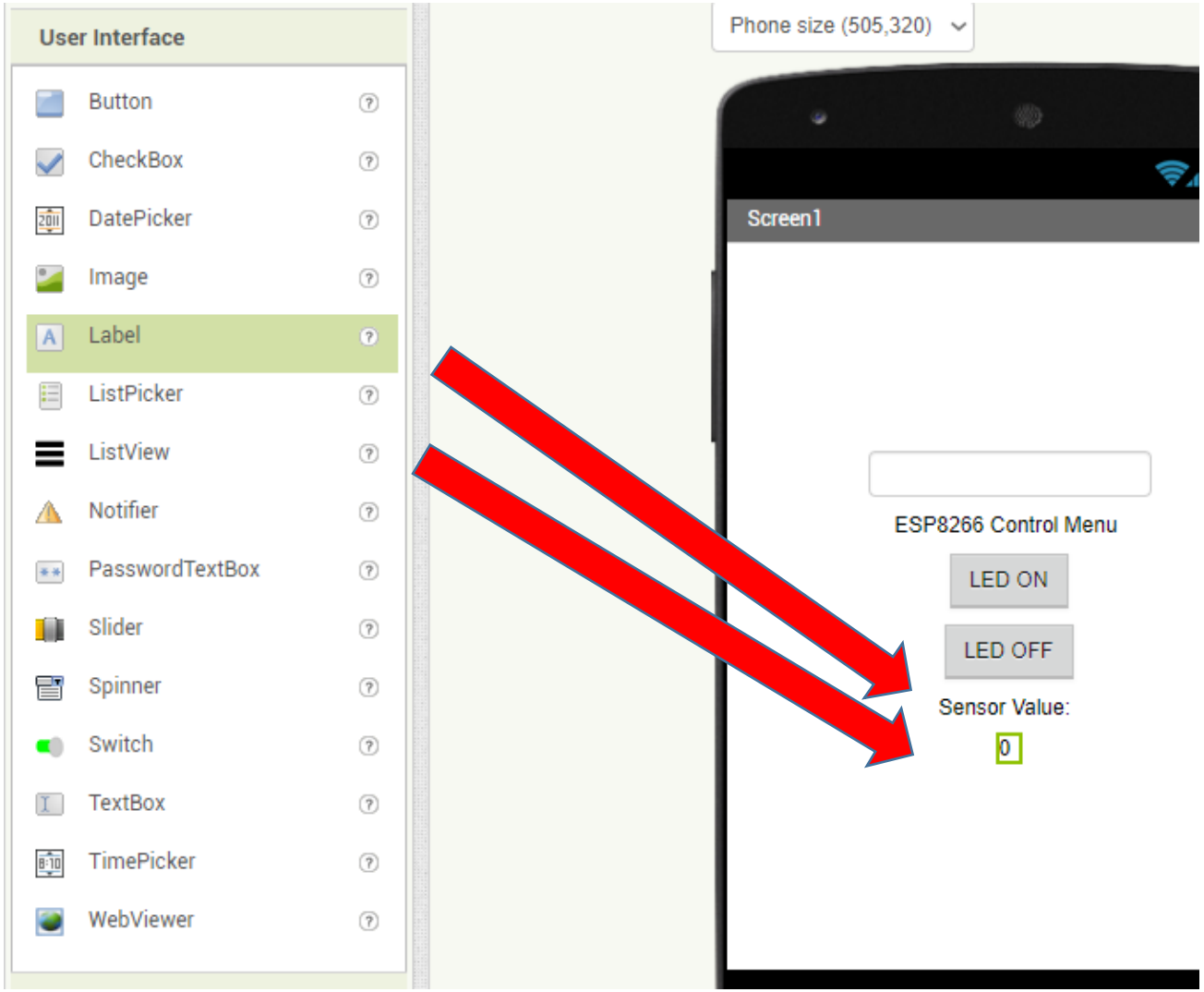
Connect the pins from the sensor to ESP8266 board:

Sensor Pin		ESP8266 Pin
VCC / + / 5v	->	3V3
A0 / Data	->	A0
GND / -	->	GND

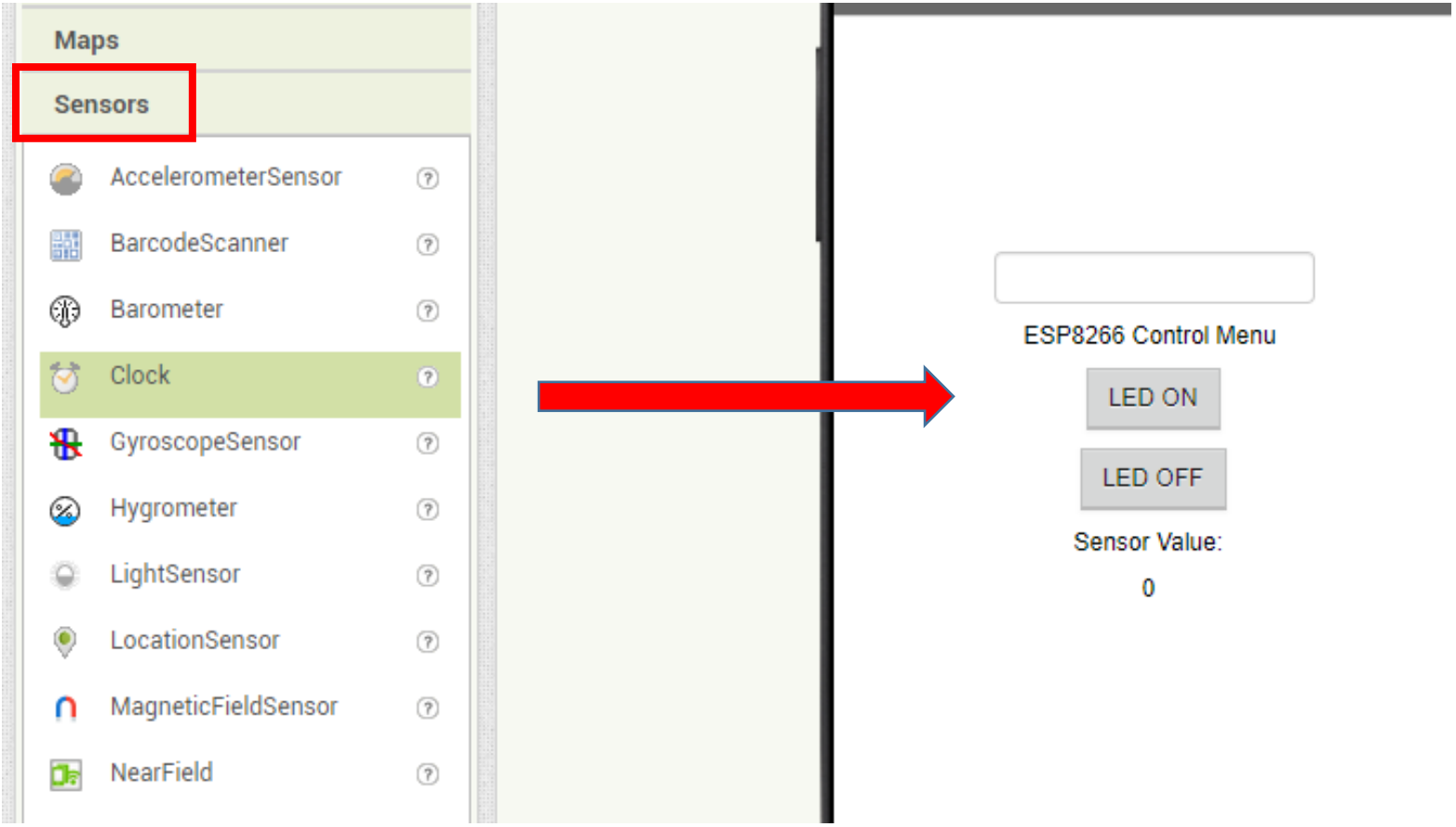
You dont need to change anything on the ESP8266 coding. All already being set. We just need to expand our apps program.

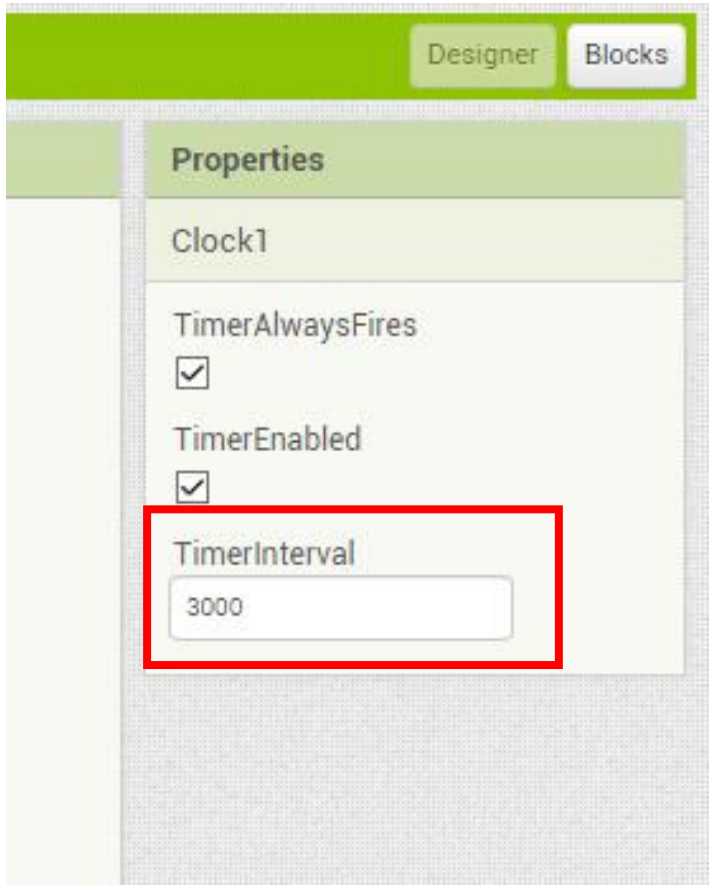
On your MIT inventor website, at the top right, go back to Designer tab. Drag two labels into your screen. Change the text to Sensor Value:, and 0.



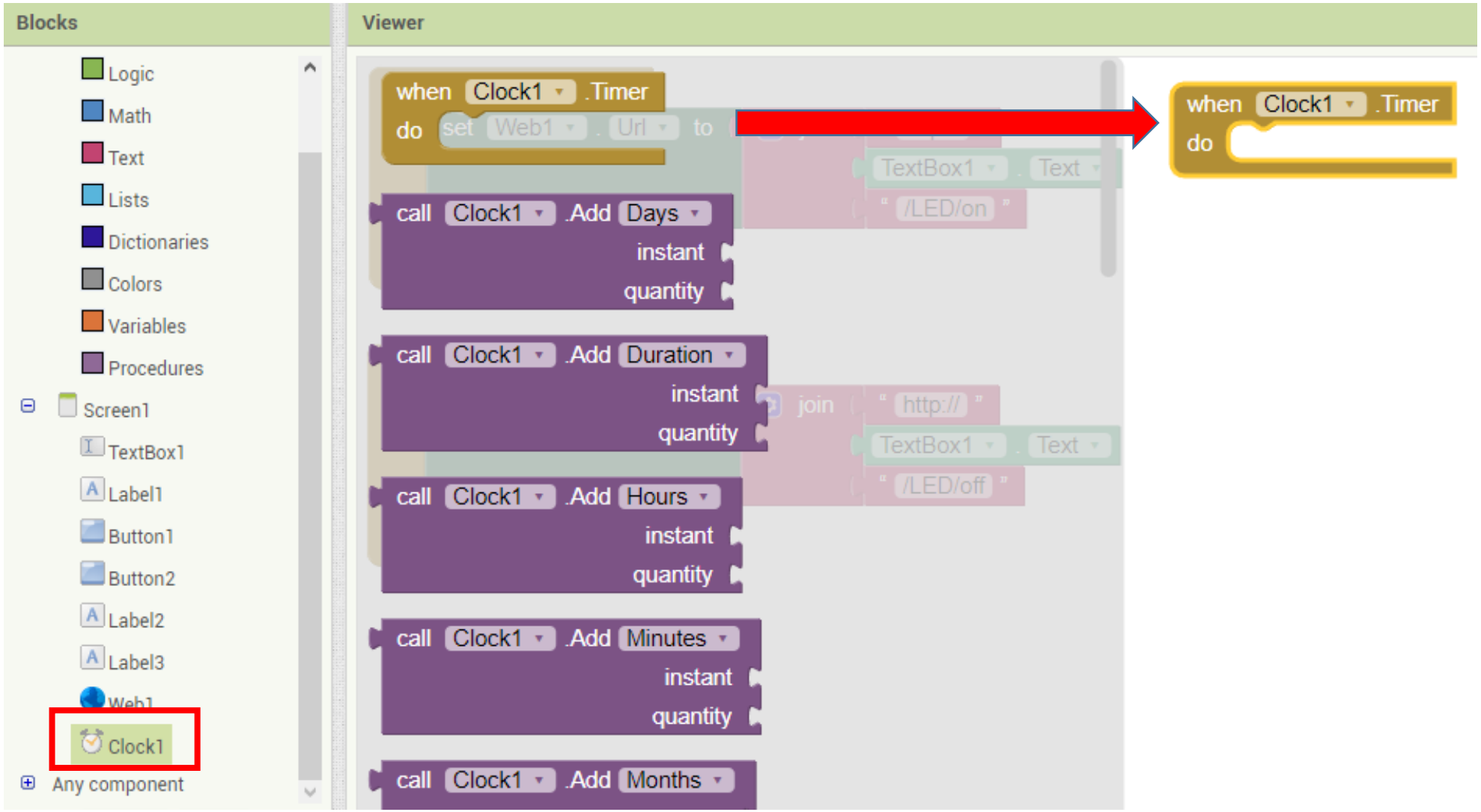


Go to Sensors Tab, Drag a Clock into your screen. Same as Web, you will not see anything on your screen, but on your Components tab. Change the TimeInterval to 3000.

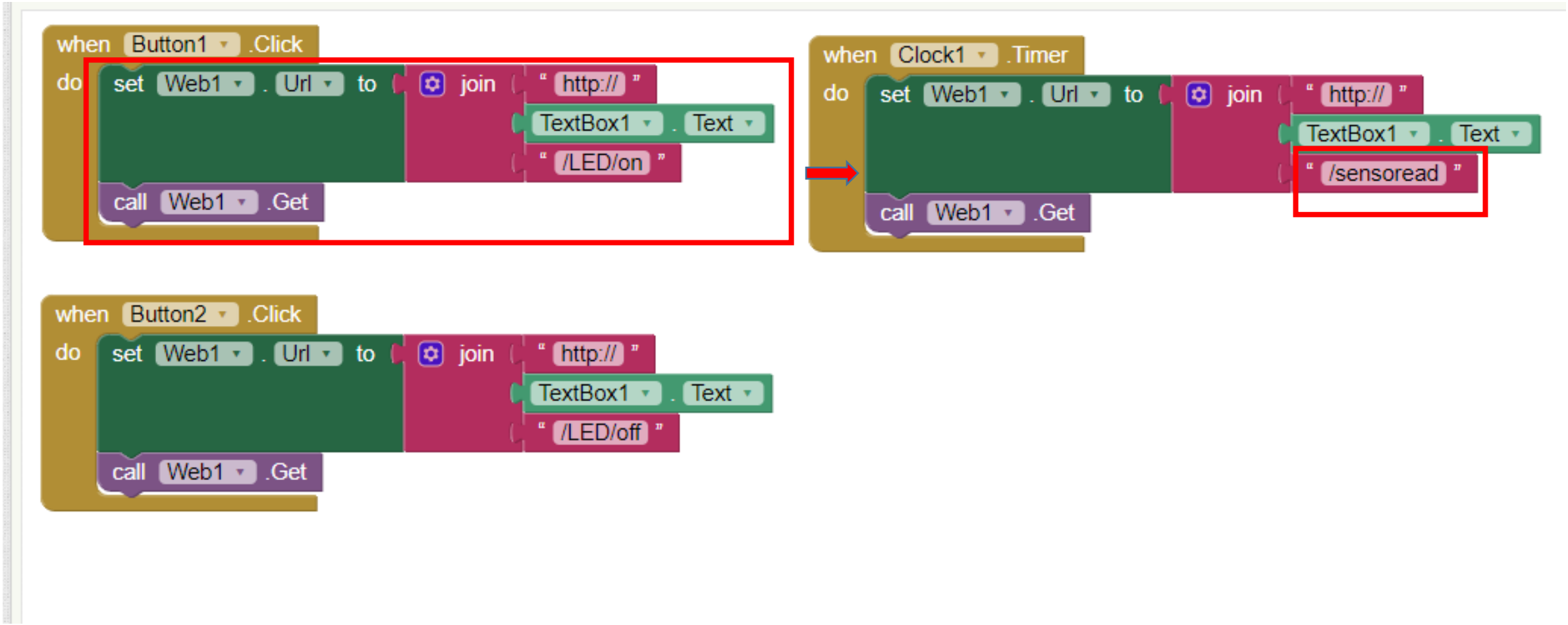




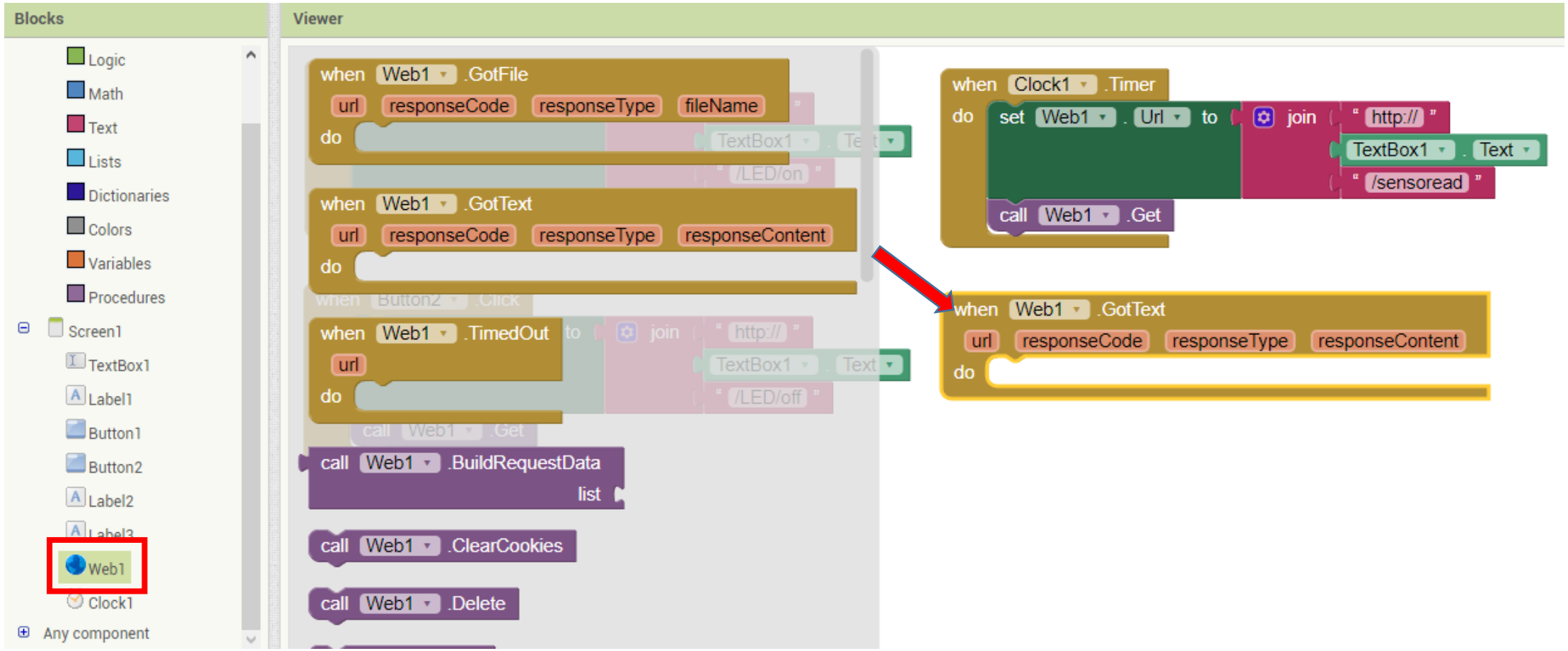
Lets go back to our Blocks Tab. Find some blank space to continue our coding. Click on Clock1, drag the when..Time block into our code.



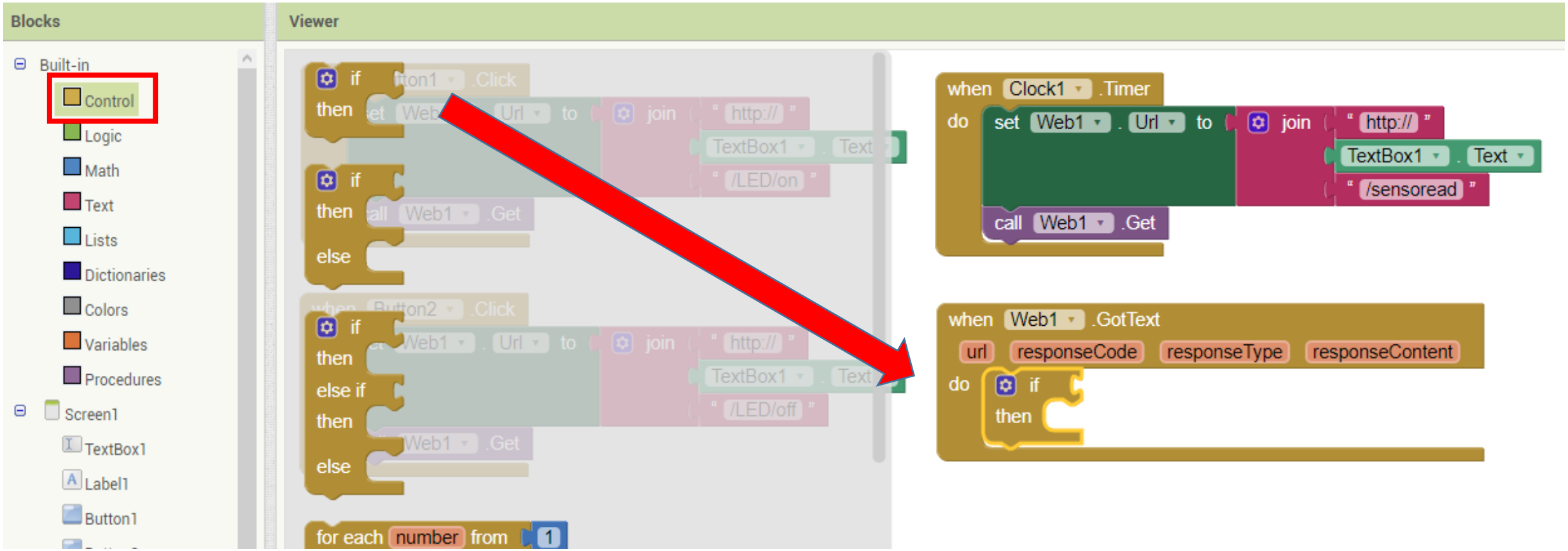
Remember our previous blocks? Duplicate the set..Url and call..Get blocks into our when..Timer block. Change the text on the 3rd position of join block, into "/sensoread".



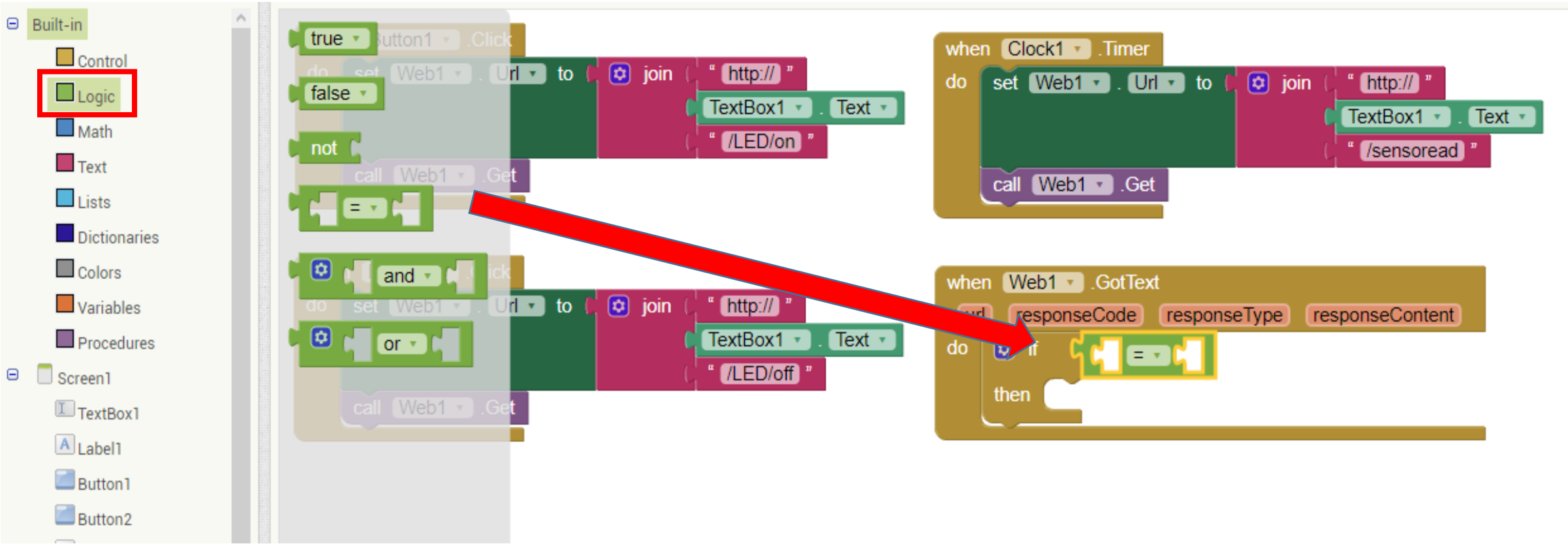
Next, click on Web1. Drag when..GotText block.



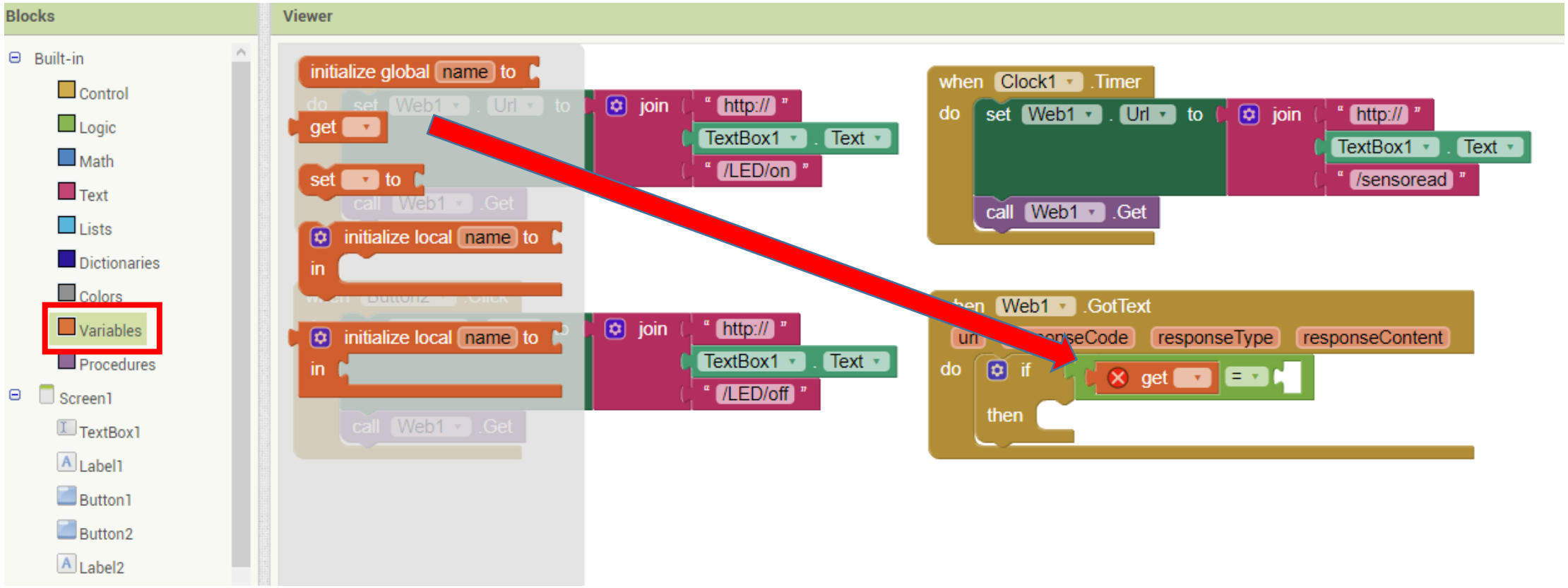
Click on Control Tab, drag if..then block



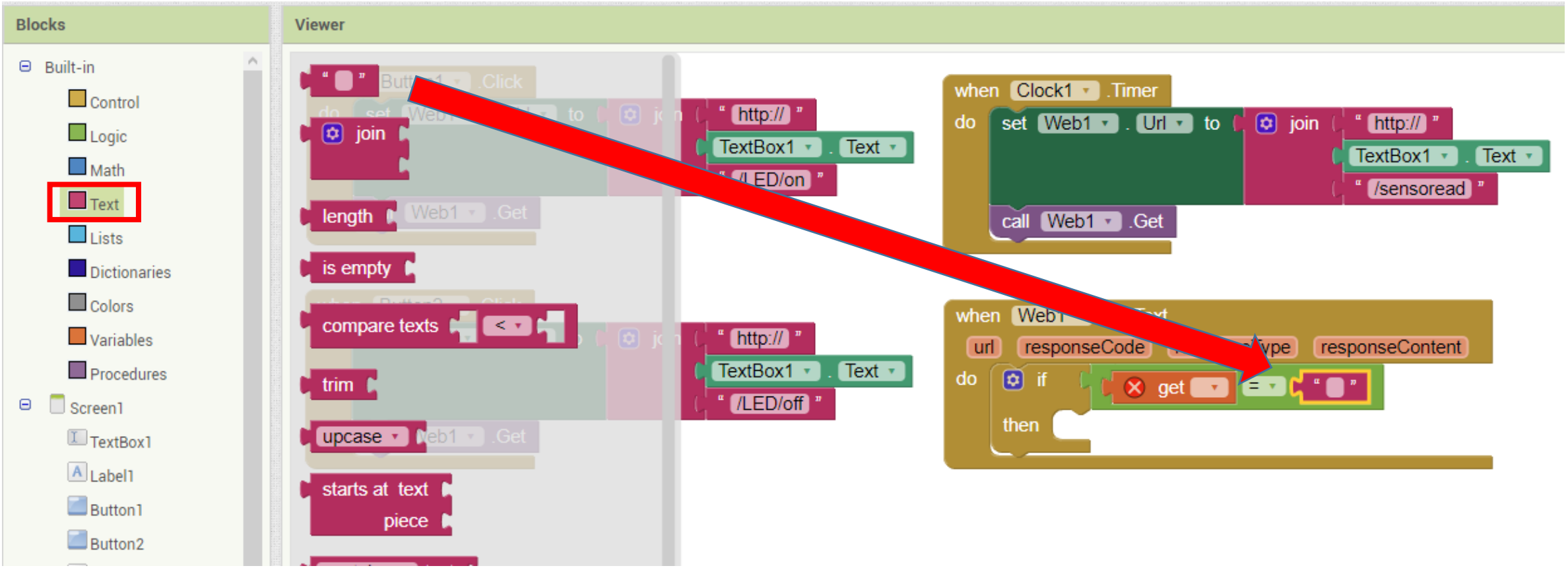
Click on Logic Tab, drag the = block into the if position.



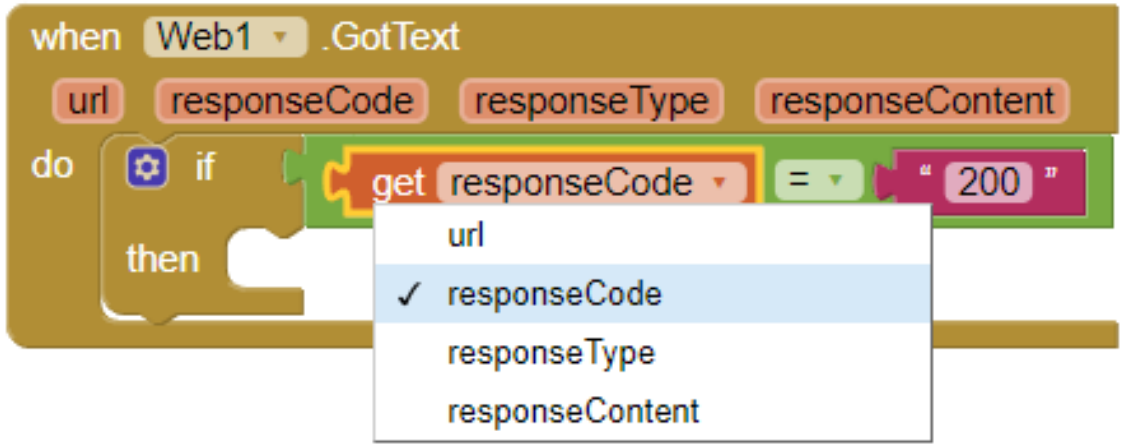
Click on Variables Tab, drag the get block into the first position of = block.



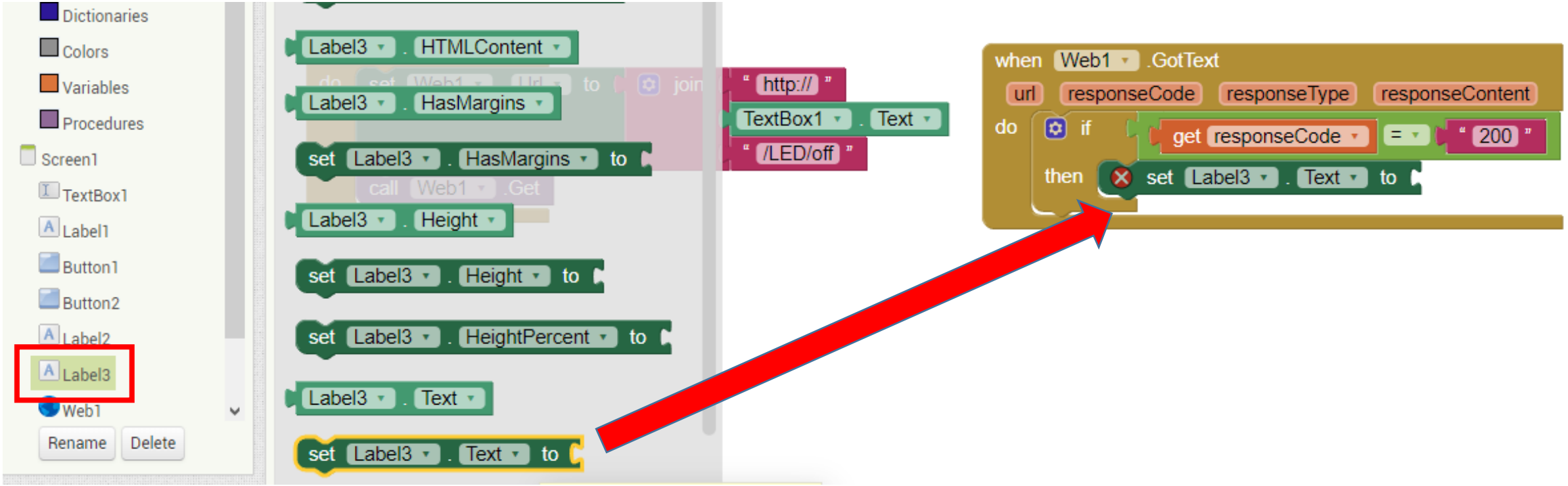
Drag the empty text block from Text Tab into the second position of the = block.



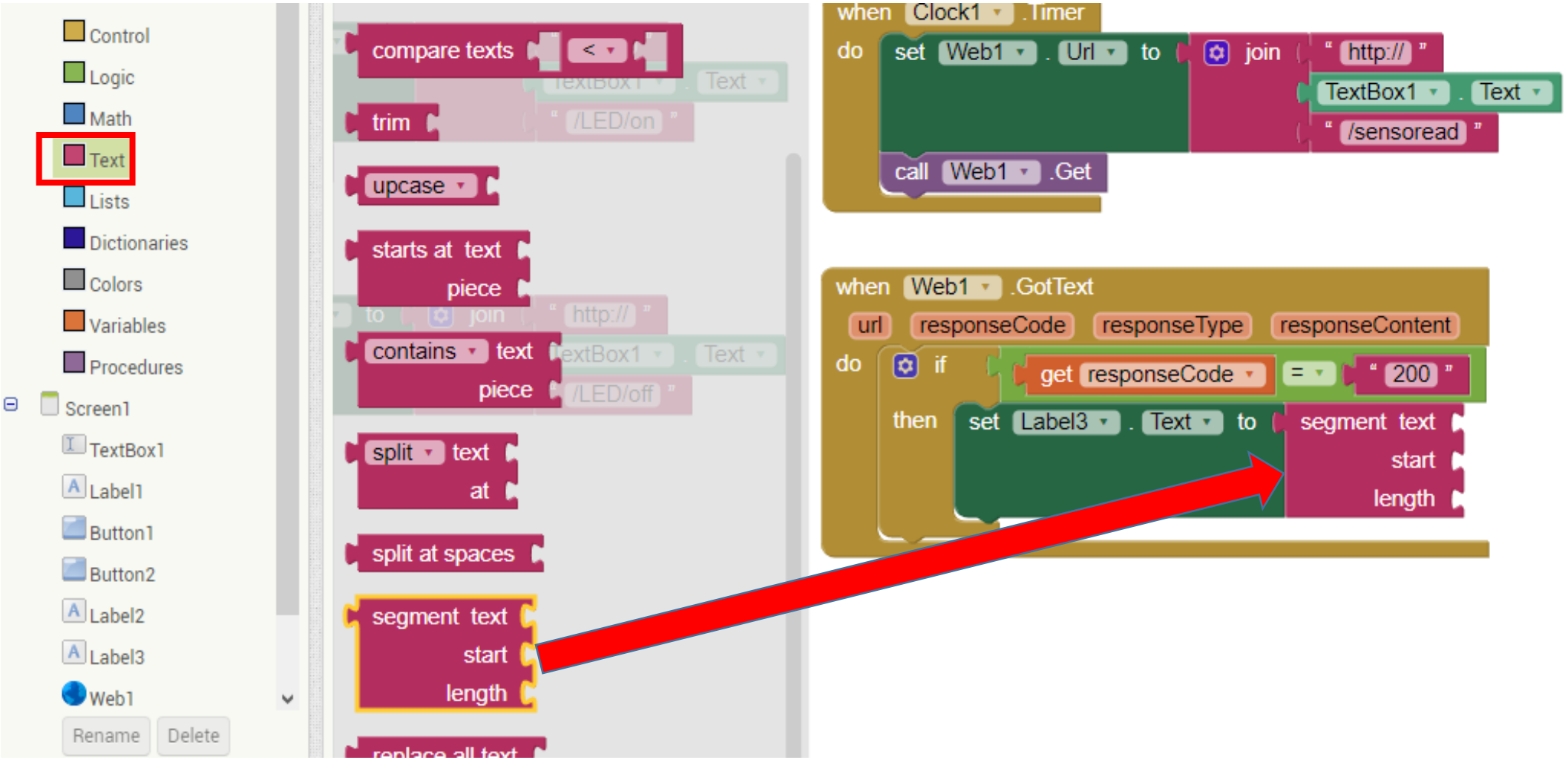
Choose the responseCode on the Get block, and input the value "200" in the empty text block.



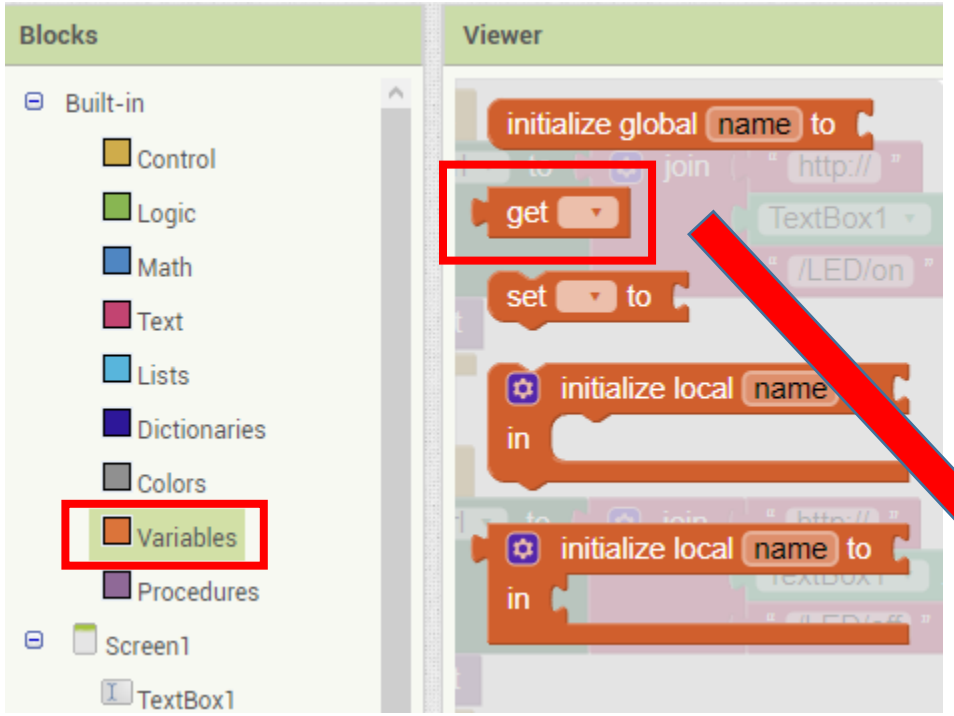
Click on Label3, drag the set..text..to block

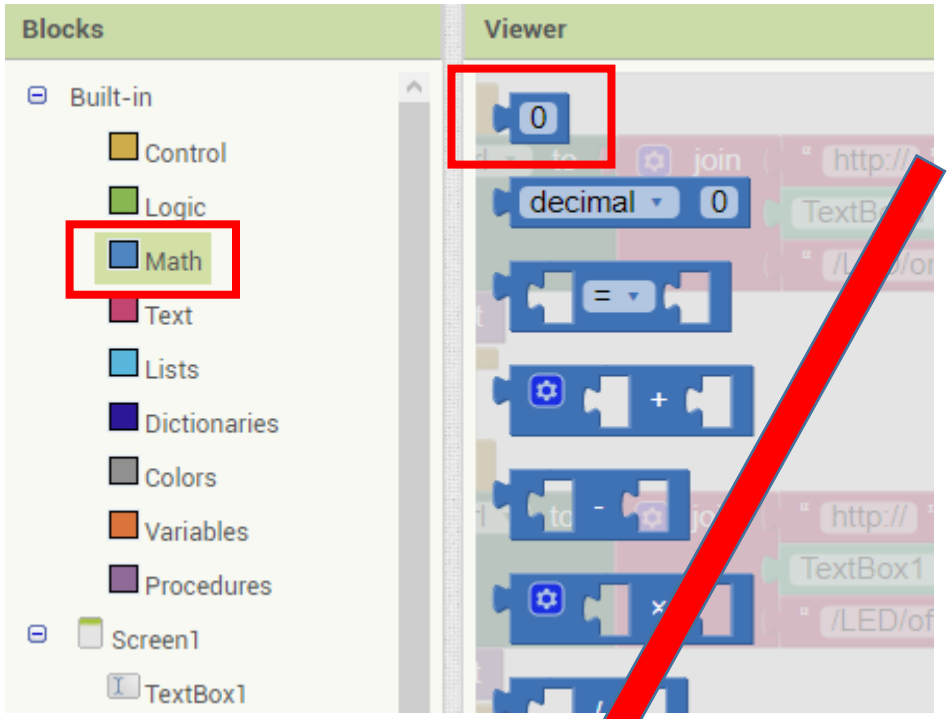


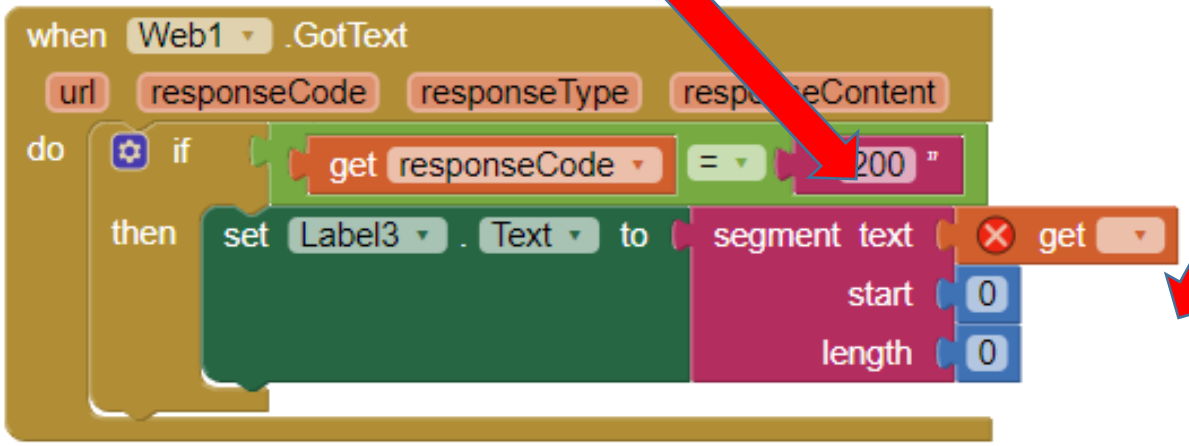
Click on Text Tab, drag the segment block



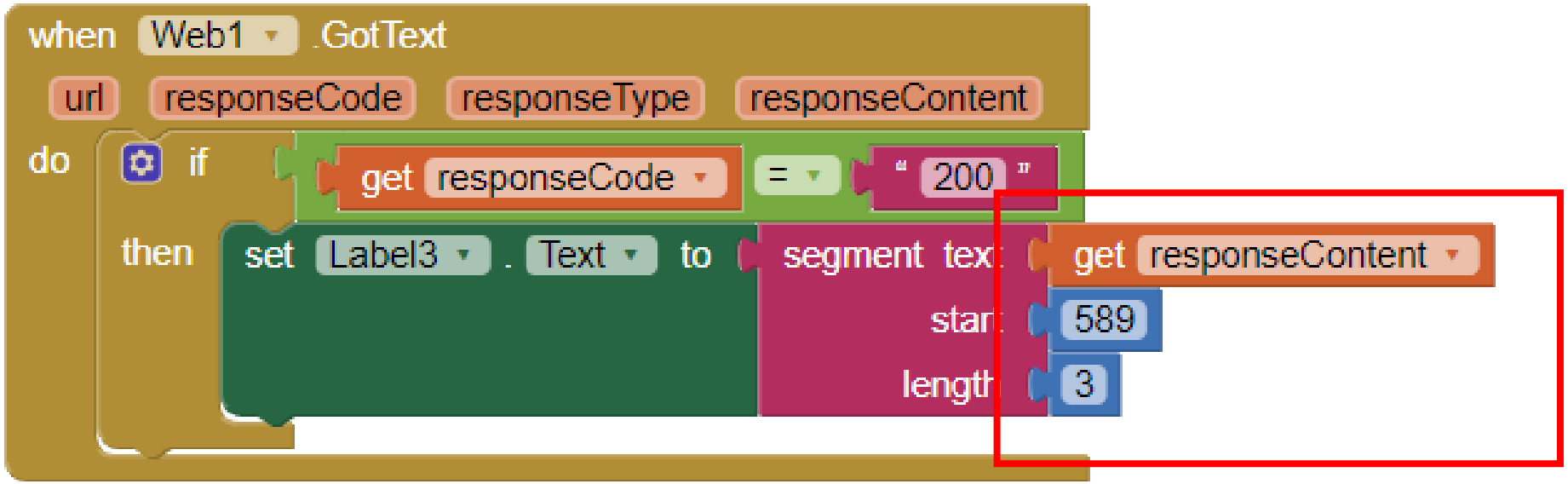
Drag the get block from Variables Tab, and number blocks from Math Tab.



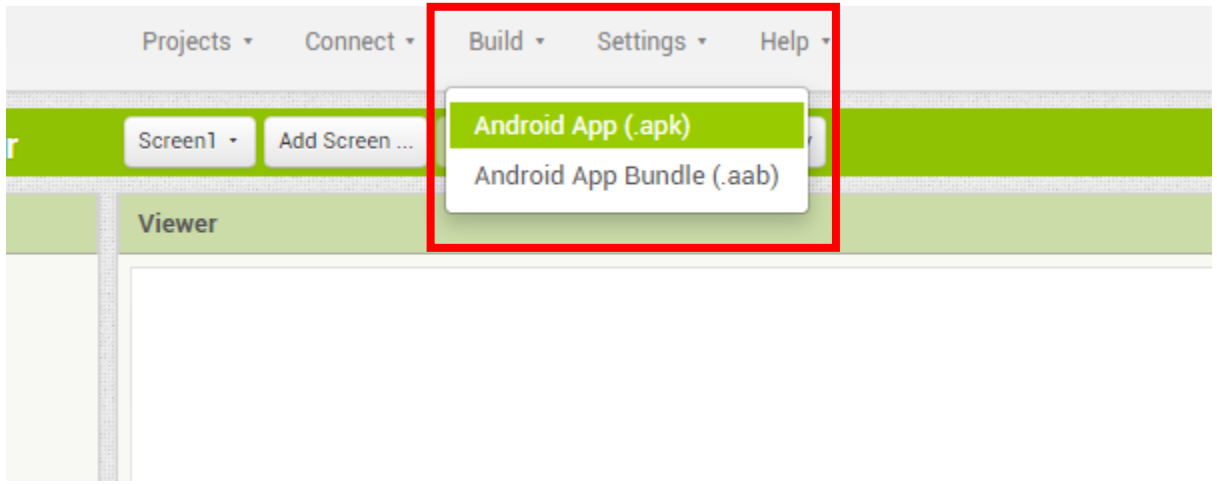


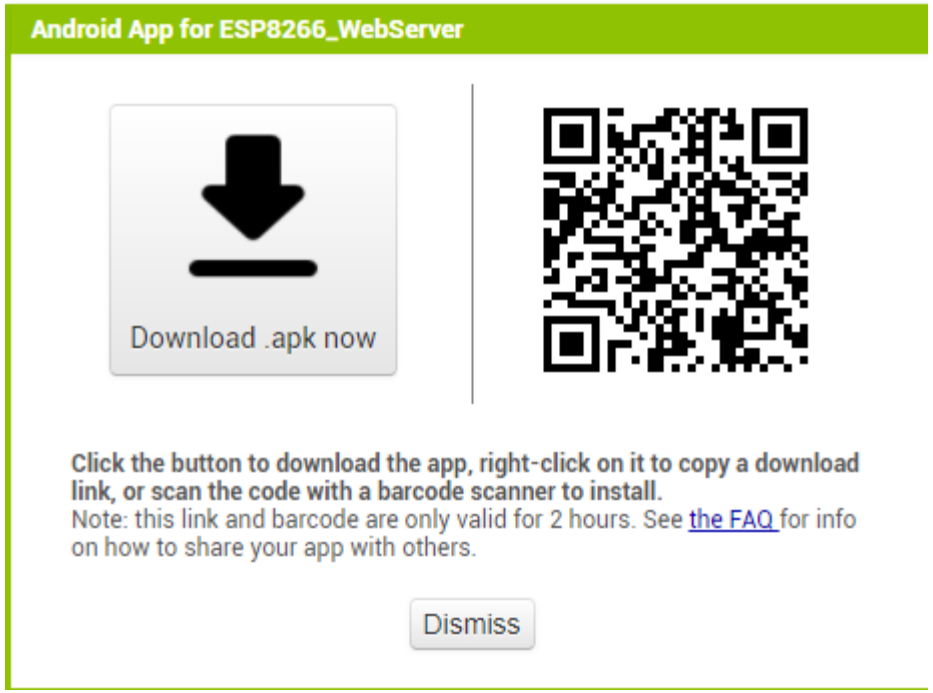


Change the value as shown below.

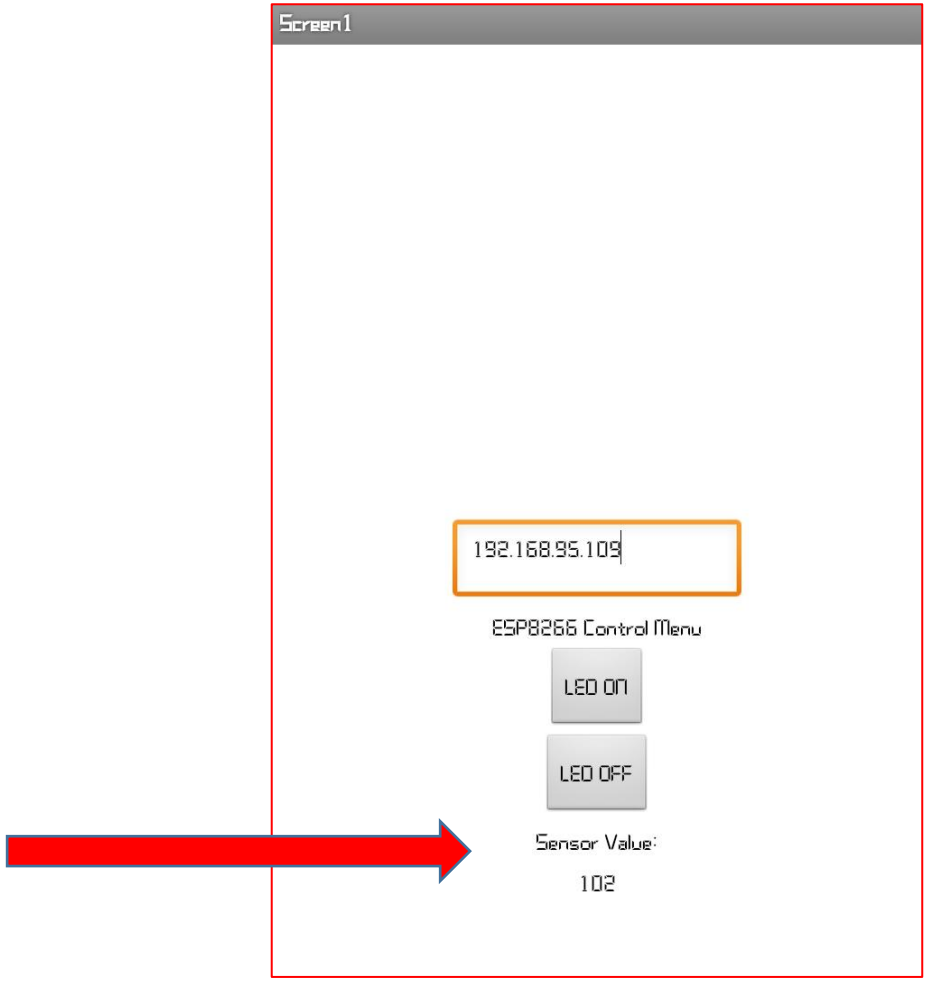


Done! Now on your real mobile phone, uninstall your apps. Then download and install a new, updated one.



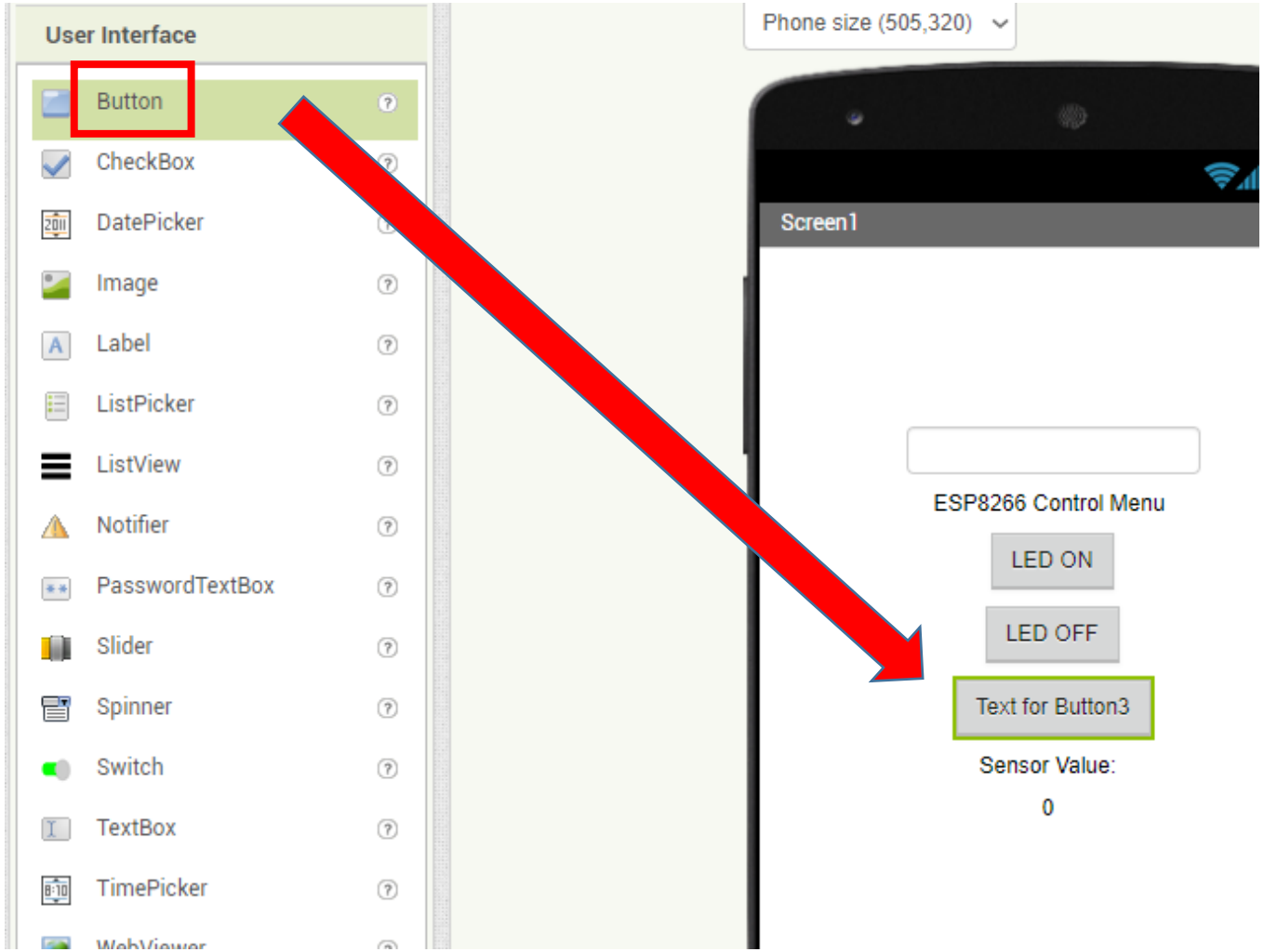


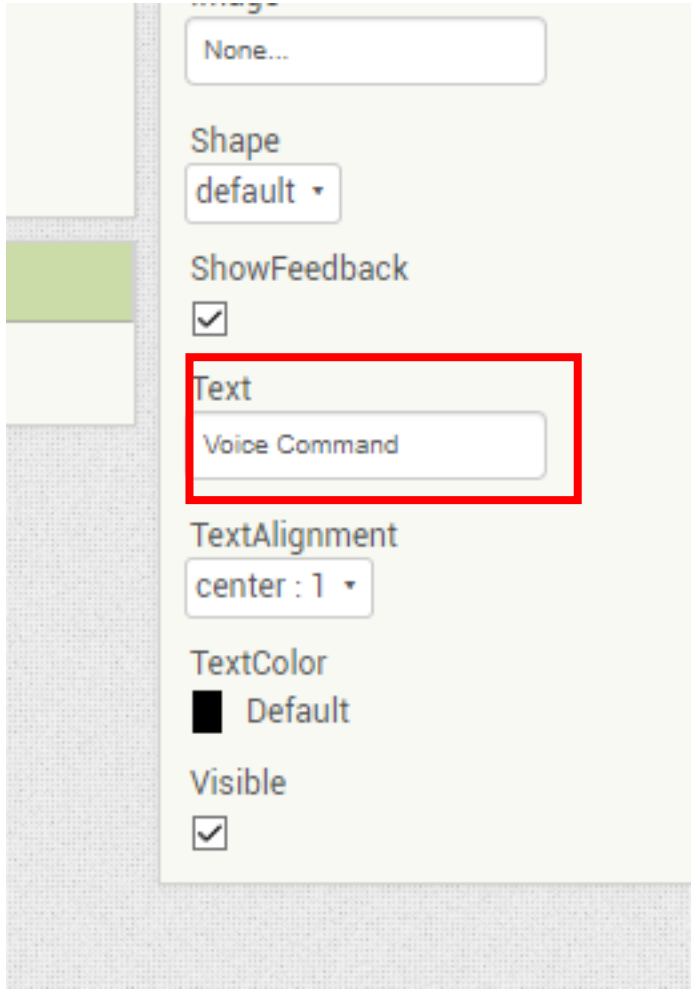
Open your apps. And you should see a new interface, a sensor reading in there. Play with your sensors, and wacth the reading changes and update in real time through the internet! Dont forget to input your IP Address from before.



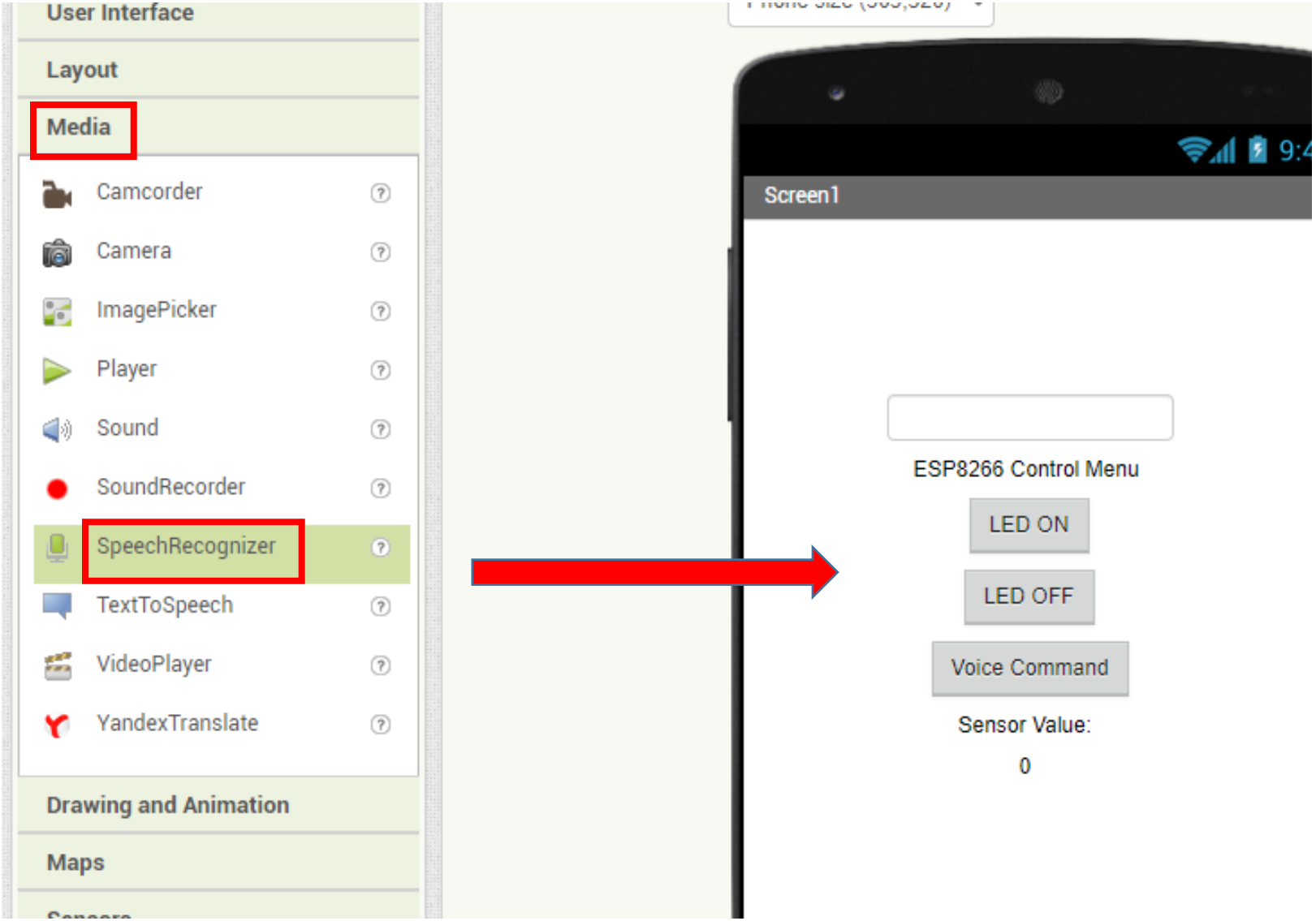
Adding Voice Recognition into your Project

Lets get back on to Designer Tab on your MIT website. Drag a button into your screen. Change the text.

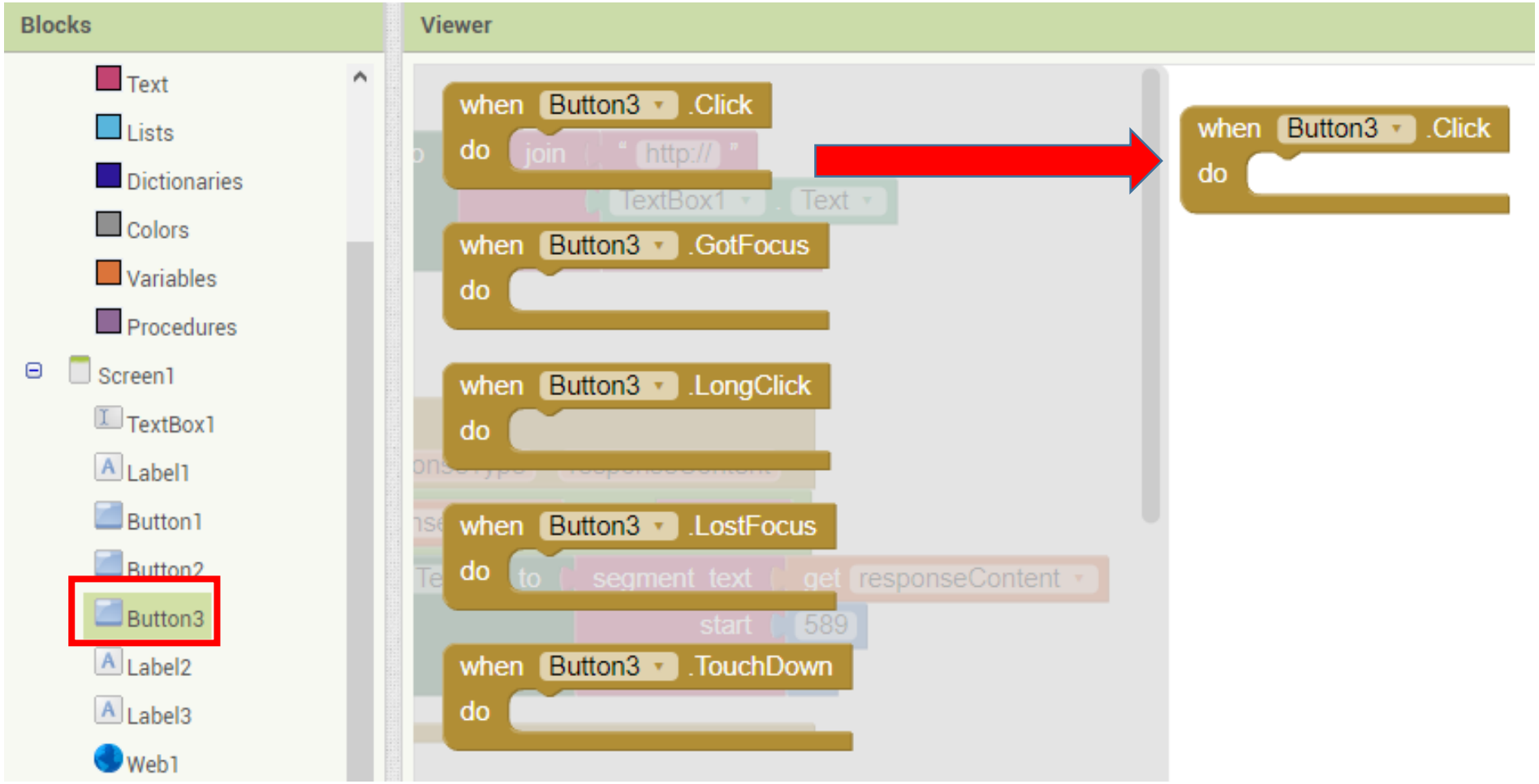




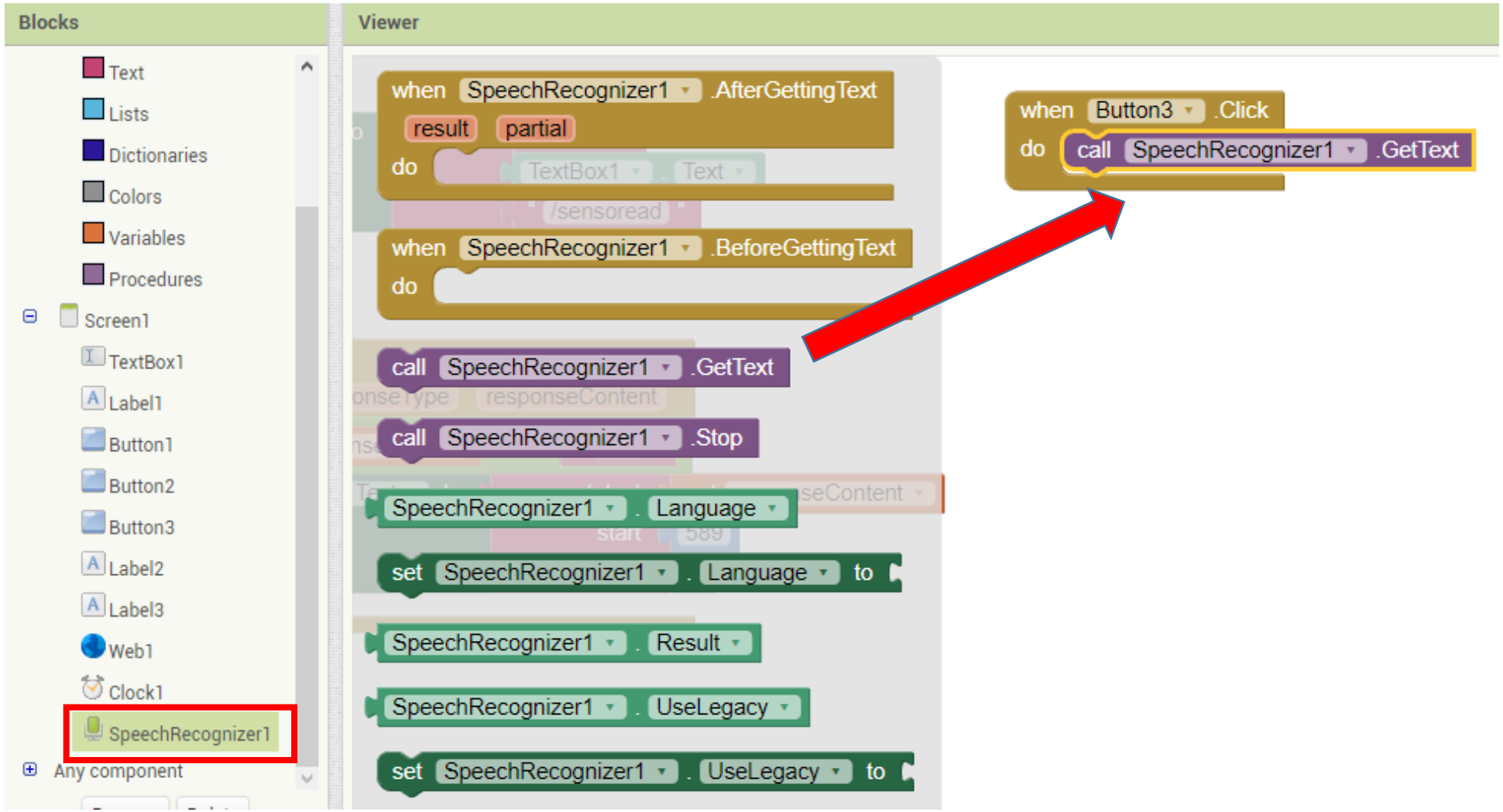
On Media Tab, drag SpeechRecognizer into your screen. Same as Web and Clock, nothing will show on your screen.



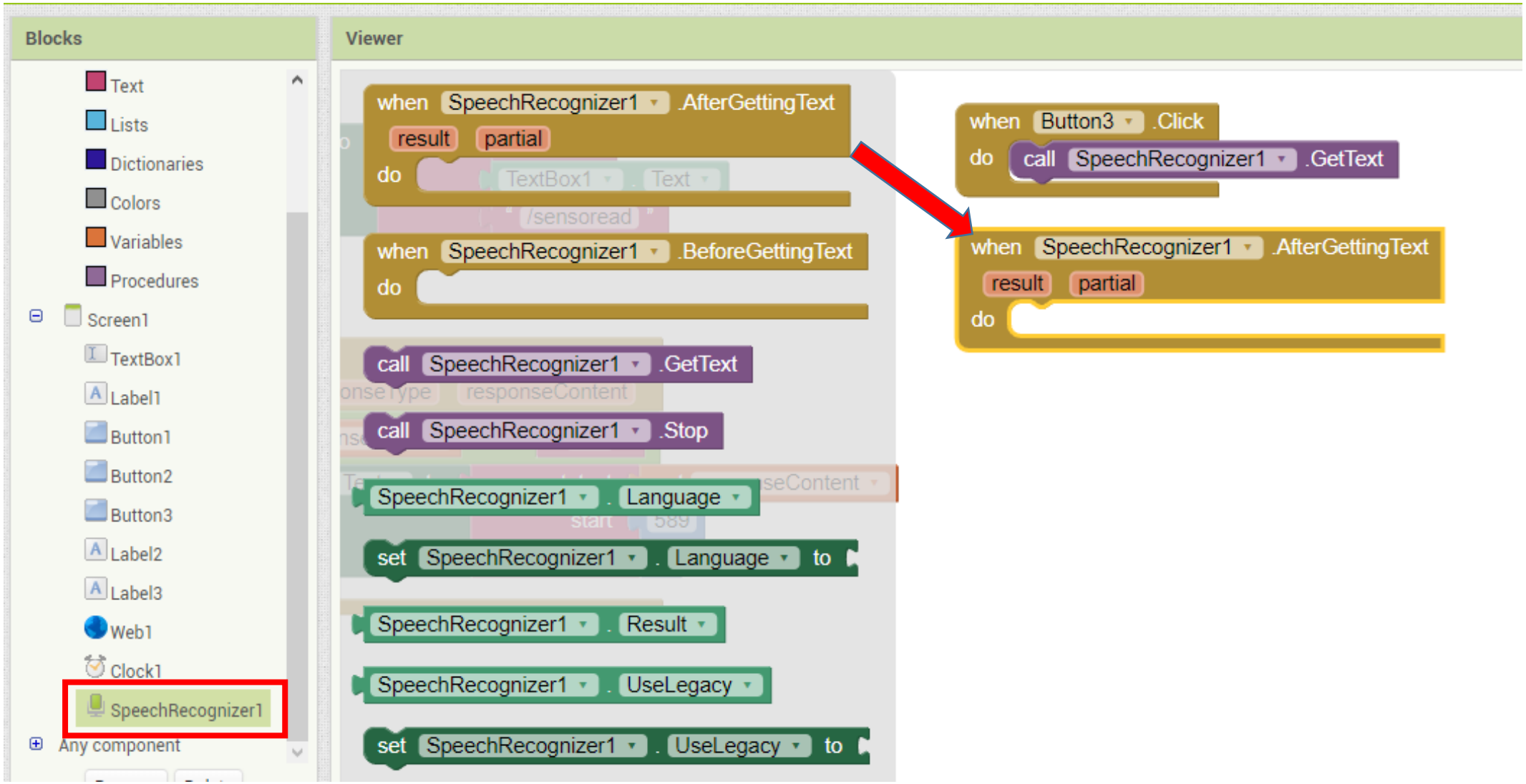
Lets continue to our Blocks Tab. Make sure you have some space. Click Button3, drag when..Click block into your code.



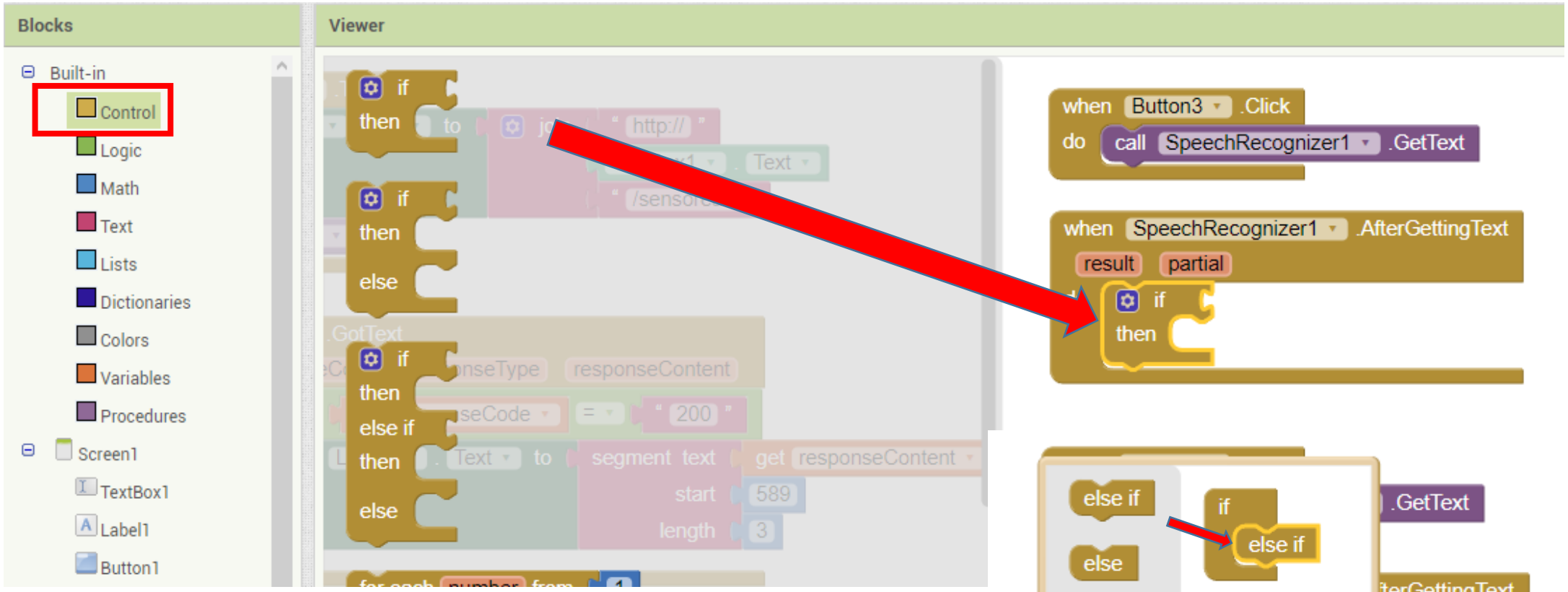
Click SpeechRecognizer1 Tab, and drag call..GetText into your code.

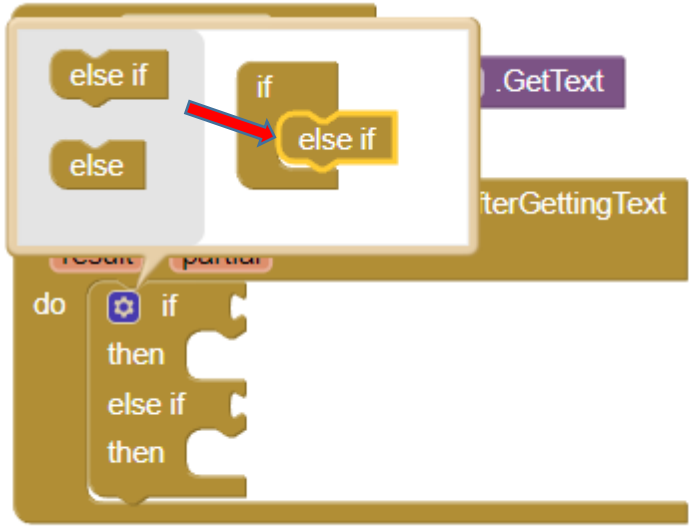


On SpeechRecognizer1 Tab, and drag when..AfterGettingText block into your code.



Click Control Tab, drag if..then block into your code.

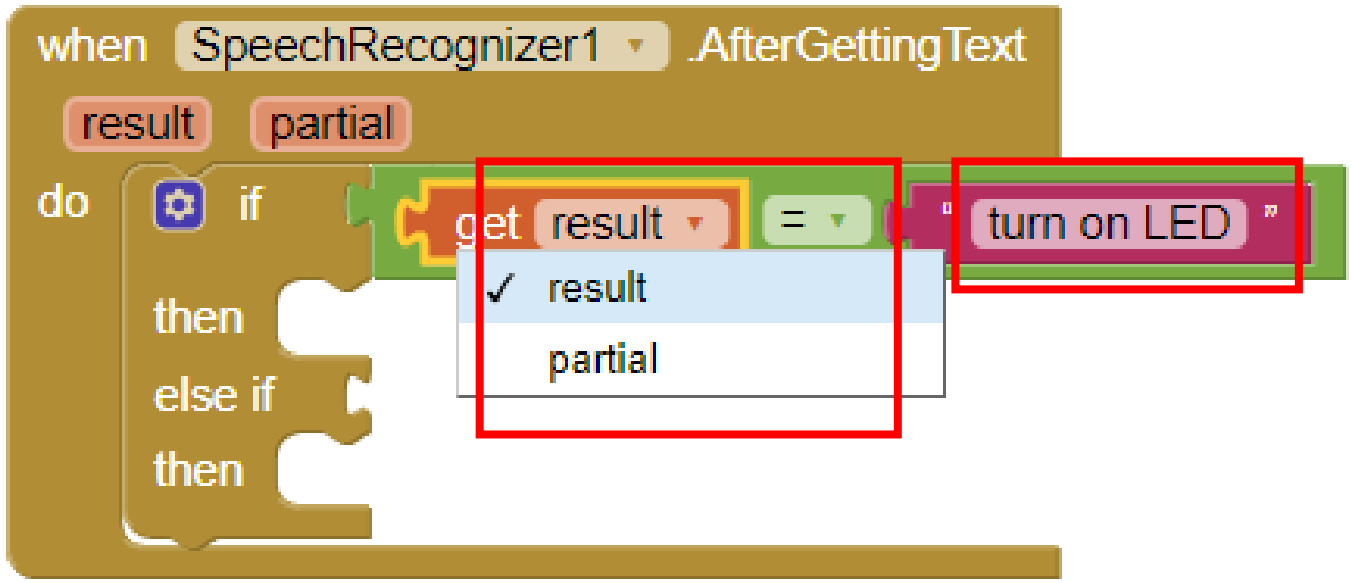




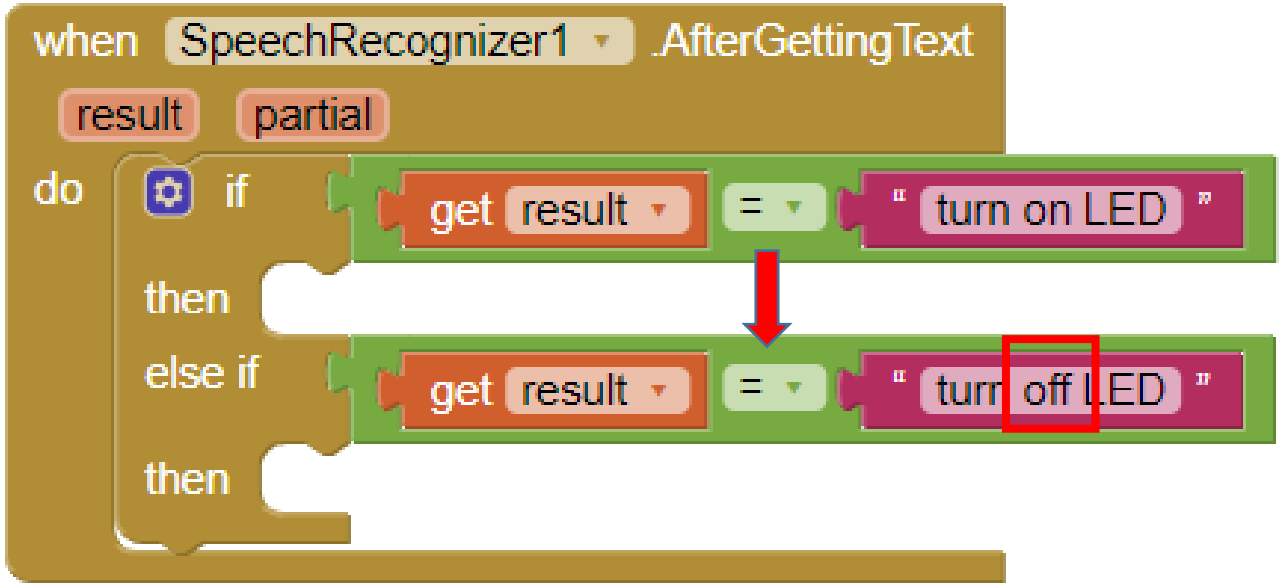
Click the gear icon on the if..then block. Add else if block into it.

Get the = block from Logic Tab, get block from Variables, and empty text block from Text.

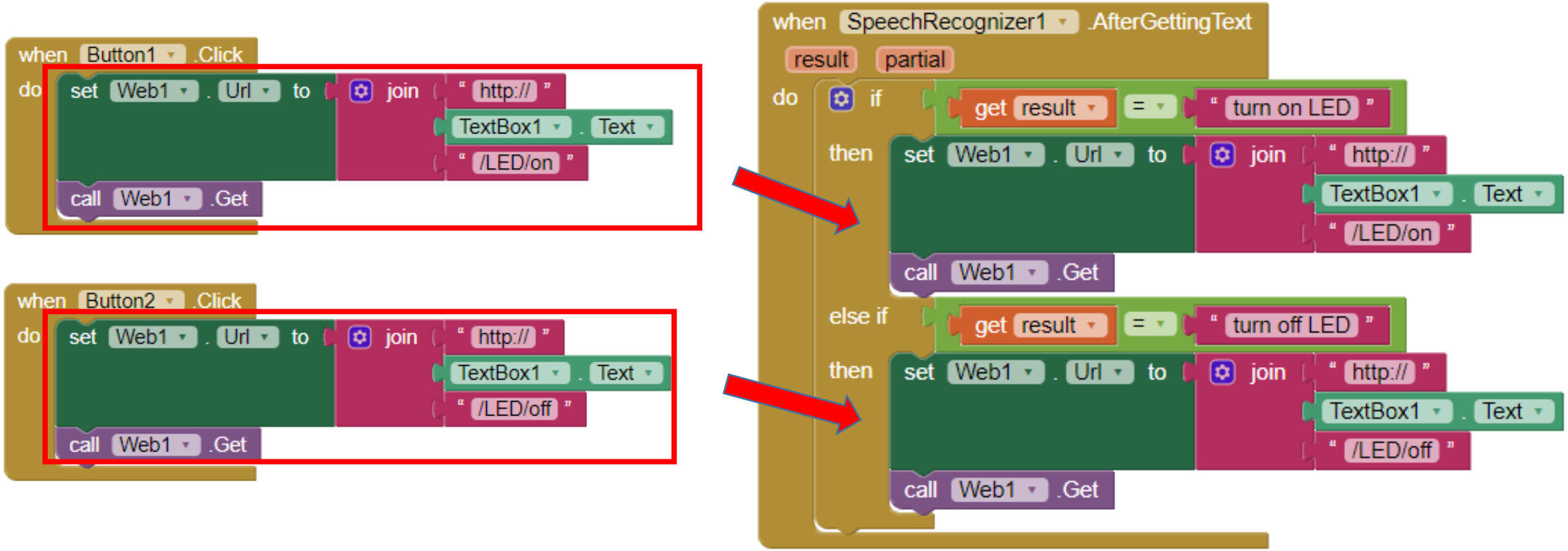
Choose result for the get block. And fill thetext block with you desired command. This is the voice command you will use for turning on the LED.



Duplicate the = block, and drag it to the else if position. Change the command. This command is for turning off the LED.

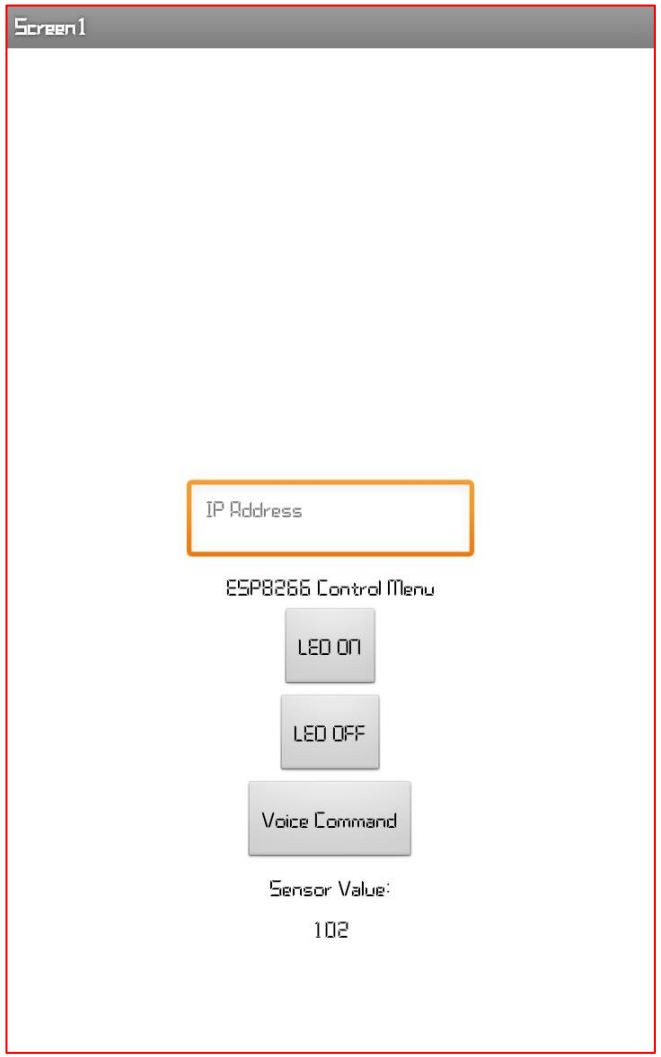


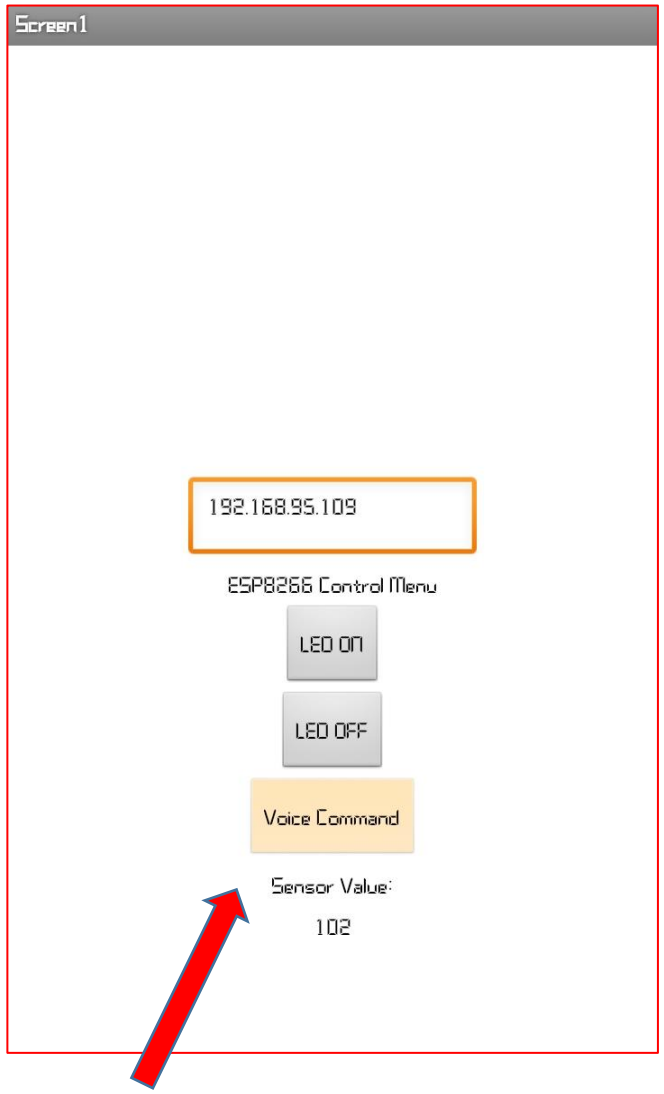
Remember our previous blocks for turning the LED on and off using buttons? Duplicate those blocks into this block.

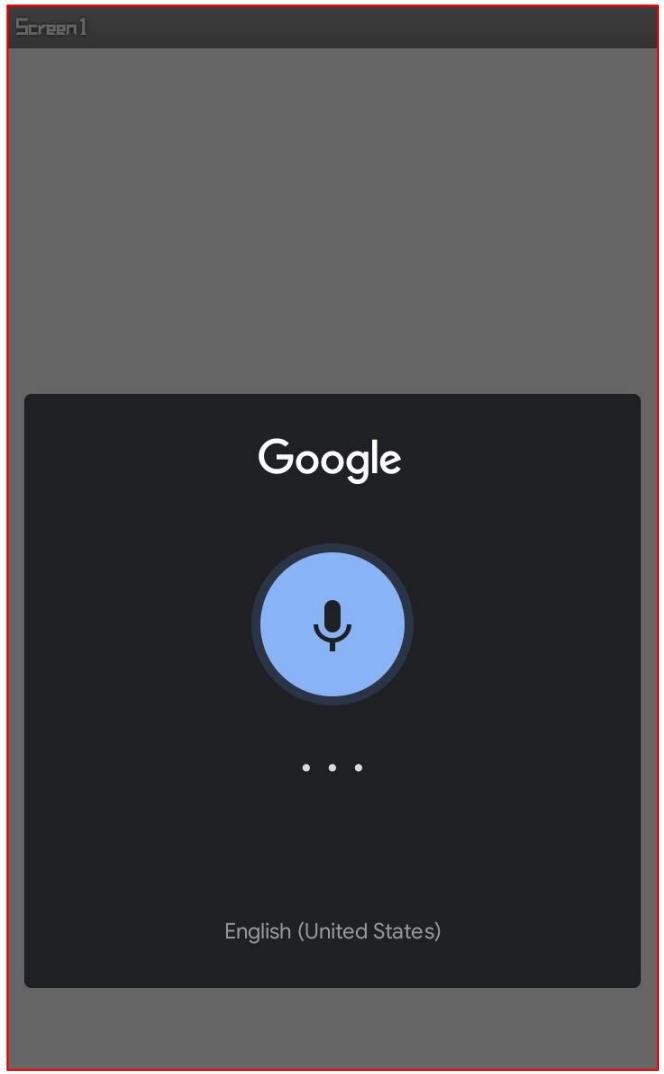


Make sure to ONLY duplicate the set..Url and call..get blocks only, NOT when..do block. Also make sure your blocks in CORRECT position, the /LED/on should be on your turn on voice command, and vice versa.

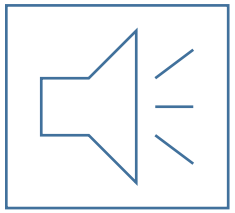
Now reinstall your apps. Open it and you should see a brand new Voice Command button. Insert your IP Address. Press the voice command button and use your voice control the LED.

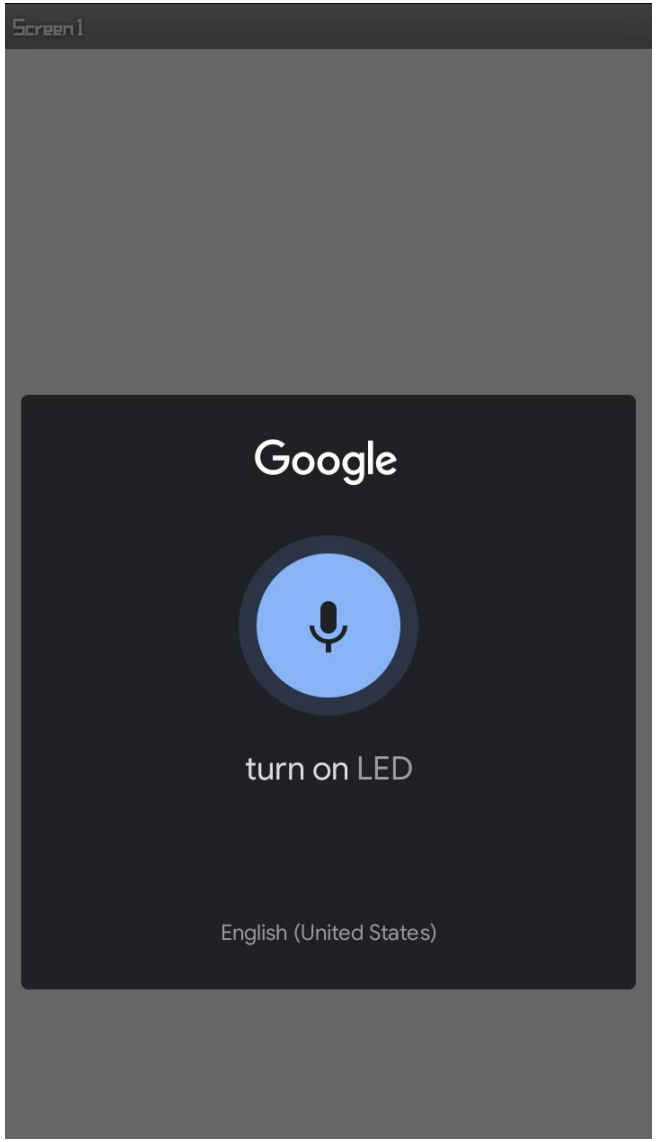


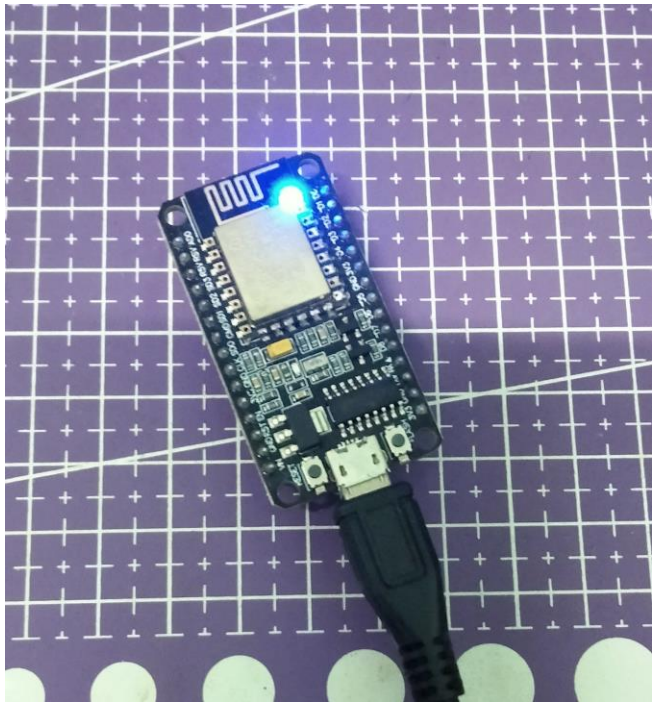


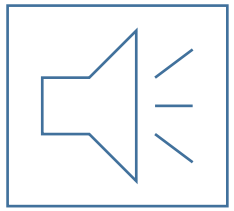


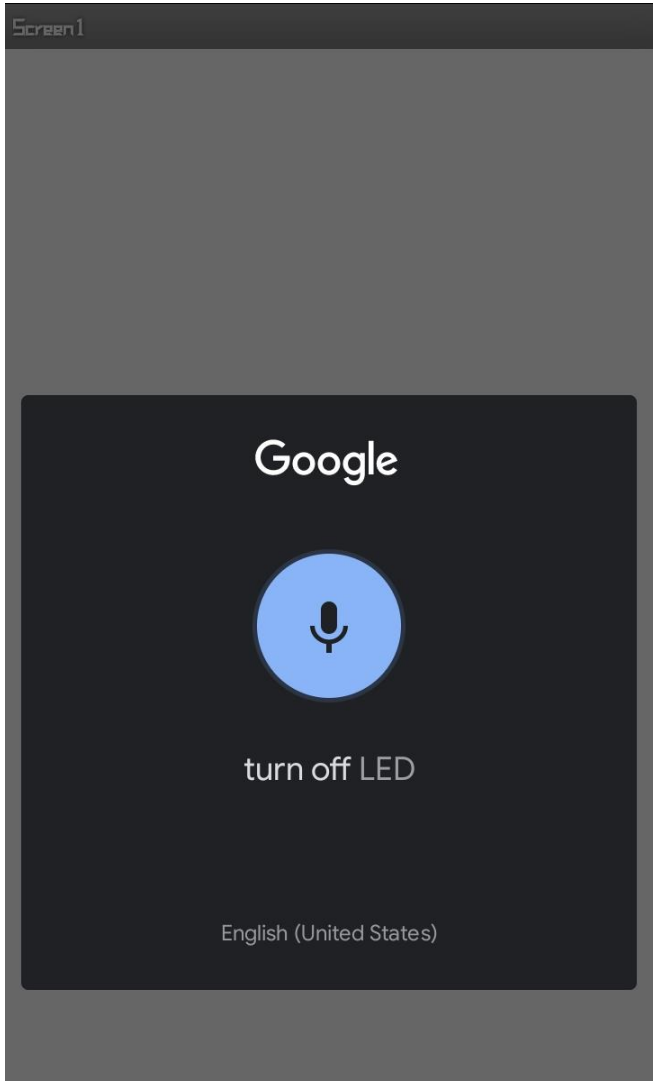
Make sure you said exactly what you put in your apps coding. For this example, “turn on LED” and “turn off LED”.





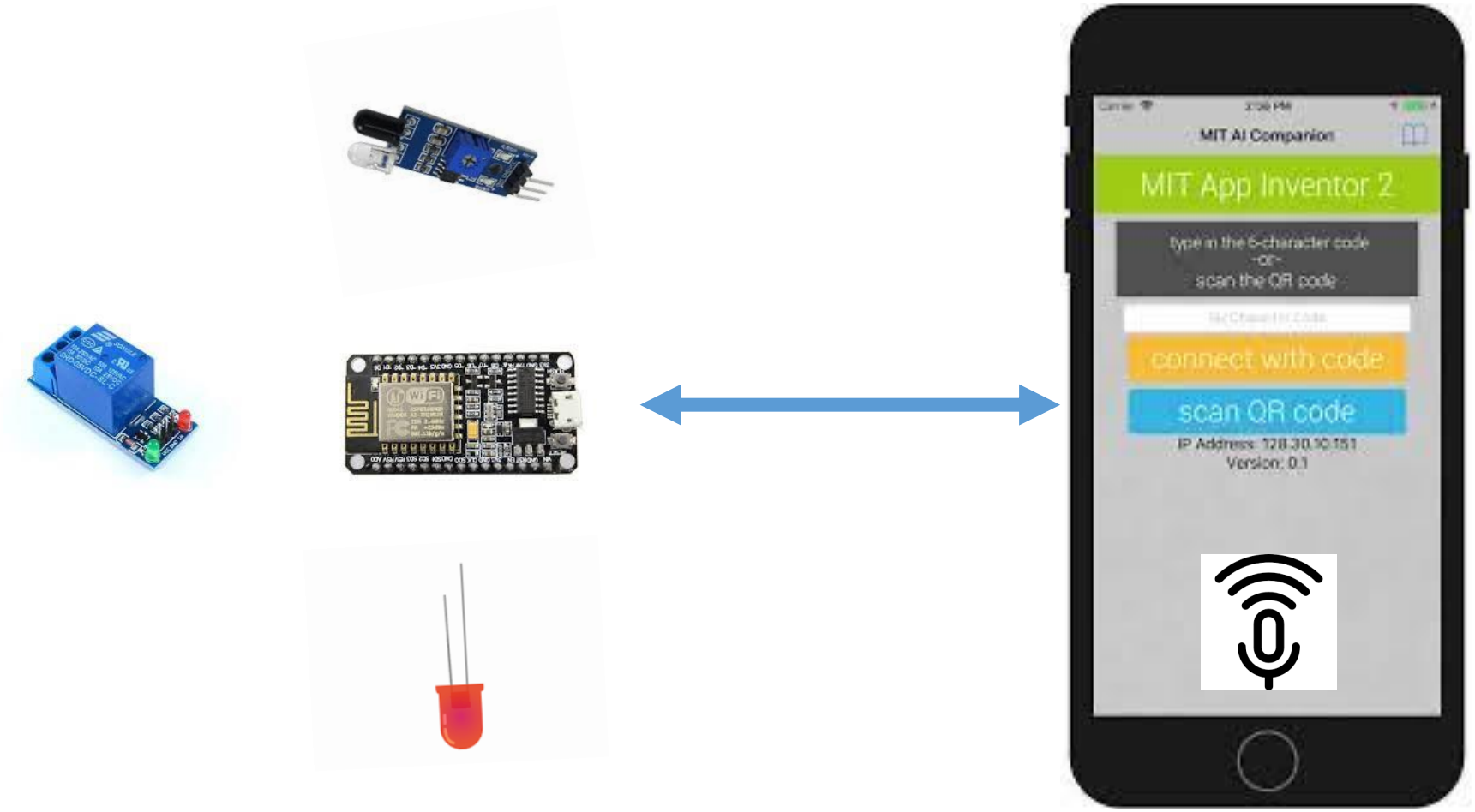





Screen1
Google
turn off LED
English (United States)

Question and Answer

Conclusion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Version: 0.1