MIT AI2 204

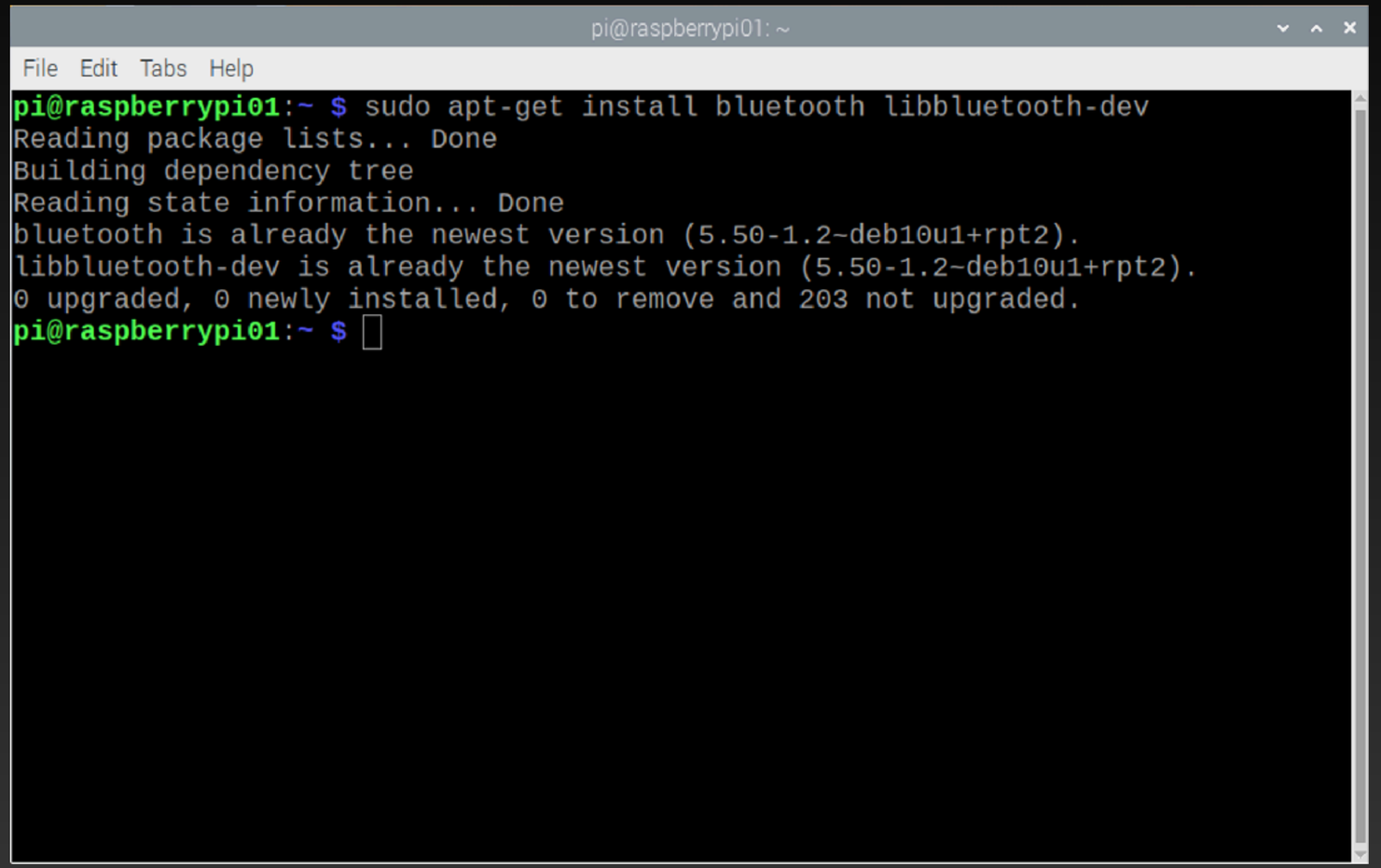
IoT with MIT App Inventor

Fundamental

Xincheng Tang

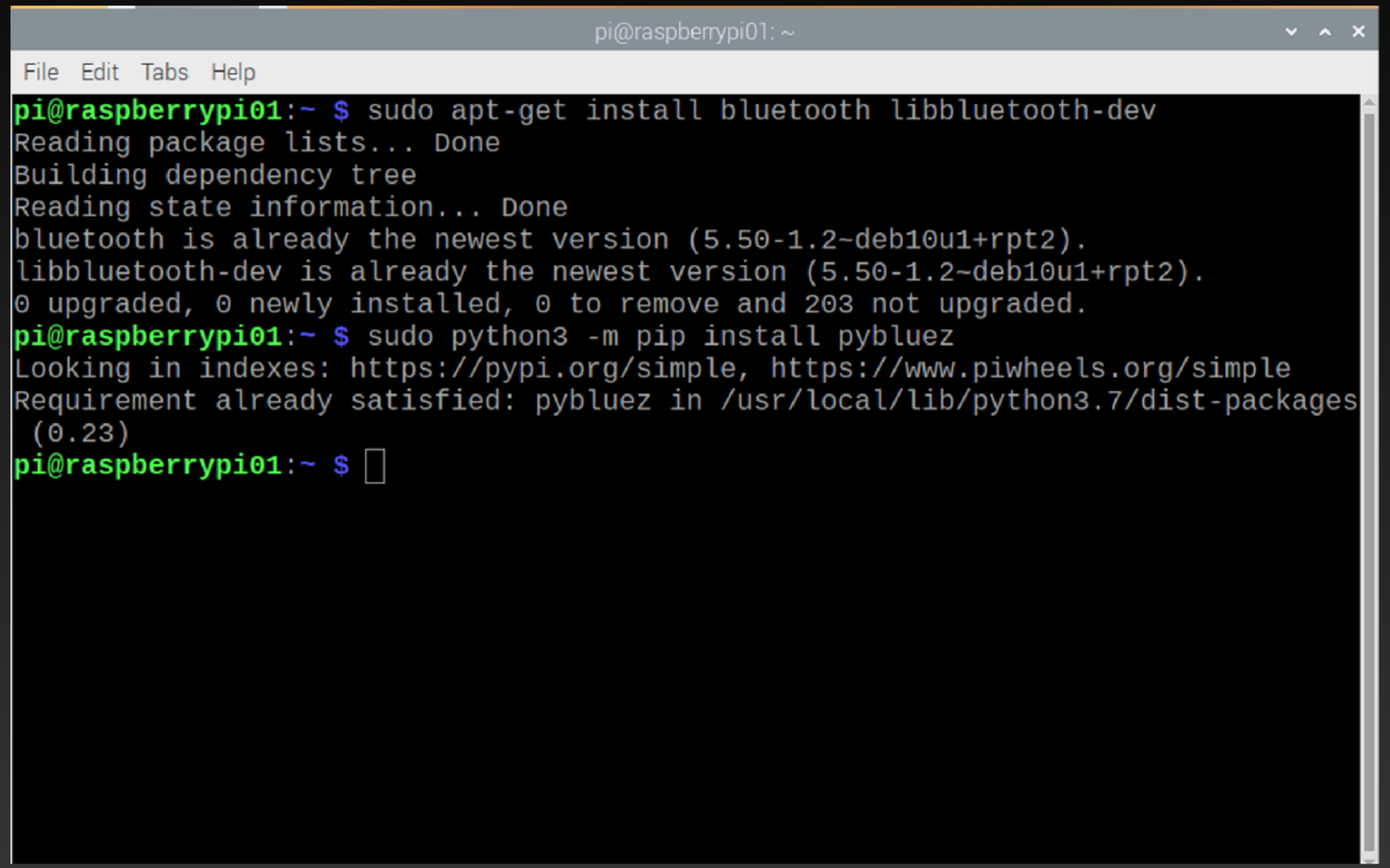
Python Program - Bluetooth setup

```
$ sudo apt-get install
bluetooth libbluetooth-dev
```



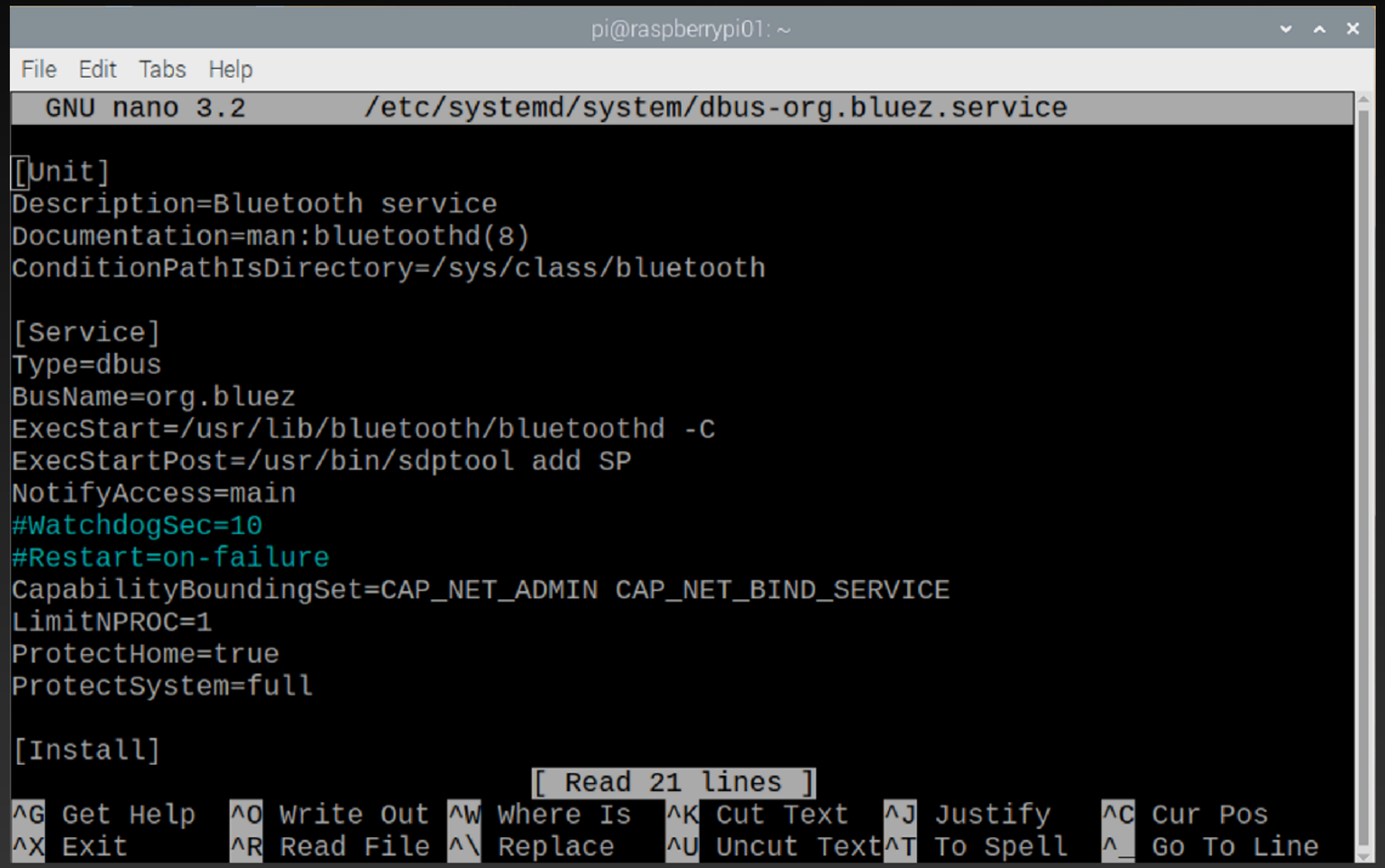
Python Program - Bluetooth setup

```
$ sudo python3 -m pip
    install pybluez
```



Python Program - Bluetooth setup

```
$ sudo nano /etc/systemd/
    system/dbus-
    org.bluez.service
```



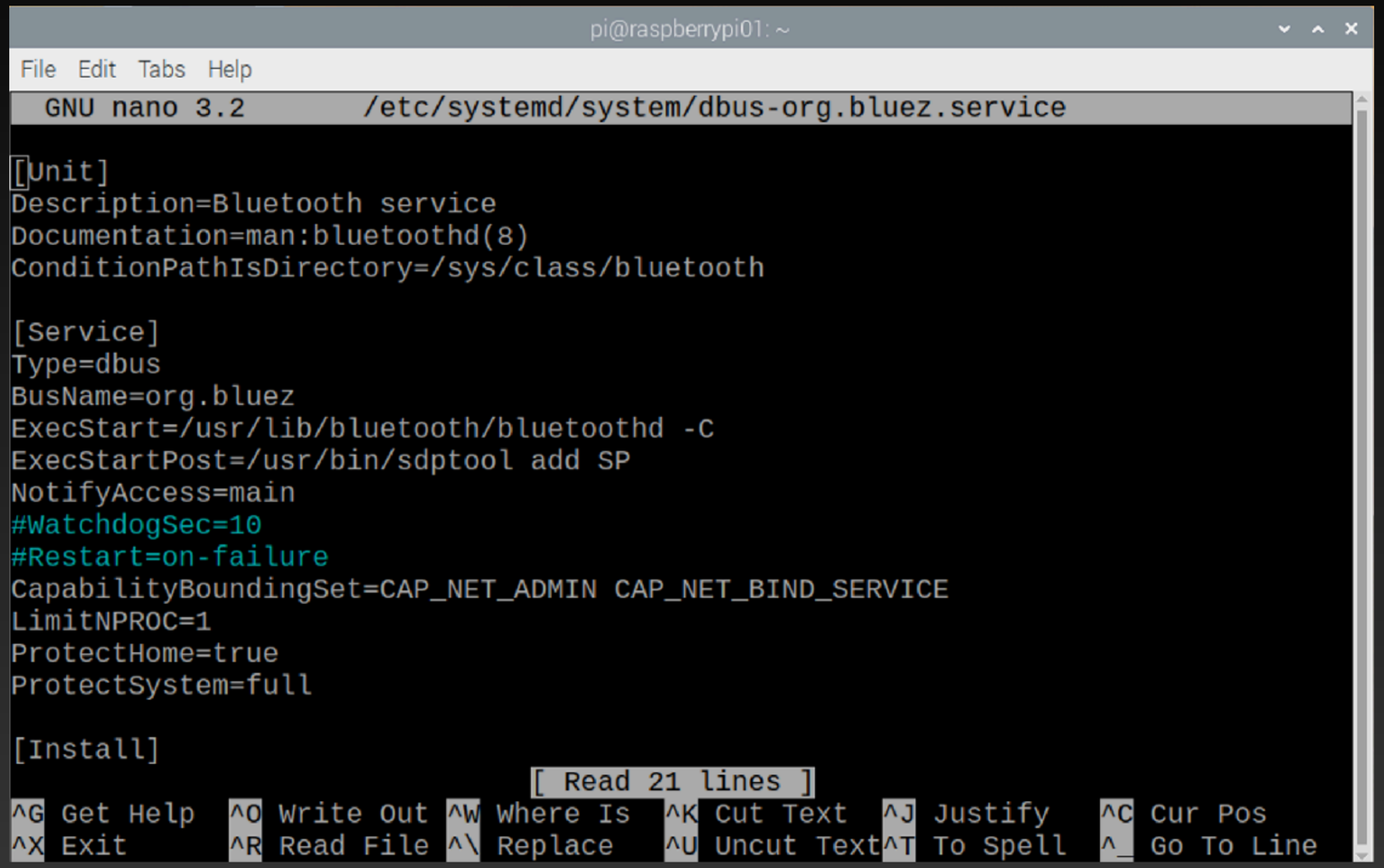
Python Program - Bluetooth setup

Add -C at the end of the ExecStart = line.

Also add another line after the ExecStart line.

The final two lines should look like below:

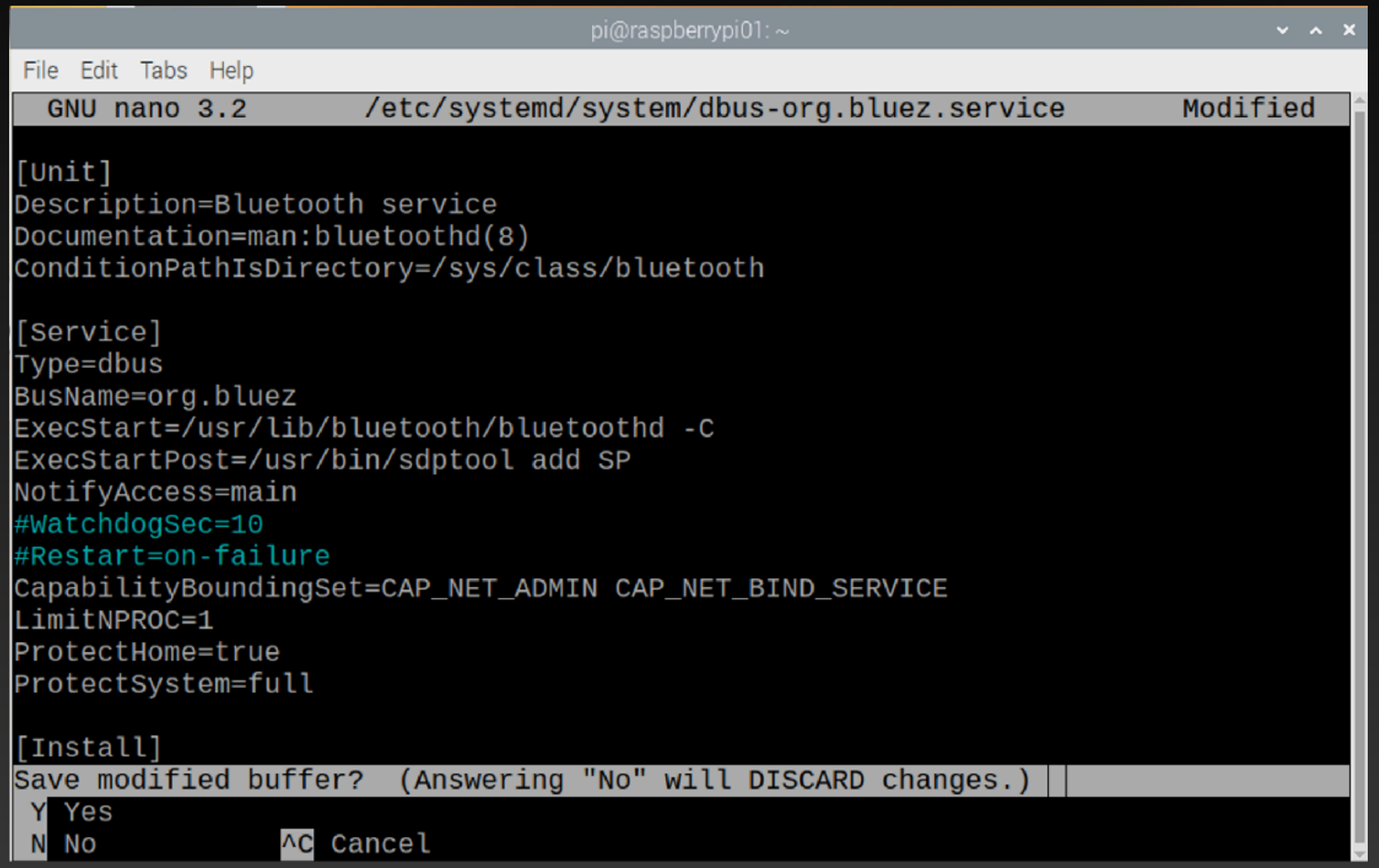
```
ExecStart=/usr/lib/
bluetooth/bluetoothd -C

ExecStartPost=/usr/bin/
sdptool add SP
```



Python Program - Bluetooth setup

Exit and save the file by entering Ctrl + X, followed by Y.

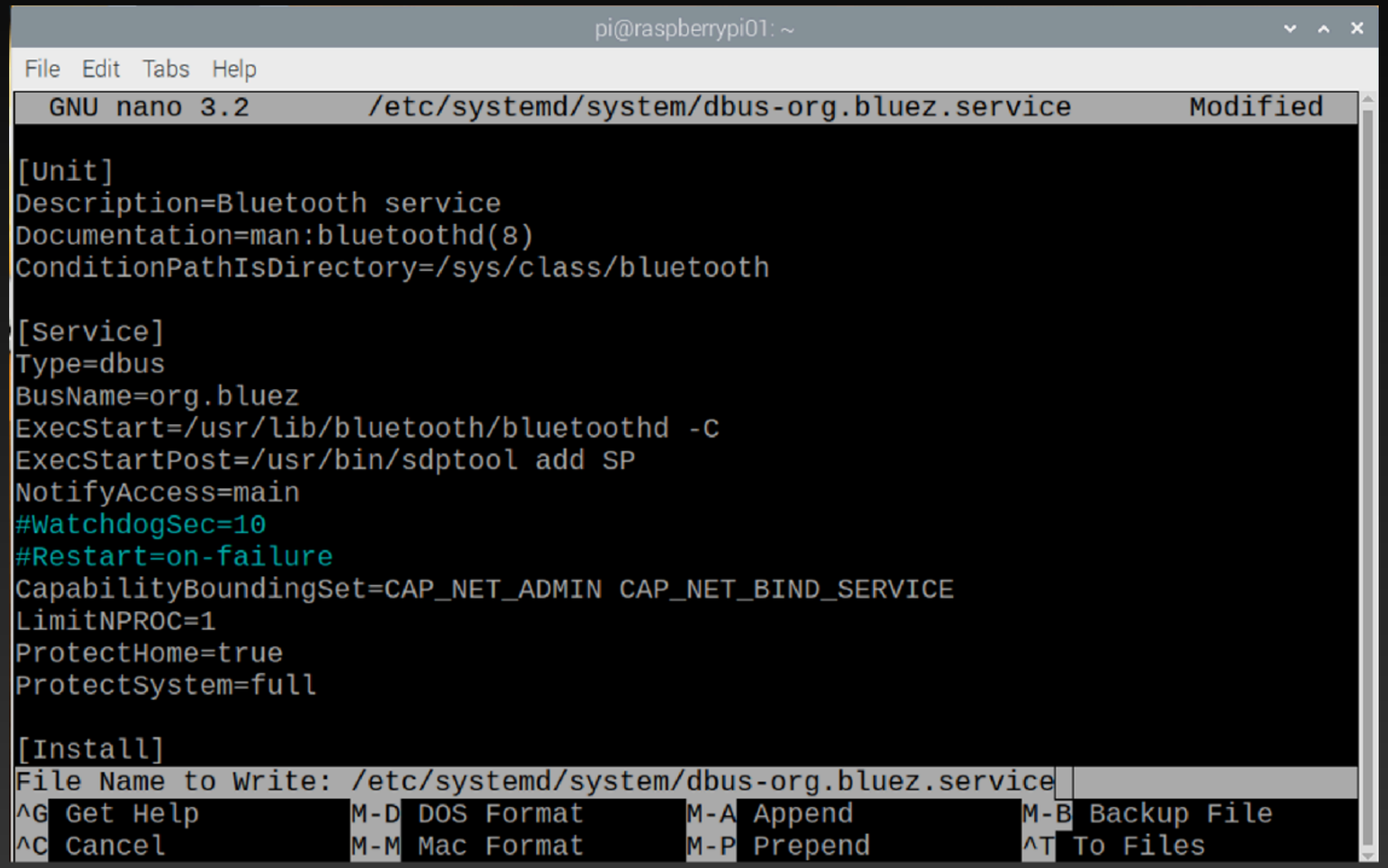
Press enter after type in Y



Python Program - Bluetooth setup

Exit and save the file by entering Ctrl + X, followed by Y.

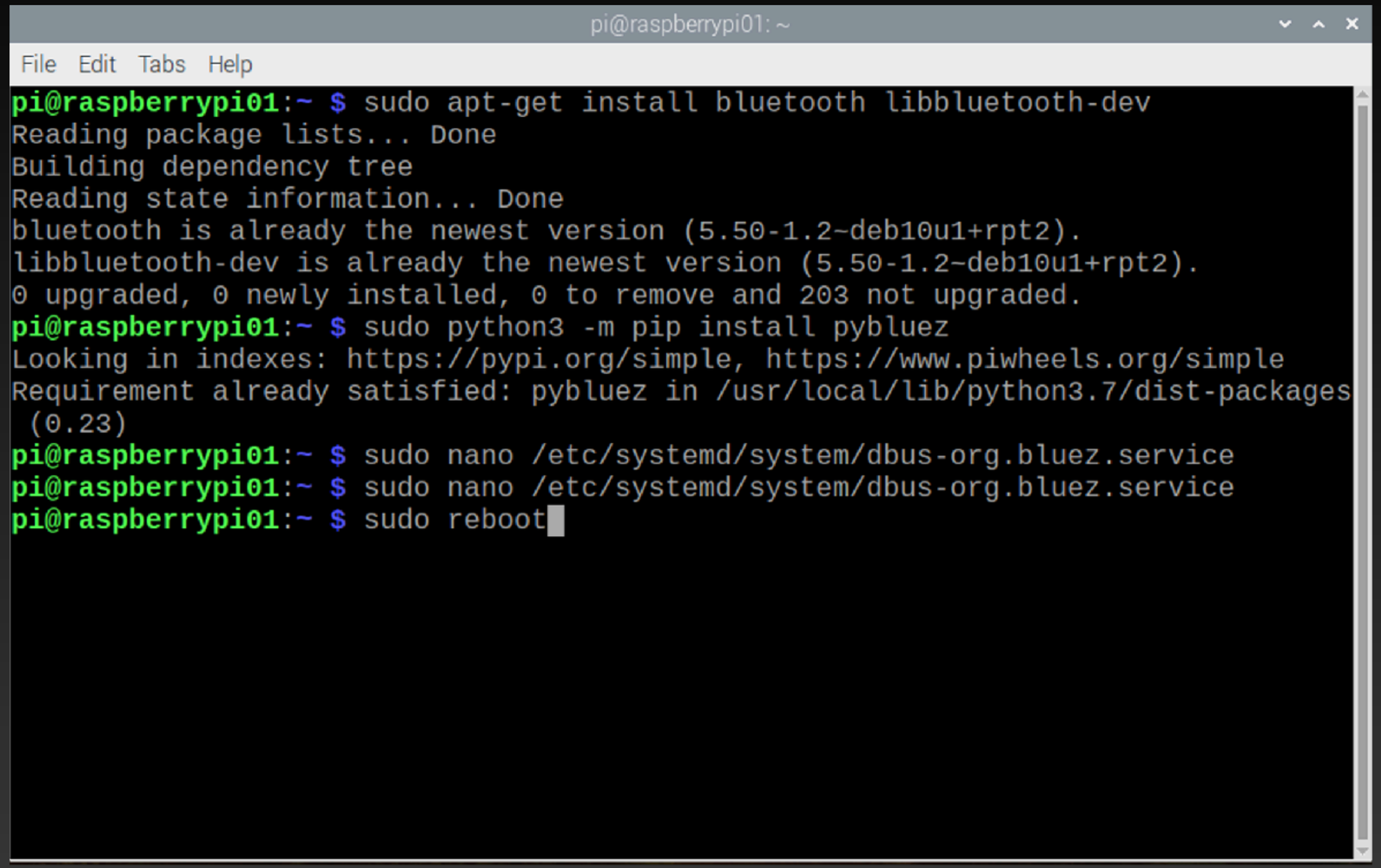
Press enter after type in Y, you will be back to terminal screen



Python Program - Bluetooth setup

```
$ sudo reboot
```

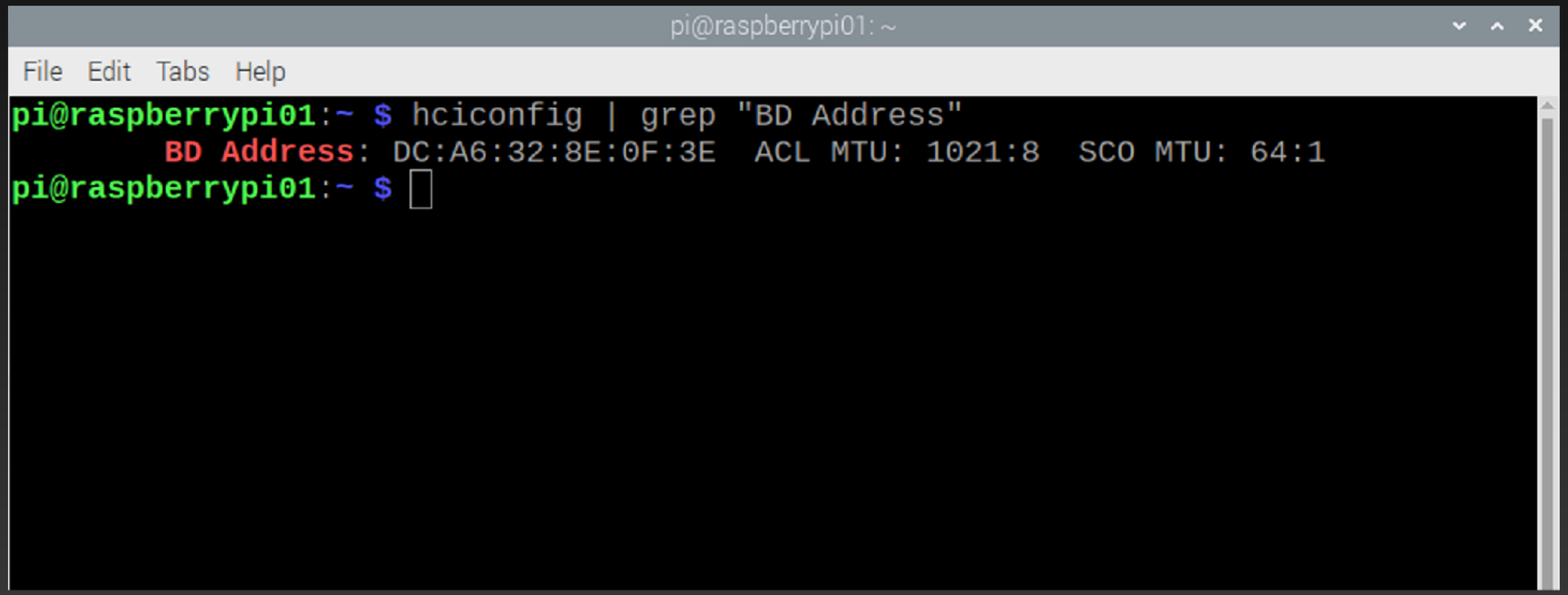
Press enter, your Raspberry Pi will reboot



Bluetooth Pairing with Android Devices

Open your terminal, type below command:

```
$ hciconfig | grep "BD Address”
```



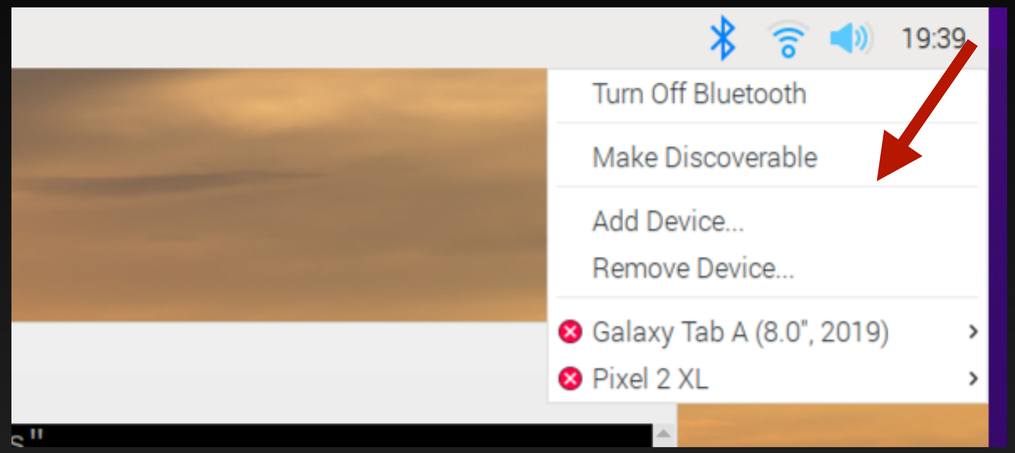
Bluetooth Pairing with Android Devices

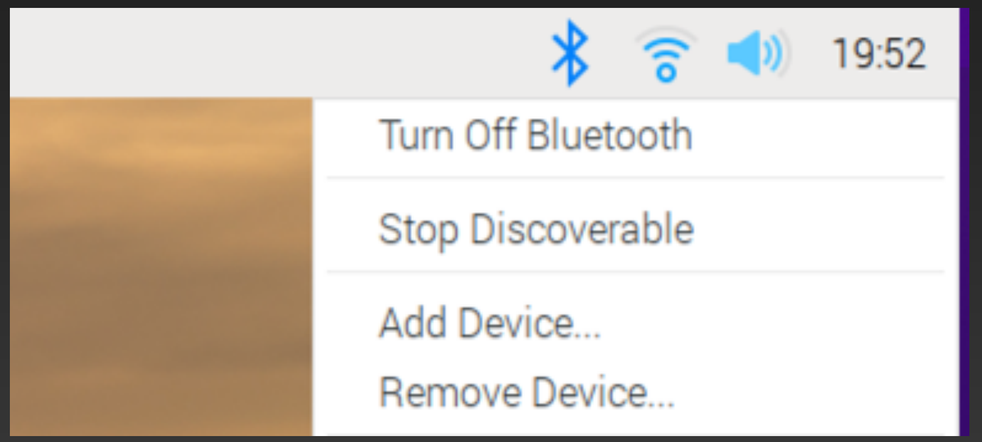
MAC address: A media access control address (MAC address) is a unique identifier assigned to a network interface controller (NIC) for use as a network address in communications within a network segment. This use is common in most IEEE 802 networking technologies, including Ethernet, Wi-Fi, and Bluetooth.

Bluetooth Pairing with Android Devices

Config your raspberry Pi to discoverable.

First make sure the bluetooth is turned on, then click on Make Discoverable, you should see the bluetooth icon is flashing in green and blue color.





Bluetooth Pairing with Android Devices

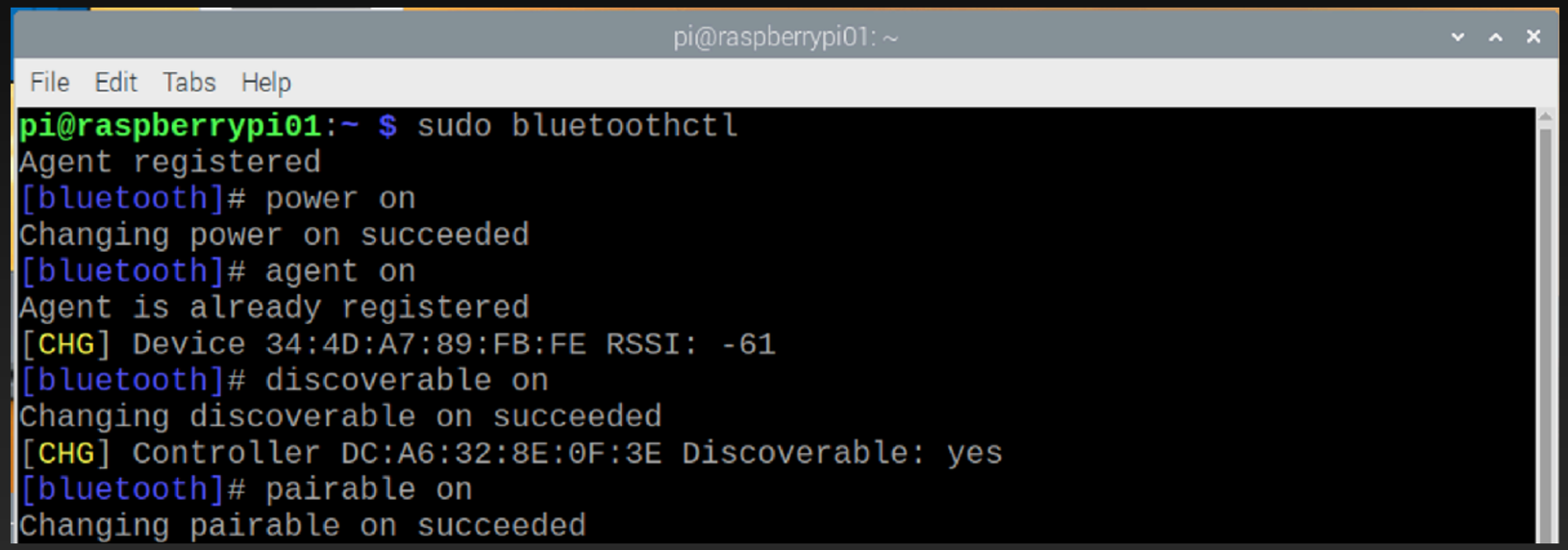
Go to your Android device, find connection under settings.

Pair raspberry pi with your device.

Bluetooth Pairing with Android Devices

Debug from terminal.

```
$ sudo bluetoothctl
# power on
# agent on
# discoverable on
# pairable on
```

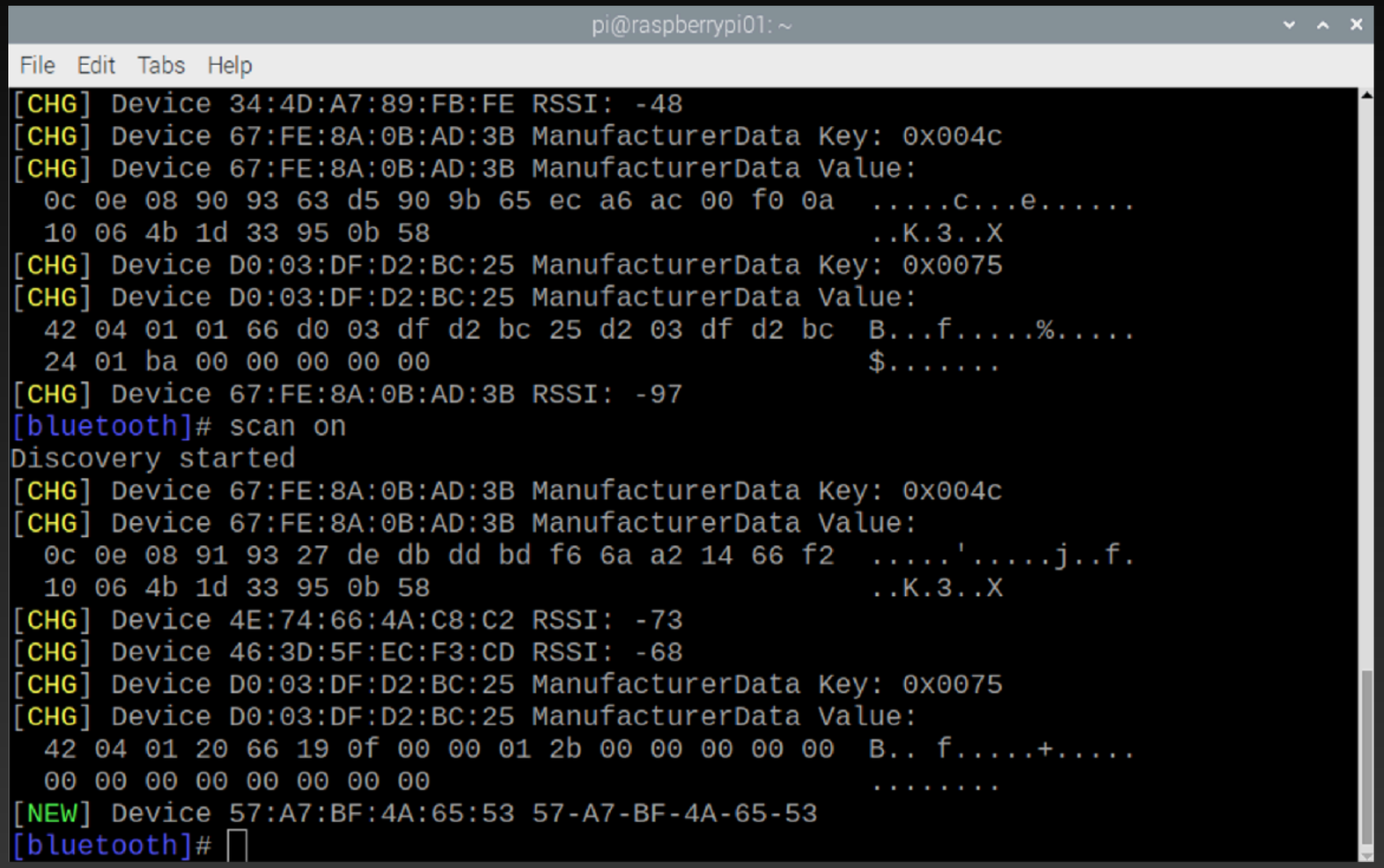


Bluetooth Pairing with Android Devices

```
# scan on
```

After the last command *“scan on”*, you will see your Bluetooth device (Mobile phone) in the list. Make sure that your mobile has Bluetooth turned on and visible by nearby devices. Then copy the MAC address of you device and pair it by using given command:

```
# pair <address of your phone>
```



Python Program - LED control through bluetooth

Notice that what is returned into variable data is byte objects which is actually arrays of integers.

Here, we are using the built-in decode function to convert them into their equivalent ASCII characters.

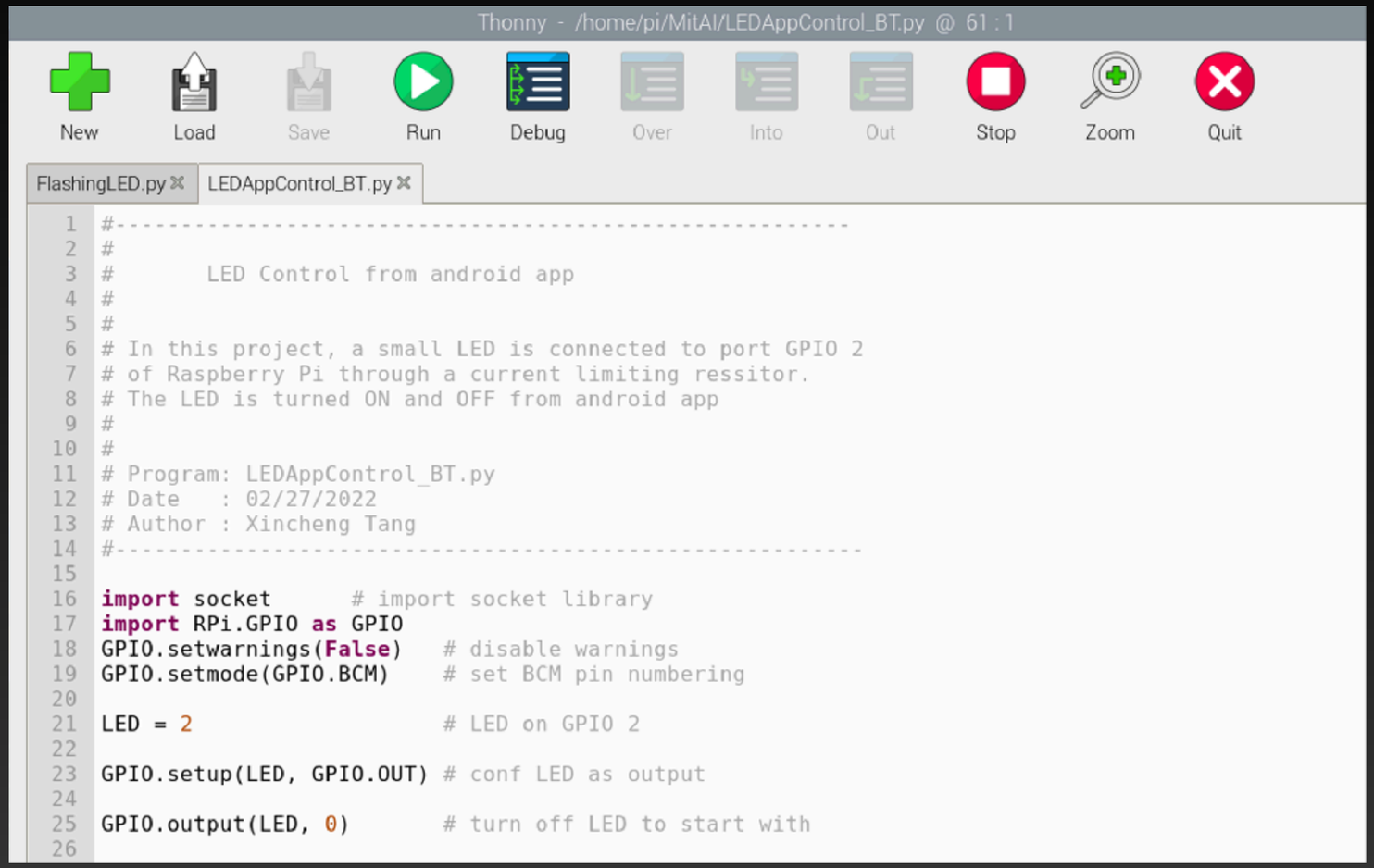
In Python3, utf-8 is the default encoding and decoding parameter.

```
Decode MAC to ASCII (utf-8 in python 3)
#------------------------------------
#
#       decode Pi signal/data
#
#------------------------------------

try:
    while True:
        data = client.recv(1024)                # Recieve data bytes
        if data.decode('utf-8') == '1':         # 1 received
            GPIO.output(LED, 1)                 # LED ON
        elif data.decode('utf-8') == '0':       # 0 received
            GPIO.output(LED, 0)                 # LED OFF

except KeyboardInterrupt:                       # Keyboard interrupt
    client.close()
    s.close()
```

Python Program - LED control through bluetooth

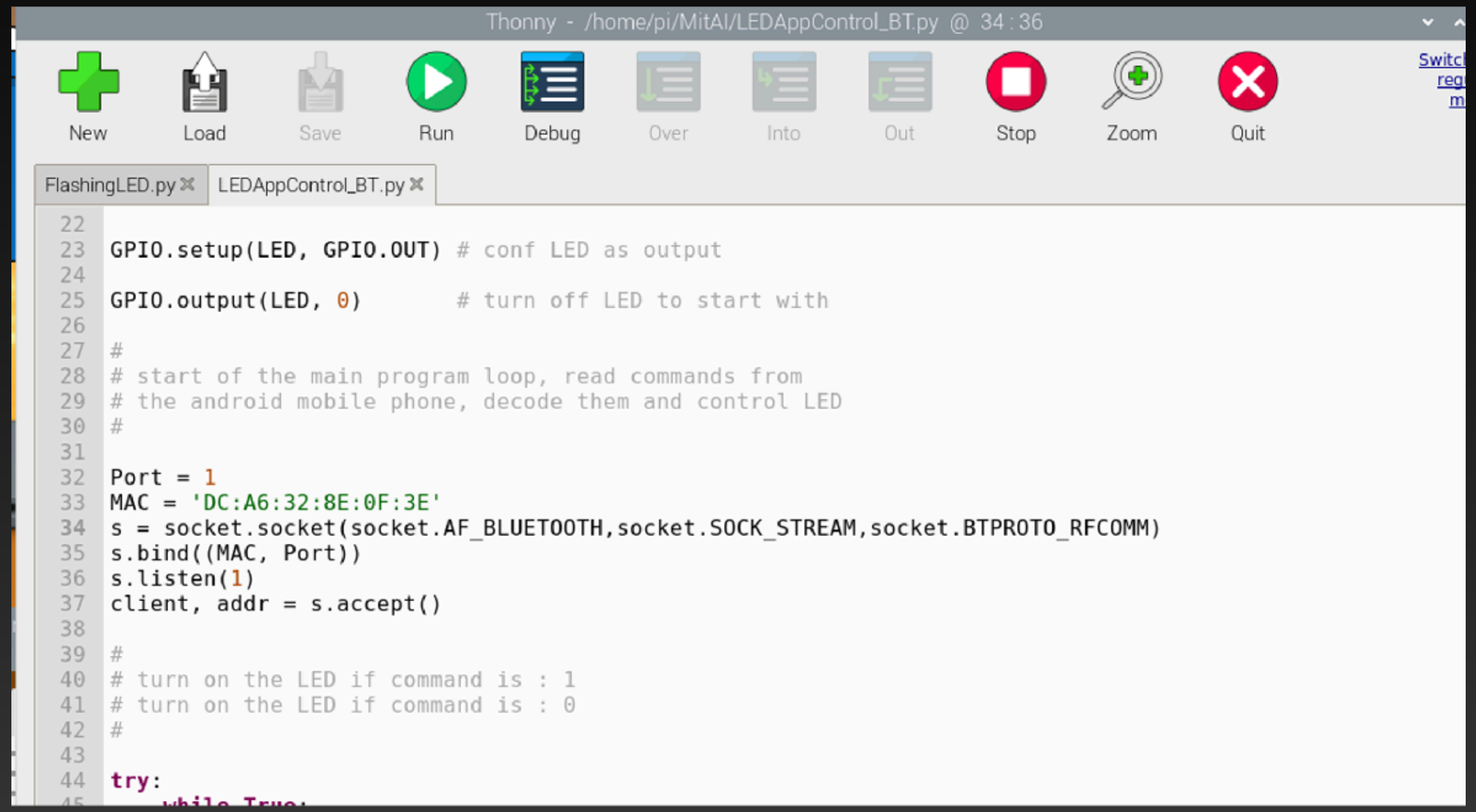
Develop the python program to for bluetooth control.

GPIO library setup



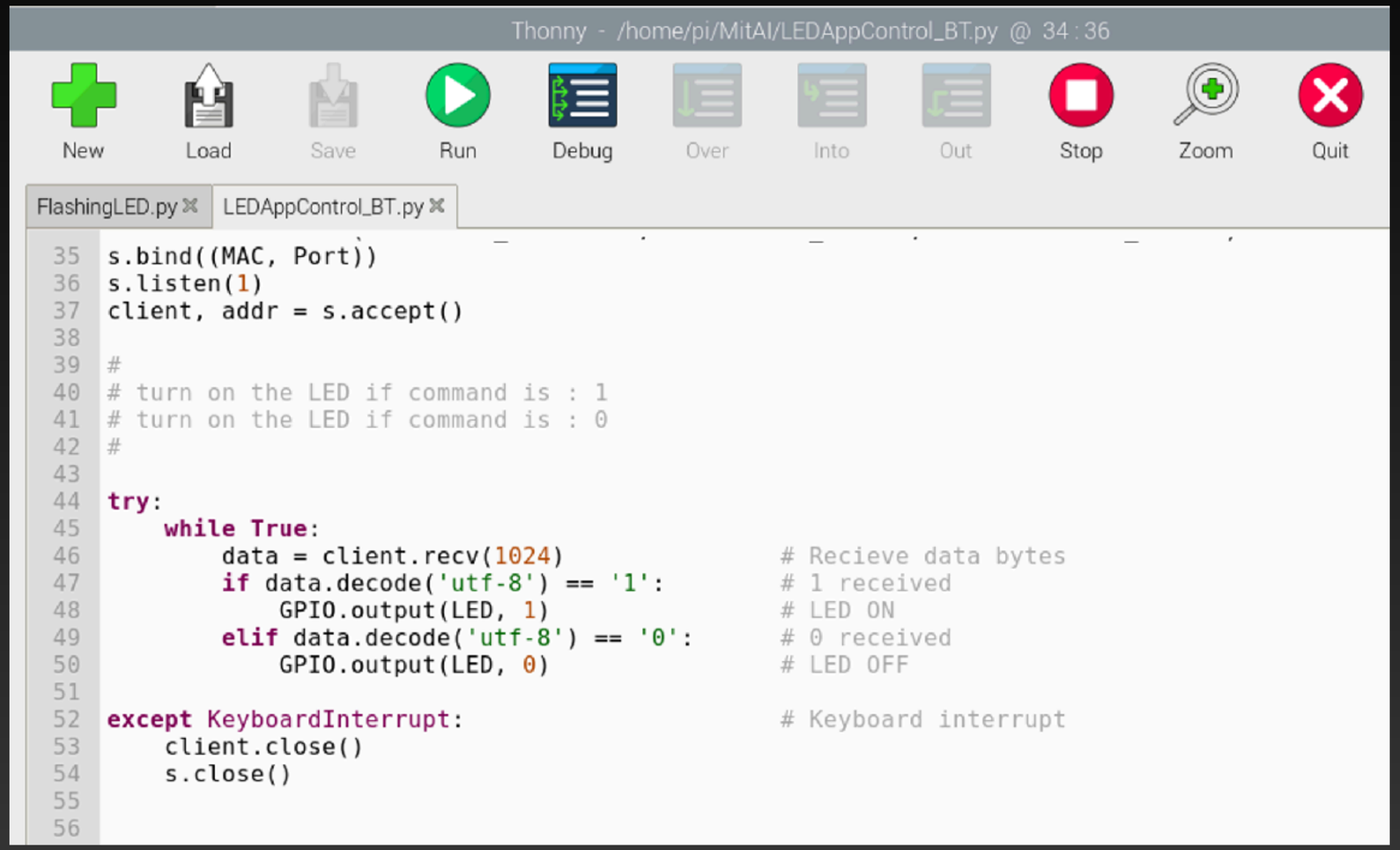
Python Program - LED control through bluetooth

Setup socket to recieve signal from physical device.



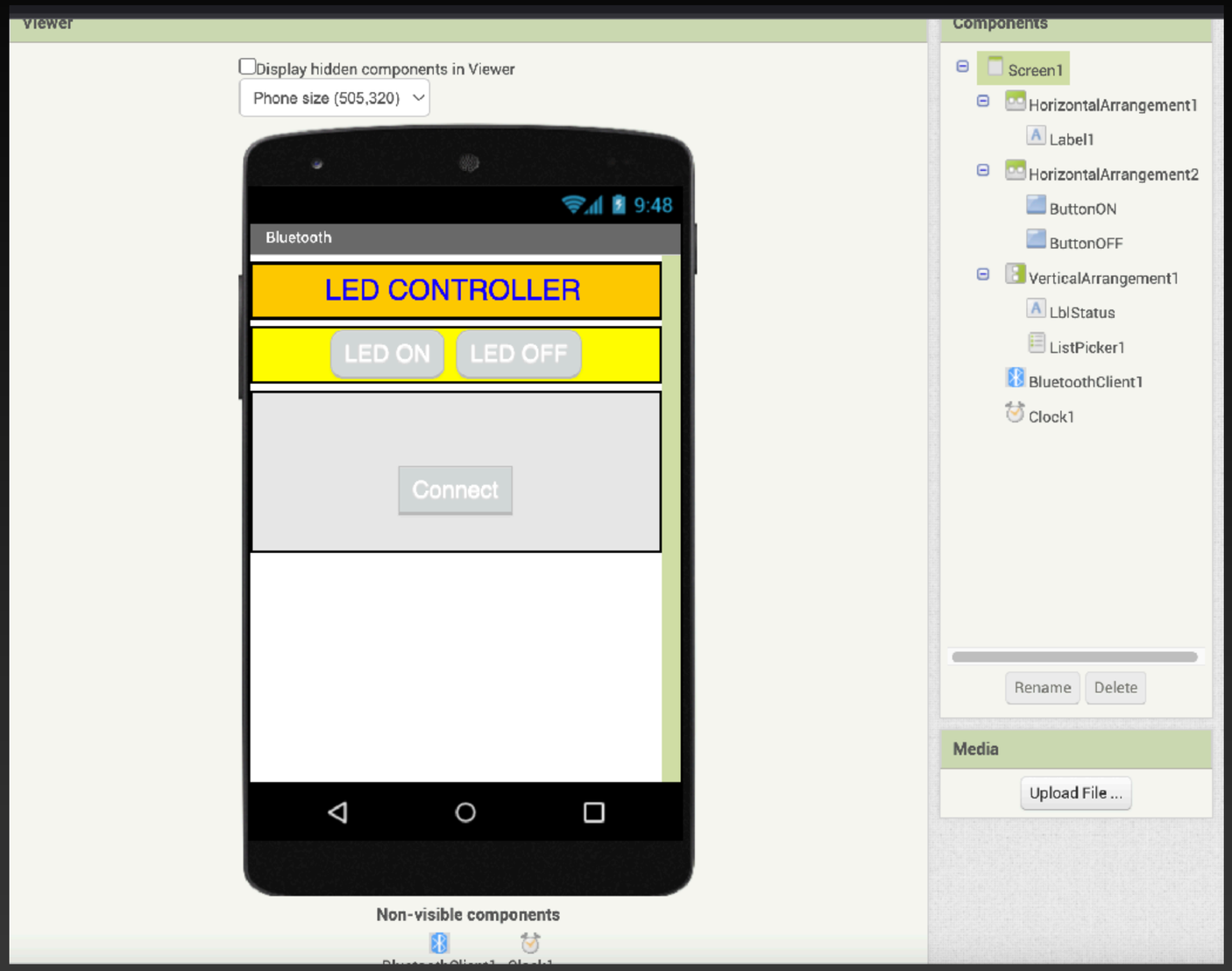
Python Program - LED control through bluetooth

Decode the signal.



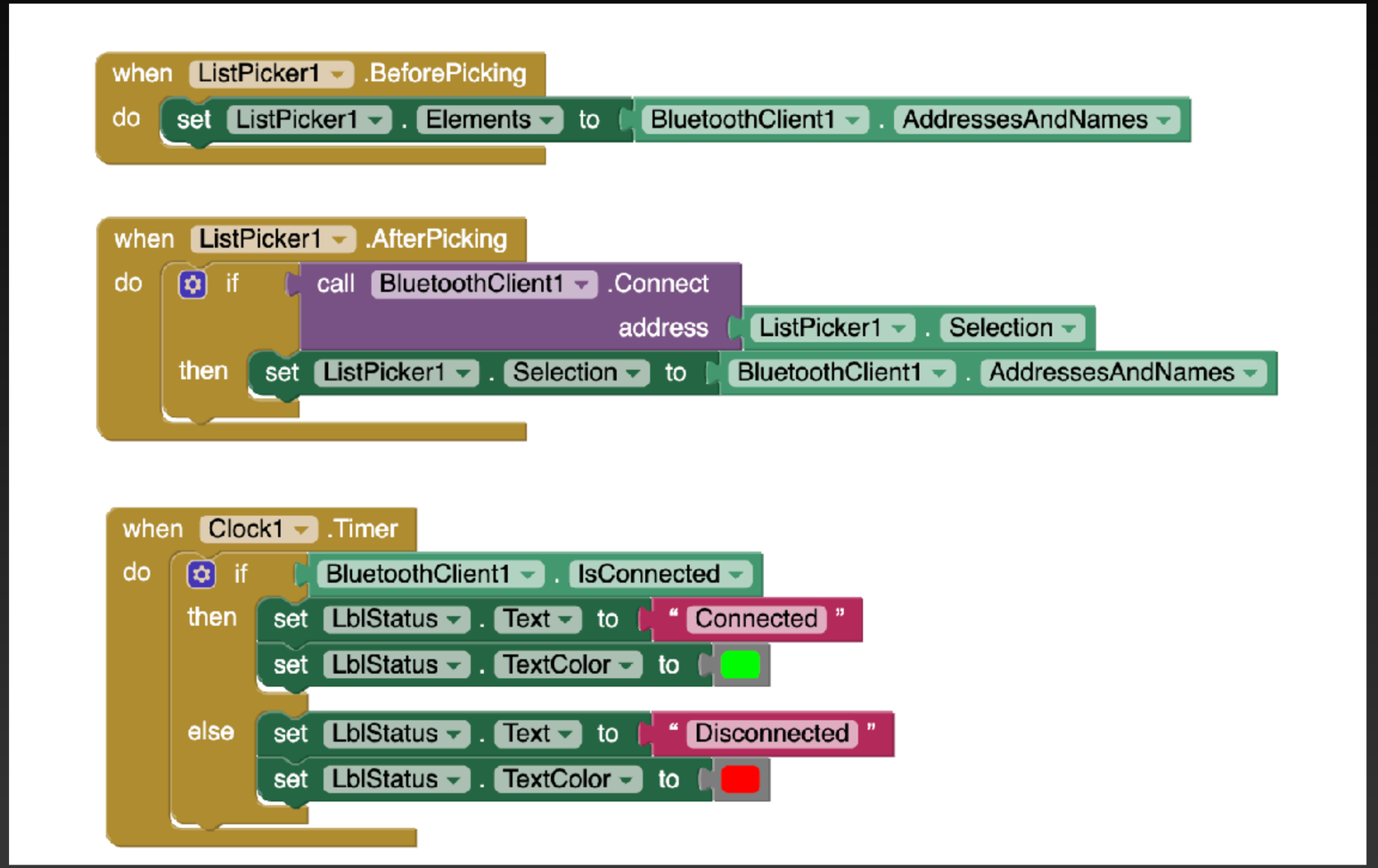
App Inventor - LED control through bluetooth

Application designer build.



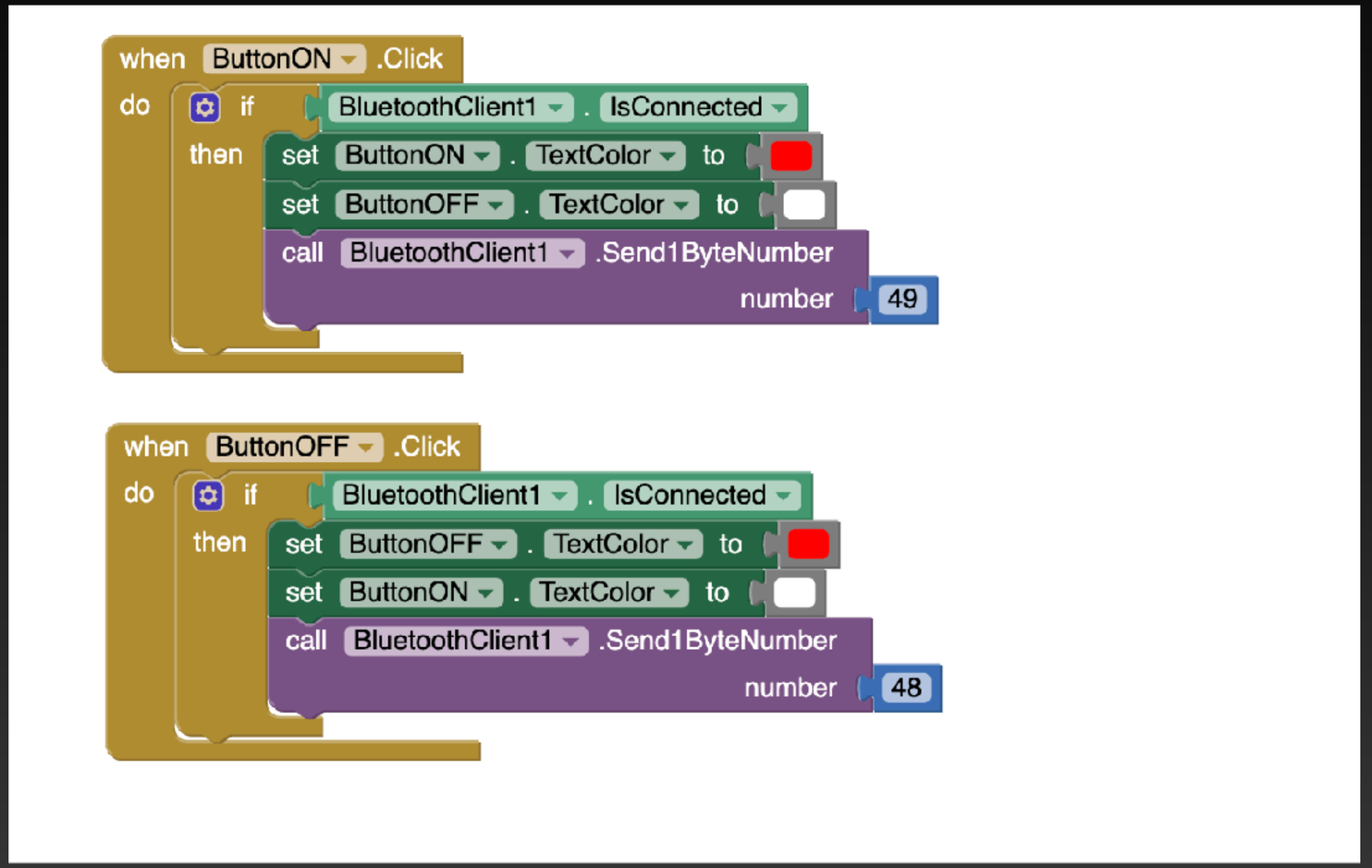
App Inventor - LED control through bluetooth

Application blocks build.



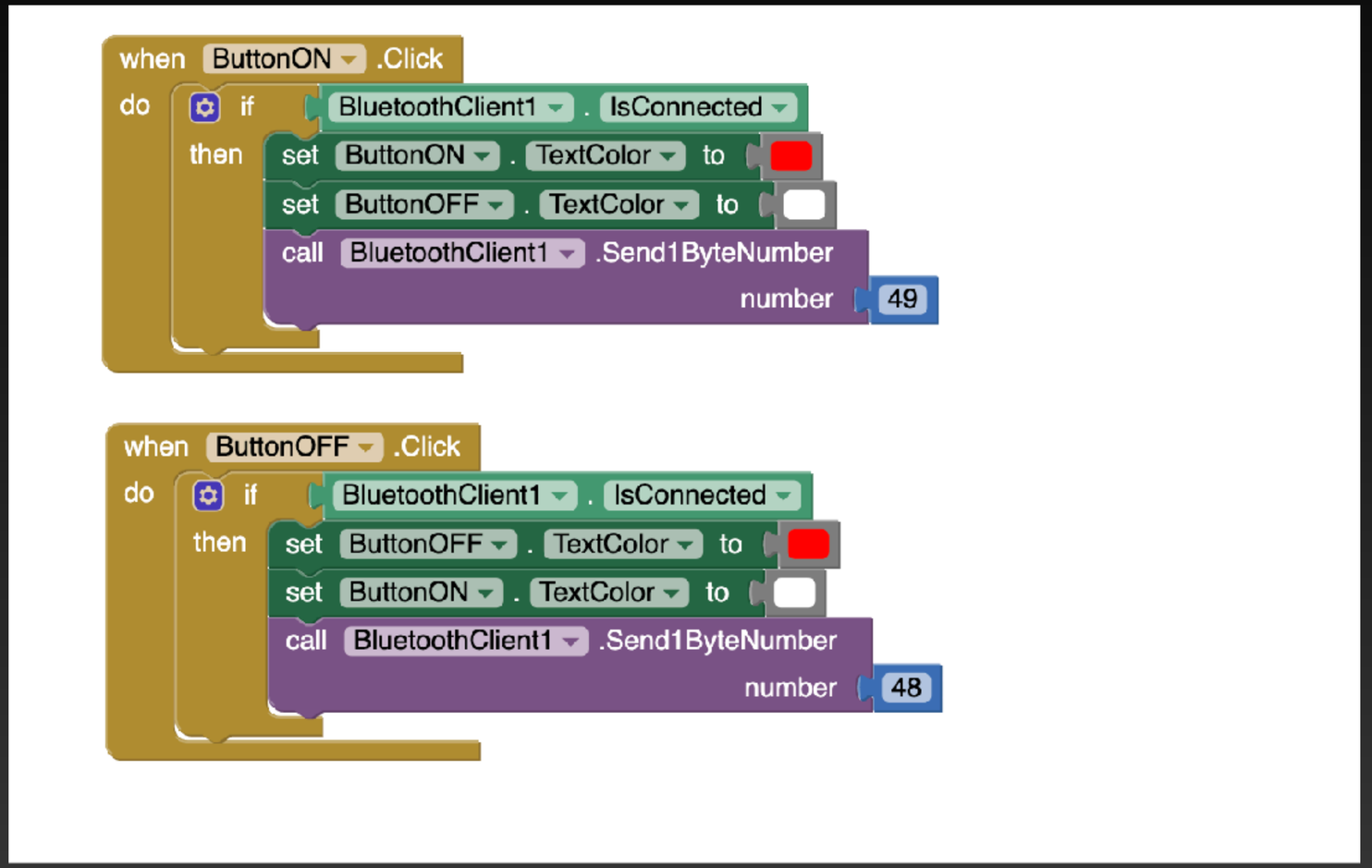
App Inventor - LED control through bluetooth

Application blocks build.



App Inventor - LED control through bluetooth

Application blocks build.



LED Control App - Bluetooth

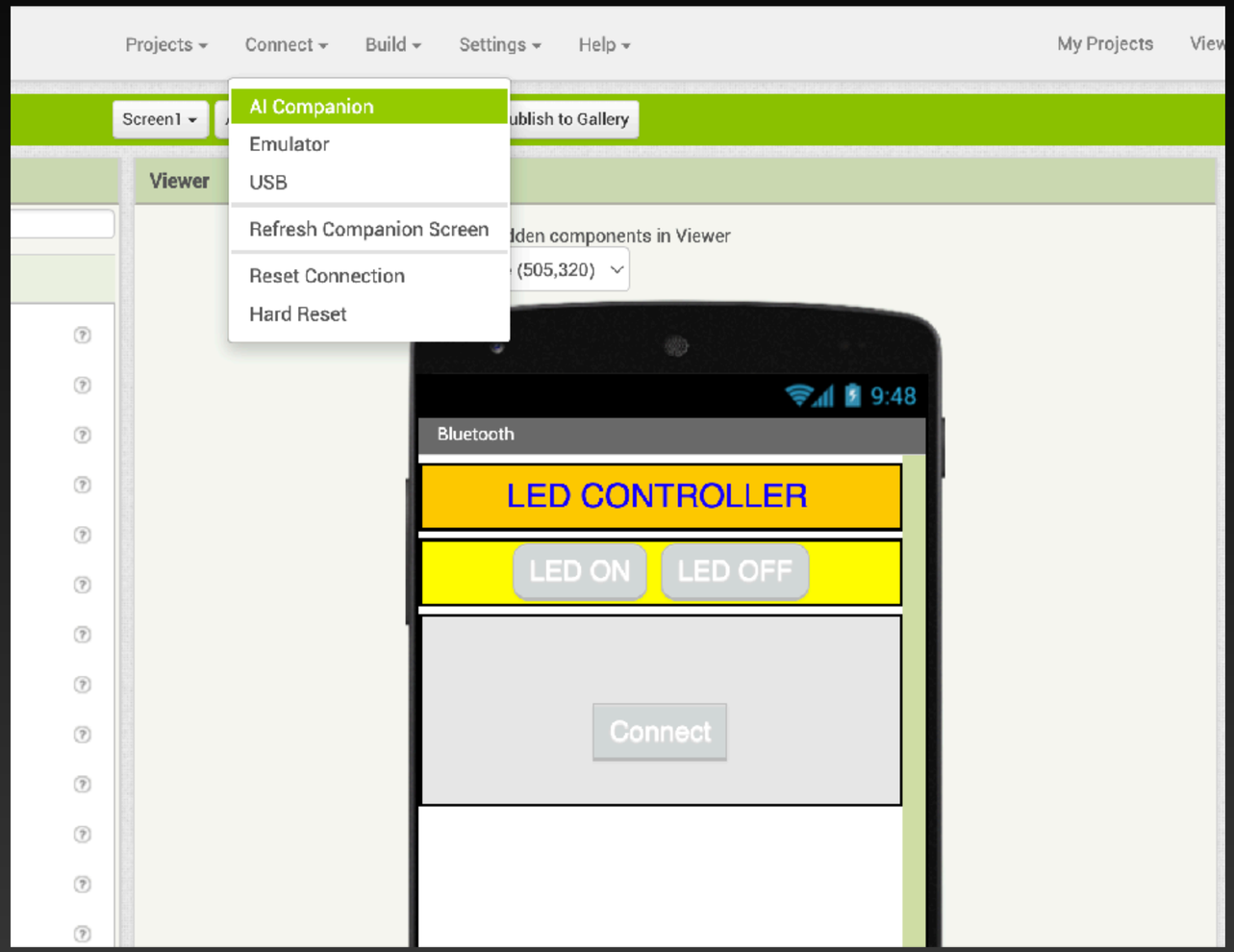
Test steps:

- Make sure that Bluetooth is enabled on your Android device.
- Make Bluetooth discoverable by clicking the Bluetooth icon on the top right-hand side of your raspberry Pi.
- You may have to accept to pair the two Bluetooth devices. If it asks for a password, enter 1234.
- Run your python program from GUI.

LED Control App - Bluetooth

Test steps - continued :

Generate QR code through AI companion, and scan from your android device.

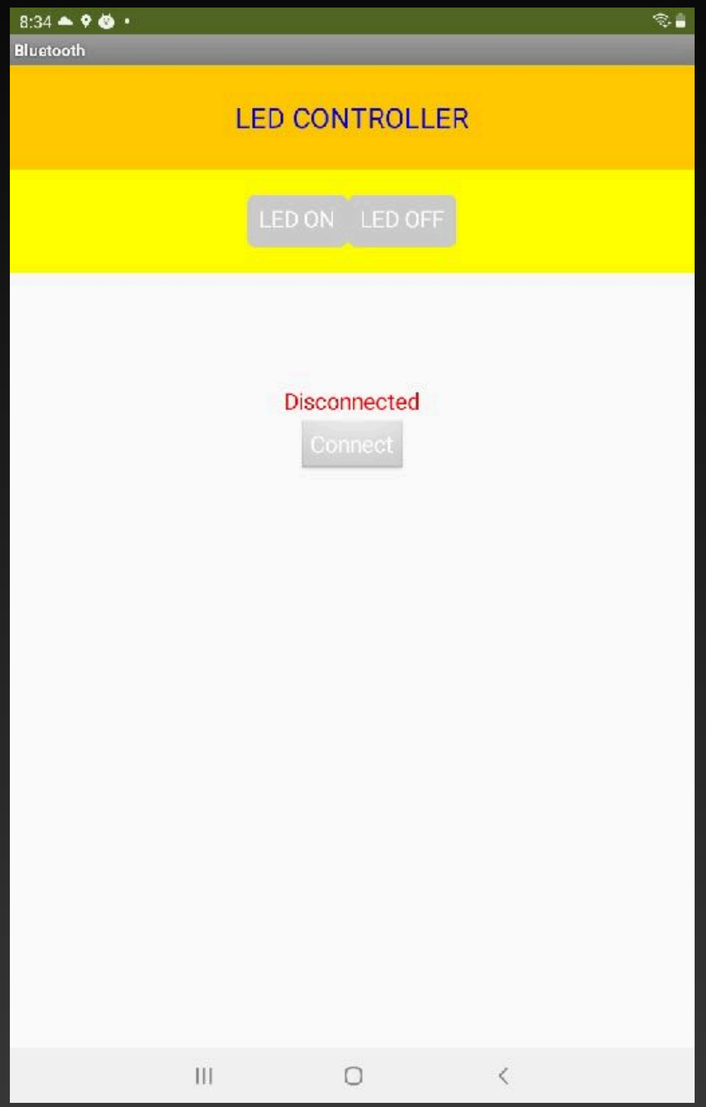


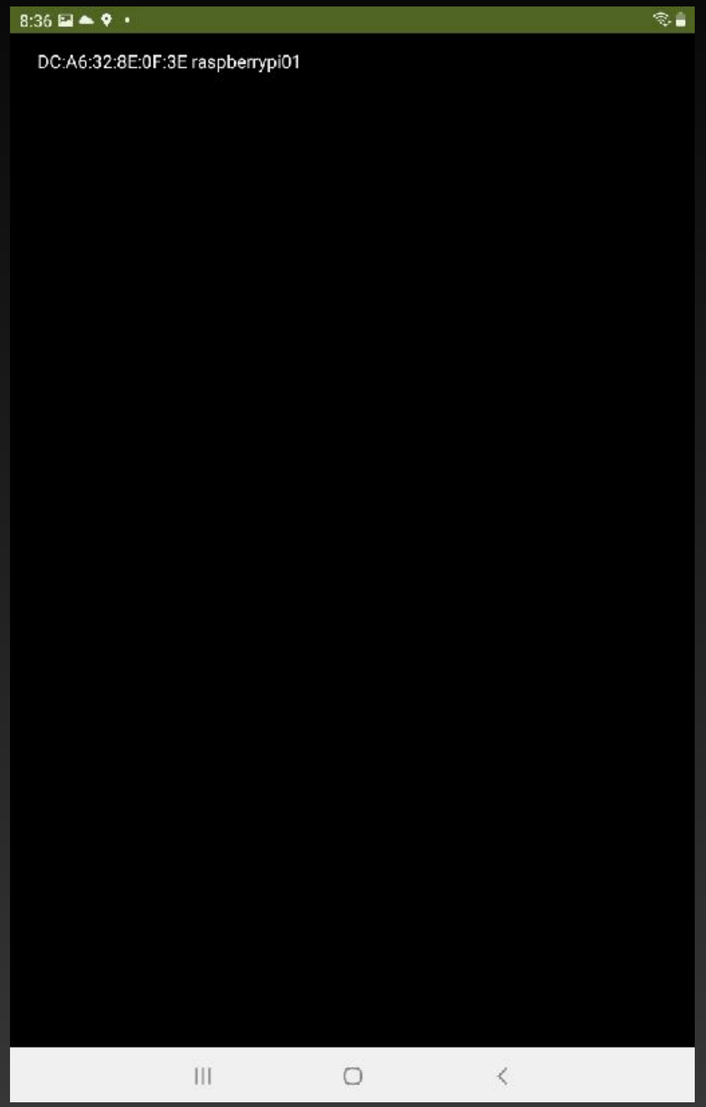
LED Control App - Bluetooth

Test steps - continued :

Start the mobile application on your Android device and click button Connect.

You should see the reachable bluetooth devices, click on raspberry Pi.



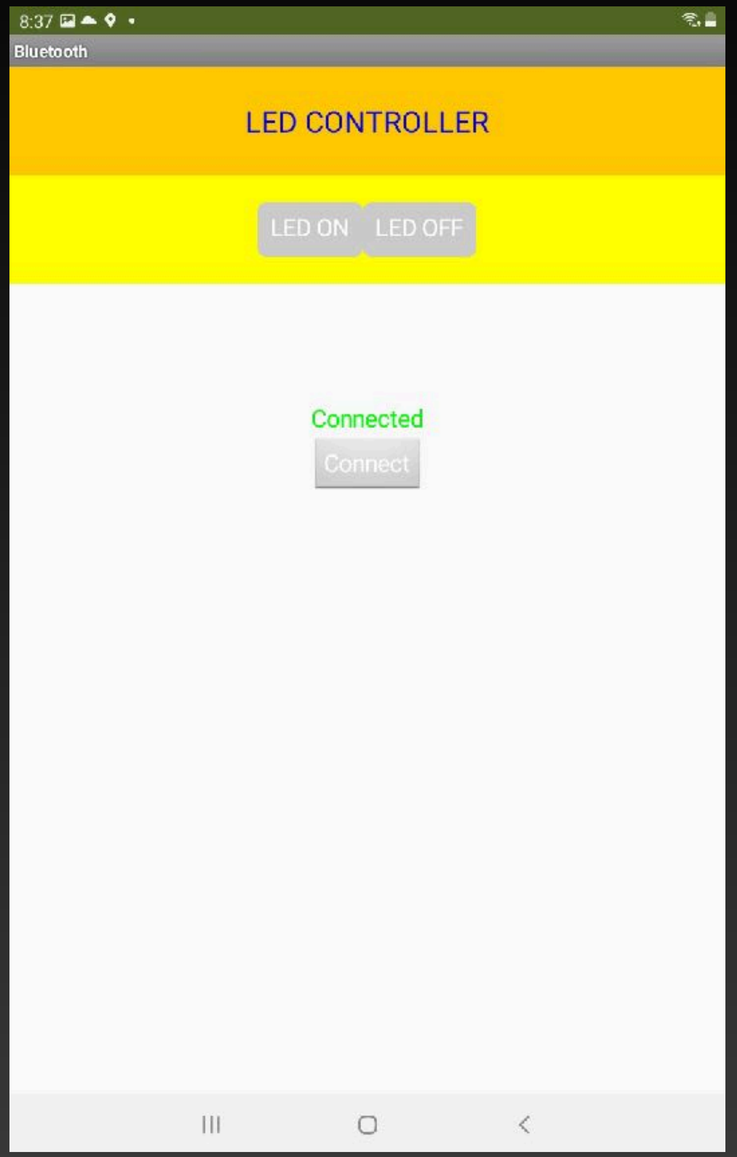


LED Control App - Bluetooth

Test steps - continued :

After click on raspberryPi, your app will show Connected!

Now you can test your application.



Python Program - LED control through bluetooth

Homework - Read through class materials to pair your android device with Raspberry Pi, finished code in class MIT app and Python control code.