LiFi Module Compatible for Raspberry Pi


Document Version: V1.0

Contents:

www.researchdesignlab.com

1. INTRODUCTION

RPI Li-Fi Shield is a plug-and-play evaluation board for developing a wide array of visible light communication applications in consumer, wearable, industrial, medical and Internet of Things (IoT). RPI Li-Fi Shield transfers data from one source to another through visible light without the flickering effect. Technically, 1‟s (LED on) and 0‟s (LED off) are modulated and then transmitted at very high speed.
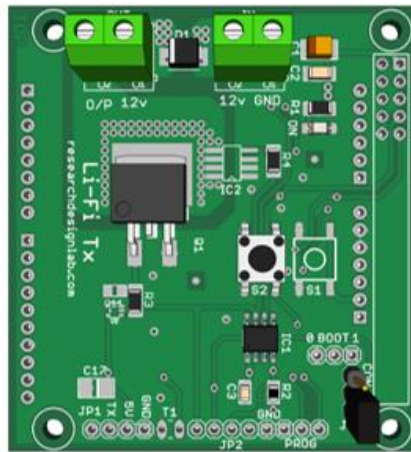
Li-Fi Tx
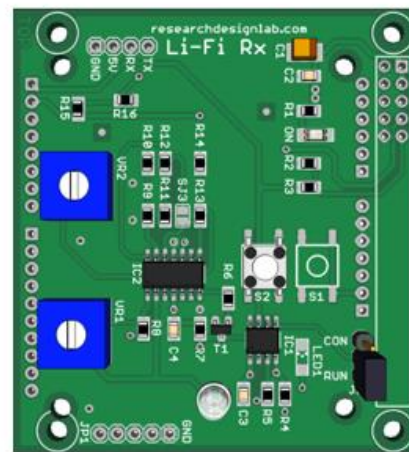
Li-Fi Rx

2. FEATURES

- Supports baud rates up to 38400
- Support serial (UART) communication
- Supported distance from the ceiling 6 to 15 feet max
- Plug-and-Play with simple configuration
- Ceiling / wall mounting LED light can be used for the communication

3. COMPATIBILITY

- Raspberry PI
- Raspberry Pi 2
- Raspberry Pi Model B+
- Raspberry Pi zero
- Raspberry Pi 3
- Raspberry Pi 4

4. SPECIFICATIONS

Specifications	
Supply Voltage	5V,2A
Supported MAX Load (LED)	15W
Baud Rate	34500
Max communication Distance *	15 feet
Communication	One way.
Communication Type	Serial UART
Communication Light Spectrum	Visible light 400 to 700nm
Dimension(L * W)	58MM * 49MM

* Supported distance from the ceiling 6 to 15 feet max

5. ADVANTAGES

- **Security** - Area of interest can be securely focused with higher data rates.
- **Li-Fi Device can be used EMI sensitive environments**
- **Augmented reality** - In museums and galleries Li-Fi enabled lighting can provide localized information within that light.
- **Localized advertising** - Shop display lighting can be used to transmit advertising information on the goods being viewed.
- **Underwater communication** – Data can be transmitted under the water with the help of light.
- **Safety environments** - In explosion hazard environments, where the use of electrical equipment, including mobile phones, is generally greatly restricted.
- **Intelligent transportation systems** - AGV (auto guided vehicle).
- **Connectivity** - Sensor area network can be created.
- **Sensitive data** - Better deployment of secure networked medical instruments, patient records, etc.
- **Indoor navigation** – Li-Fi enabled lamps can be fixed in indoor places for data transmission.
- **Dense urban environments** - Dense urban environments by their nature tend to have complete artificial lighting coverage. This lighting infrastructure can provide always available high data rate access for users as they move through that environment.

6. APPLICATIONS

- Indoor wireless open optical communication.
- Indoor navigation.
- Under water visible light communication.
- Smart indoor blind assistive application.
- Vehicle to vehicle communication.
- Monitor as transmitter for Data Communication.
- Preventing Phishing Attacks using One Time Password and User Machine Identification.
- Super market navigation system and discount information based on location.
- Smart LIFI based Car Parking system.
- Smart Location Aware of Services.
- Visible light positioning for asset tracking.
- POSITIONING TECHNIQUES FOR ACCURATE LOCALIZATION mobile robot navigation.
- Integrated, underwater optical /acoustic communications system.
- Visible Light Communication Based Traffic Information Broadcasting Systems.
- Li-Fi wireless optical communication.

Package Contains:

Li-Fi (Visible Light Communication) Compatible for Raspberry Pi + LED

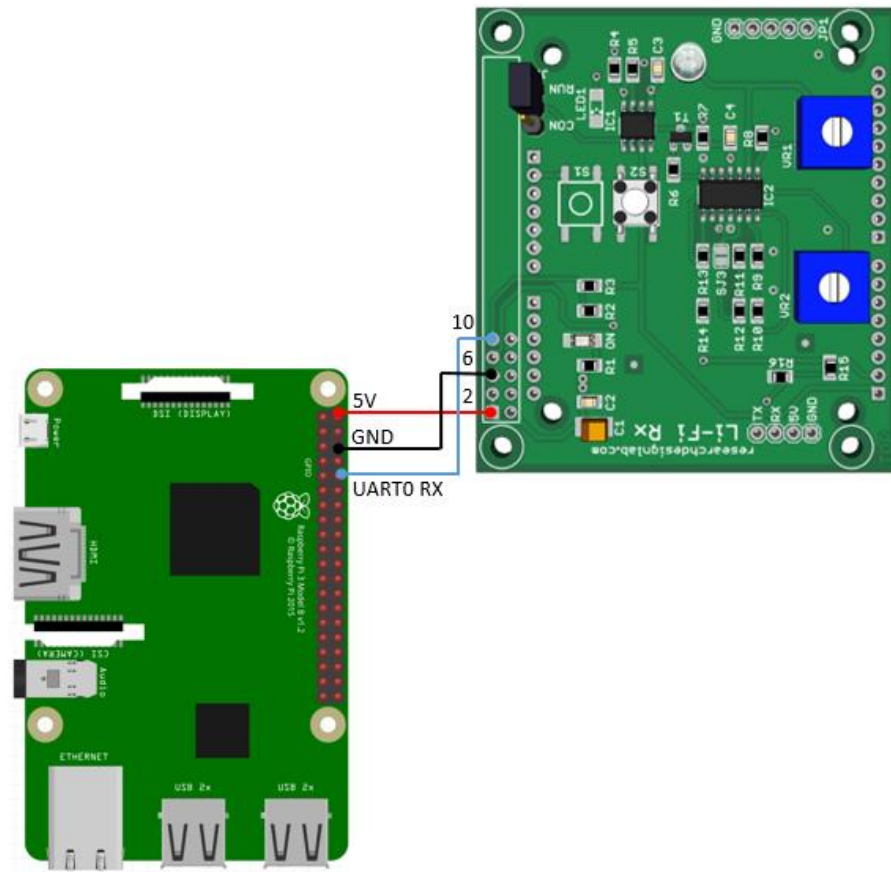**Note1:** The Raspberry Pi in the picture above is just for reference, it does not include in the package.

7. APPLICATION BLOCK DIAGRAM

7.1 Internal Block connections-Raspberry Pi

Li-Fi Tx:
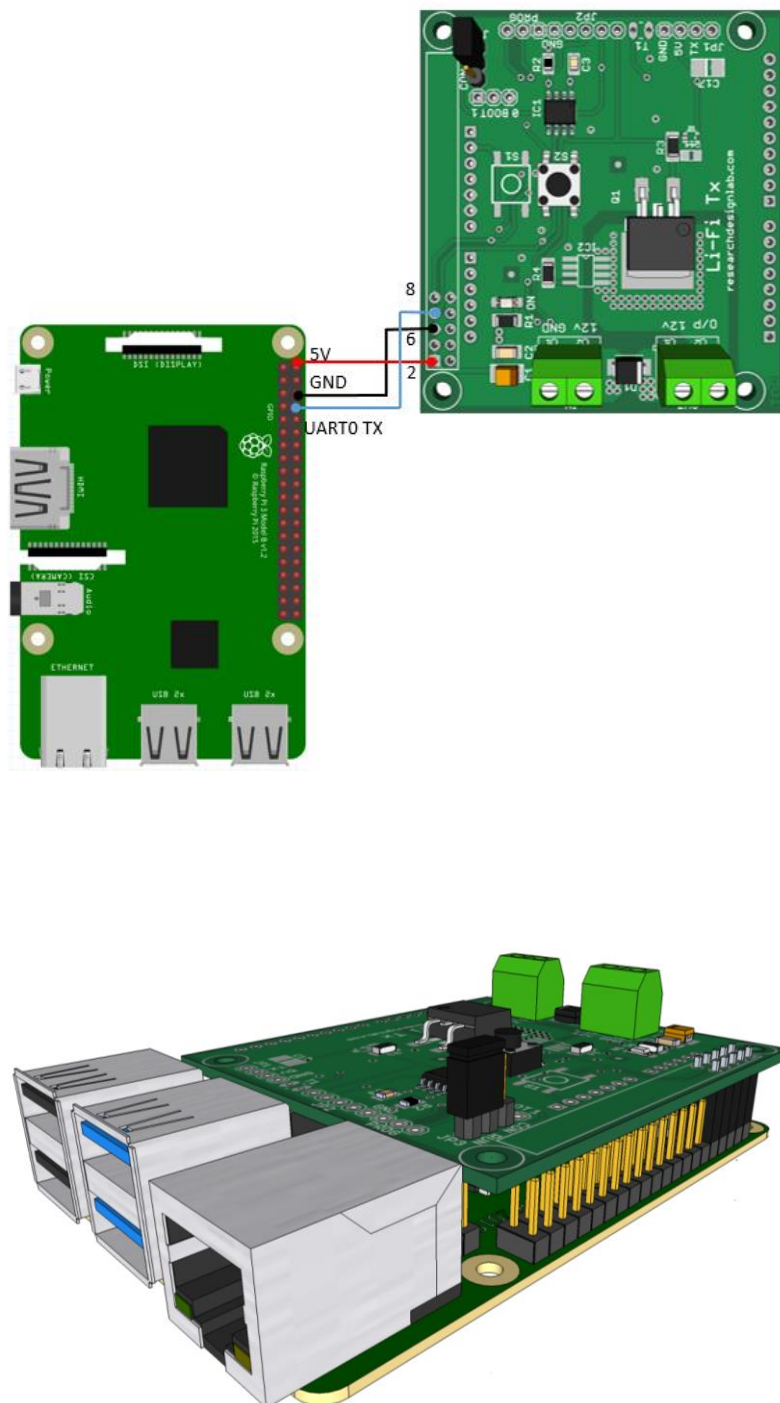
Li-Fi Rx:
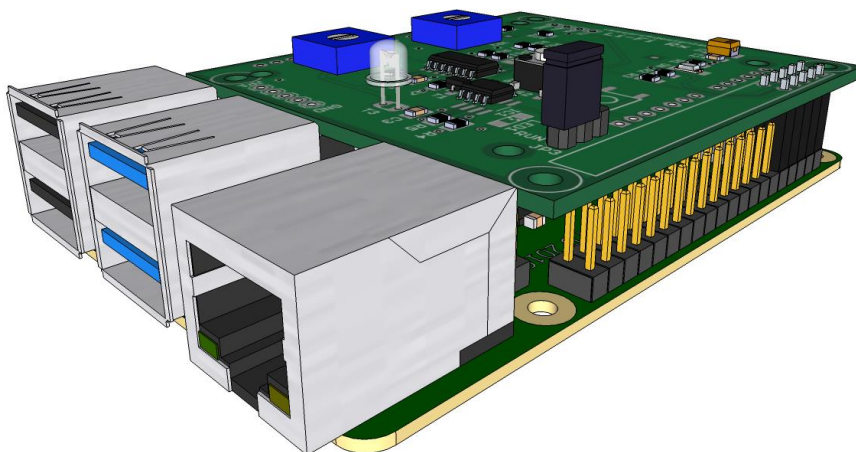
7.1.1 Installing py serial package

First download and install python serial package called pyserial from the below site.
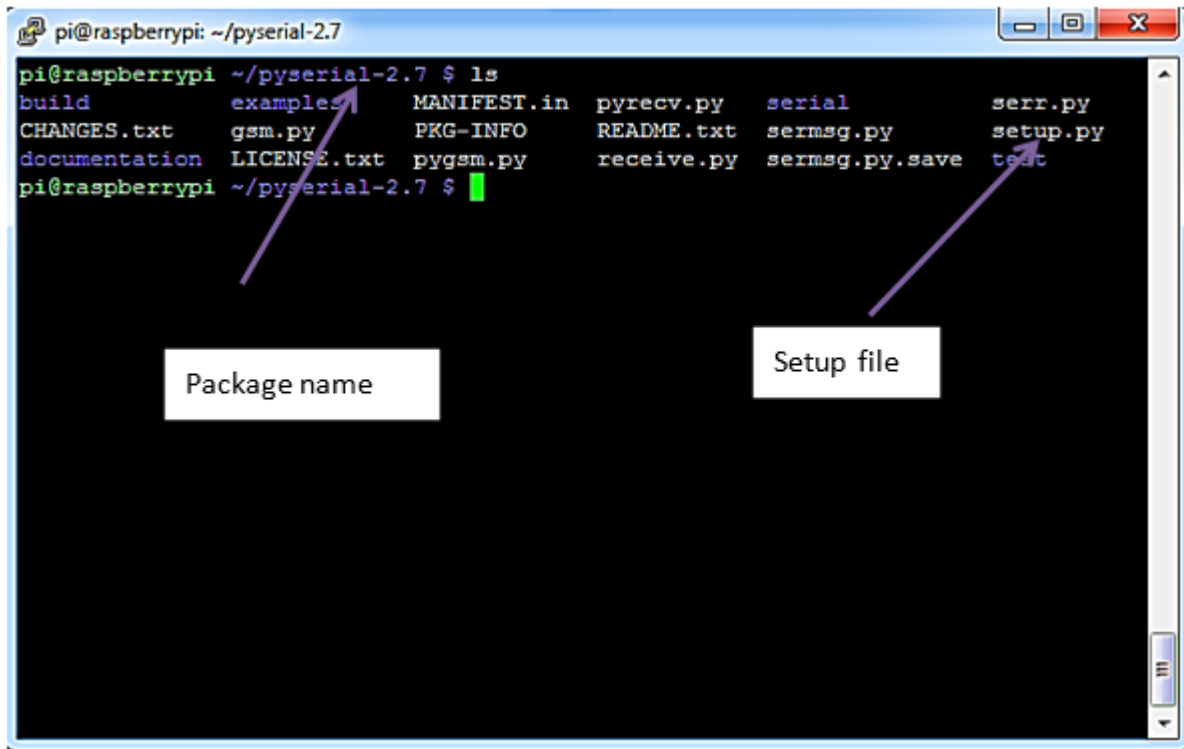https://pypi.python.org/pypi/pyserial

Unzip the file and enter into that folder using command

 cd "package name"

Inside the package name there will be setup file, called setup.py. Install the
software by typing following command.

 sudo python setup.py install

7.1.2 Sample python code

Please go through Li-Fi fine tune steps mentioned in the below link
http://researchdesignlab.com/projects/Li-Fi.pdf

Testing Li-Fi-Rx board:
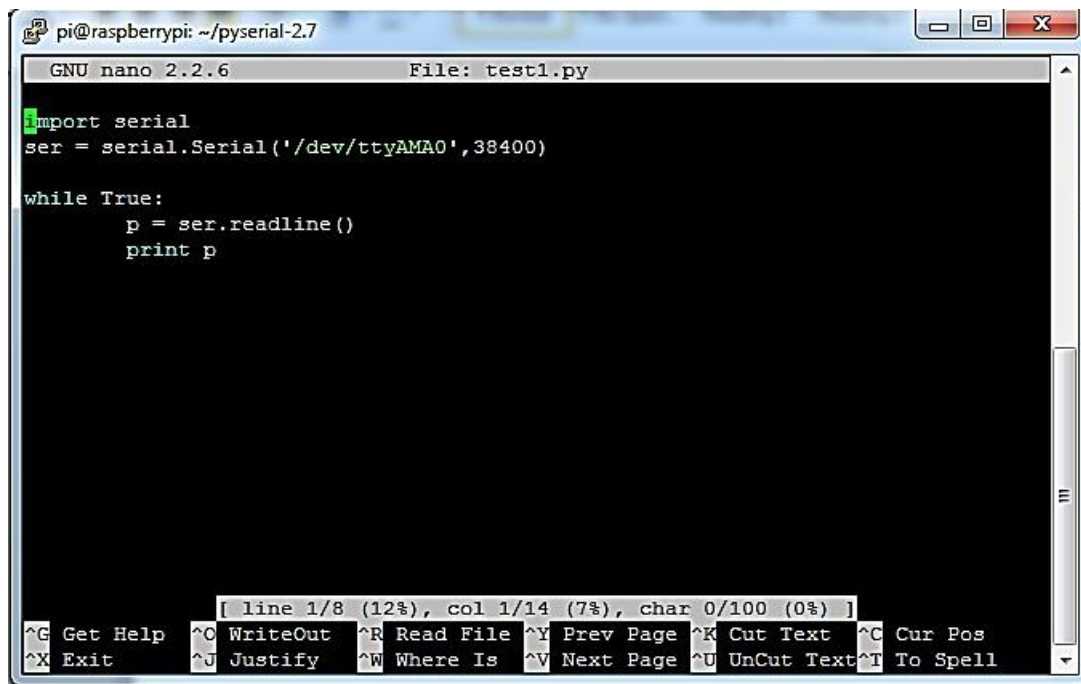
- Connect Li-Fi-Rx board to one raspberry pi and open nano editor by typing following command

  Nano filename.py

```
pi@raspberrypi: ~/pyserial-2.7
pi@raspberrypi ~/pyserial-2.7 $ nano test1.py
```
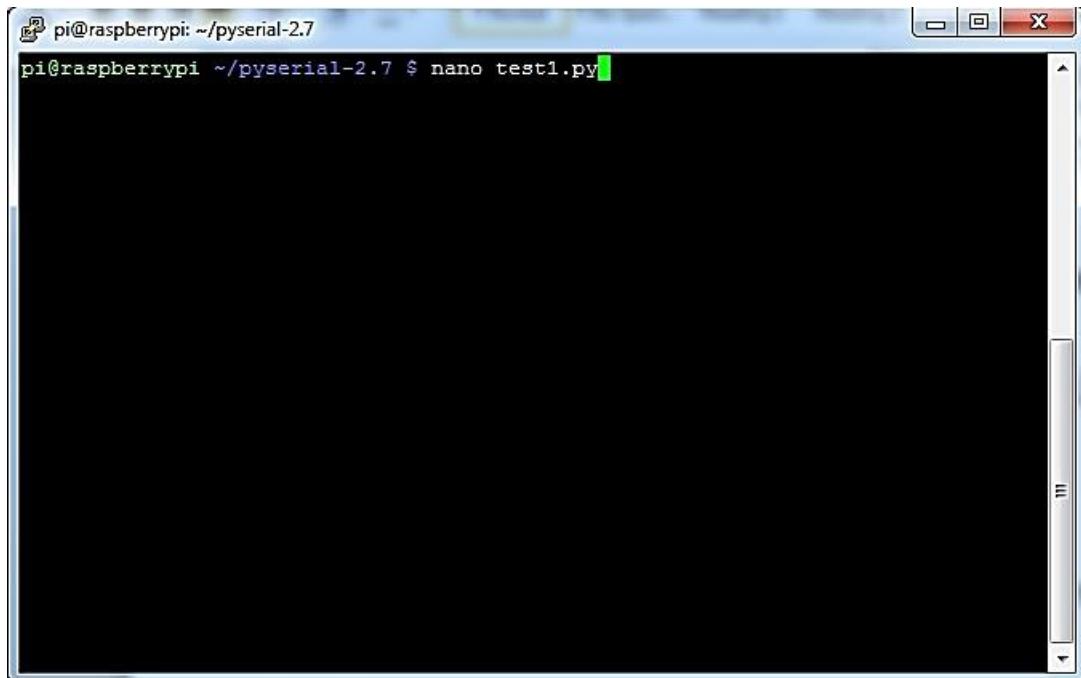
- Type the following code inside the editor

  import serial

  ser = serial.Serial('/dev/ttyAMA0',38400)
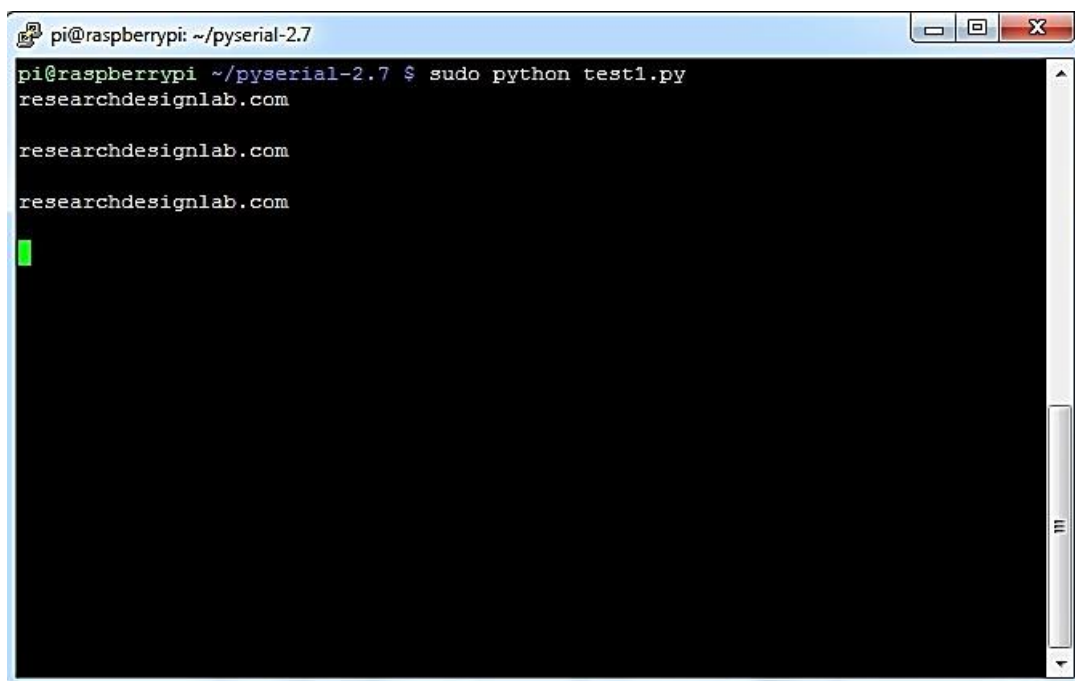
  while True:

      p = ser.readline()

      print p

- now run the code by following command

  sudo python filename.py

When we press switch S2 on Li-fi board we can see research designlab.com is printing on raspberry screen.

Testing Li-Fi-Tx board:

- Next connect Li-Fi-Tx to another raspberry board and run same test1.py code on Li-Fi-Rx board. And press reset switch on Li-Fi-Tx board. This will print researchdesignlab.com on Li-Fi-Rx raspberry pi screen.

```
pi@raspberrypi: ~/pyserial-2.7
pi@raspberrypi ~/pyserial-2.7 $ sudo python test1.py
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researchdesignlab.com

researchdesignlab.com
```
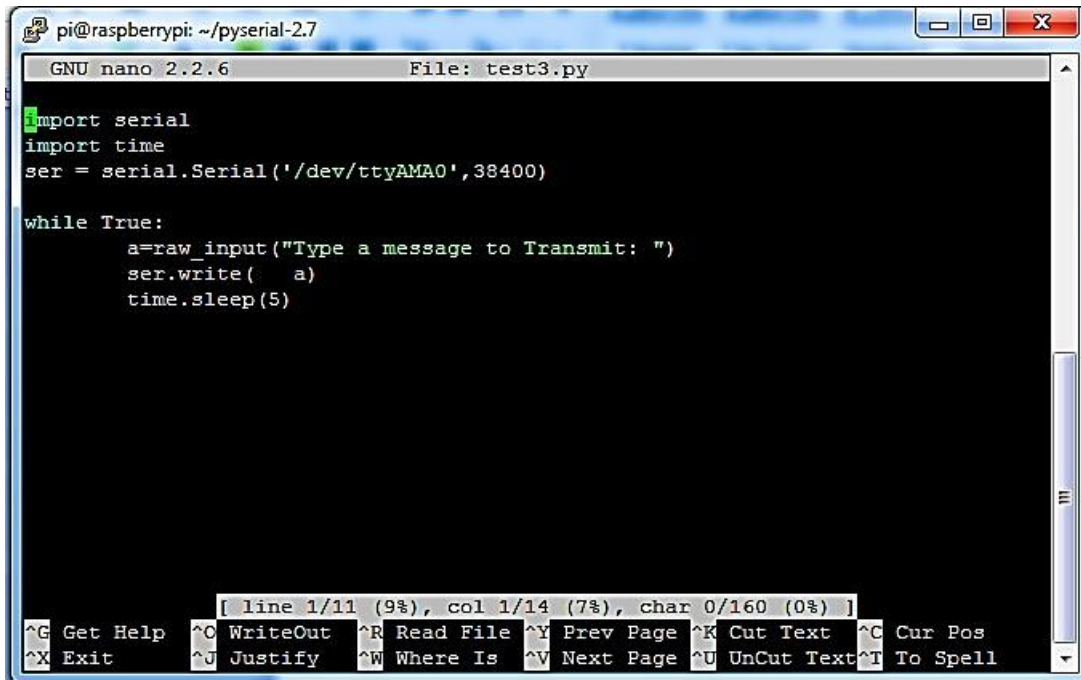
Communication between Li-Fi-Tx and Li-Fi-Rx:

- open nano editor in Li-Fi-Tx raspberry and enter following code

```
import serial
import time
ser = serial.Serial('/dev/ttyAMA0',38400)
while True:
        a=raw_input("Type a message to Transmit: ")
        ser.write(a)
        time.sleep(5)
```
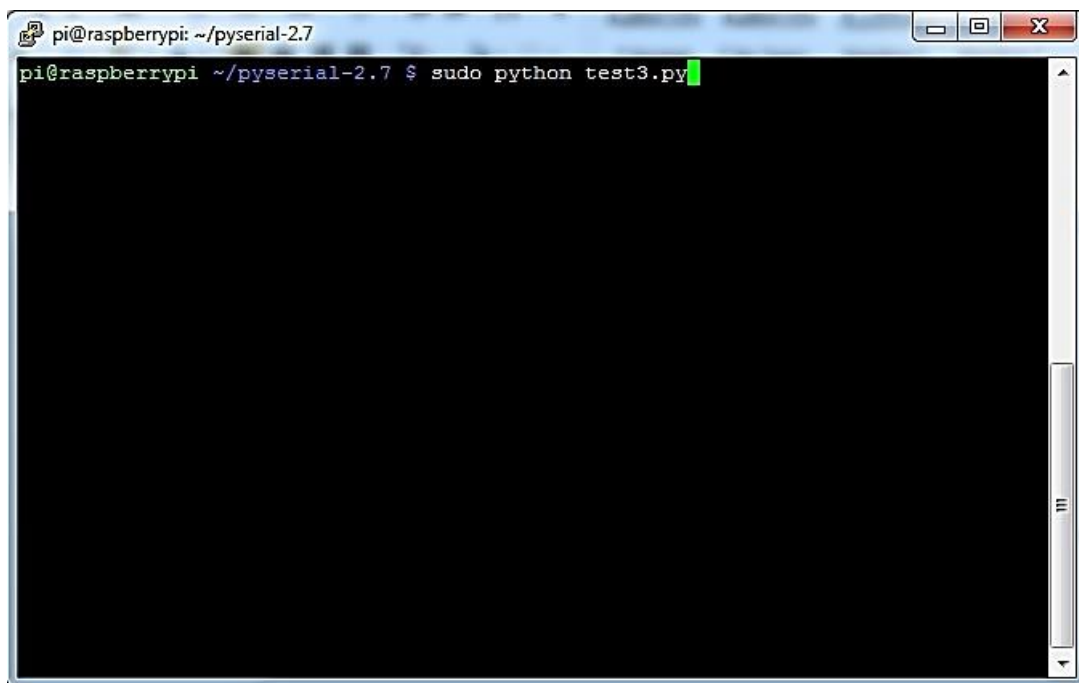
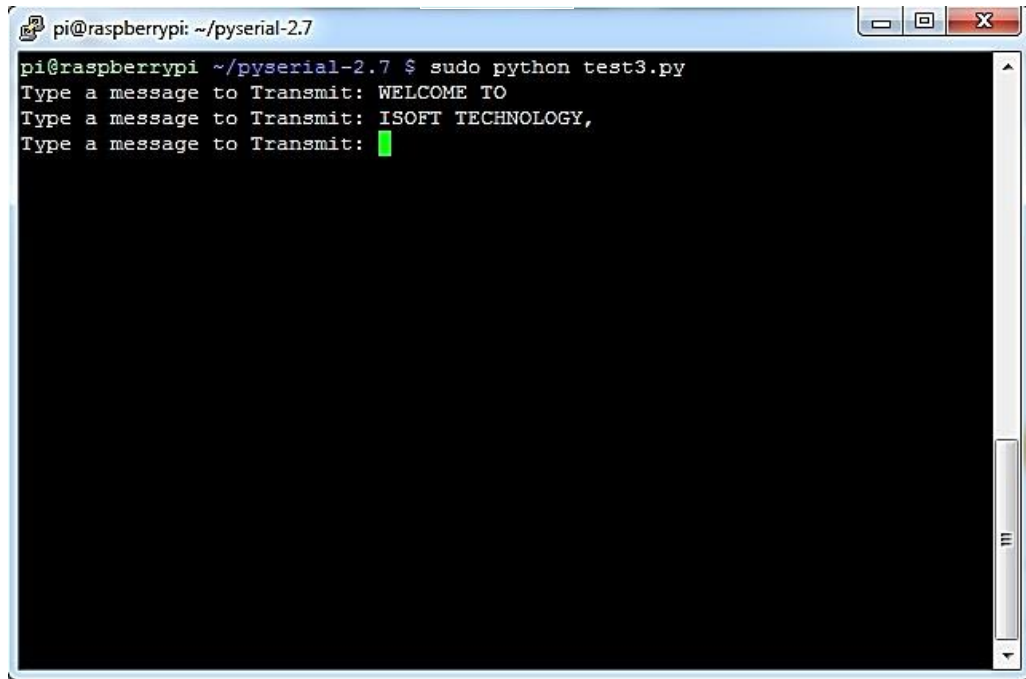- Run the above code by typing following command. And at the same time run Li-Fi –Rx code in another raspberry pi

  sudo python filename.py

- We can see whatever message typed in Li-Fi-Tx is printing on Li-Fi-Rx.

Li-Fi-Tx

Li-Fi-Rx

8. DIMENSIONS:
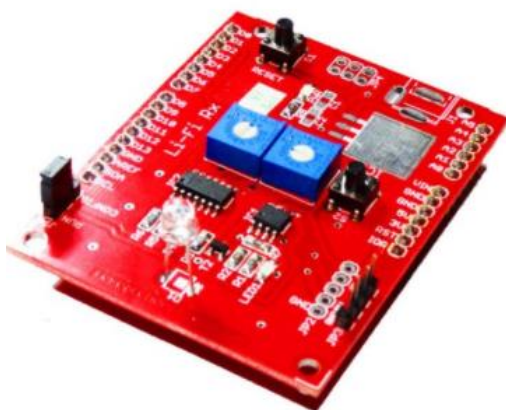
9. RELATED PRODUCTS

LiFi Nano V2

ORDER CODE: RDL749

LiFi Visible Light Communication

ORDER CODE: RDL/LIFI/13/001/V1.0

LiFi RX Visible Light Communication

ORDER CODE: RDL/LFS/13/001/V1.0

LiFi TX Visible Light Communication

ORDER CODE:RDL/LIFI-T/13/001/V1.0