

DATA TRANSMISSION TROUGH VISIBLE LIGHT USING LI-FI TECHNOLOGY

ANKITA SINGH,

Dept. of Electronics and Telecommunication, DYPIET Pimpri Pune
ankita301996@gmail.com

PRATIBHA BIRAJDAR,

Dept. of Electronics and Telecommunication, DYPIET Pimpri Pune
birajdarpratibha19995@gmail.com

SHUBHANGI BIRADAR

Dept. of Electronics and Telecommunication, DYPIET Pimpri Pune
shubhangibiradar00@gmail.com

MRS. PRIYANKA PATIL

Dept. of Electronics and Telecommunication, DYPIET Pimpri Pune
priyanka20.patil@gmail.com

ABSTRACT

We've around more than 15 billion cellular phones around us & with these transmits more than 20000 TB of data every day. Wireless communication is our day to day necessity. It's so important because of which Harald decided to look into the following issues:

1. Capacity: the way in which data is transmitted using E.M waves are limited & Radio waves are scarce and have limited range. Due to this limitation it doesn't cope with the today's demand of the wireless data transmission. We have limited range of the spectrum.

2. Efficiency: Efficiency of base statⁿ is only 5%.

3. Security and 4. Availability.

We've millions and billions of light bulbs. Where light is a part E.M spectrum. Light exists around us from trillions of years and has created life on our mother earth & is perfectly safe to use. When comparing size of visible spectrums to size of the radio waves, its 10k times more in size. Hence it can be used for communication

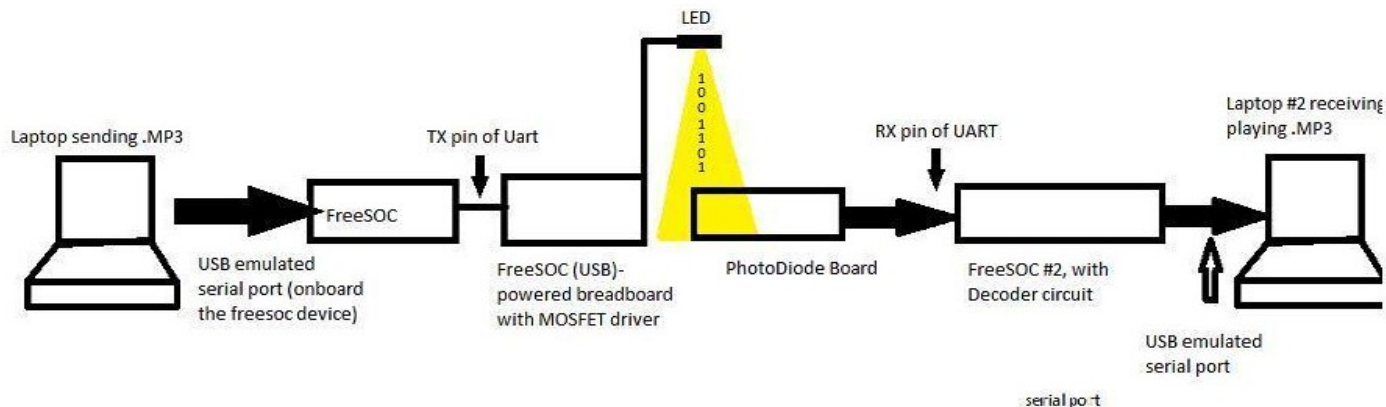
KEYWORDS: LED, VLC& Li-Fi.

INTRODUCTION

New technology like LED's are semiconductors and has a property of very high-speed modulation of intensity and switches off at higher speeds. This is the fundamental property for Li-Fi technology. It's possible to encode the data by varying the LEDs' flickering rate which gives sequence of 1's and 0's. Modulation of LED intensity makes the output appear constant.

Teams at Oxford University & Edinburgh University are working on parallel data transmission using the arrays of the LEDs, where every single LED transmits different data stream. So, here we'll be making a prototype which could show that data can also be transmitted through LED's.

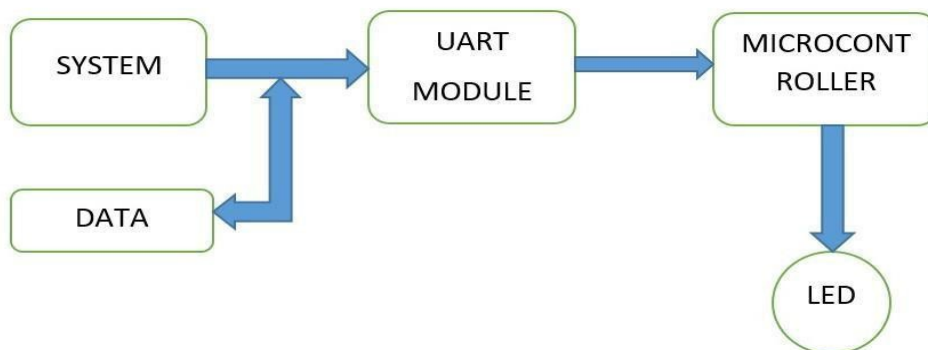
SYSTEM SPECIFICATION AND BLOCK SCHEMATIC



PWM technique is used here. In this technique transferring of data will take place in combination of binary digits. Since every key on our keyboard has some different ASCII value. So, di event PWM will we assigned to these ASCII values. Hence providing different intensity range to the data that has to be transmitted and then that data will be received at receiver.

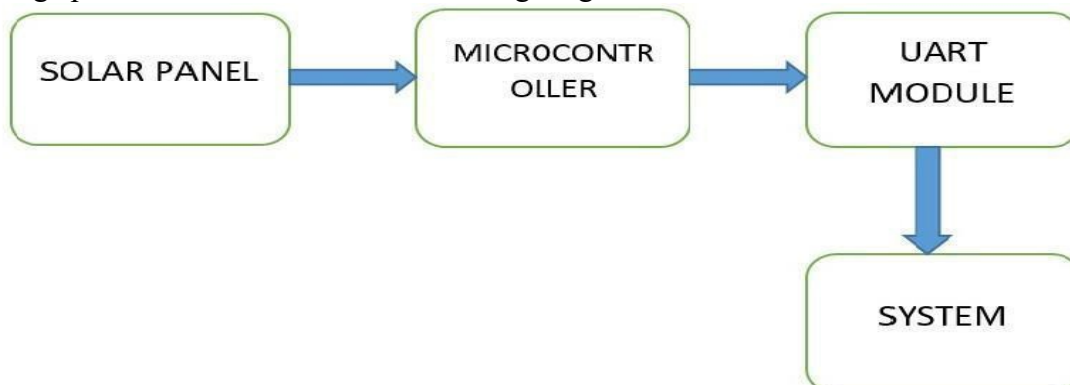
TRANSMITTER PART

Initially the data will be provided from the system(computer). Then by using UART module cp2102 we will communicate between system and PIC18F4550 microcontroller. Every ASCII value is assigned a PWM value in microcontroller, thus as PWM changes intensity of LED will also change. Thus, transmitting our data to receiver.



RECEIVER PART

The transmitted data is received at the solar panels. When the solar panels receive the light, it develops a voltage. So, for different intensity different voltage is developed. These different voltages are then used by developer on receiver side. These received voltages are then provided to microcontroller and the microcontroller then checks that which voltage have been received & then will generate the dedicated value for that received voltage which had been assigned to it earlier. Then this value is given to the receiver system by using cp2102 UART module. Thus, the signal gets received at receiver.



ADVANTAGES & EFFICIENCY

Efficiency: Li-Fi works on visible light technology. Since homes & offices already have the LED lights, the same source of could be used to transmit the data. Hence, it is very efficient & economical.

AVAILABILITY & DISADVANTAGES

Internet couldn't be used without any light source. This could limit the locations & situations where Li-Fi could've been used.

Other light sources might interfere with the signal. Biggest drawback is the interference of outdoor signals. Sun rays will interfere with these signals, which will result in disrupted Internet connection.

A complete new infrastructure for Li-Fi is required.

APPLICATIONS

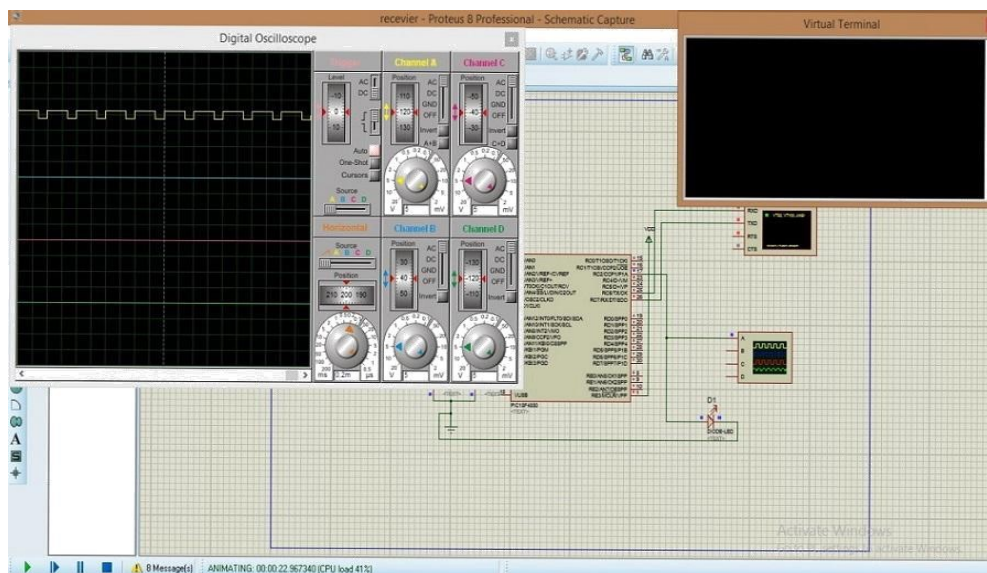
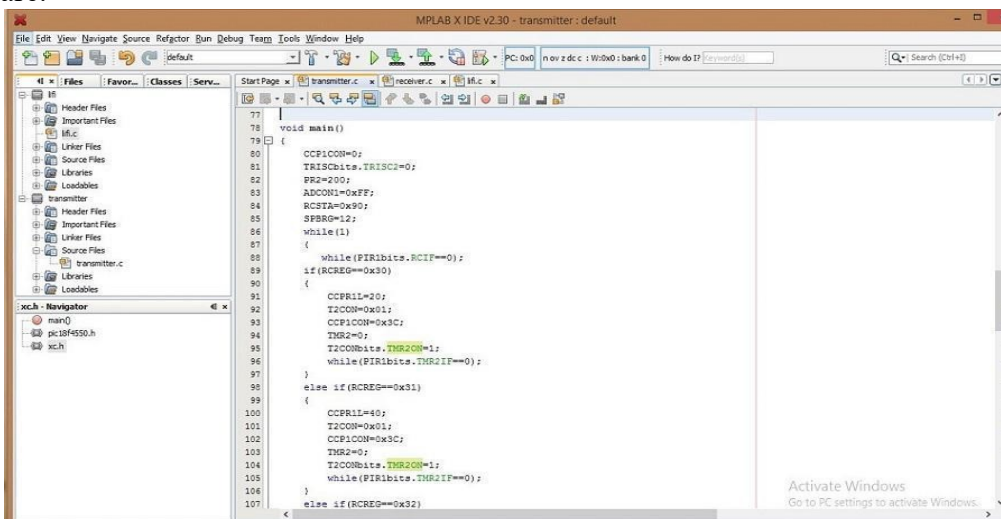
In the operation theatres, Wi-Fi isn't used because the radiations are hazardous for the patients' health.

The radiations emitted by the radio waves are really harmful for people and its reduced usage will improvise the condition.

In airplanes, passengers can't use internet but the using Li-Fi technology will provide high-speed internet at reasonable rates.

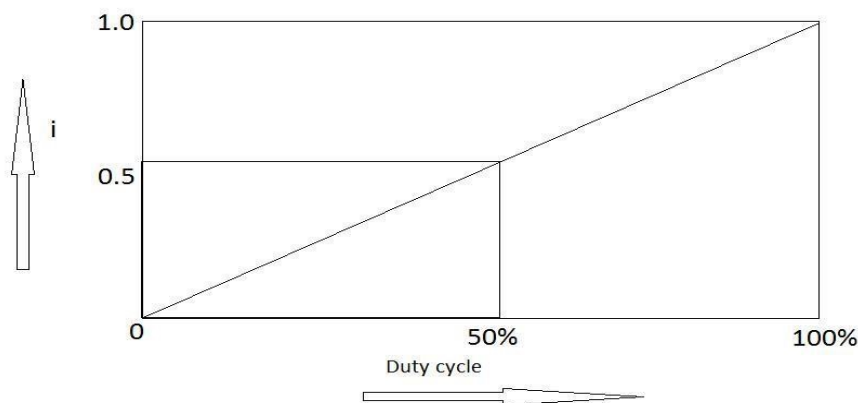
SOFTWARE SIMULATION OF THE PROTOTYPE

Here we've used Proteus8.1 to simulate the results of our prototype and the program is written on the MPLAB software.



RESULT

By changing the duty cycle of PWM, the pulse brings about a change in the average forward biased current of LED & therefore its luminosity.



FUTURE SCOPE

In near future, the Wi-Fi router will become past since it will be replaced by the LiFi hotspot. And the LED bulbs of the bedroom, car, television will not only illuminate but they will communicate too. It doesn't matter where the patent is done or where the research is going on. India has enormous consumers with high demand & Li-Fi routers will soon provide them:

- High speed communication
- Pocket friendly
- More friendly and secure than Wi-Fi

CONCLUSION

Use of this technology in practical life will bring a revolutionary change, every bulb in house, streets, offices etc. can be used as the wi-fi hotspots. This will transmit huge amounts of wireless data economically data at very high speeds.

REFERENCE

- I. HASS, H. (2016, APRIL 14). HTTP://www.ted.com. Retrieved from TEDTALKS: <https://www.youtube.com/watch?v=UulEFh8yhCg>
- II. (S. Dimitrov, harald hass, 2013)
- III. (HAAS, 2013)
- IV. (Visible Light Communication (VLC)A Potential Solution to the Global Wireless Spectrum Shortage, 2011)
- V. (SHANNON, 1948)
- VI. (S. HRANILOVIC, 2009)
- VII. (HASS, THE UNIVERSITY OF EDINBURG, n.d.)