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Two Way Communication Using IR Sensors with Arduino by Using Li-Fi Principle

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Abstract: ***In this paper we proposed IR transmitter & receiver sensor based two way communication system which is basically taken from Li-Fi technology. In Li-Fi technology we use visible rays for communication. It is very important to be considered during design are proper line of sight, presence of light and illumination. Sometimes problems are created through external factors like other light source or if power supply of electricity is gone our communication is also stop at that time. In our proposed system IR sensors used to overcome these problems.***

Keywords: Wi-Fi, Li-Fi, IR sensor, Arduino microcontroller board, Arduino software

1. Introduction

Nowadays we need very fast communication system for our daily professionals. We have low timing and fast working for our business areas. Therefore we need a system that allow fast accessing in our daily needs. Wi-Fi is great for general wireless coverage within a building whereas Li-Fi ideal for high density wireless data coverage in bound areas where there are no obstacles and reliving radio frequency interference issues. In similar ways Infrared technology addresses a wide variety of wireless applications. The frequency range of infrared is higher than microwave and lesser than visible light.

In our proposed system we used IR sensors with arduino for two way communication. Arduino board can provide a quick tool in development of VLSI test bench especially of sensors. Arduino is an open source microcontroller which can be easily programmed, erased and reprogrammed at any instant of time. Introduced in 2005 the Arduino platform was designed to provide an inexpensive and easy way for hobbyists, students and professionals to create devices that interact with their environment using sensors and actuators. Based on simple microcontroller boards, it is an open source computing platform that is used for constructing and programming electronic devices. It is also capable of acting as a mini computer just like other microcontrollers by taking inputs and controlling the outputs for a variety of electronics devices. Basically our aim to time consuming data transmission in two way communication. It helpful for a office building where any document or information need at any instant.

1.1 System Design

To perform our method requirement for hardware and software are:-

1) Arduino uno microcontroller board
2) Personal computer or display unit
3) IR transmitter/receiver led
4) Processing software
5) Arduino software

1) Arduino (UNO Microcontroller)

There are four classes of Arduino but in this system Arduino UNO is used. This Arduino UNO is enough for the file transfer from one PC to another PC. This Arduino class has 13 digital pins, 5 analog pins and power supplies such as 5 volts and 3.3 volts. The LED is connected to one of the digital pins. The Arduino works according to the program dumped into the Arduino. The LED blinks according to the binary logic sent from the processing software.

2) Personal Computer:-

In our proposed system we used personal computer for both purposes that:-

a) for given power supply to the arduino board
b) for sending data
c) display unit to obtained output

3) IR transmitter/receiver LED

Infrared transmitter and receiver are commonly used in engineering projects for remote control of objects. But we used for transmitting data from IR transmitter and receiving data from IR photodiode.

4) Processing Software

This is used as the front end software, used to instruct the Arduino Coding is written in the embedded ‘c’ language.

5) ARDUINO Software

This software has its own syntaxes and formats used to blink the LED connected to one of its digital pin. The code written in the Arduino software is compiled and uploaded to the Arduino using the serial port via cable.

2. System Diagram

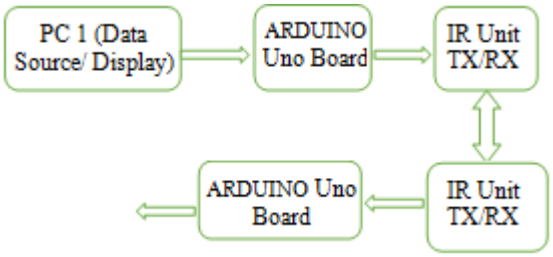

Figure 1: Block diagram of developed ir TX/RX system

The block diagram shown in figure 2. In this diagram for data source we use personal computer this personal computer is also use for obtained output data that means used as display unit. Also the major point of our proposed system is that this PC use for power supply of our arduino board. The Arduino is ATmega328 type of arduino. This consists of some digital i/o pins for digital function, analog i/o pins for analog working, AVR CPU, its like a computer CPU that controls all the logic and arithmetic functions and microcontroller that uses load the program according to our applications. IR Tx/Rx unit both side is used for data transmission. It consists of transmitter LED and receiver photo detector that detect the invisible rays coming from the transmitter.

3. Result Analysis

a) Transmitter part

In transmitter part the data is said to be transmitted by transmitting an number or word from pc via data modulation unit and through led array. Words/data can be converted to digital signals of 0s and 1s in data modulation unit and provides series of pulses such that data can be converted into digital signals of binary bits. Data gets selected from the pc which we want and is then transmitted successfully. Once the data is transmitted it reaches receiver side through IR LED. The goal of transmitter part is to transmit data.

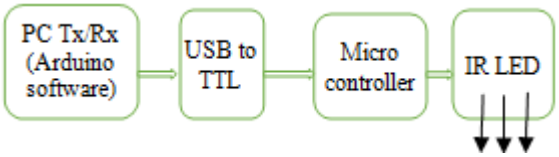

Figure 2: Data modulated and given to LED

b) Receiver Part

The goal of receiving part is to receive the data that is transmitted from the transmitted side successfully.

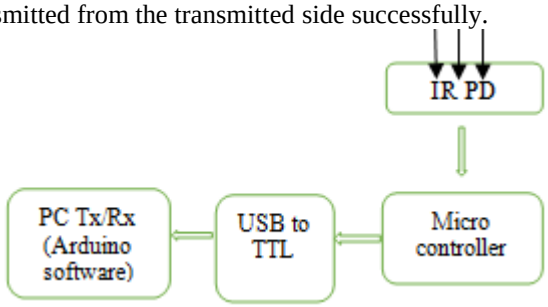

Figure 3: Demodulation and decoding of data

The data sent by transmitter is successfully received by the receiver that is IR photo detector is detect the invisible rays coming from the IR LED.

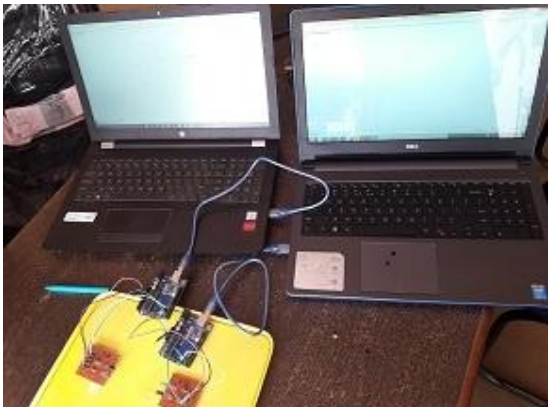

Figure 4: Hardware implementation

4. Conclusion

This technology is still under research andsurely it will be a breakthrough in communication. It assures data speed of 9600 baud rate for serial communication which is entirely greater than radio waves. In this paper transmission of datais done through this IR sensor technology. The goal of this paper is our project provides secured ,low cost ,easy data transmission and provides reliable communication. It can used in a whole building for office management. It can also be used in industrial ,medical, military applications. This is still in its beginning stages, but improvements are being made rapidly, and soon this technology will be able to be used in our daily lives. It is intended that this research will provide the starting steps for further study.

References

[1] Mahendran R., 2016, May. Integrated Li-Fi (Light Fidelity) for smart communication through illumination. In Advanced Communication Control and Computing Technologies (ICACCCT), 2016 International Conference on (pp. 53-56). IEEE. He presented the methodology of sending image from one system to another using Li-Fi technology.

[2] Leo Louis1 , WORKING PRINCIPLE OF ARDUINO AND USING IT AS A TOOL FOR STUDY AND RESEARCH,in International Journal of Control, Automation, Communication and Systems (IJCACS), Vol.1, No.2, April 2016. He represented the different type of arduino features and its applications.

[3] Riccardo Scopigno, Senior Member IEEE, Alessia Autolitano, Tankut AcarmaDzn2, <;:agda Yaman, and Suat Topsu,"The Potential Benefits of OnBoard Li-Fi for the Cooperation among Vehicles", International conference on Transparent optical Networks - 2015.

[4] Noof AI Abdulsalam, Raya AI Hajri, Zahra AI Abri, Zainab AI Lawati, and Mohammed M. Bait-Suwailam," Design and Implementation of a Vehicle to Vehicle Communication SystemUsing Li-Fi Technology", 2015 International Conference on Information and Communication Technology Research (ICTRC2015).

[5] Dr. Gordan, Prof. Harald and Dr. Mostafa from university of Edinburgh named this technique Visible Light Communication (VLC).Li-Fi is now part of VLC PAN IEEE 802.15.7 standard [4]. They give a basic principle about Li-Fi with VLC module.

[6] Shubham Chatterjee, Shalabh Agarwal, Asoke Nath, "scope and Challenges in Light Fidelity(LiFi)Technology in Wireless Data Communication", International Journal of InnovativeResearch in Advanced Engineering(IJIRAE), Issue 6, Vol 2, Page 1-9,(June 2015).
[7] S. Schmid, G. Corbellini, S. Mangold, and T. R. Gross, "Led-to-led visible light communication networks," in Proceedings of the fourteenth ACM international symposium on Mobile ad hoc networking and computing. ACM, 2013, pp. 1–10.
[8] Dr. Gordan, Prof. Harald and Dr. Mostafa from university of Edinburgh named this technique Visible Light Communication (VLC).Li-Fi is now part of VLC PAN IEEE 802.15.7 standard [4]. They give a basic principle about Li-Fi with VLC module.