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Light Fidelity Vehicle To Vehicle Communication

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Abstract*— this paper introduces the concept of LIGHT-FIDELITY which is used for data transfer. Li-Fi is an LED based alternative that uses visible light instead of radio frequency spectrum. Simply, Li-Fi is nothing but Wi-Fi using light. In Li-Fi system we analyses its performance with respect to existing technology. With the help of light data can transmit. This is latest technology in which LED can transmit data faster as compare to Wi-Fi technology. Here we developed hardware of Li-Fi technology using microcontroller ATMEGA328 in which data can be transmitted through light and received by using photodiode or photo detector.*

Keywords-*Li-Fi, WI-Fi, LED, ATMEGA328*

I. Introduction

At the time of using internet whether it is own or stealing from other, one has probably gotten frustrated because slow speed of the internet when more devices are connected to a same router.Due to increasing of internet users exponentially, Radio Spectrum is congested but the demand for wireless data double each year. Dr. Harald Haas has come up with a solution for those he calls "Data through illumination", Simply Li-Fi. Li-Fi is nothing but Wi-Fi using light. Li-Fi is now part of the VLC as is implemented using white LED light bulbs. Data transmission takes place from this LED bulb by varying the current at extremely high speeds which undetectable by the human eye. Li-Fi is a datatransfer technique that uses light for data transfer. Light is analogous not only to illumination but also speed. Thus Li-Fi provides very high data rates. Also Li-Fi is very secure as light cannot penetrate through the walls. Li-Fi uses visible light spectrum, thus it is known as visible light communication (VLC). Visible light is unregulated unlike radio frequency spectrum. Hence it is cost effective. Here we developed application module of Li-Fi technology which transmits data through LED bulbs and receive by using photodiode.

II. Objectives

It used to give as an alternativeor upgrade add-on toexisting wireless technologies .To re established high speed connection quickly (in case of disaster problem). LiFi is used because it is fast and optical version of Wi-Fi which is very cheap. These technologies use electromagnetic wave for data transfer. Wi-Fi technology used higher frequency and bandwidth for under water communication. Electromagnetic wave causes high absorption of the transmitted signals. This type of communication needs big antenna, thus it affects design complexity and cost. To overcome this limitation we used Li-Fi technology for wireless and underwater communication because light can travel easily in water. Li-Fi technology solves the problem of radio frequency congestion. Visible light has very large spectrum and is safe for human. Thus it has very high data transfer rate.

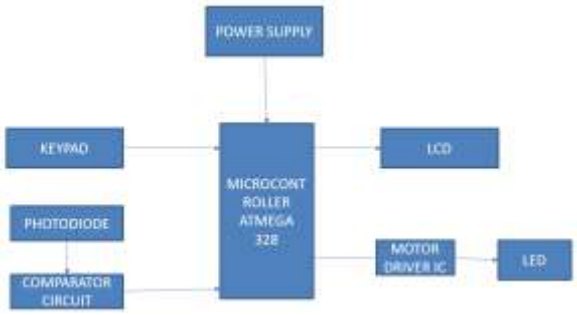
III. Literature survey

Li-Fi makes possible to have a wireless Internet in specific environments (hospitals, Airplanes etc.) where Wi-Fi is not allowed due to interferences or security considerations. Justification and objective of carrying out the research work. It is based on the transmission of digital data 0's and 1's. The logic is, if the LED is OFF, digital 0 is transmitted and if the LED is ON, digital 1 is transmitted, which can't be detected by human eye. The LED's can be switched ON and OFF very quickly by which we can transmit data with the help of light. Generally white LED bulbs are used for implementing the concept of li-fi which is used for illumination by applying a constant current. However, the light output can be made to vary at extremely high speeds by fast variations of the current. To build up a message we are flashing the LEDs numerous times. In order to obtain data rates in the range of hundreds of mega bytes per seconds we can use array of LEDs which also helps us for parallel data transmission or wecan also use combination of three basic colours LEDs red, green, blue to alter the frequency of light. At one end, all the data on the internet will be streamed to a lamp driver. When the LED is turned ON, the microchip converts the digital data in the form of light. Then the signal is received by a light

sensitive device known as photo detector, which will help to convert it back into original data. Then it is given to the device which is connected on it.

IV. Research Methodology

Li-Fi is typically implemented using white LED light bulbs at the downlink transmitter. These devices are normally used for illumination only by applying a constant current. However, by fast and subtle variations of the current, the optical output can be made to vary at extremely high speeds. This varying property of optical current is used in Li-Fi setup. The LED lamp will hold a microchip that will do the job of processing the data. On one end all data on the data will be streamed to a lamp driver. When LED is ON microchip convert digital data in form of light. On the other end this light is detected by the photo detector. Then this light is amplified and fed to the device. If the LED is ON, transmit a digital 1, if it's OFF you transmit a digit 0.



Transmitter section

Transmitter section consists of microcontroller ATMEGA328 in which programming using AVR is done. The keypad is used for transmitting the message. The measure data are store in ATMEGA328. LCD display is used to display the message which we are going to transmit. This data is been transfer using LED panel by light waves. When LED is ON microchip convert digital data in form of light. The operational procedure is simple. If the LED is on, we transmit a digital 1 and if it is off transmit a 0. The LED can be switched on and off very quickly, which gives nice opportunities for transmitting data.

Receiver section

Receiver section consists of photo detector, which detects the light. Then this light fed to the LED driver circuit. Using this driver circuit we drive the received data to the ATMEGA328, which stores this data and display on LCD Display in receiver section.

The proposed system mainly consists of

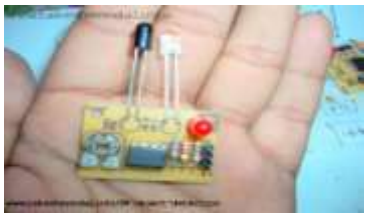
1. Microcontroller ATMEGA328
2. Comparator Kit
3. LED Driver circuit
4. LCD display
5. LED
6. Photodiode\Photodetector

1.Microcontroller ATMEGA328

The ATmega328 is a single-chip microcontroller created by Atmel in the megaAVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core.The Atmel 8-bit AVR RISC based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM , 2 kB SRAM , 23 general purpose I/O lines, 32 general purpose working registers , three flexible timer/counters with compare modes, internal and external interrupts , serial programmable USART , a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator , and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz

2.. Photodetector

Photdiodes or photodetectors are sensors of light . A photo detector has a p–n junction that converts light photons into current. The junction is covered by an illumination window, usually having an anti-reflective coating. The absorbed photons make electron-hole pairs in the depletion region. Photodiodes and photo transistors are a some examples of photo detectors. Solar cells convert some of the light energy absorbed into electrical energy.

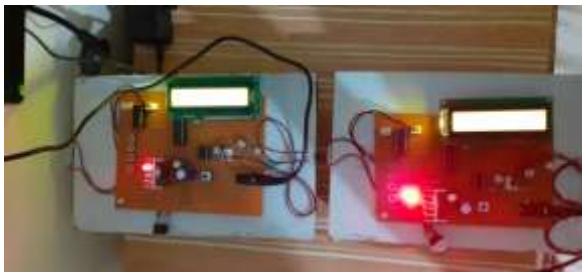


3. Software used

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kit.

board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loadingprograms from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++ . In addition to using traditional compiler toolchains , the Arduino project provides an integrated development environment (IDE) based on the Processing language project

V. Result



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