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Audio and Data Transmission Using Lifi

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ABSTRACT:
Li-Fi stands for Light-Fidelity. LIFI technology is very new and was proposed by the German physicist Harald Haas in 2011. Light based communication system is the backbone of the future of the communication system. Li-Fi is a wireless technology that uses light emitting diodes (LEDs) for transmission of data. The development of the wireless communication leads to advance research in Li-Fi technology. The term Li-Fi states to visible light communication (VLC) technology that uses as medium to deliver high-speed communication in a fashion similar to Wi-Fi. Li-Fi comprises a wide range of frequencies and wavelengths, from the Infrared through visible and down to the Ultraviolet spectrum. The immense use of Li-Fi may solve some bottleneck of data transmission in Wi-Fi technology. With the innovation in technology and the number of users, the existing radio-wave spectrum fails to accommodate this need. To resolve the issues of scalability, availability and security, we have come up with the concept of transmitting data wirelessly through light using visible light communication (VLC) technology. The objective is to study and describe the Li-Fi technology. The improvement of the wireless communication leads to advance research in Li-Fi technology through Visible Light Communications (VLC) Technology.

KEYWORDS: Visible Light Communication, PIC Microcontroller, MAX232 Converter.

INTRODUCTION

Over the past few years, there has been a rapid growth in the utilization of the RF region of the electromagnetic spectrum. This is because of the huge growth in the number of mobile phones subscriptions in recent times. This has been causing a rapid reduction in the free spectrum for future devices. Hence, an alternative means to wireless communication is necessary to accommodate the exponentially increasing wireless traffic demand. Visible light communication systems provide an alternative to the current standards of wireless transfer of information, using light from LEDs as the communication medium.

The term Li-Fi was Invented by the German Professor at the University of Edinburgh, Harald Haas and it refers to light-based communications technology that delivers a high-speed, bidirectional networked mobile communication which is similar to Wi-Fi. Light-fidelity (Li-Fi) operates in the visible light spectrum of the electromagnetic spectrum i.e. it uses visible light as a medium of transmission rather than the traditional radio waves. Li-Fi is the transmission of data using visible light. This is done by sending data through an LED light bulb that varies in intensity at a speed much faster than the human eye can follow. If the LED is on, the photo detector registers a binary one; otherwise, it's a binary zero that is registered.

This Li-Fi system can be used to produce data rates higher than 1 Giga bits per second which is much faster than our average broadband connection or Wi-Fi. The high speed of Li-Fi can be explained using

frequency spectrum of Electromagnetic Radiations.
From the electromagnetic spectrum, we can see that the frequency Band of the visible light is in between 430THz to 770THz and that of Radio Frequency Band is in between 1Hz to 3THz. Hence the Frequency Bandwidth of the visible light is about 400 times greater than the Radio Frequency Bandwidth and so, number of bits can be transferred through this Bandwidth than in the radio frequency bandwidth. Thus, the Data rate will be higher in Li-Fi and higher speed can be achieved

EMBEDDED SYSTEM

An embedded system is a computer system—a combination of a computer processor, computer memory, and input/output peripheral devices—that has a dedicated function within a larger mechanical or electrical system. [1][2] It is embedded as part of a complete device often including electrical or electronic hardware and mechanical parts. Because an embedded system typically controls physical operations of the machine that it is embedded within, it often has real-time computing constraints. Embedded systems control many devices in common use today.[3] Ninety-eight percent of all microprocessors manufactured are used in embedded systems. Modern embedded systems are often based on microcontrollers (i.e. microprocessors with integrated memory and peripheral interfaces), but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also common, especially in more complex systems. In either case, the processor(s) used may be types ranging from general purpose to those specialized in a certain class of computations or even custom designed for the application at hand.
Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale. Embedded systems are designed to do some specific task. Examples of properties of typical embedded computers, when compared with general-purpose counterparts, are low power consumption, small size, rugged operating ranges, and low per-unit cost. This comes at the price of limited processing resources, which make them significantly more difficult to program and to interact with. However, by building intelligence mechanisms on top of the hardware, taking advantage of possible existing sensors and the existence of a network of embedded units, one can both optimally manage available resources at the unit and network levels as well as provide augmented functions, well beyond those available.[10] For example, intelligent techniques can be designed to manage power consumption of embedded systems.

PIC MICROCONTROLLOR

PIC (usually pronounced as "pick") is a family of microcontrollers made by Microchip Technology, derived from the PIC1650[1][2][3] originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to Peripheral Interface Controller,[4] and is currently expanded as Programmable Intelligent Computer.[5] The first parts of the family were available in 1976; by 2013 the company had shipped more than twelve billion individual parts, used in a wide variety of embedded system. Early models of PIC had read-only memory (ROM) or field-programmable EPROM for program storage, some with provision for erasing memory. All current models use flash memory for program storage, and newer models allow the PIC to reprogram itself. Program memory and data memory are separated. Data memory is 8-bit, 16-bit, and, in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instruction

set also varies by model, with more powerful chips adding instructions for digital signal processing functions. The hardware capabilities of PIC devices range from 6-pin SMD, 8-pin DIP chips up to 144-pin SMD chips, with discrete I/O pins, ADC and DAC modules, and communications ports such as UART, I2C, CAN, and even USB. Low-power and high-speed variations exist for many types. The manufacturer supplies computer software for development known as MPLAB X, assemblers and C/C++ compilers, and programmer/debugger hardware under the MPLAB and PICK it series. Third party and some open-source tools are also available. Some parts have in-circuit programming capability; low-cost development programmers are available as well as high-production programmers. PIC devices are popular with both industrial developers and hobbyists due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, serial programming, and re-programmable flash-memory capability.

LITERATURE SURVEY

Roma Jain, Pallavi Kale, Vidya Kandekar, PratikshaKadam et.al., With incessantly growing needs of telecommunication world, there is an increased thrust for higher bandwidth that facilitates faster and secure data transmission. Present telecommunication industry relies on radio waves of electromagnetic spectrum for data transmission. Inappropriately the radio wave spectrum has certain key limitations: Capacity, Efficiency, Availablility, Security. So using the light emmiting diodes that offers in the transmission of the data much faster and relaiable than the data that can be transmitted through Wi-Fi. Li-Fi is a wireless communication system in which light is used as a carrier signal instead of traditional radio frequency as in Wi-Fi. Li-Fi technology communicates with the help of Visible Light Communication (VLC) spectrum and has no side effect as we know the light is very much part of our life and so much faster. Moreover Li-Fi makes possible to have a wireless internet in specific environments where Wi-Fi is not allowed due to interferences or security considerations. **[2] Imran Siddique & Muhammad Zubair Awan et.al.,** Transfer of data from one place to another place is one of the most important daily activates. When the multiple devices are connected to the existing wireless networks that connect us to the internet are very slow. As the number of devices increasing the internet access, the fixed bandwidth which is available makes it more and more difficult to utilize high data transfer rates and connected to a network. But radio waves are just small part of the spectrum available for data transfer. A solution to this problem is by the use of the proposed system Li-Fi. Li-Fi is the transmission of data through light by sending data through an LED bulb that varies in intensity faster than the human eye can follow and the faster data transmission speed. LiFi is the new technology has used to label the fast and cheap wireless communication system, which is the next optical version of WiFi. With innovation in technology and the number of users, the existing radio-wave spectrum fails to accommodate this needs. To resolve the issues of scalability, availability and security , we have to come up with the concept of transmitting data wirelessly through light using Visible Light Communication. **[3] Adam Bocker, Viktor Eklind Daniel Hansson, Philip Holgersson, Jakob Nolkrantz&Albin Severinson et. al.,** Visible light communication (VLC) is an exciting prospect, with a long historical background, but has never become popular for various reasons. However, currently interest for this kind of communication is increasing, and the technology for making it possible is constantly becoming more easily available. The main technological development that made VLC possible is cheap, high-powered, light-emitting diodes (LED) of high quality, capable of switching at high frequencies. Furthermore, the infrastructure for VLC is already available. All that needs to be done is to exchange the already deployed

light bulbs with intelligent and efficient LED bulbs. One intresting application is Vehicle-to-Vehicle communication, where they communicate with each other through their head lights. When the vehicle in front suddenly breaks, it can communicate this to the vehicle behind and a potential multiple-vehicle accident is avoided. **[4] Mr Korde S.K et.al.,** LiFi is the trend if today and near future. It is one of the cheapest and efficient modes of data transfer. It surely can replace the traditional WiFi networks and can further be extended to different platforms to make it easily accessible and portable which is the growing demand of the increasing populations. One of the limitations however is that only works in direct line of sight (LOS) but thisa would solve the problem like the shortage of radio frequency bandwidth and allow internet to be used in places and situations where it cannot be used it currently like the hospitals or aircrafts. There are billions of light bulbs worldwide, they just need to be replaced with LEDs ones that transmit data. Visible Light Communication (VLC) is very cheaper to WiFi because it uses light rather that radio frequency signals.

EXISTING SYSTEM

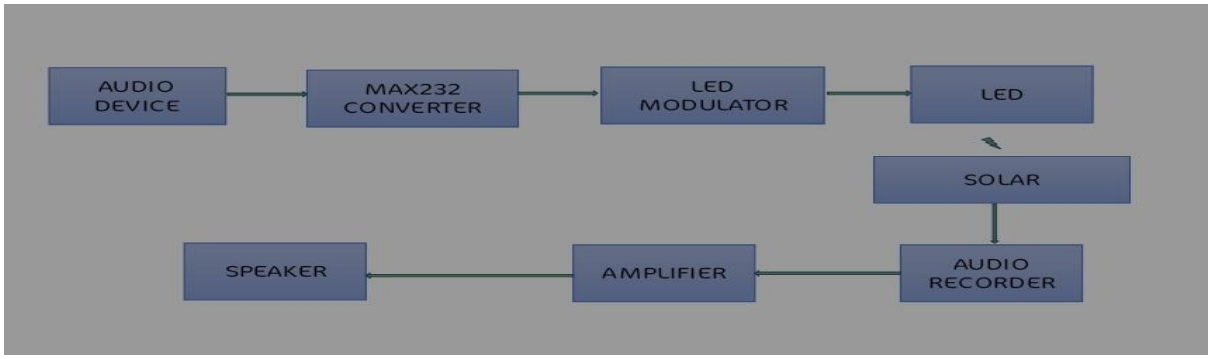
The existing Wireless communication makes use of electromagnetic waves for communication system. For instance, the deployment of Wi-Fi obviously brings several important benefits. Because it is very convenient that numbers of equipment connect to each other using wireless networks. Home-based Wi-Fi enabled device helps you to connect PC, game console or laptop. There are no boundaries if you are using Wi-Fi, you can move from one room to another or even away from home you have the liberty to access internet within the range of radial distance. Wi-Fi hotspots concept is getting popularity among business communities and mobile workers. For this reason ISPs are consolidating Wi-Fi switches to numerous spots for the scope of wide range.

DISADVANTAGE OF WI-FI TECHNOLOGY

- Unsecured communication through, wireless communication based on radio frequency.
- Radio frequency based on EMF can easily make and interference with medical interments.
- Health problems due to the daily usage of radio frequency communication.
- Wireless networks are typically slower than wired networks, sometimes even up to 10 times slower.
- Security issues is another disadvantage of Wi-Fi network.

PROPOSED SYSTEM

The proposed system consists of a transmission section and a receiver section. The transmitter section consists of an Li-Fi transmitting module, MAX converter and the receiver section consists of a Li-Fi receiving module, PIC microcontroller, an amplifier and speaker.



AUDIO TRANSMISSION

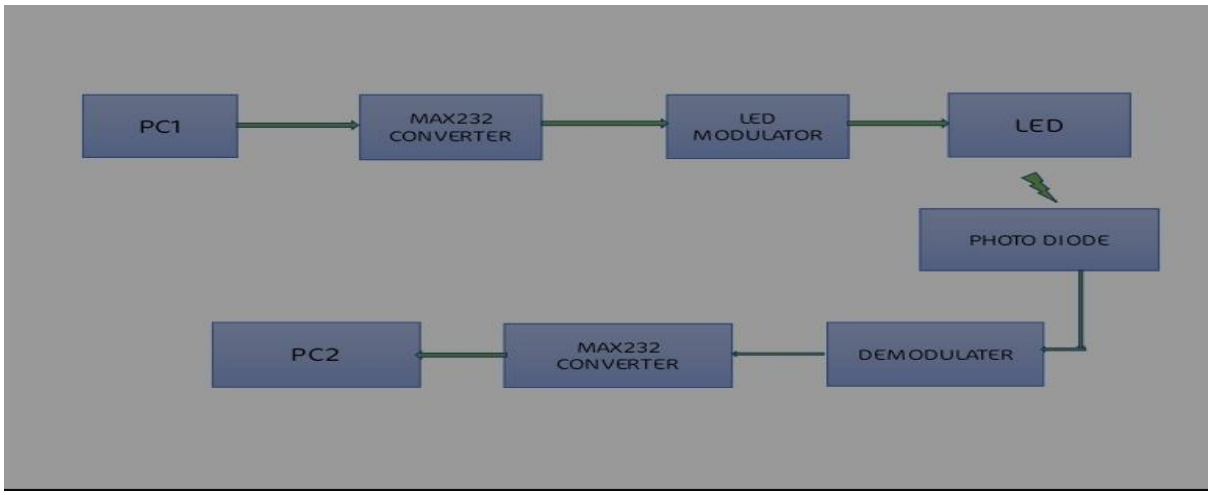


FIG 3.2 DATA TRANSMISSION

DATA TRANSMISSION

ADVANTAGES OF LI-FI

Efficiency: Li-Fi works on visible light technology. Since homes and offices already have LED bulbs for lighting purposes, the same source of light can be used to transmit data. Hence, it is very efficient in terms of costs as well as energy. Light must be on to transmit data, so when there is no need for light, it can be reduced to a point where it appears off to human eye, but is actually still on and working.

Availability: Wherever there is a light source, there can be Internet. Light bulbs are present everywhere – in homes, offices, shops, malls and even planes, meaning that high-speed data transmission could be available everywhere.

Security: One main advantage of Li-Fi is security. Since light cannot pass through opaque structures, Li-Fi Internet is available only to the users within a room and cannot be breached by users in other rooms or buildings.

VISIBLE LIGHT COMMUNICATION

Visible Light Communication "VLC" - Nowadays, wireless communications have become fundamental to our lives and we transmit a lot of data every day. The main way we transmit wireless data is by using electromagnetic waves, in particular radio waves. However, radio waves can support only limited bandwidth because of restricted spectrum availability and interference. Furthermore, radio spectrum is full to bursting and it is difficult to find radio capacity to support media applications.

Li-Fi is a wireless optical networking technology that uses LEDs for data transmission. There is an emerging wireless communication with a promising future and which can be a complement of radio waves: Visible Light Communication (VLC) or LIFI. VLC or LIFI is a data communication technology that uses a visible light source as a signal transmitter, the air as a transmission medium or channel and a signal receiving device. Generally, the transmitters are Light Emitting Diodes (LEDs) while the principal device of the receiver is a photodetector, usually a photodiode. By using VLC or LIFI in short distance applications, we can supplement radio waves achieving high data rates and a larger bandwidth.

Light is part of the electromagnetic spectrum, specifically the visible light spectrum, which covers wavelengths between 380-780nm. We have already a lot of LED-based lights installed in the world and we can use them for communications. A LED is a semiconductor device that has the advantages of fast

switching, power efficiency and emits visible light that is safe for the human because it is not harmful to vision. Therefore, we can both illuminate and transmit data everywhere.

BLOCK DIAGRAM DESCRIPTION

BLOCK DIAGRAM FOR AUDIO TRANSMITTER:

In the process of voice communication through the visible light on the transmitter side, voice is used as the input signal. This signal is converted to an electrical signal through a microphone. The transmitted data will be digitized then the digital signal drives the LED by using on-off-keying (OOK) modulation. LED, turning led ON for ones and OFF for zeros. Hence, the transmission data rate has to be so high that it eliminates the flicker and perceive as a constant light source to human eye. LED, turning led ON for ones and OFF for zeros.

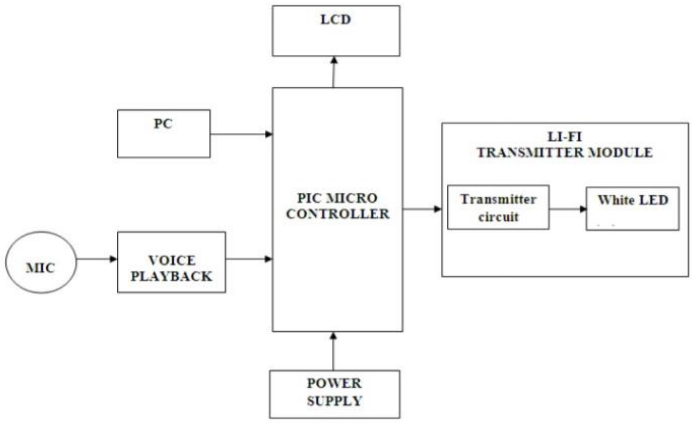


Fig: Transmitter Block Diagram

AUDIO TRANSMITTER

Voice Record and Playback Module

General Description

WTV-SR is one of the members of recording serial products. WTV-SR module can record as well as fixed voice playback, recording content uploaded and a variety of control modes can be chosen. With the ace chip and module SPI-FLASH, it has an awesome favourable position in the span time of recording and cost execution.

Product Description

WTV-SR is provided with mp3 mode, Key control one by one, parallel interface, one-line serial interface, three line serial interface occasions. It can be changed different control modes by setting I/O, which on the bottom of WTV-SR. It gives a Flexible power supply by either supply module or supply solution, so it is an effective recording solution. The recorded voice can be uploaded to the system. It also supports download voice from PC and play recorded voice with high quality. It can record up to 252 segment voice (including fixed voice) and recording time up to 1600 seconds. It supports audio recording at 10 KHz or 14 KHz sample rate.

Playback Module

Microphone

In the process of voice communication through the visible light on the transmitter side voice is used as the input signal. This signal is converted to an electrical signal through a condenser or microphone.

MICROPHONE

Li-Fi Transmitter

The data whose has to transmit given from the playback module to the modulator circuit. The information is modulated to bits of 1's and 0's using On-Off Keying modulation .Light is used as a carrier signal. The modulated signal is amplified by Audio Amplifier. The data of 1's and 0's comes out from LED which on for ones and off for zeros.

RECEIVER

The receiver module consists of photo detector. When the light falls in, it detects the data that is transmitted via light . This detected data will be given to an amplifier which will amplify the detected signal and give it to microcontroller. The microcontroller will extract the data from the received signal. This digital data will be converted to analog using digital to analog converter. The analog signal (i.e. audio) will (audio) comes out from the speaker.

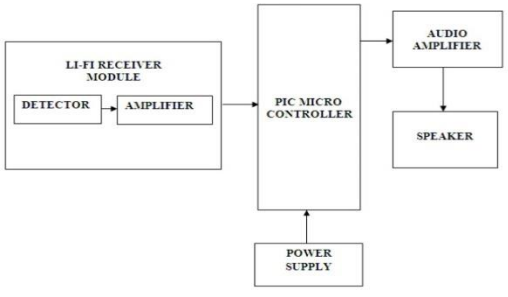


Fig.2. Block diagram of receiver

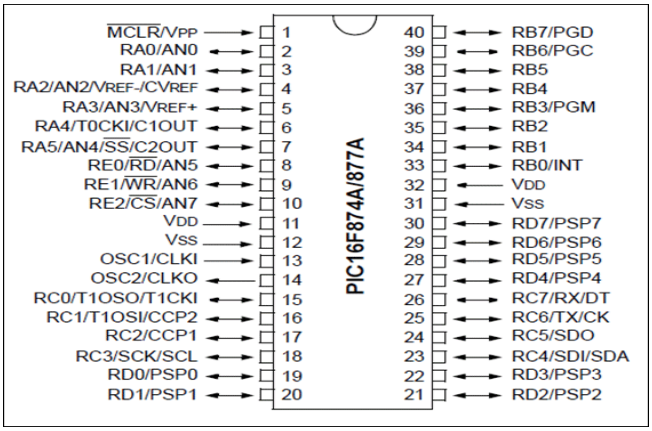
AUDIO RECEIVER

LiFi Receiver

The data of ones and zeros from the LED source absorbed by the photo detector and equivalent electrical signal is produced. This signal is demodulated and then amplified by audio amplifier. Light intensity is absorbed by LDR .Based on the intensity of the light, microcontroller detects the error and minimizes using PWM error minimization technique. The error controlled audio signal comes out using speaker.

PIC Micro Controller

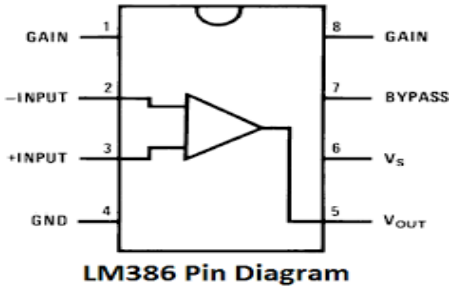
The PIC16F877A is a CMOS flash-based 8-bit microcontroller, which has operating frequency of 20 MHz. It takes 200 ns to execute an instruction cycle. In our project we have used a 40 pin PIC16F877A. Its main function is to control the voice recorder. It serially sends the recorded audio file from voice recorder to the transmitting module. For that it uses RS-232 device which helps the microcontroller to send the data serially. **45**



PIC16F874A/877A PIN DIAGRAM

Audio Amplifier

Audio amplifier can amplify sound that is given from Microphone. This circuit can be used as "Small mic and loudspeaker system" for a small space like a room. This circuit can also be used in many applications like portable music players, intercoms, radio amplifiers, TV sound systems, Ultrasonic drivers etc. It can also be used as sound sensor for microcontrollers. It is inexpensive, low power operated and only need few components to work. This circuit depends on LM386 IC to increase sound. LM386 is a low voltage sound intensifier and oftentimes utilized as a part of battery controlled music gadgets like radios, guitars, toys and so forth. The pick up go is20 to200, pick up is inside set to 20 (without utilizing outside segment) yet can be expanded to 200 by utilizing resistor and capacitor between PIN 1 and 8, or just with a capacitor. Voltage picks up essentially implies that Voltage out is 200 times the Voltage IN. LM386 has a wide supply voltage go 4- 12v. The following is the Pin outline of LM386.

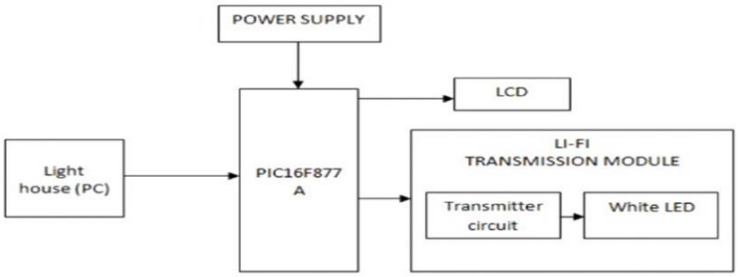


LM386 Pin Diagram

BLOCK DIAGRAM OF DATA TRANSMITTER

In transmitter part the data is said to be communicated by transmitting a data from pc via data modulation unit and through LED array. Data can be converted to digital signals of 0s and 1s in data modulation unit and provides series of pulses such that image can be converted into digital signals of binary bits. Data gets designated from series of stored data and is then designated and transmitted

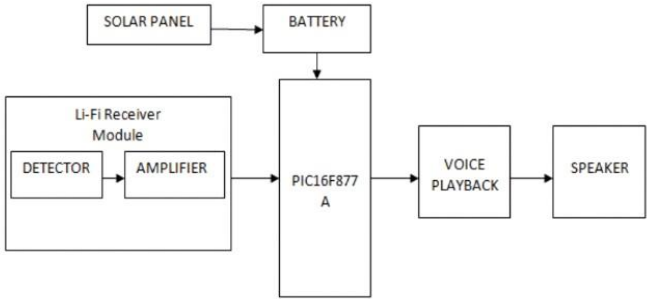
successfully. Once the data is transmitted it reaches receiver side through visible light communication scheme. The goal of transmitter part is to transmit image.



DATA TRANSMITTER

Receiver

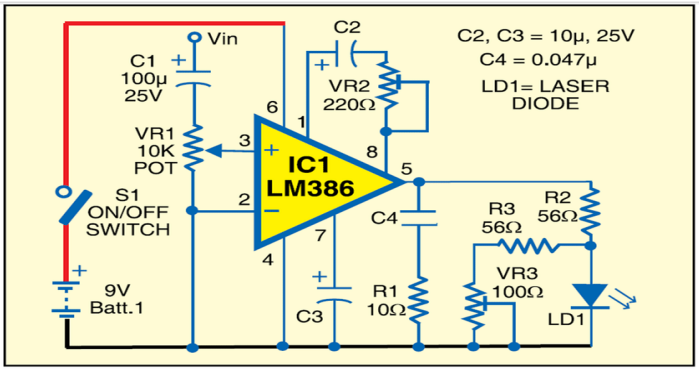
The goal of receiving part is to receive the data that is transmitted from the transmitter successfully. The goal of receiving part is to receive the data that is transmitted from the transmitter part successfully.



DATA RECEIVER

Circuit Diagram of Transmitter

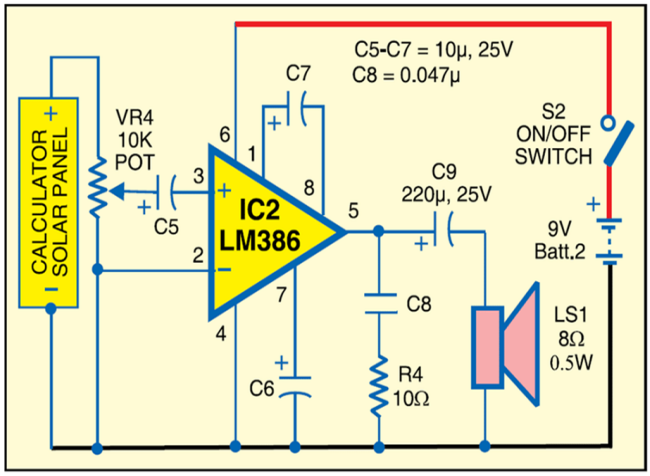
The data whose has to transmit given from PC or microcontroller. If the data is from the PC, the transmitter section is interfaced with PC through the level logic converter MAX 232. The MAX 232 is used to convert the +12v and -12v pulse to 0v and 5v pulse then given to hex inverter 40106. If data is from the microcontroller, it is directly given to hex inverter input. When 5v is given to base of the switching transistor BC 547, the transistor is conducting and it closed the collector and emitter terminal. Now the LED is conducting, so data is transmitted as the light medium. When 0v is given, the transistor and LED is turned off. Hence the binary data 0, 1 are transmitted through light medium.



DATA CIRCUIT DIAGRAM

Circuit Diagram of Receiver

This circuit is deliberate to receive the data from the LED transmitter side. In this circuit the photo diode is used as receiving device. The data are transmitted in as light medium. The light rays are fallen on the photo diode. When light ray falls on the photo diode, the diode is conducting and became short circuit. When there are no light rays, the diode became open circuit. The photo diode is connected in series with resistor and constructs the voltage divider. This grouping is allied to inverting input terminal of the comparator. The comparator is fabricated with LM 741 operational amplifier. In the comparator circuit the reference voltage is given to non-inverting input terminal. When photo diode is conducting, the comparator non-inverting input terminal voltage is higher than inverting input. Now the comparator output is in the range of +12V. This voltage is given to base of the transistor. Hence the transistor is conducting. Here the transistor is act as switch so the collector and emitter will be closed. The output is taken from collector terminal. Now the output is zero which is given to hex inverter 40106.When there are no light rays, the photo diode is open circuit. The inverting input voltage is grander than non-inverting input. Now the comparator output is -12V so the transistor is cutoff region. The 5v is given to hex inverter 40106 IC. Then the final output data is directly given to microcontroller. If the output data has to give to PC, we essential level logic converter RS-232 which converts the TTL input to PC acceptable format (+12V to -12V)



DATA RECEIVER CIRCUIT DIAGRAM

WORKING

The output of a LED may be a continuous constant-amplitude output (known as CW or continuous wave); or pulsed, by using the performances of Q-switching, model-locking, or gain-switching. In many applications of pulsed LED‟s, one aims to payment as much energy as possible at a given place in as short time as conceivable. Some LED‟s and vibronic solid-state LED can produce light over a far-reaching range of wavelengths; this property makes them suitable for engendering extremely short pulses of light, on the order of a few femtoseconds (10-15 s). The peak power of pulsed laser can achieve 1012 Watts.

SERIAL COMMUNICATION

The serial communication is used, to transfer to a device located many meters. In serial communication, the data is sent one bit at a time, in which the data is sent a byte or more at a time. The ARM has serial

communication proficiency built into it, thereby making apparent fast data transfer using only a few wires. It provides the data in byte-sized chunks, When microprocessor interconnects with the outside world ,. The ARM transfers and receives data serially at many baud rates. The baud rate in the ARM is programmable. This is done with the help of timer 1.

USB TO TTL

As data can be transmitted between two devices a serial port cable should be there for serial communication. Recommended Standard 232(RS232) is used for this type of communication where data can be transmitted bit by bit over long distances. This is widely used communication for data transmission.

VISIBLE LIGHT COMMUNICATION(VLC)

Digital data of 1s and 0s are approved by unconventional switching of LED bulb lights through visible light communication. Data from LED light array is transmitted through visible light which is then captured by photo detector and this diode converts light signals into electrical signals which is then demodulated by data demodulation unit and is filtered to get prerequisite appropriate output on the receiver side of personal computer (PC).The final voltage signal should correspond to the received light pulses which are then decoded in the final decoder block, thus extracting the digital data.

PIC (16F877)

Various microcontrollers offer dissimilar kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most recently develop. d. Technology that is used in pic16F877 is flash technology, so that data is retained even when the power is switched off. Easy Encoding and Obliterating are other features of PIC 16F877.

POWER SUPPLY

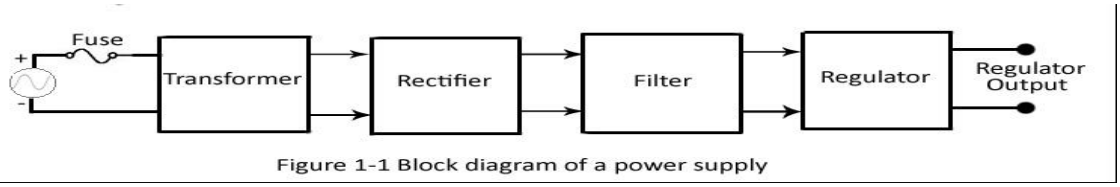


Figure 1-1 Block diagram of a power supply

The ac voltage, typically 220V rms, is connected to a transformer, which periods that ac voltage down to the level of the anticipated dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage fluctuates. This voltage regulation is habitually obtained using one of the popular voltage regulator IC units.

COMPARISION BETWEEN LIFI AND WIFI

LIGHT FIDELITY

Li-Fi, which means Light Fidelity, is an emerging piece of technology that makes use of Visible Light Communication (VLC) technology instead of radio waves to transmit data. In Li-Fi, solid-state lighting (SSL) such as LED bulbs are used in the transmission of data and provide access to the internet or a wireless network. This is done by modulating the light given off by the light source (the transmitter) and

is received by a photodiode (the receiver). The signals received from the transmitter are then translated into usable data forms that are readily consumed by the end user. Connections provided by Li-Fi are typically confined within the space where they are provided due to the nature of visible light.

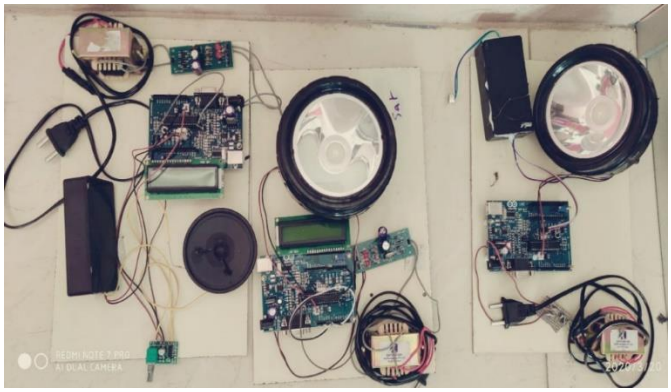
WIRELESS FIDELITY

WiFi, meaning Wireless Fidelity, is the name of the wireless networking technology that uses radio waves to create wireless network connections, provide internet access, or transmit data. It is very popular because it allows users to access networks without the need for a physical wire between the device and the transmitter. When a radio frequency (RF) current is supplied to an antenna, an electromagnetic field is created, which propagates through any space. This creates an access point in which users can connect and gain access. These access points are accessible up to 20 to 50 meters away. However, in order to connect to an access point, the user will need to have a wireless network adapter installed on the accessing device.

COMPARISION BETWEEN LIFI AND WIFI

Feature	LiFi	WiFi
Full form	Light Fidelity	Wireless Fidelity
Operation	LiFi transmits data using light with the help of LED bulbs.	WiFi transmits data using radio waves with the help of WiFi router.
Interference	Do not have any intereference issues similar to radio frequency waves.	Will have intereference issues from nearby access points(routers)
Technology	Present IrDA compliant devices	WLAN 802.11a/b/g/n/ac/ad standard compliant devices
Applications	Used in airlines, undersea explorations, operation theaters in the hospitals, office and home premises for data transfer and internet browsing	Used for internet browsing with the help of wifi kiosks or wifi hotspots
Merits(advantages)	Interference is less, can pass through salty sea water, works in densy region	Interference is more, can not pass through sea water, works in less densy region
Privacy	In LiFi, light is blocked by the walls and hence will provide more secure data transfer	In WiFi, RF signal can not be blocked by the walls and hence need to employ techniques to achieve secure data transfer.
Data transfer speed	About 1 Gbps	WLAN-11n offers 150Mbps, About 1-2 Gbps can be achieved using WiGig/Giga-IR
Frequency of operation	10 thousand times frequency spectrum of the radio	2.4GHz, 4.9GHz and 5GHz
Data density	Works in high dense environment	Works in less dense environment due to interference related issues
Coverage distance	About 10 meters	About 32 meters (WLAN 802.11b/11g), vary based on transmit power and antenna type
System components	Lamp driver, LED bulb(lamp) and photo detector will make up complete LiFi system.	requires routers to be installed, subscriber devices(laptops,PDAs,desktops) are referred as stations

RESULT ANALYSIS



TOP VIEW OF HARDWARE

The project is designed and implemented a wireless communication device which transmit audio and text wirelessly known as LIGHT FIDELITY (LiFi) .The project contain two section ,transmission and receiver section. The transmitter section modulates the incoming audio and text signal and transmit towards the receiver in the form of visible light using LEDs. The receiver section interprets the incoming light which is detected using a solar panel and converts to the audible sound signal with the help of speaker and read the text from the receiver side PC.

RESULT

FOR AUDIO: Sound heard from receiver side speaker.
FOR DATA : Text displayed on receiver side pc.

CONCLUSION

The project "**AUDIO AND DATA TRANSFER USING LI-FI"** has been completed**.** The possibilities are numerous and can be explored further because the concept of Li-Fi is currently attracting a lot of eye-balls because it offers a genuine and very efficient alternative to radio based wireless. It has a good chance to replace the traditional Wi-Fi because as an ever increasing population is using wireless internet, the airwaves are becoming increasingly clogged, making it more and more difficult to get a reliable, high-speed signal. In the future, data for laptops, smart phones and tablets can be transmitted through light in the room by using Li- Fi. Researchers are developing micron sized LED which are able to flicker on and off around 1000 times quicker than larger LED. If this technology can be put into practical use, every bulb can be used as a Wi-Fi hotspot to transmit wireless data and we will proceed toward the cleaner, greener, safer and brighter future. This concept solves issues such as the shortage of radio-frequency bandwidth and boot out the disadvantages of Wi-Fi. Li-Fi is the upcoming and on growing technology acting as competent for various other developing and already invented technologies. Hence the future applications of the Li-Fi can be predicted and extended to different platforms and various walks of human life.

FUTURE ENHANCEMENT

Li-fi have energy saving parallelism. With growing number of people and their many devices access wireless internet , on one way data transfer at high-speed and at cheap cost. In future LI-FI have LED array besides a motorway helping to light the road, displaying the latest traffic update and transmitting internet information to wirelessly to passenger laptop notebook and smart phone . This is the kind of extra ordinary ,energy saving parallelism that is believed to deliver by the pioneering technology .