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DataTransmission By Using Optical Wireless Communication

Mulani S.A, Gaherwar V.H, Lipne N.A,Prof (Dr). P.H. Patil[5]

ABSTRACT

By using this project audio musical notes can be generated and heard up using IR transmission method. The circuit can be divided into two parts: transmitter and receiver. The music transmitter works for a 9V battery, while the music receiver works for regulated 9V to 12V.The transmitter uses popular melody generator IC UM66 that can continuously generate musical tones. The output of this music melody generator is fed to the driver stage to get the maximum range.An ILED is connected in the Transmitter section. This LED flickers according to the musical tones generated by UM66 IC, indicating modulation. The music receiver uses popular op-amp IC µA741 and audio-frequency amplifier IC LM386 along with phototransistor L14F1 and some discrete components. The melody generated by IC UM66 is transmitted through IR LEDs, received by phototransistor and fed to pin 2 of IC µA741. Here we are using LPC2148 as our controller. The output of IC µA741 is fed to IC LM386 via capacitor C5 and potentiometer. The melody produced is heard through the receiver's loudspeaker. Also a 16X2 alphanumeric LCD is used to display. This project uses regulated 5V, 500mA power supply. 7805 three terminal voltage regulator is used for voltage regulation. Bridge type full wave rectifier is used to rectify the ac out put of secondary of 230/12V step down transformer.

KEYWORDS: Optical wireless communication,Visible light communication , Light emitting diode, Signal to noise ratio, Bit error rate.

1. INTRODUCTION

The number of personal computers and personal digital assistants for indoor use are rapidly growing in offices, manufacturing floors, shopping areas and warehouses. In near future, one will find very often several such devices clustered within small indoor areas. This will result in the need for flexible interconnection through the distributed or centralized data communication systems. The traditional way to meet this requirement is to use wired physical connections. But, wired physical connections have some inherent problems, in setting up and in its expansion. Wireless systems offer an attractive alternative. Both, radio frequency (RF) and infrared (IR) radiation are possible options in implementing wireless systems. Unfortunately, the RF can support only limited bandwidth because of restricted spectrum availability and interference; while this restriction does not apply to IR. Thus, optical wireless (IR) technology seems to be ideal for wireless communication systems of the future. It can provide cable free communication at very high bit rates (a few Gbps as compared to tens of Mbps supported by radio). In indoor optical wireless systems, laser diodes (LDs) or light emitting diodes (LEDs) are used as transmitter and photo-diodes as the receivers for optical signals. These opto-electronic devices are cheaper as compared to RF equipment as well as wireline systems. Further, IR transmission does not interfere with existing RF systems and is not governed by Federal Communications Commission (FCC) regulations. The IR signal does not penetrate walls, thus providing a degree of privacy within the office area. In addition to privacy, this feature of IR systems makes it easier to build a cell-based network. Due to the above reasons, optical wireless systems are becoming more popular in various operating environments, such as houses (consumer electronics), offices, medical facilities, manufacturing plants, and business establishments.

2. LITERATURE SURVEY

Nowadays, a lot of researchers are working on the development of Light emitting diode. The LED lighting system can achieve lower power consumption and has a longer lifetime compared to the fluorescent lamp system. In this project, the Several experiments were conducted in the visible light communication system. Led lightCommunication has good intensity, efficiency, as well as better visibility and performance quality. It provides a much simpler communication system and reducing the complex wiring. As Compare To The LED Based Communication System It Is More Efficient And Problem of interference faced in case of electromagnetic waves is not there .High Secure Medium.So for That Why Led Light Optical Wireless Communication Is More Superior Than Other Light Communication System

3. SYSTEM OVERVIEW

Since the late 1970's, significant research has been done on the applications of optical wireless (IR) technology to high-speed indoor data communications. Also, in the past several years, extensive effort has been devoted to understanding and implementing optical wireless technique for long distance inter-satellite systems (outdoor applications). But it is the indoor applications that are the driving force behind optical wireless. The first indoor optical wireless system was developed in 1979. This system used the infrared radiation which was spread in all directions. Such systems are called diffused infrared systems. Since then several products using IR radiation have been successfully commercialized. The advancement of inexpensive opto-electronic devices, such as LEDs and LDs, p-intrinsic-n (PIN) photo-diodes and avalanche photo-diodes (APDs) and various optical components, has resulted in the improvement of these

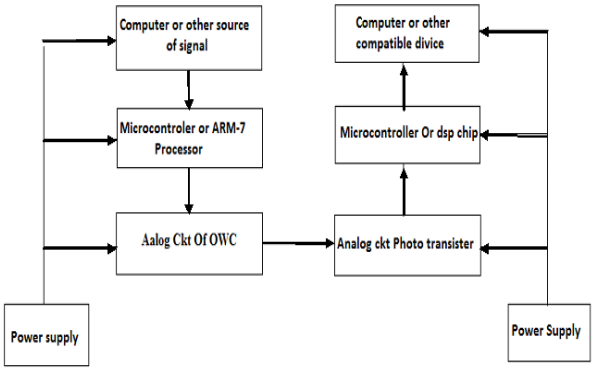


Fig: Block Diagram

Figure shows the overall functional block diagram of our system. The transmitter side consists of a signal source, a microcontroller, and analog circuitry incorporating LED, all of which are powered in some fashion. The receiver side is similar, containing analog circuitry incorporating photo transistor, microcontroller and a device capable of receiving and interpreting the output, all of which are also being powered in some fashion.The microcontroller is used as the signal source for our design by utilizing a binary system to transmit text. Light source is the most important component in optical signal since communication is doneby transmitting light. Light-emitting diode (LED) and injected led diode (ILD) are two types of optical light source commonly used in optical communication. These devices are commonly made fromsemiconductor materials whereby the interaction between positively chargesemiconductor and negatively chargesemiconductor produces photons or light energy . The output light emitted by the ILD is monochromatic, coherent and has high radiance which makes it suitable for long distance free space transmission.

4. MODULATION TECHNIQUE

SIM-OFDM is a modification of the classical OFDM modulation scheme. In OFDM a number of different frequency carriers are modulated with a signal from a scheme such as Quadrature Amplitude Modulation (QAM). The approach of SIM-OFDM tries to exploit an additional "new" dimension in the OFDM frame coming from the state of each subcarrier – active or inactive. This additional dimension is employed to transmit information in an On-Off Keying (OOK) fashion. The motivation behind this concept lies in an attempt to optimize power usage, which is crucial in the current climate of "green communication systems" . Each active carrier receives the energy of an M-QAM symbol and the energy of the additional bit encoded in OOK fashion. The individual performances of QAM and OOK are thus improved. Overall, this leads to performance improvement of SIM-OFDM on an energy-per-bit basis.

It consist of a following blocks-

1 POWER SUPPLY

2 ARM7TDMI PROCESSOR
3 LCD DISPLAY
4 SENSOR

The project works on two parts:

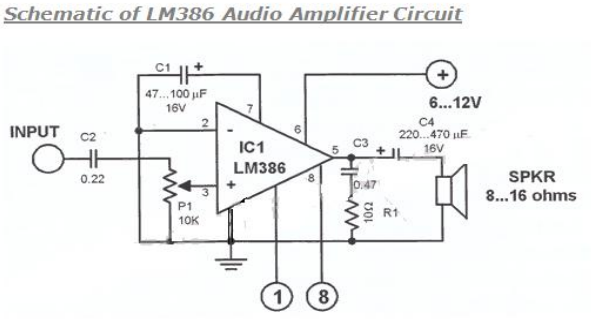
1. SENSOR CIRCUIT
2. DISPLAY UNIT

- The crystal would be used for generating the clock frequency and the RC network along with switch would be used for resenting the microcontroller and for power on reset.
- The LCD used is 16 X 2 for the Display.
- The output from ARM7TDMI processor is display

1. LM 386

The integrated chip LM386 is a low power audio frequency amplifier requiring a low level power supply (most often batteries). It comes in an 8-pin mini-DIP package. The IC is designed to deliver a voltage amplification of 20 without external add-on

parts. But this voltage gain can be raised up to 200 (Vu = 200) by adding external parts.



2. SWITCHES AND PUSHBUTTONS

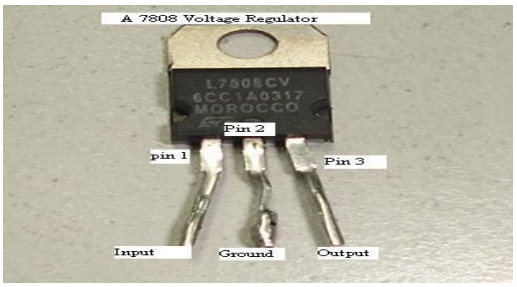
A push button switch is used to either close or open an electrical circuit depending on the application. Push button switches are used in various applications such as industrial equipment control handles, outdoor controls, mobile communication terminals, and medical equipment, and etc. Push button switches generally include a push button disposed within a housing. The push button may be depressed to cause movement of the push button relative to the housing for directly or indirectly changing the state of an electrical contact to open or close the contact. Also included in a pushbutton switch may be an actuator, driver, or plunger of some type that is situated within a switch housing having at least two contacts in communication with an electrical circuit within which the switch is incorporated.

Fig: Switch

3.Voltage Regulator

A **voltage regulator** is an electricalregulator designed to automatically maintain a constant voltage level. It may use an electromechanical mechanism, or passive or active electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages. There are two types of regulator are they.

- Positive Voltage Series (78xx) and
- Negative Voltage Series (79xx)



2. LPC 2148

The LPC2141/42/44/46/48 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bitwide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

4. IR SENSOR

IR sensors are excellent at suppressing background interference. Here photodetector is used as a IR sensor. The modulated signal transmits from LED transmitter and received at photodetector. It converts optical signal i.e modulated signal into electrical signal and thenthis electrical signal given

to the filter circuit consisy of low pass filter power amplifier.

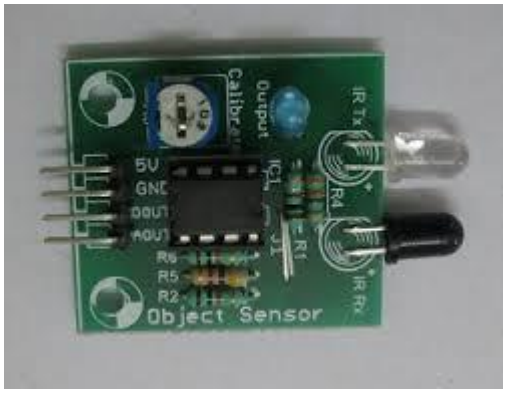


Fig.3 IR sensor

7. CONCLUSION

Led transceiver, the device for wireless transfer of data has been developed becouse of due to its efficient peformance . Led beam technology has increased the distance of RS-232 interface from approx. 10 m up to 500 m, so monitoring equipment can be placed at a significant distance and without wiring to computer. Data channel is resistant to electromagnetic and radio noise and it does not interfere with other equipment.

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