

SHIP TO SHIP COMMUNICATION SYSTEM USING LI-FI TECHNOLOGY

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Abstract—This paper develops a ship to ship communication which provides protection against ship collisions. Li-Fi (Light Fidelity) is a transmission of data using visible light by sending data through a LED light bulb that varies in intensity faster than the human eye can follow. The term Li-Fi refers to visible light communication (VLC) technology that uses light as a medium to deliver high-speed communication in a manner similar to Wi-Fi. The Wi-Fi is useful for general wireless coverage within buildings while Li-Fi is ideal for high density wireless data coverage in confined areas where there are no obstacles.

Keywords—Li-Fi; VLC; Wi-Fi; Photo detector; OWC

1. INTRODUCTION

Li-Fi is a wireless technology which uses the band of visible light for transmission which is 10,000 times more than the band used in Wi-Fi communication. It is fast, useful in secure communication as light cannot penetrate the walls and cheap as LED lights are used for data transmission. The data is transferred by encoding it in the LEDs in digital form. The flickering of the LEDs give the output as 0 or 1. Persistence of vision makes the flickering undetectable for the human eye. Different strings of 0's and 1's can be decoded to give the transmitted information. The LEDs act as light source that is transmitter, which transmits 0's or 1's. A silicon photodiode acts as a receiving element that is „receiver“. By proper amplification, modulation and signal processing, data can be received by devices like mobile phones, LCDs, laptops, etc.

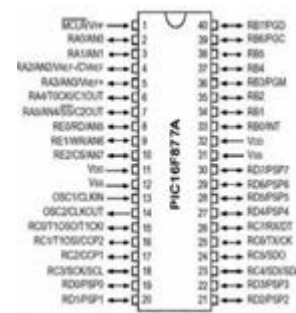
It is an application of VLC which uses visible light between the wavelength 780nm and 375nm. For indoor applications, white Light Emitting Diode (LED) is a promising technology for short range, high speed wireless data transmission for which inexpensive transmitter and receiver circuits can be designed and transmission up to a range of 0.45m can be achieved. It works in dense region. It becomes difficult to control the environmental conditions so certain modulation techniques like OFDM should be employed which improves the range of transmission.

2. SYSTEM DESIGN

Quantification of using Li Fi over Wi Fi in vehicular communications is typically because the cost of the components is less as LEDs have turned up to be commonly used in automotive lighting. VLC transceivers have been implemented using edge emitted laser diode and silicon photo diode for bi directional high speed and short range communication. The implemented design operates in a full duplex mode at 120Mbps/s. Transceivers have also been designed for vehicular visible light communication which was tested using a modified version of the 802.11 MAC protocol. Another implementation includes

designing a transmitter and receiver where the transmitter includes a led driver to make to current constant so as to protect the led, and the receiver module consists of a trans-impedance amplifier to get a clear output. adding new circuits and making the implementation complex. The proposed design implement in the ship for avoiding collision and measuring the wind speed and various parameters.

3. COMPONENTS OF THE SYSTEM A.PIC 16F877A

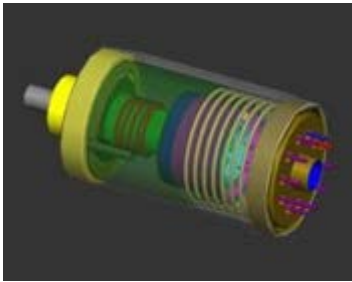


The term PIC stood for Peripheral Interface Controller. These devices were originally designed for use in applications with 16-bit microprocessors and computer peripherals, remote control transmitters, mestic products and automotive ems. A simple microcontroller consist of the following modules: an arithmetic logic unit (ALU), one or more working registers for temporary storage during

computations, program memory and data memory, program counter, instruction register, the control unit and a stack.

ACCLEROMETER

The LEDs produce the digital sequence which travels in a wireless channel to the photodiode. The current generated by the silicon photodiode is decoded to a digital sequence using ADC and the number represented by the sequence carries the information which is used to alert the driver in the vehicle following the one which transmit its speed. Our paper is focused on the effective design of using the existing technology in cars rather than



An accelerometer is a device that measures proper acceleration. The proper acceleration measured by an accelerometer is not necessarily the coordinate acceleration (rate of change of velocity). Highly sensitive accelerometers are components of inertial navigation systems for aircraft and missiles. Accelerometers are used to detect and monitor vibration in rotating machinery.

FIRE SENSOR



A fire alarm circuit for security reasons. Equipment specifically manufactured for these Purposes are selected and standardized installation methods are anticipated during the design. Various circuits can be designed for this purpose. It is recommended that more than one smoke detector should be installed in a hallway if it is more than 30 feet long.

FLOAT SENSOR



Float Sensor is an electrical ON/OFF Switch, which operates automatically when liquid level goes up or down with respect to specified level. The Signal thus available from the Float Sensor can be utilized for control of a Motor Pump or an allied electrical element like Solenoid, Lamps, and Relays etc. Float Sensors contain hermetical sealed Reed Switch in the stem and a permanent Magnet in the Float. As the Float rises or falls with the level of liquid the Reed Switch is activated by Magnet in the Float.

TEMPERATURE & HUMIDITY SENSOR

The DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness.

4. RESULT

The blinking of the LED is controlled by the signal generator, which send a bit stream, e.g. 10101010 and then changes the stream as 11110000 llll 0000 based on the change in the speed of the ship.

The output of the receiver side where the LDR detects the bit stream transmitted by the LED light, produces a current and changes it into voltage and gives the amplified output. Further, the output of the receiver circuit can be fed into the microprocessor which changes into digital form and thus the transmitted data can be recovered back at the receiver side.

5. CONCLUSION

Taking into account the vast potential of Li-Fi technology it can be effectively used in applications like disaster management in the case of earthquake and floods, cheaper internet in air crafts, biomedical and underwater applications. In the case where wireless communication is affected due to environmental conditions Li-Fi can act as a reliable source.

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