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LIFI PRODUCT SYSTEM BASED ON VISIBLE LIGHT COMMUNICATION

K.Siva Prakash [1], Keerthana Vijayakumar[2], Kavinsankar Saravanan[3], Manjupriya Ganesan[4]

[1]*Assistant Professor,Department of ECE, KGiSL Institute of Technology, Coimbatore, India*
[2,3,4]*UG Scholar,Department of ECE,KGiSL Instsitute of Technology, Coimbatore,India*

Abstract__As the world wants to get equipped with fastest modes of technology, the inventions regarding the enhancement in the existing system or a change of the present system became more usual. One such proposed system for the fastest modes of data transfer is the LIFI technology. LIFI technology is based on the concept of transferring the information through illumination of light. Here LEDs acts as a major element for data transfer. This technology has proved that it is more efficient than the WIFI, though it is a widely existing system it faces challenges like availability, capability and security. Overcoming these challenges and making the source to acts as illuminating source and as medium of data transfer made the LIFI more preferable amoung the data transfer technologies. This paper is about the idea of implementing the technology in a departmental store where the LEDs make the data transfer about the details of the product so that we could eliminate the presence of humans for stock checking and can also make prior arrangements for products and so gaining customers and their satisfaction. The idea is carried out by using a controller, IR sensor, LEDs and a personnel computer where the details are displayed.

keywords__IR sensor, USB to TTL convertor.

I.INTRODUCTION

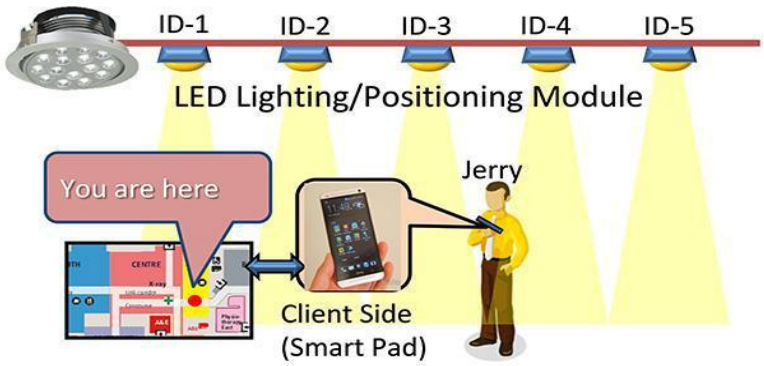
Over these years, humans turn towards the technology to surrender their work as the technology reduces the efforts of humans and also provides error free output in most of the cases. So there is a necessity of implementing a technology in ever y sectors so that we can globally increase the potential of every sectors. Thinking to make the use of LEDs in an enchanced way the plan is being implemented in a departmental store where there are numerous LEDs which can play the role of a light source as well as a data transferring medium. The concept is all about making the light to gather information about the product regarding their stock details and thereby making the LEDs to act as a LIFI transmitter. The received information is being displayed on personnel computer and thus eliminating the presence of human work in stock checking. The idea is carried out using IR sensor, arduino, USB to TTL convertor, lifi transmitter and lifi receiver. The IR sensor is being placed near to products and is interfaced with the controller. The IR sensor recognizes the movement of the product through heat and if found any variation or movement over the product the arduino makes the required action since it is interfaced with the sensor. The aurdino works in a programmed manner and performs appropriate function needed by the LIFI transmitter. The LIFI transmitter is nothing but the LEDs which holds the data send by the controller. The transistor acting as switch produces illumination so that the intensity of light can get hold of information transmitted. Variations in light, voltage and current in a electric circuitary is an important factor to consider as certain components accept and work under only specified range of current and voltage. Exceeding range may damage the component and create information loss. To adjust those variations variable resistor is used. The circuit also consists of an op-amp comparator to compare voltages and and allow only fixed voltage as arduino accept only the range of 5v. In the receiver side photodiode is used to perform light to current conversions. Most of the photo diodes are mostly solar cells made of silicon. The receiver section then proceeds with a USB to TTL performs serial communication making the output to get displayed in personnel computer. Thus its clear that it is a dual advantage scope and also the mode of transmission is secure and eco-friendly.

II. LITERATURE REVIEW

Product detection or positioning using lifi- visible light communication has already been carried using other schemes. Those are grey code technique and regression technique. These techniques made use of grey codes and LSS regression approach.

A.GREY CODE TECHNIQUE:

Gray code evaluates the nature of binary code or data that is composed of on and off indicators, commonly represented by ones and zeros. Developed by Bell Labs scientists, gray code has been used to look at clarity and error correction in binary communications. Gray code is also known as reflected binary code. This grey code can be used for indoor positioning and this idea has been practically implemented and tested. The principle object behind the process is the LED. The LED lamps are placed at a distance of 1m and is driven by the microcontroller unit (MCU) devices which is an android pad device interfaced with the PD module and a driver circuit. The PD is to detect the optical signal. A receiving software which can be used for signal processing and positioning. Manchester encoding is applied to alleviating the flicker problem associated with modulation in this experiment.



B. REGRESSION TECHNIQUE:

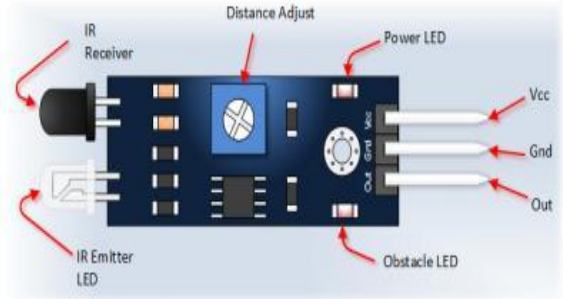
Regression method is a prediction method where you would predict the postioning of a system by means of mathematical calculations. It is fully a mathematical method.

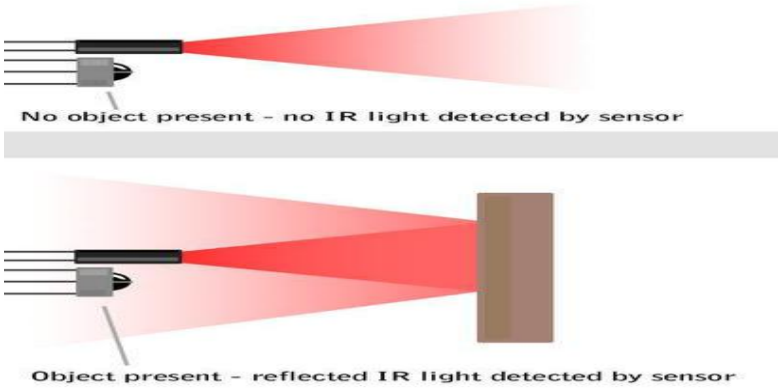
C.PROBLEM DEFINITION:

The common problem that is encountered in the positioning techniques are they both are complex methods. Firstly coming to grey code , when used on software implementations, they change the state of all three bits at the same time which is not the thing that grey code does. Grey code positioning system also wants the leds to be at the distance if 1m. Though it can avoid overlapping problems it sets the limitation of requiring a PD module inerfaced with the andrroid to receive the optical signal. Then, the regression approach is very cricital method and it lacks accuracy as the position is being predicted and judged. Humans are prone to error and so we cannot always receive a correct position. Since the concept is fully mathematical, humans usually do not give priority to adopt or impement the technique

III. IR SENSOR:

An infrared sensor is an electronic device that emits when there is a change in the aspects of the surrounding. The sensor can detect the heat of an object as well as can detect the motion of an object. The sensor used is made in connection with the product so as the movement in the product can easily get detected by the sensor. The IR sensor corresponds to a frequency of range 430THZ to 300GHZ and can cover upto a range of 100cm – 500cm. Once the infrared signal reaches product it bounces back its signal and the signal is received by infrared receiver. The emitter is simply a light emitting diode and the receiver is a photodiode which changes its resistances according to the input received. When there is no fall of light on the photodiode it has an infinite resistance and act as an open switch. The working of any Infrared sensor is governed by three laws: Planck's Radiation law, Stephen – Boltzmann law and Wien's Displacement law.





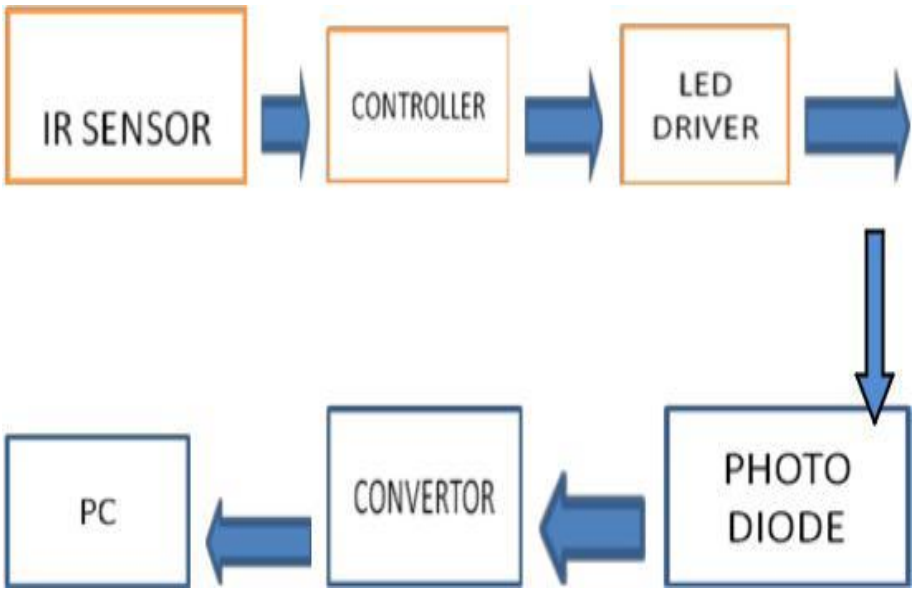
Based on this working the infrared sensor while acting as an open switch will transfer control to the arduino. Before the signal is transferred to arduino the voltage is being revised and sent to controller. From the operations it is observed that the motion in product is detected by the sensor and is being transferred to the controller for further operations.

VI.PROPOSED SYSTEM

There are various existing methods for data transmission over LIFI and object detection through LIFI but the system proposed here aims for providing low cost, efficient and secure data transmission. The scope of this proposed system is to make the store to get updated with their product details without human efforts. The main propagator of the project is nothing but the LEDs which serves as light and also as transmitter and receiver and thus adding advantage and making the process simple.

In this proposed system, the grey code technique and the regression technique used for object detection is completely eliminated with a motive of making the detection job easier to perform and understand. Grey code code is more oftenly used to control home based appliances but they often make error while performing binary conversion that are involved in the process of detecting and controlling the product or object. Due to this error in their conversion technique they failed to meet the requirements of humans. On the other hand regression technique involves many mathematical process to identify the product. Those mathematical steps are usually not preferred by humans as they require more human efforts. Inorder to avoid these complication an alternative technique is proposed. Controller is made in use to and it activates the lifi transmitter and receiver. Arduino is used as controller here since it can be reprogrammed as many times. This solution is easily understandable and can provide better performance than the existing system.

E. BLOCK DIAGRAM:



OVERVIEW:

LIFI:

Li-Fi is a technology for wireless communication between devices using light to transmit data and position. In its present state only LED lamps can be used for the transmission of visible light. The term was first introduced by Harald Hass during a 2011 TEDGlobal talk in Edinburg In technical terms, Li-Fi is a visible light communication system that is capable of transmitting data at high speeds over the visible light spectrum, ultraviolet and infrared radiation.

OWNER DEVICE:

Making the effective of this technology the process goes on in a simple way and finally the output is being displayed in PC. The owner will receive the details about the stock of the product and thereby making the stock checking work easier. It is a profitable method as well as secure method. The owner with this system can gain customers by providing continuous availability of commercial products.

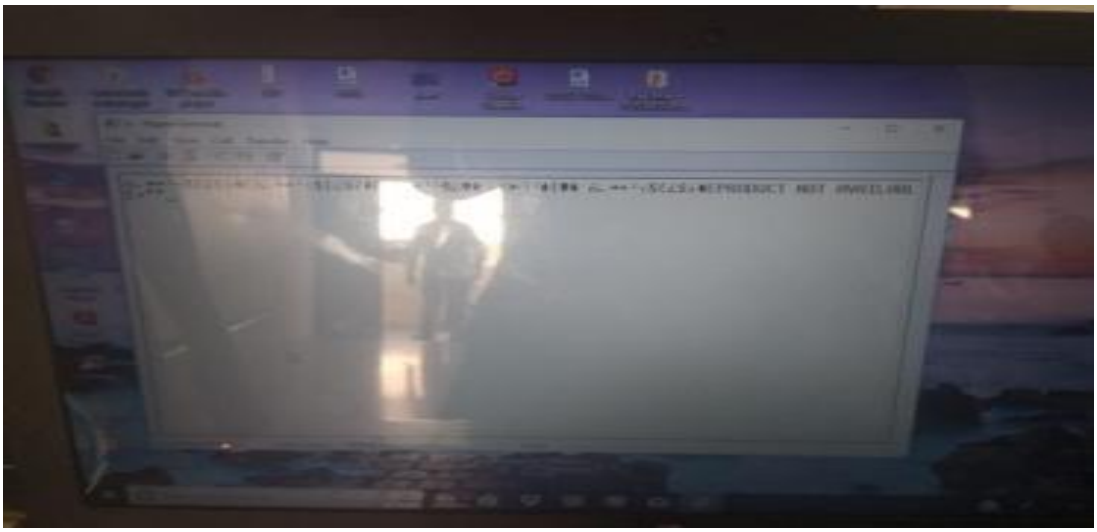
SOTFWARE IMPLEMENTATION:

ARDUINO NANO which is very much similar to the arduino UNO is used. The software is being programmed as per requirement with a simple C program.

VII. CONCLUSION AND FUTURE SCOPE

From the above observations, the system is proved to be cost effective ,secure and reliable. Since the medium of transferring information is light, the system plays dual advantage role. As you get the information as soon the product is not available it is easier to make prior arrangements for products. It saves human effort and is also a beneficial technique for positioning system. In future the system can be modified as like making the products to get displayed in an android application by enhancing positioning skills and also making the payment online thereby saving time.

IX. RESULT



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