

IOT BASED BEVERAGE INDUSTRIAL AUTOMATION USING VLC TECHNOLOGY

Prof. Smita Pawar^{#1}, Neha Upadhyay^{#2}, Priya Thorat^{#3}, Prachi Tailor^{#4}, Tanuja Pawar^{#5}

Department Of Electronics And Telecommunication

Xavier Institute Of Engineering

Smita.p@xavierengg.com^{#1}, nehaupadhyay964@gmail.com^{#2},
thoratpriya97@gmail.com^{#3}, prachitailor15@gmail.com^{#4},
tanuja2411@gmail.com^{#5}

Abstract

IoT is starting to become engrained in our everyday lives, as smart devices become part of life, and soon it will be hard to imagine life before it. It is predicted that there will be over 80 billion connected device by the year 2025 which is a very large number and the radio spectrum are limited and it will be difficult to handle such a large number of connected devices and the radio bandwidth will be insufficient. The VLC technology is gaining more and more popularities because of its larger bandwidth also it is energy efficient as well as it does not have any negative impact on the environment and human health unlike radio wave communication. Anywhere in industrial areas data has to be transmitted, VLC is capable of replacing slip rings, sliding contacts and short cables, such as Industrial Ethernet. Due to real time capability of VLC it is also an alternative to common industrial Wireless LAN standards. Due to constant growth of IoT and need of spectrum there is a growing interest in using IoT technology in industries. Automation in industry provides the advantages of improving productivity and quality. So a constant monitoring is required to avoid abnormal condition therefore, we have proposed IoT based beverage industrial automation using VLC technology.

Keywords: Li-Fi, IoT, Industrial Automation, Beverage, VLC.

1. Introduction

The main objective is to design the monitoring system for industrial parameter reducing human efforts using Visible Light Communication. The industrial parameters are not monitored and controlled properly, it occur to an abnormal condition. Monitoring is most important in industry. Monitoring is done by sensor with most accuracy and reliability. Arduino decodes the commands are given through Visible Light Communication with the help of LED and monitor the industrial devices. The interfacing between LI-FI transmitter and LI-FI receiver is done by Arduino.

Our project mainly aims at alleviating the problem for the health of the machines and helps them monitor without depending on human. Now a days industrialization as increases as well as increasing population they are releasing unwanted things in environmental especially in industry. This is one of the most upcoming issues in industrial sector. The present idea of our project is monitor the machine health to interface LI-FI with machine and help to communicate with the LI-FI. Here input such as sensors temperature sensor, level sensor, flow sensor and infra-red

sensor are given to ARDUINO development board. LI-FI is used to send a message through LED bulb. LI-FI provides uninterrupted output. This application is developed for monitor the machine health in industry. In existing project WIFI concept is used which is high cost and data transfer speed is 150Mbps .WIFI is difficult to transmit message to long range. The applicability of LI-FI concept is implemented in industrial sector itself to monitor the machine health. LI-FI is cheaper than WIFI because free band does not need license and it uses light.

2. Block Diagram Description

2.1 Transmitter

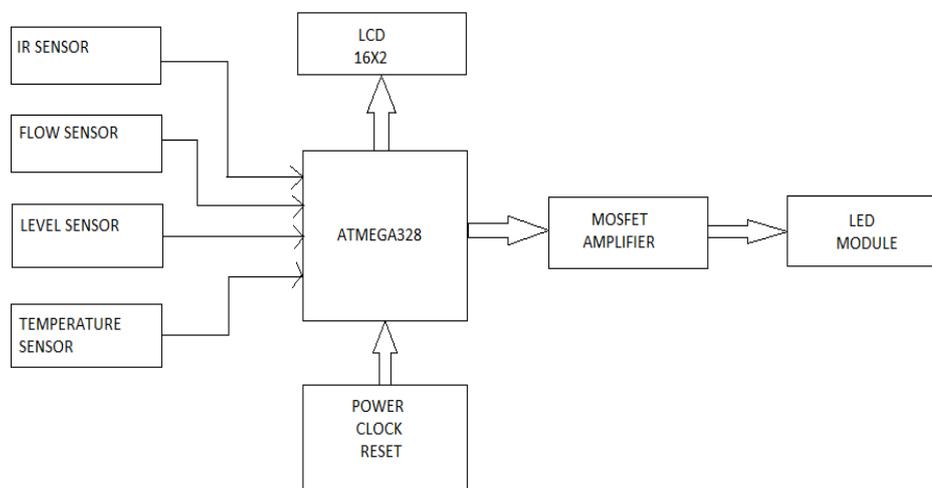


Figure 1. Transmitter

The transmitter section consists of sensors, controller, MOSFET amplifier, LCD, photo led for LIFI module and power supply. We are using ATMEGA328 controller which has 32Kb memory, 8 bit controller and has 28 pins, out of 28 pins VCC pin is given to the supply of 5V and ground pin is connected to ground. It works on crystal oscillator which works on 16MHz clock. It contains 16 analog pins and 14 digital pins, so that sensors are connected to analog pins. Here we are using Thermistor for temperature sensing, Float sensor for liquid level sensing, hall effect sensor for sensing the flow of the liquid, IR sensor for counting the product packages over a conveyer belt, these values are given to the controller. Controller performs three functions that are it converts the ac value to dc value of the sensor and also display it over an LCD. This information is then transmitted through LIFI module.

2.2 Receiver

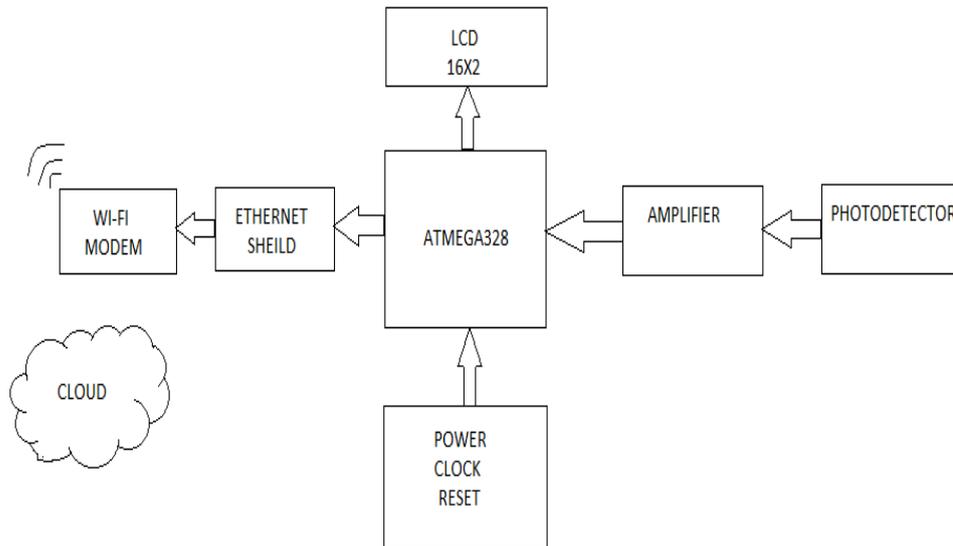


Figure 2. Receiver

In receiver section the transmitted light beam is received by the photo detector and given to the Rx pin of the controller but a received signal is very weak so the signal is first amplified by a transistor BD139 NPN transistor and is given to the controller. To check the data received at the controller and LCD is used to display the data. It is again a 16x2 LCD which is used in 4-bit mode. This processed data is also given to the receiver of the Ethernet shield where this Ethernet shield is used to write the data over the cloud using a software tool pubnub.in. Also this data is going to be displayed on dashboard using a software tool freeboard.io.

3. Methodology

Our project mainly aims at alleviating the problem for the health of the machines and helps them monitor without depending on human[5]. Now a days industrialization as increases as well as increasing population they are releasing unwanted things in environmental especially in industry. This is one of the most upcoming issues in industrial sector. The present idea of our project is monitor and control the machine health to interface LIFI with machine and help to communicate with the LIFI. Here input such as sensor, infrared sensor, temperature sensor, flow sensor and level sensor are given to ARDUINO development board. LIFI is used to send a message through LED module. LIFI provides uninterrupted output. This application is developed for monitor the machine parameters in industry. In existing project WIFI concept is used which is high cost and data transfer speed is 150Mbps .WIFI is difficult to transmit message to long range. The applicability of LIFI concept is implemented in industrial sector itself to monitor the

Smachine parameters. LIFI is cheaper than WIFI because free band does not need license and it uses light. Also IoT is used to upload the data on cloud so that it can be available to the user and the user can monitor it from anywhere in the world.

4. LIFI

Here we can understand the construction and working of the LIFI model. LIFI provides transmission of message through illumination by sending data via LED light module that varies in intensity faster than human eye can follow. It is possible to encode data in light by varying the rate at which the flicker on and off method. The LED intensity is regulated so quickly that human eye cannot observe, so the output appears constant. LIFI means light fidelity. It provides better bandwidth, efficiency, availability and security. It has high data rate of transmission and accuracy.[4]

5. Internet of Things

Internet of Things is a global network infrastructure consists of multiple connected devices that rely on sensory, communication, network and information processing technology. The main motive of IoT is to connect different things over the network. User experiences internet be different because the data information will live up in the cloud so the user can use the information on phone or any internet connected device.[2]

6. Conclusion

We have designed the industrial automation for monitoring the industrial parameters reducing human efforts using visible light communication and Internet of Things. The combination of both VLC and IoT is used to deliver uninterrupted output related to maintenance officer located anywhere at any time.

References

- [1] Qian. H , Xiaohang. L , Mark .S ,”Integrating Li-Fi Wireless Communication and Energy harvesting wireless sensor for next generation building management”, *International high performance building conference at Prude*,2014
- [2] Li Da Zu,” Internet of Things in Industries”,*IEEE Transactions on Industrial Informatics*,Vol.10,November 2014
- [3] Ashwini.D,Prajakta.P,Sangita.S,”Industrial Automation Using Internet of Things (IOT)”,*International Journal of advanced research in computer engineering and technology(IJARCET)*,Vol.5,February 2016
- [4] Jovan.I,Borisav.O,”Analysis of Visible Light communication system for implementation in sensor network”,*Infoteh-Jahorina Vol.15*,March 2016
- [5] Ojaswini.D,P. Gawande,”Design and implementation of industrial automation system using internet of things(IOT)”,*International research journal of engineering and technology(IRJET)*Vol.3,May 2016
- [6] K.Chintalapudi,A.Iyer,V. Padmanabham ,” Indoor Localization without pain” , *Proc.16th Annual International Conference .Mobile Computer Network* ,June 2016
- [7] A.Deepika,S.Shalini,M. Sheela ,”Applicability of LIFI technology for industrial automation system”, *International research journal of engineering and technology(IRJET)*Vol.5,February 2018