isrjournals

International Journal of Advanced Research in Electronics, Communication & Instrumentation Engineering and Development

Volume: 3 Issue: 1 Apr,2021,ISSN_NO: 2347 -7210

EXTRACTION OF BMS DATA AND ITS ACQUISTION USING LIFI COMMUNICATION FOR FACILITY MANAGEMENT

Ranjith Kumar[1], Anto Shelsea Shiny A[2], Dharshiga R[3], Ejolin Mercides E.J[4]

[1-4]Department of Electronics and Communication Engineering,

Jeppiaar Engineering College,

Chennai, Tamil Nadu, India.

ABSTRACT- Light fidelity (Li-Fi) technology is a wireless communication system which uses visible light spectrum for communication and to transmit data with high speeds in a secure manner compared to all existing traditional methods like (Wireless Fidelity) Architecture. In this project we employ Li-Fi technology in data acquisition of sensor data from Building Management systems. Building Management system consists of many sensors which can give a lag in data in turn a slower analysis when health's of the building or its related equipment's are measured. By employing this simple method in devising the fast response to alerts and alarms using this Li-Fi IoT combined devices we can eliminate more error losses. A simple sensor integrated circuit is designed in this project to acquire data and transform into user readable data with the help of high-speed Li-Fi communication. After the initial stages practical examinations and evaluations will be done to check the performance of the circuit and give out the best Key performance index of this project. As per the suggested plan by increasing the communication speed between sensor connected devices and the building equipment's we can observe a drastic change in the various test environments and in real world cases.

1, INTRODUCTION

This project we employ Li-Fi technology in data acquisition of sensor data in building management In system. By employing this simple method in BMS systems we can increase the speed of communication between the sensors and node, paves the way to higher speeds in data information exchange and wireless communication using light. The concept behind this technology is that the data can be transmitted with the help of light emitting diode (LED) bulbs and transmission rate can be control by using intensity of LED bulb which can be varies even faster than light intensity human eye can observe [1]. Keeping in mind number

of users increase day by day and heavy traffic of data, Li-Fi technology can be used as a solution to provide users an environment of high-speed data transmission.

II. RELATED WORKS

In this Light-fidelity the Indoor is very Hybrid Wi- Fi in particularly Systems and Omnidirectional communication using Li-Fi Networks of Navigation system using Li-Fi in a subtle way. Interference of kind of other light sources in the receiver terminals range limitations in basically omnidirectional communication using Li-Fi for all intents and purposes High power supply rates which limits the usage of battery and battery time, which particularly is fairly significant.

III. PROPOSED SYSTEM

To specifically Convert the Building Management System's Sensor data into light and transmitting over a fairly few distance using Li-Fi technology Data Acquisition from the sensor networks and display in a dashboard for sort of High-level user experience Encryption of sensor data while transmission using perfect coding methods and achieving the output at a desired time without any hinderance, contrary to popular believe. The Li-Fi system consists of mainly two parts, the transmitter and the receiver. LED light is used as signal source between two end systems. The transmitter part modulates the input signal with the required time period and transmits the data in the form of 1's and 0's using a LED bulb.

IV. SYSTEM REQUIREMENTS

SENSORS

Most of the android devices have built-in sensors that measure motion, orientation, and various environmental condition. The android platform supports three broad categories of sensors.

- Motion Sensors
- Environmental sensors
- Position sensors

Some of the sensors are hardware based and some are software-based sensors. Whatever the sensor is, android allows us to get the raw data from these sensors and use it in our application. For this android provides us with some classes. Android provides Sensor Manager and Sensor classes to use the sensors in our application. In order to use sensors, first thing you need to do is to instantiate the object of Sensor Manager class.

Volume: 3 Issue: 1 Apr,2021,ISSN_NO: 2347 -7210

A human has moved in or out of the sensor's range. They are commonly found in appliances and gadgets used at home or for businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

PIR SENSOR

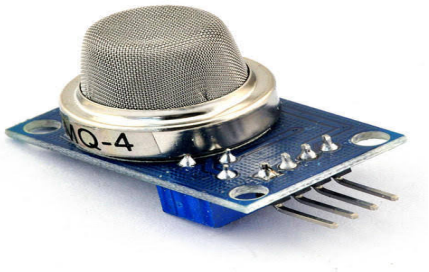
PIR sensors allow you to sense motion. They are used to detect whetherPIRs are made of pyroelectric sensors, a round metal can with a rectangular crystal in the centre, which can detect levels of infrared radiation. Everything emits low-level radiation, and the hotter something is, the more radiation is emitted. The sensor in a motion detector is split in two halves. This is to detect motion (change) and not average IR levels. The two halves a connected so that they cancel out each other. If one-half sees more or less IR radiation than the other, the output will swing high or low.

MQ 135 sensor

MQ135 Gas Sensor is an air quality sensor for detecting a wide range of gases, including NH3, NOx, alcohol, benzene, smoke and CO2. Ideal for use in office or factory. MQ135 gas sensor has high sensitivity to Ammonia, Sulphide and Benzene **steam**, also sensitive to smoke and other harmful gases. It is with low cost & particularly suitable for Air quality monitoring application.

Volume: 3 Issue: 1 Apr,2021,ISSN_NO: 2347 -7210

MQ 4 SENSOR



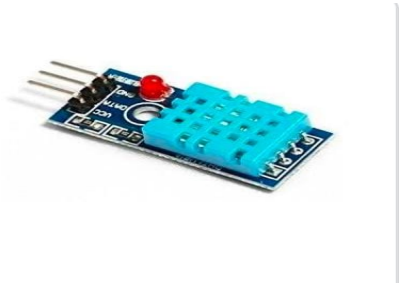
Sensitive material of MQ-4 gas sensor is SnO2, which with lower conductivity in clean air. When the target combustible gas exists the sensors, conductivity increases higher along with the gas concentration rising.

MQ-4 gas sensor has high sensitivity to Natural gas, Methane and could be used to detect both Methane and Propane. The sensor could be used to detect different combustible gas especially Methane, its low cost and suitable for different application.

MQ 7 SENSOR

Sensitive material of MQ-7 gas sensor is SnO2, which with lower conductivity in clean air. It makes detection by method of cycle high and low temperature, and detect CO when low temperature (heated by 1.5V). The sensor's conductivity is higher along with the gas concentration rising. When high temperature (heated by 5.0V), it cleans the other gases adsorbed under low temperature. Please use simple electro circuit, convert change of conductivity to correspond output signal of gas concentration. MQ-7 gas sensor has high sensitivity to Carbon Monoxide. The sensor could be used to detect different gases contains CO, it is with low cost and suitable for different application.

DHT 11 SENSOR



DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc… to measure humidity and temperature instantaneously.

DHT11 humidity and temperature sensor is available as a sensor and as a module. The difference between this sensor and module is the pull-up resistor and a power-on LED. DHT11 is a relative humidity sensor. To measure the surrounding air this sensor uses a thermistor and a capacitive humidity sensor.

3.4 ARDUINO

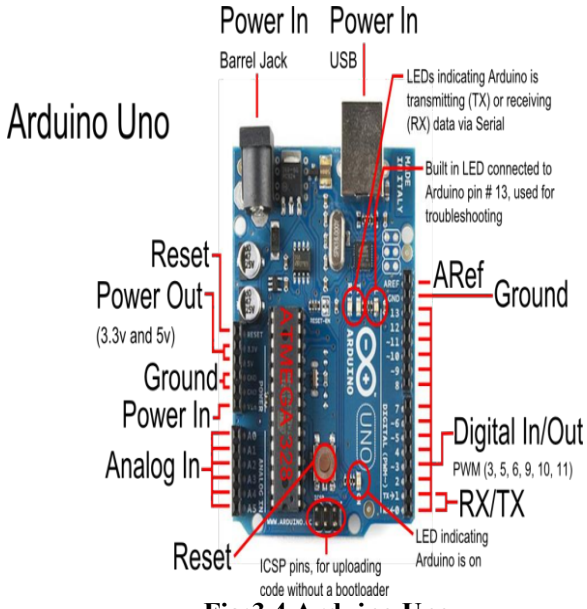


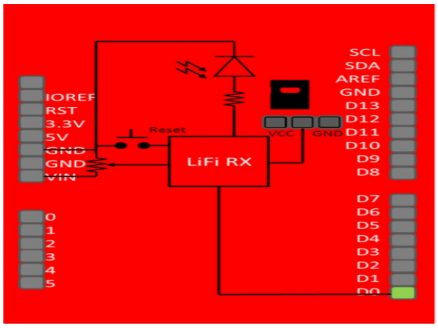
Fig:3.4 Arduino Uno

Volume: 3 Issue: 1 Apr,2021,ISSN_NO: 2347 -7210

To use the voltage divider as a sensor reading device first you need to know the maximum voltage allowed by the analog inputs you are using to read the signal. On an Arduino this is 5V. So, already we know the maximum value we need for Vout. The Vin is simply the amount of voltage already present on the circuit before it reaches the first resistor. You should be able to find the maximum voltage your sensor outputs by looking on the Datasheet, this is the maximum amount of voltage your sensor will let through given the voltage in of your circuit. Now we have exactly one variable left, the value of the second resistor. Solve for R2 and you will have all the components of your voltage divider figured out! We solve for R1's highest value because a smaller resistor will simply give us a smaller signal which will be readable by our analog inputs.

LIFI Transmitter

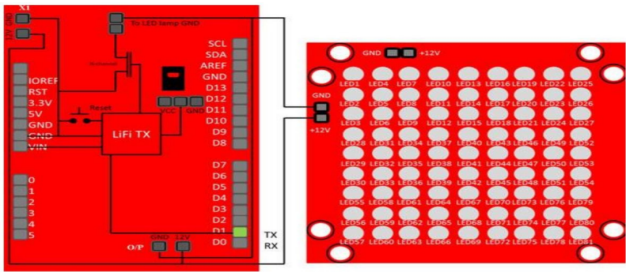
The Tx side will transmit the data. It is connected to arrays of led through which data is transferred. This data will be received by the receiving side (Rx) side.



LIFI Receiver

In the receiver end Arduino uno is used. The receiver side will receive the data that is transmitted through the led panel. This output will be displayed in the LCD connected to the Arduino. Li-Fi receivers that use visible light communication . That signal is then decoded into an audio, text, or video file on a connected device. The photovoltaic layer is ultra-thin and transparent, and can be integrated between the screen and touchscreen layer of a device.

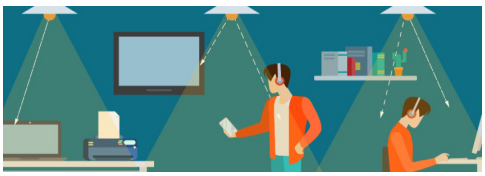
Volume: 3 Issue: 1 Apr,2021,ISSN_NO: 2347 -7210



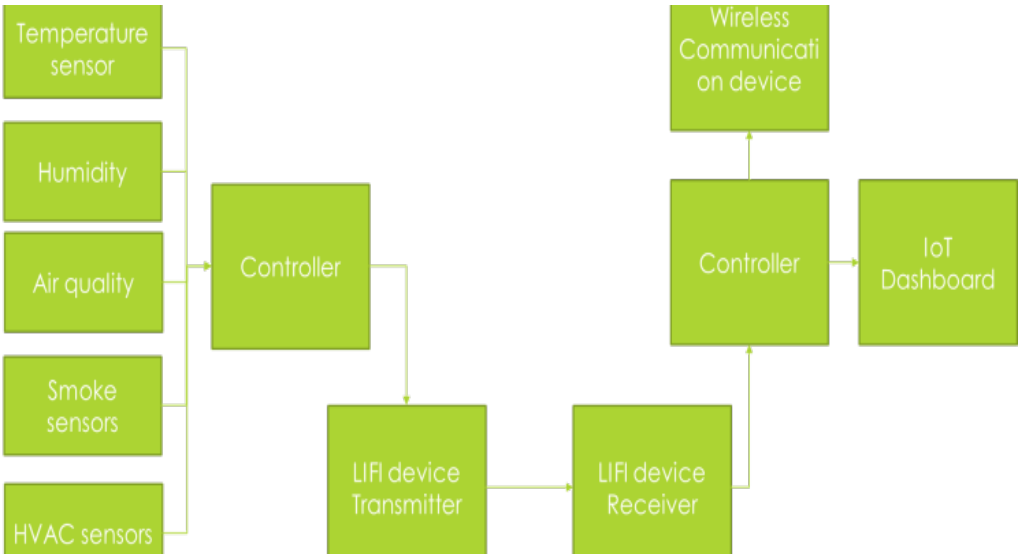
V. Implementation and Methodology

Li-Fi is the short form of "Light Fidelity". It works on the principle of Visible Light Communication (i.e., VLC). The network is also referred as VPAN or VLC Personal Area Network. The VLC transmits data by intensity modulation. It uses LEDs and Laser diodes (or photo detectors) at transmit and receive ends respectively. It works in 380 nm to 780 nm optical band which is visible light and hence the name VLC.

Basic concept diagram Li-Fi



BLOCK DIAGRAM



Volume: 3 Issue: 1 Apr,2021,ISSN_NO: 2347 -7210

The above figure 1 shows the block diagram of proposed methodology. The system consists of temperature sensor, humidity, air quality, smoke sensors, HAVC sensors, the sensors are connected to the controller where a power supply of 5v range (the volt supply varies from 12v but we consider 5v) is connected to it. The data from all the sensors are collected and transmitted to the receiver and it is displayed on the LCD screen. This whole process is done by the Li-Fi connection where the data is transmitted in the form of light and the solar plate is arranged to get the light impulse. At the receiver side we have amplifier so that we can avoid the unwanted signals.

The VLC standard or VPAN standard defines three classes of devices viz. infrastructure, mobile and vehicle. These devices operate in one of the three topologies mentioned below. The different device has different coverage range, data rate and other requirements.

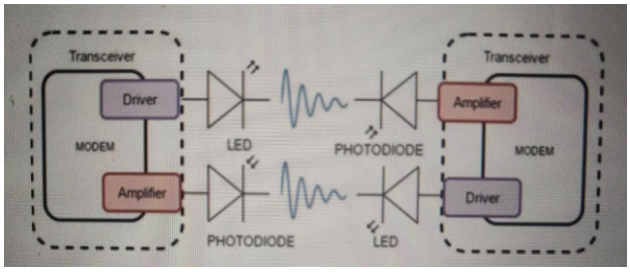


Fig 3.5 Transceiver Li-Fi based on VLC

Working of Li-Fi

Li-Fi is a VLC (visible light communication) system. It uses a photo Detector (photodiode) to detect incoming signals and decode the data received into digital form. The LED light bulb uses a fast-alternating stream of dim and bright signals that are invisible to the human eye.

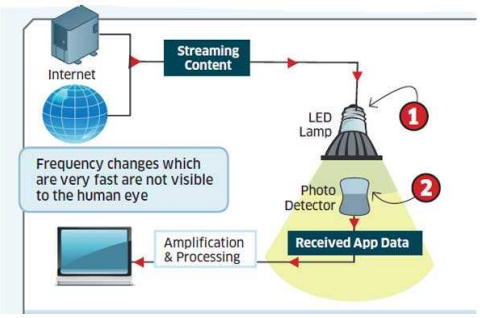


Fig 3.5.2 Basic diagram for working of Li-Fi

First, data is fed to the LED bulb. The bulb operates on signal processing technology so it is capable of sending the data in an embedded format high rapid speeds to the Detector which in this case is the photodiode. The photodiode then converts the incoming beam of light into electrical signals. The electrical signals are then converted into streamable data.

CONCLUSION

Datas are thus got transmitted from a room to the next room in their dashboard in high speed and full data security. It can be even from the mobile phone which is connected.We solved the speed and security issues using LIFI in this BMS.

REFERENCES

[1]1 .Global statistics-Global 5G subscriptions forecast 2019-2023,2020[online] Available https://www.5gamericas.org/resources/charts-statistics/global/.

[2]V.Alekseeev and D. Dine, “simulation framework for realization and quality of service in Li-Fi Network”, International Conference Automatics and Informatics 2017,pp.201-204,4-6 October 2017.

[3]E Ramadhani1 and G P Mahardika1,Published under licence by IOP Publishing Ltd

[4]IOP Conference Series: Materials Science and Engineering, Volume 325, International Conference on Information Technology and Digital Applications (ICITDA 2017) 8–9 November 2017, Yogyakarta, Indonesia Citation E Ramadhani and G P Mahardika 2018 IOP Conf. Ser.: Mater. Sci. Eng. 325 012013.Kuppusamy P, Muthuraj S and [7]Gopinath S 2016 Survey and challenges of Li-Fi with comparison of Wi-Fi Proc. 2016 IEEE Int. Conf. Wirel. Commun. Signal Process. Networking (WiSPNET 2016) 896-9 no. March

[5]Khandal D and Sakshi J 2014 Li-Fi (Light Fidelity) - The future technology in wireless communication Int. J. Inf. Comput. Technol. 4 1687-94

[6]Haas H, Yin L, Wang Y and Chen C 2016 What is LiFi? J. Light. Technol. 34