

Patient Monitoring In Hospital Using Li-Fi

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ABSTRACT: *Li-Fi stands for Light Fidelity. Li-Fi technology, proposed by the German physicist Harold Haas, provides transmission of data through illumination by sending data through an LED light bulb that varies in intensity faster than the human eye can follow. Li-Fi is a bidirectional, high speed and fully networked wireless optical communication and is a form of visible light communication. The proposed model helps in the Patient monitoring in the hospitals and can be done by using the concept of Li-Fi instead of the Wi-Fi technology to avoid the frequency interference with the human body. Sensors such as temperature, and heartbeat used in this model perform its respective functions. These sensors collect the data from the human body and are converted in to the digital form using the analog to digital converter and the outputs of these sensors are given to the microcontroller. The output from the microcontroller is fed to the Li-Fi module which transmits the data in the form of light and the receiver end collects this data and then displays the parameters on LCD in doctor's cabin.*

KEYWORDS: *IOT, Embedded System, Li-Fi, Sensors, Micro-controller.*

1. INTRODUCTION

In the era of emerging technology, it is necessary to find better solutions for every activity. Patient monitoring can be done in a very efficient manner using the Li-Fi technology. Patient monitoring done by the Wi-Fi is slower when compared to the Li-Fi and it also has less bandwidth.

Reliability is better in Li-Fi than Wi-Fi. Since transmission of data by Wi-Fi is through RF waves, there is a high possibility that these waves might affect the human body. The designation of these signals may be carcinogenic and this has been given by the World Health Organization. To solve this problem, Li-Fi (light fidelity) technology is used for healthy environment. Light fidelity is transmission of information through optical wireless medium. In this model, sensors such as heartbeat, temperature, and blood pressure are used transmitted through the Li-Fi module. Rapid pulses are generated in the form of 0s and 1s. Silicon photo diode is used at the receiver end. Flickering of light takes place at the rate of hundreds of megabits per seconds. By using UART, the receiver is connected to computer. The information is displayed in computer can be sent as a mail to the person concerned. The range of the Li-Fi technology is 10m and secured communication is possible. The transmission of information by light through wireless is termed as Visible Light Communication (VLC)

The reason for depending on wireless network in hospital is the cables which are running over the patient's body interconnecting the devices may cause contamination. Dependency on the wireless internet increases the burden on wireless fidelity (Wi-Fi) technology which, in turn, creates a huge demand for bandwidth and radio spectrum [1]. To reduce the load on Wi-Fi, an alternate mean of wireless internet is Li-Fi finds which find its applications in almost every field, even in vehicle technology [2].

For a long time, medical technology has lagged behind the rest. The scope for wireless communication in the medical field is set on the rise; there are many devices which work on Wi-Fi such as infusion pumps, defibrillators, lung ventilators, and anesthesia machine. When a doctor is supposed to use magnetic resonance imaging scanners along with infusion pumps, which work on Wi-Fi there results a frequency-overlapping problem. With more and more number of wireless medical devices coming up, utilizing the radio frequency spectrum increases which lead an electromagnetic interference (EMI) that results in potentially hazardous events related to medical equipment operations [3]. Apart from the interference with medical equipment, an EMI affects human body also in the form of diseases, immune dysfunction, electromagnetic hypersensitivity, etc., and in worst case, it may lead to cancer. Another limitation of Wi-Fi in hospital system is its security issue. Patient information must be private and secure but remain accessible to authorized persons. Hospitals are places where both EMI sensitivity and security of medical details are issues with the uses of Wi-Fi. To combat the above limitations of Wi-Fi in health monitoring system, Li-Fi is used, which is a novel technology for high-density wireless data coverage radio interferences in restricted areas [4].

2. PROBLEM STATEMENT

The radio frequencies are harmful for human beings so our proposed technology uses LED's for data transmission which ultimately increases the speed of data transmission and reduces the power consumption and use the wide range of bandwidth.

3. EXISTEM SYSTEM

In general, the Temperature, Pressure and Heart Beat of the patients in ICU are sensed by sensors and monitored by computer or the readings are taken manually. As the technology grows, these are performed using Wi-Fi. But, Wi-Fi is not advisable to use in ICU. Hence, the eco-friendly technology called Li-Fi has bloomed into existence, where many devices in a room can exchange data using light. This is called as Visible Light Communication (VLC). In Bio-medical field, the usage of Li-Fi has extended in transmitting the Electroencephalography (EEG) signal via VLC link.

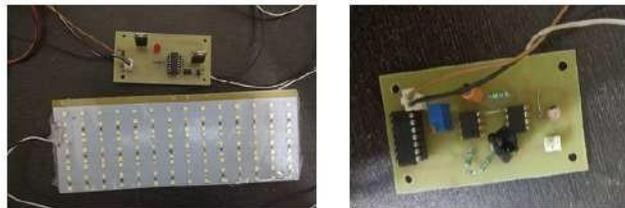
4. PROPOSED SYSTEM

The patient in ICU needs ultimate care and continuous monitoring. The Temperature, Pressure and Heart beat of each patient are sensed by corresponding sensors. These analog signals are converted into Digital form and are stored in a Microcontroller. From the microcontroller the data is transmitted through the light and received by a Photo detector. The receiver which is placed in the room, containing Universal Asynchronous Receiver

Transmitter (UART) can be connected receiver model and the values can be displayed continuously. Hence, the patient can be monitored 24*7 and their details are updated easily.



Fig2. Designed system



a. LiFi Transmitter

b. LiFi Receiver

Fig3. LiFi modules

5. SYSTEM ARCHITECTURE

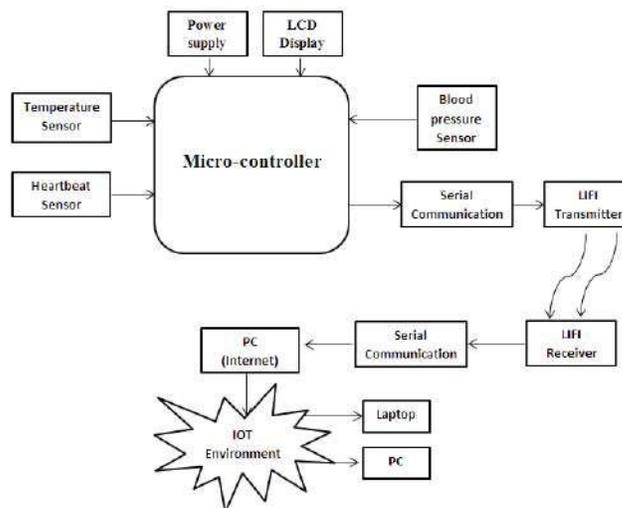


Fig.4 Proposed block diagram

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6.RESULTS



Fig4. Project title on LCD



Fig5: Working Module



Fig6: Final Results

7. IOT RESULTS



Fig7: Link Of Patient Record

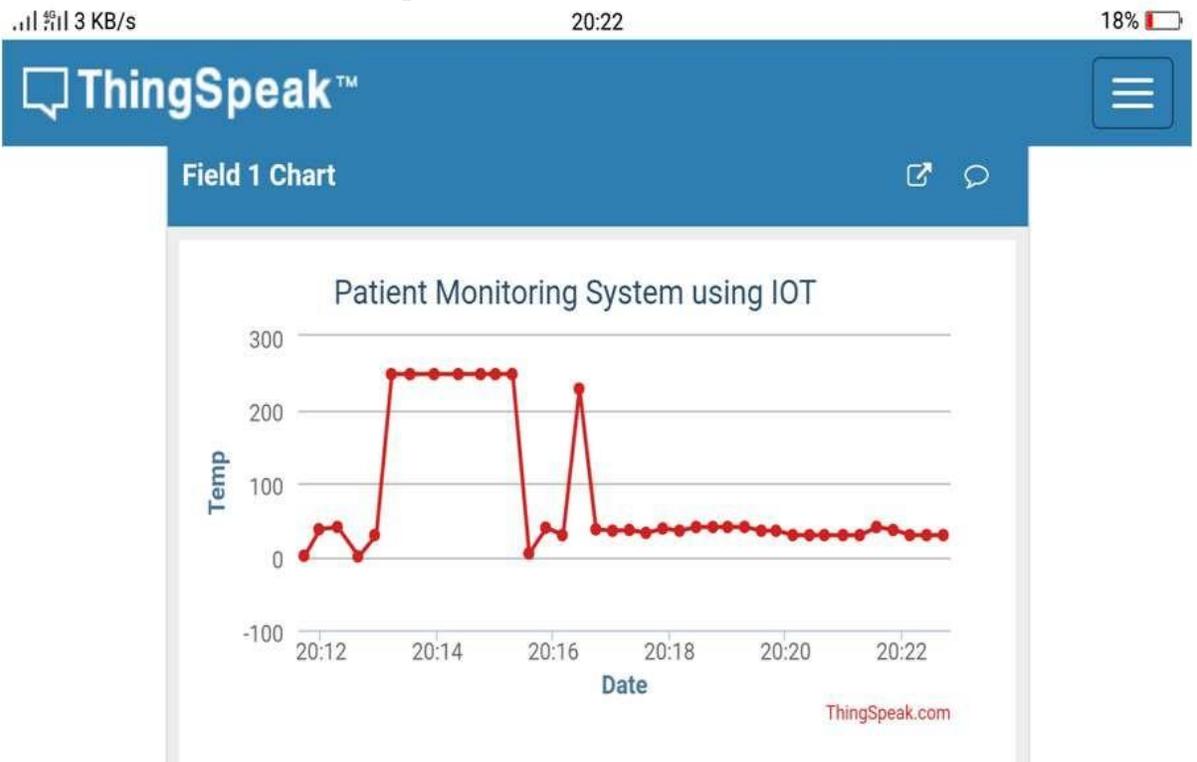


Fig8: Temperature Record Of Patient

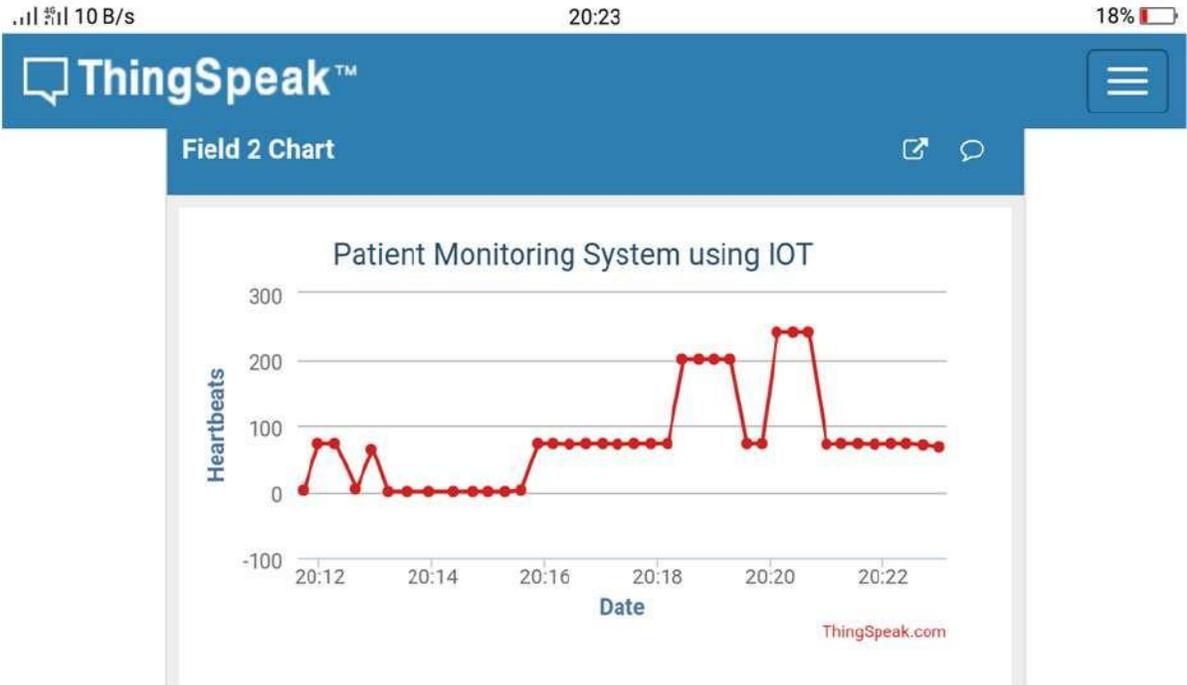


Fig9: Heartbeats Record Of Patient

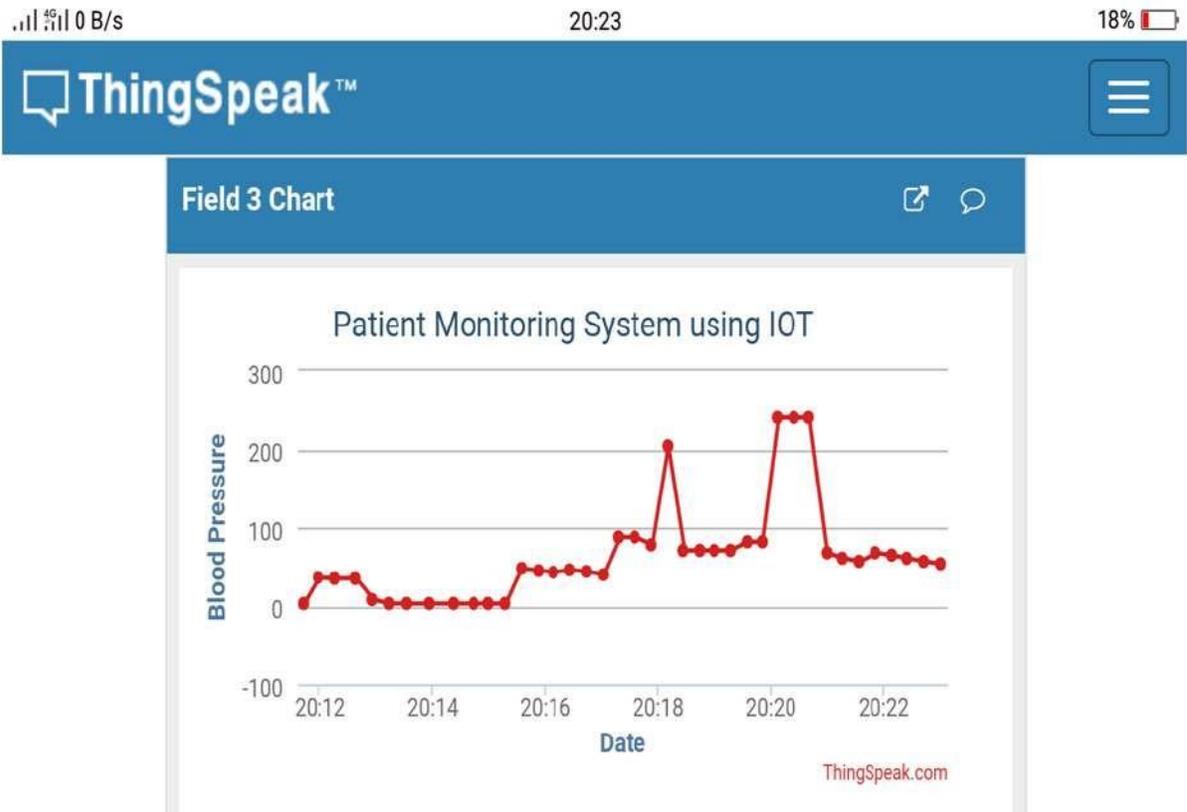


Fig10: Blood Pressure Record Of Patient

8. CONCLUSION

We had designed a biomedical sensor based system by which we are getting some necessary parameters of patient such as temperature, blood pressure and heart rate. As the use of radio frequencies are restricted in hospitals so we are using LiFi for communication. Patient data is send to doctor via LiFi communication. Further we are sending the same data on server so that if doctor is not available in hospital he can access it on internet and can take decision. This system is much useful in hospitals.

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