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HEALTH CARE MONITORING USING LIFI

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Abstract: Manual patient monitoring by nursing personnel is the norm in hospitals and is done around the clock. It takes a lot of people to keep track of the vitals of newborns and severely sick patients, therefore nursing homes often struggle to meet demand. The patient's condition can deteriorate to a lethal state in the event of noncompliance or postponement. Many wireless technologies have been suggested to monitor the patient's status using various sensors; nevertheless, these schemes may interface with medical equipment and are detrimental to patients and newborns. A Li-Fi based health monitoring system that continually displays the patient's vitals (heart rate, temperature, respiration rate) on an LCD has been suggested as a way to create a hospital-friendly monitoring system. Notification will be sent to the appropriate personnel in the event of any irregularities.

1. INTRODUCTION

Finding better solutions for every task is essential in this age of developing technologies. The need for technology-based health care systems has grown in recent years in response to rising health care costs. Li-Fi technology allows for highly efficient patient monitoring. For the purpose of guiding management decisions, including when to make therapeutic interventions, and assessment of those interventions, patient monitoring involves "repeated or continuous observations or measurements of the patient, his/her physiological function, and the function of life support equipment" (Hudson, 1985,).

When compared to Li-Fi, patient monitoring using Wi-Fi is slower and has less bandwidth. When compared to Wi-Fi, Li-Fi offers superior reliability. Wi-Fi data transmission uses radio frequency (RF) waves, which might potentially have harmful effects on human health. The World Health Organization has classified these signals as potentially carcinogenic. Li-Fi (light fidelity) technology is used to address this issue in a way that promotes a healthy atmosphere. Data transfer over optical wireless media is known as light fidelity. Through the Li-Fi module, vitals including temperature, respiration rate, and heart rate may be sent. The generation of rapid pulses is done using binary digits. The receiving end makes use of a photo diode. Light flickers at a rate of several hundred megabits per second. A mobile device may be linked to the receiver over Bluetooth. With the help of an app, the data received by the smartphone may be seen on the go. Secured communication is feasible within the 10m range of Li-Fi technology. Visible Light Communication refers to the wireless transfer of data by light.

Over the last several decades, wireless sensor networks have found widespread use in healthcare, particularly in the areas of emergency management, intensive care unit (ICU) patient monitoring, chronic disease (CV) patient monitoring, and incubator (NICU) baby monitoring. Data transmission monitoring makes use of a number of different wireless technologies, including Bluetooth, Zigbee, Wi-Fi, and many more. Due to its complicated networking challenges, short range, sluggish speed, and high power consumption, Bluetooth is not an ideal option for WSN. The Zigbee's low power consumption is a benefit in healthcare, but the range is a drawback; it only consistently works within a 10-100m radius. Due to its high data rate and range, Wi-Fi has also found widespread usage in healthcare monitoring systems. However, when dealing with a large number of linked devices, it suffers from the same issues as other wireless networks: excessive power consumption and poor performance. Use of radio frequency (RF) in healthcare facilities has the potential to impact patient health due to its harmful impacts, in addition to the aforementioned issues with wireless technology. Medical equipment including scanners, ventilators, and electrocardiography machines are susceptible to interference by electromagnetic radiation.

2. LITERATURE REVIEW

cutting-edge tech, At the 2011 TED Global Conference in Edinburgh, he showcased an example of Li-Fi and explained its benefits, including how it may replace Network wireless. Many individuals have worked on this technology as a result of his study [5]. Then, Liang Yin, an IEEE student, and Prof. Harald Hass tried to differentiate between visible light communication (VLC) and light-fidelity (LiFi). They also showed us how LiFi uses LEDs to improve upon VLC [6].

In December of 2013, Harald Hass, together with Professors Svilen Dimitrov, ThiloFath, and Irina Stefan, among many others, worked on the idea of Li-Fi modulation and networked Li-Fi attocells, which went on to become a huge success [7].

Clinicians have a limited grasp of how their patients' illnesses and treatments impact their day-to-day lives, according to 2014 study by professor Eugene C. Nelson and researcher Elena E. ftimovska. To address this issue, several validated measures have been created to collect patient-reported outcomes, such as symptom status, physical function, mental health, social function, and overall well-being, throughout the last 30 years. Researchers or service payers have mostly pushed the patient reported outcome measures (PROMs) movement's agenda, which has not adequately prioritized patients' views on how to improve care quality [8].

3. METHODOLOGY

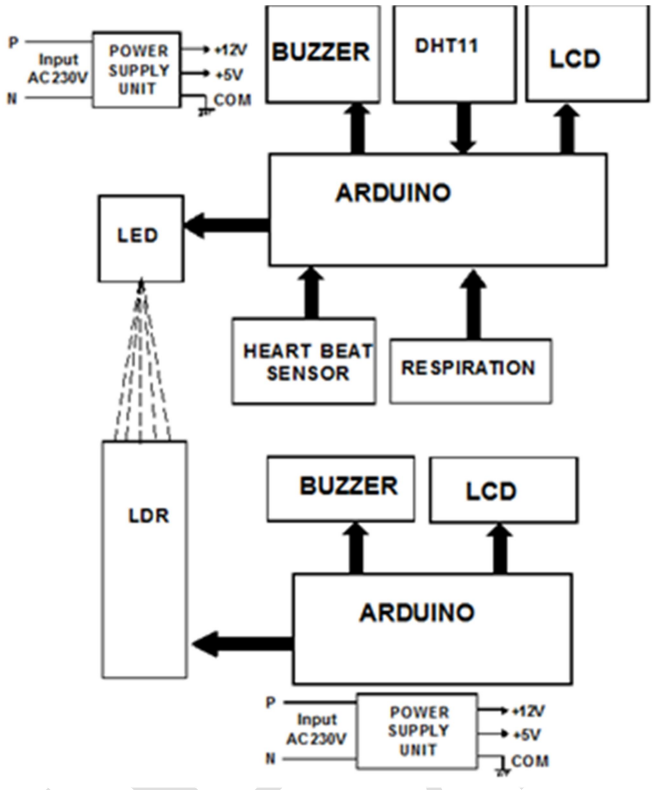

Fig: Block diagram

When compared to Li-Fi, patient monitoring using Wi-Fi is slower and has less bandwidth. When compared to Wi-Fi, Li-Fi offers superior reliability. Wi-Fi data transmission uses radio frequency (RF) waves, which might potentially have harmful effects on human health. The World Health Organization has classified these signals as potentially carcinogenic. Li-Fi (light fidelity) technology is used to address this issue in a way that promotes a healthy atmosphere. Data transfer over optical wireless media is known as light fidelity. Through the Li-Fi module, vitals including temperature, respiration rate, and heart rate may be sent. The generation of rapid pulses is done using binary digits. The receiving end makes use of a photo diode. Light flickers at a rate of several hundred megabits per second. A mobile device may be linked to the receiver over Bluetooth. With the help of an app, the data received by the smartphone may be seen on the go. Secured communication is feasible within the 10m range of Li-Fi technology. Visible Light Communication refers to the wireless transfer of data by light.

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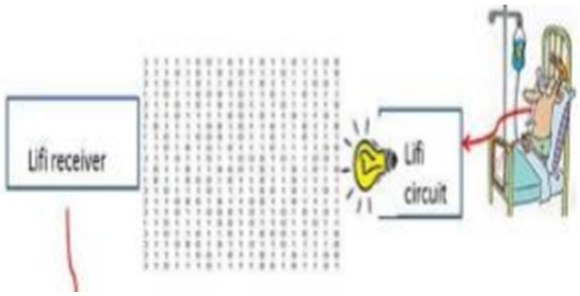
networking challenges, short range, sluggish speed, and high power consumption, Bluetooth is not an ideal option for WSN. The Zigbee's low power consumption is a benefit in healthcare, but the range is a drawback; it only consistently works within a 10-100m radius. Due to its high data rate and range, Wi-Fi has also found widespread usage in healthcare monitoring systems. However, when dealing with a large number of linked devices, it suffers from the same issues as other wireless networks: excessive power consumption and poor performance. Use of radio frequency (RF) in healthcare facilities has the potential to impact patient health due to its harmful impacts, in addition to the aforementioned issues with wireless technology. Medical equipment including scanners, ventilators, and electrocardiography machines are susceptible to interference by electromagnetic radiation.

All of the issues listed above may have a solution with Li-Fi. With Li-Fi, data may be sent at a speed of 800 Mbps by use of light-emitting diode lamps. Patient health and medical device performance are unaffected by Li-Fi since it is human-friendly. When compared to competing wireless standards like Bluetooth and Wi-Fi, Li-Fi offers superior data rates, security, and affordability. Compared to other RF technologies, Li-Fi's spectrum is 10,000 more extensive since it makes use of visible light. Because its prototype is simply implementable with the use of LEDs and photodiodes, Li-Fi provides a solution that is both inexpensive and simple to implement. In a healthcare setting, LEDs are both aesthetically pleasing and safe for patients. Infants' vitals, including their heart rate and oxygen saturation level, may be tracked via Li-Fi in incubators, according to reports. Message recovery is complicated, and there is a limit to the bandwidth available when using Phase Shift Keying (PSK) for communication. This article proposes a hospital-based health monitoring system that is based on Li-FI. The patient's vitals, including temperature and heart rate, have been tracked and sent over Li-Fi in this study.

LIFI

A child can easily understand and use the Li-Fi module. A logic 1 indicates data transmission and a logic 0 indicates no data transfer; this is based on the idea of light-emitting diodes (LEDs). data. With the use of sensors, Li-Fi enables patient monitoring. The model's temperature, heart rate, and accelerometer sensors all work together to provide the required results. An analog-to-digital converter is incorporated into the AVR ATMEGA microcontroller, which is used to transform the observed data into digital form. After then, the Li-Fi module uses light to transfer the data. Turning the lights on and off shows that the data is there or not. The blinking of these LEDs creates a series of ones and zeroes, which in turn generates rapid pulses.On the receiving end, a photo detector picks up the light.



Working Model Of Li-Fi

Temperature sensor

The LM35 is the temperature sensor that is suggested for use in this model. This device measures the temperature of the patient using a thermistor.The power output is directly proportional to the Celsius temperature. The patient's temperature is taken using the present fluctuations.

Heartbeat sensor

It has a light detector and a dazzling red LED. Depending on the strength of the light measured by the detector, a current is generated when the finger is brought near to the sensor, allowing a certain quantity of light to flow through. The detector picks up on a higher light intensity when the finger isn't there. In this way, data is derived from the pulses that are recorded according to the fluctuations in the current.

4. RESULTS

5. CONCLUSION

Li-Fi networks are quickly becoming the standard for next-gen healthcare facilities. Using a single prototype model, this experiment demonstrates how VLC may be used to HMS. It has been shown that the Li-Fi network may be used for the safe and fast transmission of physiological data, including temperature, blood pressure, and heart rate, among

other indicators. This technology enables the use of the internet in conjunction with equipment that rely on radio waves, which speeds up the diagnostic process. With its entirely automated nature, the suggested technology has the potential to revolutionize the medical industry.

Everything needed to finish this job was done, and the end product was better than expected. Being a prototype module, it has undergone extensive revisions to account for technological advancements and the introduction of new and better ways of medical devices for accurate diagnosis. There was a need to make a more compact, lightweight, and aesthetically pleasing module as the hardware employed in this project was somewhat large. However, when this prototype module was transformed into an engineering model, all of the cumbersome components could be fit into a single chip.

An adequate knowledge of human anatomy and physiology is essential for engineers to comprehend the interconnections between engineering methods and the living sciences.

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