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Monitoring the Temperature and Heart Rate of Human Using Li-Fi Technology

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Abstract: *In today's fast moving world, Li-Fi is emerging as one of the best technology of the Era. 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 [1]. It 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 graph for the different parameters using the PC. This report of the patient can be sent to the concerned person through e-mail.*

Keywords: Li-Fi, Monitoring, LED, Heart Rate, Temperature

I. INTRODUCTION

Li-Fi is a technology where data transmission takes place through illumination of LED light bulb whose intensity varies that which can't be followed by normal human eye Fig 1.
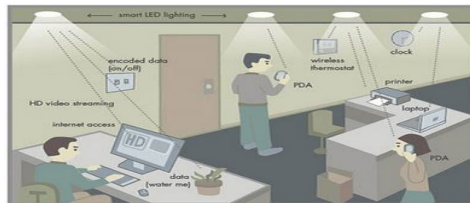

Fig. 1 Basic Architecture of Li-Fi network

Achieving Communication through Light: Let's start with the foremost communication device which everyone has in their homes i.e. a remote control. A remote control has an Infrared-LED. It creates a single data stream and the data rate achieved is around 10000b/s to 20000b/s. Now if we replace the remote control with a light box, we are able to transmit 1000's of data stream in parallel at high speeds [2]. This technology is termed as Spatial Modulation Fig 2.
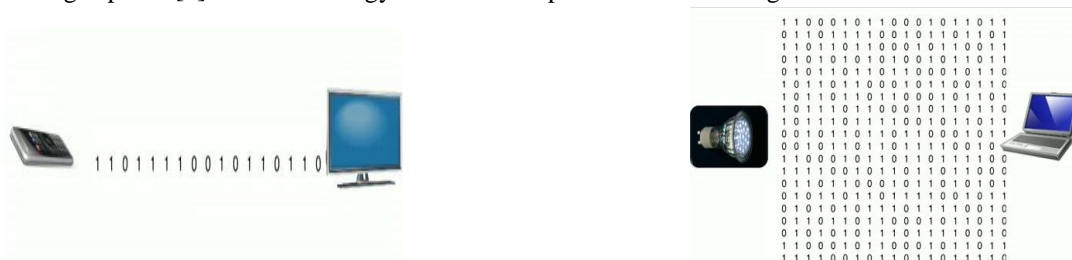

Fig. 2 Transmission of data

Li-Fi is a revolution in data communication in twenty first century. Li-Fi technology is similar to that of fiber optics communication where data transmission takes place through a LED at a higher intensity [3].

Li-FI technology is applicable in many different fields like navigation, under sea communication, security system, etc.
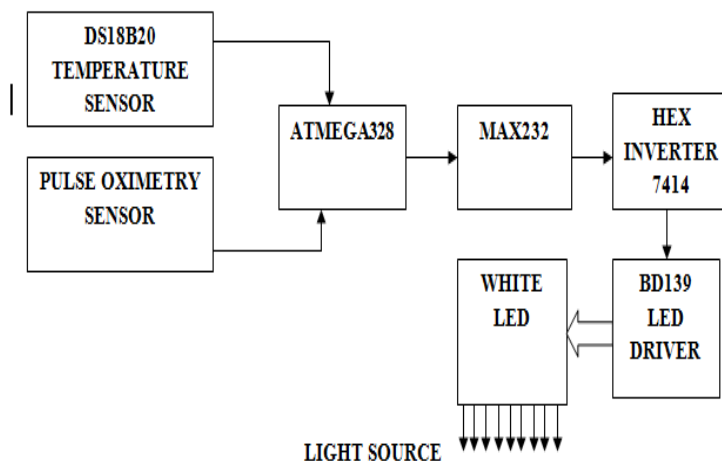
II. DESIGN METHODOLOGY

Transmitter block is divided into three section first section in a sensor part where pulse-oxi meter and temperature is connected to microcontroller atmega328 which is 8 bit 28 pin microcontroller with 32kb flash and 4kb ram which convert the information to digital and sends the same information to second section which consist of MAX232 unit this IC converts the CMOS to rs232 format then once again its converted to TTL which is then fed in to hex inverter this third section is led light array with transistor BD139 with white led is used to convert the electrical high speed pulse into light Fig 3.

Receiver block is divided into two section first section is photo receiver part which receives the light and convert it to electrical signal due to ambient light noise will be added which will be removed after receiving as the received signal is poor in this IC converts electrical signal into digital values after this ATMEGA-328 reads the data and displays it on LCD if the received temperature or heart beat is more or less than threshold than alarm will be turned on [4].

III. BLOCK DIAGRAM
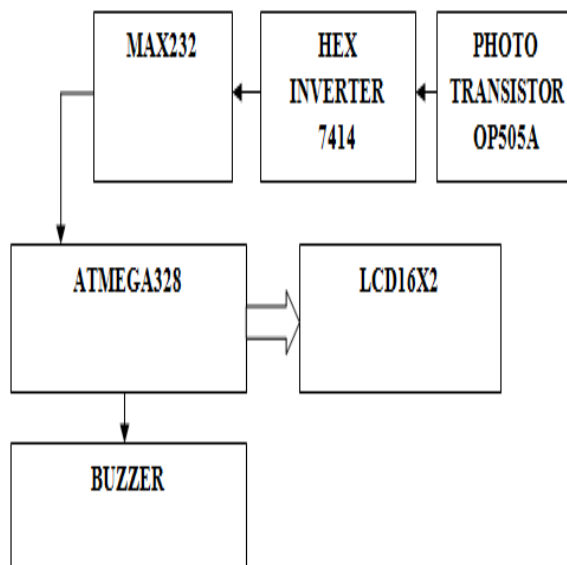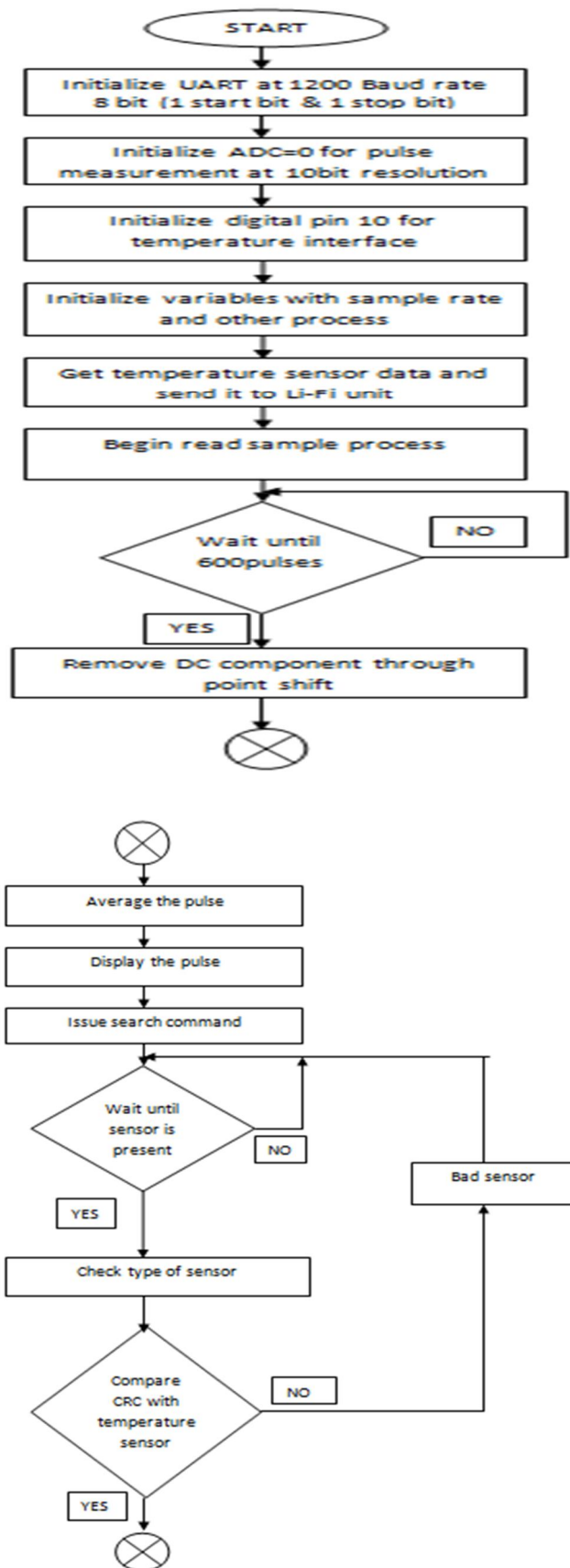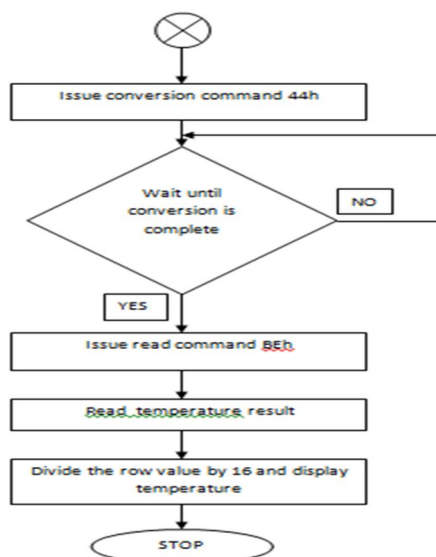
A. Transmitter Circuit

B. Receiver Circuit

Fig. 3 Block Diagram of transmitter and receiver

IV. FLOWCHART

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V.   EXPERIMENTAL RESULTS

Fig. 4 Measured Body Temperature and Heart Rate displayed on LCD (Result)

TABLE I Readings of actual and practically measured values

Person	Reading	Body Temperature(°C)	Measured Heart Rate(BPM)	Actual Heart Rate(BPM)	Percentage Error (%) (w.r.t Heart Rate)
1	1	36.06	72	73	1.36
	2	36.18	69	71	2.81
	3	36.12	70	72	2.77
2	1	36.84	80	80	0
	2	36.72	80	81	1.23
	3	37.06	77	78	1.28

VI.   CONCLUSION & FUTURE SCOPE

There are numerous possibilities that which can be explored further. If this technology can be put into practical use, every bulb can be used something like a Wi-Fi hotspot to transmit wireless data and we will proceed toward the cleaner, greener, safer and brighter future. The concept of Li-Fi may be alternative to radio-based wireless. As a growing number of people and their many devices access wireless internet, the airwaves are becoming increasingly clogged, making it more and more difficult to get a reliable, high-

speed signal. This may solve issues such as the shortage of radio-frequency bandwidth and also allow internet where traditional radio based wireless isn't allowed such as aircraft or hospitals. One of the shortcomings however is that it only work in direct line of sight.

This can be practically used every light and bulbs can be used as Wi-Fi for wireless transmission of data which will be brighter and safer side in future it is very cheap compare to WIFI. Data for laptops, mobiles and tablets can be transmitted through light by using it in rooms. In traffic signals Li-Fi can be used to reduce accidents where Li-Fi communicates with the LED lights of the car. Thousand and millions of street lamps can be transferred to Li-Fi lamps to transfer data. In aircraft Li-Fi can be used for data transmission. It can be used in chemical plants or petroleum fields where other transmission or frequencies could be Hazardous. Such advancements promise a theoretical speed of 100 GBPS - meaning one can download a full high definition film in just 3 seconds.

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