

Modern Secured Li-Fi Healthcare System by Using Body Sensor Network



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Abstract: This paper convenes checking patient's prosperity and giving a liberal disapproving of system using quick data trade advancement which is Li-Fi development. Light Fidelity as in the explained structure for Li-Fi was introduced and proposed by German scientist and physicist Harold Hass amied the Ted Global Talks, Edinburgh, Scotland. Li-Fi tackles the standard of clear light correspondence where LED is the wellspring of lighting up for trading the data. Li-Fi goes about as bidirectional, versatile, genuine and a complete organized remote advancement. The proposed model is used to develop a therapeutic administrations watching structure reliant on the thoughts of Li-Fi advancement, which can be an exceedingly convincing variable in crisis facilities and focuses. Li-Fi development is set to endure and override its past advancement which is Wireless Fidelity. Wi-Fi development is certain to have constraints which are repeat impedances, multipath inciting, etc., which can cause defenselessness in the course of the last results (data).

I. INTRODUCTION

The main objective is to develop giving a checked social protection system. Since ages, the restorative business has been on the moderate side in executing the latest advancement. As the world is set up to recognize any new advancement any minute, anyway by virtue of the helpful part, it's absolutely one of a kind. Restorative apparatus ought to be precise and accurate in giving the data as the life of an individual is liable to it, so the introduction of latest development rapidly can affect the equipment and its results.

To take a gander at the patients, the pro should be given exact results and should get the data even a long way from the patient which is made possible by Wi-Fi. Therapeutic territory has picked up a mind blowing ground over the intercession of remedial contraptions with Wi-Fi advancement as the data can be traded at increasingly noticeable speeds.

As there is a development looked for after for Wi-Fi advancement, realizing the insufficiency of radio repeat extend and significantly more requirements. Over usage of Wi-Fi and its open at essentially every recognize,

it's never again a solid correspondence medium, especially in the therapeutic field where the data must be private and unassailable. Various diverse obstacles can be seen over the utilization of Wi-Fi like repeat impediment, multipath propagation, spread adversities, etc which doubtlessly demonstrates the disadvantage of Wi-Fi advancement, so to crush these repressions and to avoid the lack of radio repeat extend we support additionally created correspondence which is Li-Fi. Li-Fi uses evident light range, which is more broad than the radio range and there will be no stresses over overpowering use. Li-Fi advancement offers increasingly checked and speedier results when appeared differently in relation to Wi-Fi. Li-Fi can be bidirectional, data can be sent and got past this advancement and trades data at quick. With the creating enthusiasm for clear light correspondence, Li-Fi is completely most supported correspondence medium and it also underlines its place in the therapeutic division. This development has its very own ground-breaking character in this field which is delineated.

II. SYSTEM DESIGN

This model involves two zones which are Transmitting and Receiving portions. Both the portions have their own one of a kind basic purposes for this endeavor, which is enlisted underneath. Related Power supplies are given in both the territories.



Fig 1: System Design

Transmitting Section:

Patients play the vital role in this section. To separate their condition differing sensors are put which will be the Temperature sensor, Vibration sensor, Eye-glint sensor, Heartbeat sensor and Blood Pressure sensor. Each sensor generate their own straight forward/modernized qualities and these are urged to the PIC Micro- controller.

Here PIC 16F877A little scale controller is used, this scaled down scale controller examinations the data from different sensors,

Revised Manuscript Received on October 30, 2019.

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process them and grandstands them on the LCD. Li-Fi transmitter (LED) is interfaced with PIC little scale controller, after the data is set up by the PIC it sets up consecutive correspondence with Li-Fi transmitter where the data is traded through the light..

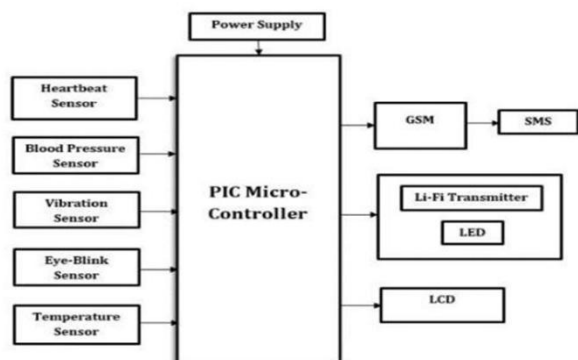


Fig 2: Transmitter Section Block Diagram

Receiving Section:

This section is also known as checking portion in light of the way that the patient's results are seen from to time through PC or adaptable. This fragment contains Li-Fi recipient (Photo Detector), TTL (Max 232) and PC.

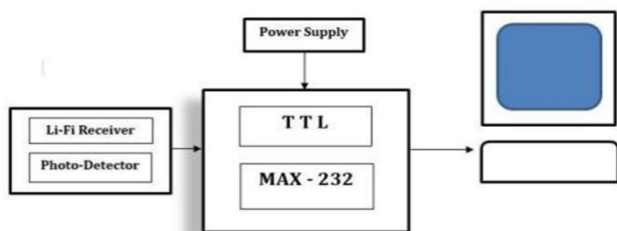


Fig: Receiver Section Block Diagram

Li-Fi receiver (photodetector) receives the information from the transmitter and is carried over to Max 232. Max 232 goes about as an IC level shifter which changes over the got information to a RS232 group which is perfect with PC. These last outcomes help in looking at patient's wellbeing conditions..

III. SYSTEM ANALYSIS

Detailed description and working analysis of every component are explained.

Hardware Requirements:

1. PIC Micro-controller
2. Sensors
3. TTL (Max232)
4. GSM
5. Li-Fi Module
6. PC
7. LCD

Software Requirements:

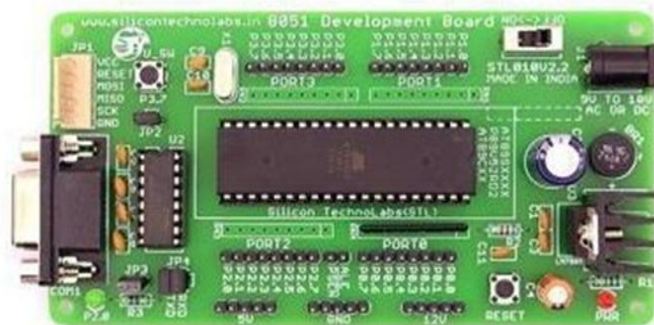
1. Embedded C 2.ARDUINOIDE

Working Analysis:

1. Pic Micro-controller

There are 5 I/O ports on this controller, which are Port A, Port B, Port C, Port D and Port E, every one of the ports are

8-bit ports aside from Port An and Port E. Port A will be a 5-bit port and Port E is 3-bit port which together establishes a 8bit port. It is Self-Reprogrammable Micro-controller under the control of programming. Info and yield gadgets like sensors, transfers are associated with the port pins of the smaller scale controller.



2. Li-Fi Module

Li-Fi is a comparable innovation to Wi-Fi, where Wi-Fi utilizes radio recurrence range and Li-Fi utilizes the unmistakable light range for exchanging the information. Wi-Fi use has brought about developing Electromagnetic Interferences which can hurt individuals from presentation to these electromagnetic waves. So Li-Fi can supplant Wi-Fi as a protected and secure information exchange system which can be useful in medical clinics and facilities.

In this undertaking, there is a Li-Fi transmitter and collector, where LED acts the transmitter and Photodetector as the beneficiary. The information from the miniaturized scale controller can be transmitted through LED as light which is gotten by the photodetector.



1. GSM

GSM stands for Global System for Mobile. It is widely used as an open wireless mobile communication system. This technology is used for carrying the voice and data services for mobile communication. Global System for Mobile uses Time Division Multiple Access (TDMA) in transferring data, it allows different channels for different clients over a particular time slot.





a. MAX 232

MAX 232 is an IC Level Shifter. It is used for converting voltage levels obtained from CMOS logic to voltage levels compatible with PCs. MAX 232 acts as a buffer where - 5V to +5V outputs are converted to -10V to +10V for serial communication, an RS232 communication system which uses serial port communication in transferring the data to PC'S uses this level shifter.

b. MP Lab IDE

Micro-controllers are programmed controllers, where several functions are carried out by debugging or dumping the programs into them by a programming platform. PIC microcontroller programming is carried out by MP Lab IDE which stands for MP Lab Integrated Development Environment. MP Lab IDE is a free software tool which is used by most of the micro-controllers like PIC and dsPIC. The MP Lab IDE uses NetBeans as a programming platform and the program is dumped to the controller only using a PIC kit (Debugger).

Role of Sensors:

i. Temperature Sensor:

Temperature is measured with the temperature sensor and patient temperature along with the surroundings. Here project temperature sensor is placed on the patient and continuously monitored for any temperature abnormalities like high temperature resembling fever which is normally above 100 OC.



Temperature sensor radiates the temperature to a corresponding output voltage and this data is fed to the micro-controller. LM35 is the temperature sensor used in this project, it is interfaced with micro-controller and consists of 3 pins

Heartbeat Sensor:



Any case which is lower or higher than the threshold values it results in abnormalities and immediate attention has to be made over the concern. Here project, heartbeat sensor is used to check the patient's health status and report any abnormalities.

Heartbeat sensor consists of a two LED's are absorbed by the photodetector which can be seen at the other LED (Blinks). Heartbeat sensor consists of three pins Vcc, Vout and Gnd, Vcc is connected to the 5V pin, Vout is connected to the RA4 pin of Port A.

ii. Blood Pressure Sensor:

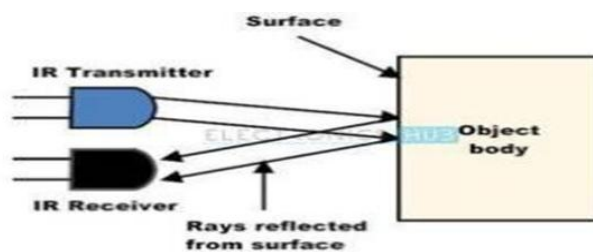
A BP sensor is used to measure the flow of blood pumped. It is measured from two conditions: diastolic pressure (Heart contracts) and systolic pressure (Heart expands). In this project blood pressure sensor is placed around the arm.



Usually for a healthy person blood pressure is in the range 80-120 mm Hg. Any case, lower or higher than the normal value results in abnormal and immediate attention has to be made. BP sensor consists of three pins Vcc, Vout and Gnd.

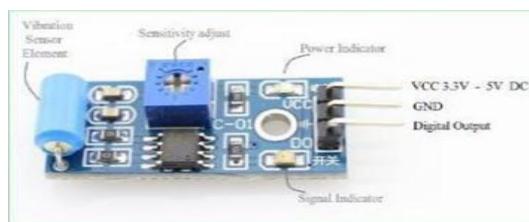
iii. Eye Blink Sensor:

when an object or human radiating heat radiation is placed on the path of IR module, the Transmitted IR radiated back to the receiver. Here when the eye is closed no radiation is received back to the receiver, if the eye is opened then it is radiated back to the receiver and the receiver gives the output as IR detected.



The eye-blink sensor consists of three pins Vcc, Vout and Gnd.

Vibration Sensor:

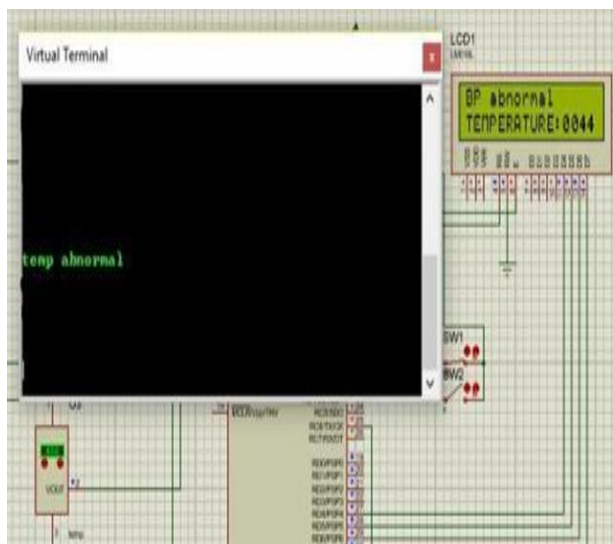


So whenever there is no movement or in the idle condition the electrical contacts are separated apart, when there is a vibration these two contacts touch each other resulting vibration detected as the output. Vibration sensor consists of three pins Vcc, Vout and Gnd, Vcc is connected to the 5V pin, Vout is connected to RC0 of Port C and Gnd is connected to the ground pin on the micro- controller.

IV. OUTPUT RESULTS

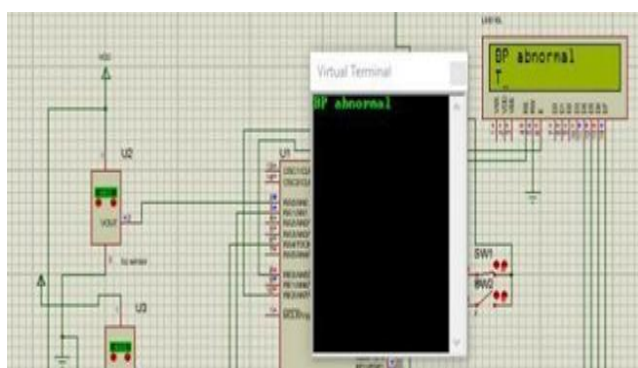
From this prototype model of the healthcare monitoring system, outputs result in abnormalities in temperature and blood pressure sensors, detected for an eye-blink and vibration sensors and calculated for heartbeat sensor.

1. Temperature Sensor:



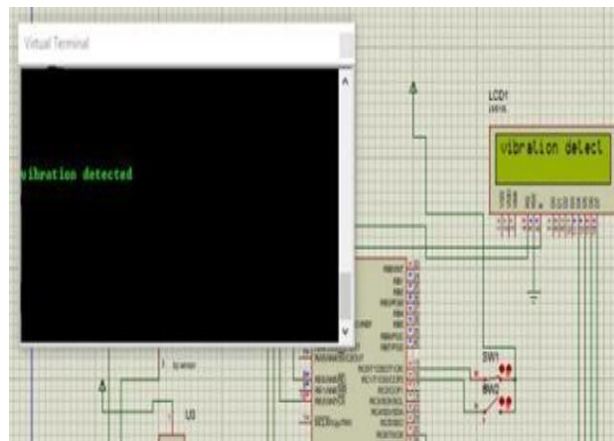
- Threshold Value: 400C
- Temperature Value: 43 0C
- Output: Temperature Abnormal

2. Blood Pressure Sensor:



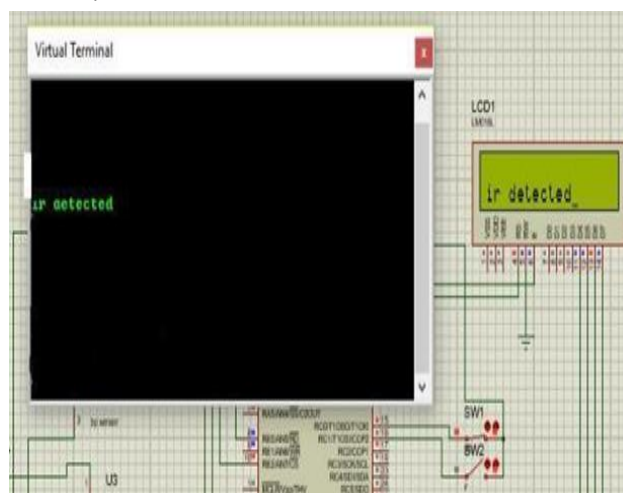
- i. BP Value: > 40 mm Hg
- ii. Output: BP Abnormal

3. Vibration Sensor:



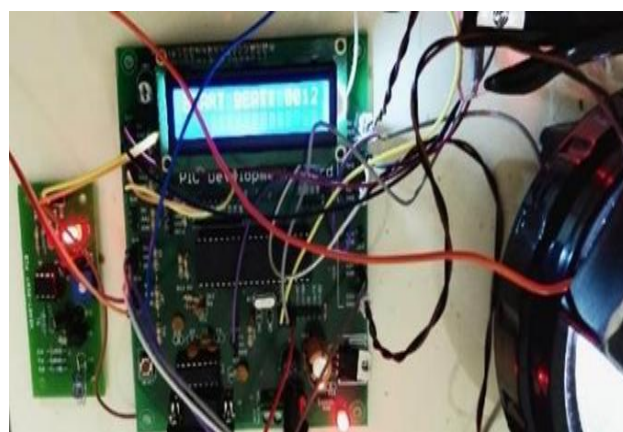
- i. Switch SW1: ON
- ii. Two Electrical Contacts are in contact
- iii. Output: Vibration detected

4. Eye-blink Sensor:



- i. Switch SW2: OFF
- ii. IR radiation is received
- iii. Output: IR detected

5. Heartbeat Sensor:



- i. Heartbeat is measured for 5secs
- ii. Displayed value: HB
- iii. Output: HB x 12 = HR
- iv. HB= Heart Beat for 5secs
- v. HR= Heart Rate for 60secs.

V. CONCLUSION

Hence, the growing demand for high-speed data transfer technology, it is necessary to meet the standards with suitable, sustainable, reliable and flexible technology. Li-Fi can be developed further in many more applications and have a sequential influence on different sectors enriching them for higher efficiencies and advanced developments.

Li-Fi in the medical field can elaborate the limitations of medical equipment by providing them numerous areas for development. As the LED's costs less they can meet the standards of almost everyone which can revolutionize the demanding market.

Medical Sector can have a secure and safe environment under Li-Fi data transfer technology, which is a convenient source of transmission, bio-friendly and economical.

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