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SMART HEALTH MONITORING

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Abstract: From day today world of technology, the field of biomedical is no longer developed compared to other domains. Outcome of engineering and technology has proved its significance in the field of biomedical. It not only made doctor more efficient but also helped them in improving total process of hospital management. In multispecialty hospitals, there are a huge number of wards and in each ward there is a lot of patients, doctors cannot supervise the patient each and every patients manually, For this doctors form the time slots and each ward is visited after specific time difference. But patients may face some problems in between these time slots. This leads to uncomfortable of patient and hospital management may feel helplessness about the issues. The Patient monitoring system provides solution for this. It continuously provides following parameters to doctors.

1. Heartbeat of patient

2. Body temperature of patient

3.Glucose drips bottle monitoring

Keywords - Arduino Uno, Heartbeat sensor, Non-contact temperature Sensor, Ultrasonic sensor, LCD display, Buzzer.

I. INTRODUCTION

The present patient monitoring systems in hospitals allow monitoring of patient vital signs by manual method, which require nurses to check whether the temperature and pulse of an patients is beyond normal or not, by using this smart health monitoring system (SHMS) is primarily implemented to have a quantitative evaluation of the crucial physiological parameters of patients during critical periods of biological functions. Heartbeat is one of the most crucial factors that can be regularly measured and monitored by doctors, once patient comes for check-up. Heartbeats define how many times contraction and relaxes take place per minute, it changes among different age groups for example for adults it is 69-72 beats per minute, and for kinds, when sleep it is 60 beats per minute and during physical activities it is up to 220 beats per minute. For Heart patients, continuous monitoring of heart beat is necessary because if there are any changes occur it leads to heart attack. Once the drips bottle attaches to the patient it has to be continuously monitor to check whether it is nearer to empty or not because if nurses or doctors forgotten to check drips bottle when it is empty it will lead to bad consequence like backflow of blood to IV tube from their vein or blood loss. This proposed system is used for measuring continuously the values of the patients automatically, important physiological parameters such as body temperature, level of glucose drip bottle, heart rate. This system detects the various biological parameters of the patient using the sensors. A biosensor is a chemical sensing device which is biologically derived recognition entity is conjugated to a transducer, it allows the quantitative development in some of the complex biological parameter. Even after connecting these systems to particular patient, a paramedical assistant needs to continuously monitor and note down all the vital parameters of a given patient by keeping track of all of his/her records manually. Adopting to such a method is error free and it lead to eliminate the case of a human error. In the current proposed system, the patient health is continuously monitored by the smart health monitoring system.

II. LITERATURE SURVEY

D.Janani et. [1] proposes “Wireless Glucose Bottle Level Indicator for Hospitals”, Professional nurses, doctors or the care takers of the patient are responsible for the patient taking intravenous solutions. There is no such automated system that helps to sense the critical level of saline. More over this paper helps to controlling the reverse flow of blood to the saline and is not rejected to just informing the care takers of the crucial level.

R.Vasuki et. [2] Proposed “A compact monitoring and controlling device of measuring glucose bottle drips rate by using an glucose infusion set”. In this method the glucose bottle set is attached to the drips chamber. The flow sensor is used to detect each drops of glucose bottle set. For each and every drop, the beam of light is broken at each and every time and that is transfered and received by InfraRed sensor. This gives a change in sensor output and comparator gives an pulse signal output for each drop. The drip rate is indicated using the LCD with which the observer can identify the volume of fluid in glucose bottle set. If the device is not sensed for 45 seconds it will give an alert message.

C.C.Gavimath et.[3]introduces an method namely “Design and development of saline flow rate measuring system of glucose bottle and Global System for Mobile Communication based remote monitoring device”. In this device an indigenously developed sensor is combined to the neck of the drips bottle. For every each drop of the saline, the signal conducting circuit form one pulse. The

signal conditioning circuit consists of comparator and phototransistor. The 8051 microcontroller that is used to count the pulse in unit time. This will resemble the flow rate. By the use of GSM technology the information about the flow rate is transmitted to the observer's mobile.

R.Aravind et. [4] Proposed a paper, "The Design of health monitoring system which uses wireless communication technology". This is an ARM based embedded system by this which the data of the patients is send and received via ZigBee or RF transmitter and receiver. Then the information is stored in database and send to global system for mobile communication. The database consists of all the details of the patient health conditions such as body temperature, blood pressure and heartbeat by using visual manner. This makes the household people to check their health by themselves. But it is not suitable for illiterate people by whom it is very difficult to operate and understand the device

Hikaru Amanand et [5] Proposed a paper, "A remote glucose drip infusion monitoring system employed with Bluetooth", developed a remote glucose bottle drip infusion monitoring system for use in hospitals and clinics. The system consists of several flow rate monitoring devices and a central monitor system. The glucose flow monitoring device which uses a Bluetooth module that can able to detect the flow rate of drips and alerts when infusion solution bag is empty, and then these data are communicated to the central monitor available at the nurses' center via the Bluetooth. The central monitor gets the data from several infusion monitoring devices and then display graphically in monitor. Therefore, the developed system can used to monitor intensively the drip flow situation of the several patients at the nurses' station.

Xinling Wen et. [6] Proposed a paper "Design of an Medical Infusion Monitor and Protection System Based on Wireless Communication", A medical glucose bottle level monitor and protection system is designed and developed based on technology of photoelectric monitor, demodulation, and modulator single chip microprocessor which employed with wireless communication. The infusion signal is received by infrared photoelectric conversion characteristic. The processor processes the monitor data and control area flow rate and controls wireless transceiver to constitute wireless communication system to transfer the data. By the use of serial interface communicator MAX487 that is connected to the main controller with each control node, PC can monitor and control the each node in real-time and renew the control-schemes. Experiments shown that the rate of infusion speed monitor error is less than 3 drop every minute, and stability time is much faster, which effectively completes intelligent flow rate system monitor and alarm

III. BLOCK DIAGRAM

The square outline of Smart health monitoring system is displayed in the figure 1.
It involves ultrasonic sensor,

- Pulse sensor,
- Microcontroller,
- Temperature sensor,
- LCD display and buzzer

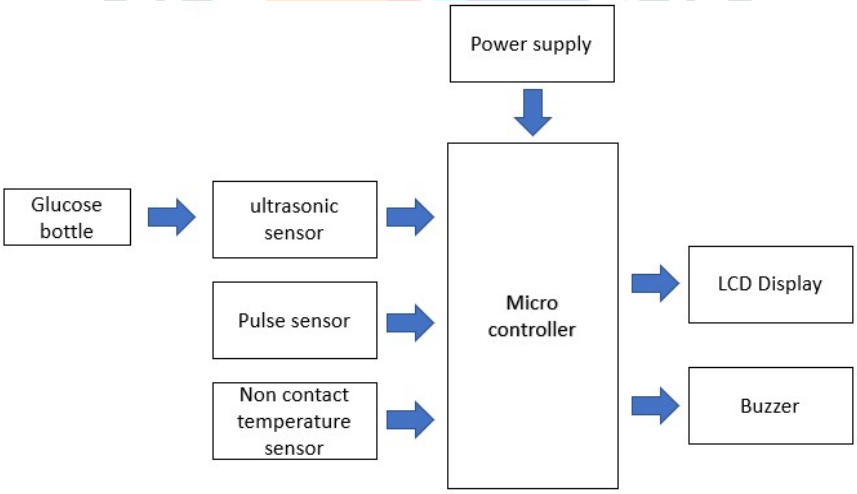


Figure 1 Block Diagram

3.1Ultrasonic sensor

Ultrasonic sensors work by emanating sound waves at a recurrence unreasonably high for people to hear. They at that point trust that the sound will be reflected back, ascertaining separation dependent on the time required. This is like how radar estimates the time it takes a radio wave to return in the wake of hitting an article.

While radar and ultrasonic sensors can be utilized for a portion of similar purposes, while radar, or even light-based sensors, have a troublesome time accurately handling clear plastic, ultrasonic sensors have no issue with this. Truth be told, they're unaffected by the shade of the material they are detecting. Then again, if an article is made out of a material that ingests sound or is moulded so that it mirrors the sound waves from the beneficiary, readings will be untrustworthy.

In order to calculate the distance by using ultrasonic sensor the below equation is used

Distance= ½(T*C) (1)

Where T=Time

C=Speed of the sound

If Speed of the sound is 340meter/sec

Therefore equation 1 becomes

Distance= ½(0.034*C) in cm

3.2Pulse sensor

Heartbeat Sensors are accessible in chest lashes, Smart Phones, Wrist Watches (Smart Watches), and so on. The heartbeat is estimated in pulsates every moment or bpm, which demonstrates the occasions the heart is contracting or growing in a moment.

Heart beat sensor works based on the principle of Photoplethysmography. The principle states that, the variation in the amount of blood flow through the organ is evaluated by the variation in the amount of light transient over that organ.

Generally, IR LED is used as the light source in heartbeat sensor and Photo Detector for example Photo diode, LDR (Light Dependent Resistor) or a Phototransistor is used as a gauge

3.3Non contact temperature sensor

Non-contact temperature measurement is the most preferred technique that is used for moving, inaccessible objects; dynamic processes that gives immediate response; and temperatures ranges between <1000°C (1832°F). the best noncontact temperature measurement device for a particular application, especially in measuring the patient body temperature by the mean of non-contact. it is essential to understand the basics of temperature measurement technology, parameters, and the features offered by the various measurement systems currently available in trend.

3.4 LCD display

LCDs (Liquid Crystal Displays) are used in embedded system applications such an interfacing sensors and displaying the sensor output and also for displaying various parameters and status of the system. LCD 16x2 is a 16-pin device that has 2 rows that can accommodate with 16 characters each. LCD 16x2 can be used in either 4-bit mode or 8-bit mode. It is also possible to create custom characters stings. It has 8 data lines and 3 control lines that can be used for control purposes of display.

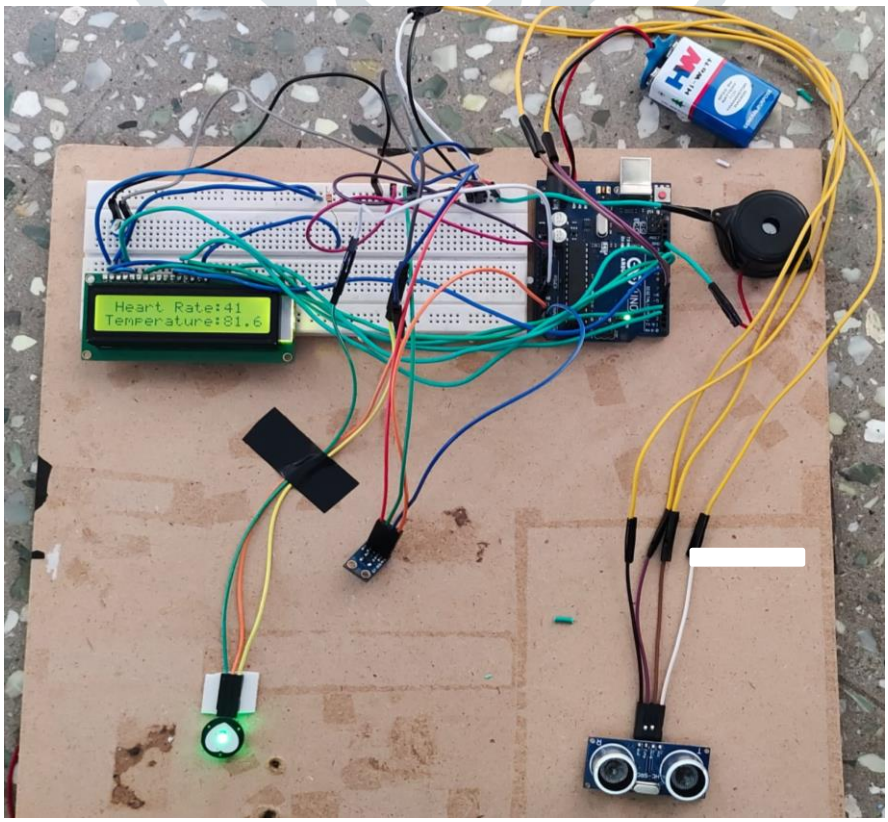
3.5Arduino

Arduino UNO is a microcontroller board that is based on the ATmega328P.Arduino is an open source microcontroller.it can be used to interface with ultrasonic, pulse and temperature sensor, etc. It is a very cheap platform to develop simple embedded projects.

IV. PROPOSED SYSTEM

Figure 2 Hardware Setup

V. RESULTS



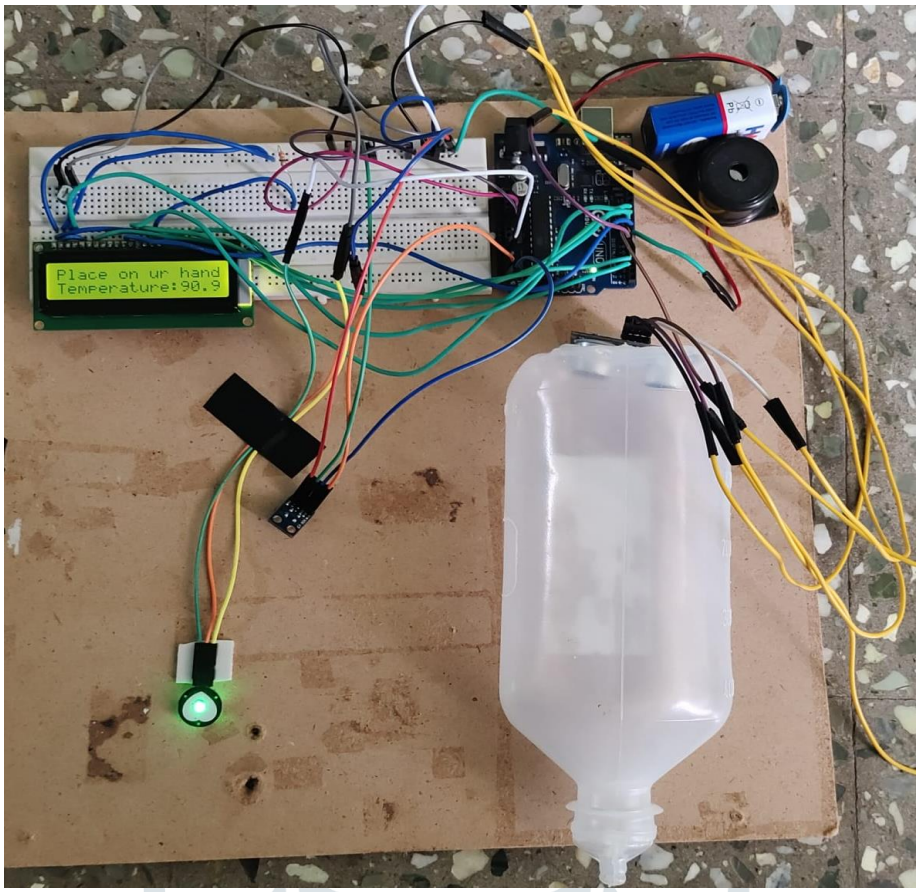


Figure 3 Smart Health Monitoring

The hardware execution has been done in a proper manner and the results have been verified. The hardware execution is shown in figure 3.

VI. CONCLUSION

The "Heartbeat and glucose drips bottle monitoring system" using Arduino Uno will be useful for Hospital application, intensive care unit patient monitoring. By using this system, we can lesser human efforts, time will be reduced as well as we need not to be checked patient regularly. This system will be useful when the patient is in critical condition and also during night time where patient has to be continuously monitored. Monitoring can reduce hospitalization and prevent/delay complications from disease, such as microvascular stroke or heart attack, in the long term. It optimizes the hospital staff efficiency and reduces clinical staff shortages.

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