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## Detect Alcohol in Patient Body through Wireless Network

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### **Abstract:**

*The paper provides a unique method of wireless technology to detect the drunken patient and also check there blood pressure, Heart rate, SpO2, temperature. This technology uses the sensor that has the ability to sense, process, analyze and communicate one or more signs of health parameters. It can be seamlessly integrated into wireless body networks and update medical records almost in a real time via the Internet. A low power wireless sensor can be used to measure health parameters. Developing a hardware which will detect alcohol present in patient body/blood, pulse rate, blood pressure, temperature of a body, and SpO2 level in blood using GSM modem all information real time transmitted to GSM/GPRS mobile. The sensors tie up on the patient's body are able to sense the several heath parameters of patient such as alcohol level, pulse rate, blood pressure, temperature, and oxygen contains. These health sensor parameters are communicated to microcontroller and then communicate to physician's server through wireless sensor network. The collected data can be forward to the physician through a GSM modem. The physician gets various threshold values from the sensor nodes of each and every patient in his server database. This system can detect the abnormal conditions of the patient, and alert to the physician by receiving a parameters value to the physician and physician sending message to patient.*

**Keywords:** *Wireless body area sensor network, alcohol sensor, GSM modem, Microcontroller, heartbeat sensor, blood pressure, temperature.*

### **1. Introduction**

Wireless network of wearable computing devices consist of set of bio sensors which can monitoring patient parameters like heart rate, pulse, pressure, temperature and oxygen saturation. Now it also detect alcohol contain present in patient body. Wireless body area network is a system that is able to continuously monitor the patient's health condition and thus detecting and preventing the early risks by providing the information to the care takers and physicians. Physiological sensor can measure various types of physiological parameters, e.g. temperature of the body, heartbeat rate, blood pressure, SpO2 and alcohol, etc. As the sensors are able to be placed at certain places on the body the patient can move freely without affecting the quality of his life to major extent. Thus the health can also be monitored whenever and wherever it is required to be.

By using the long range wireless communication technology, i.e., GSM/GPRS, the physician can monitor and provide health services to patient. In case the patient is out of network coverage, the microcontroller unit (MCU) continues to collect the data regarding different parameters. When a patient enters the network coverage this data is sent to the medical server. The physician then examines, that this data from any location and decide the further course of medical action. Then doctor will send message to the patient which will display on the LCD present on patient side.

### **2. System Methodology**

A System consists the sensor to collect the data. This data is then stored, processed, analysed using the following three modules and then action is taken if required. These three modules are data collection module, data processing module and data analysing module. Data collection module: It contains hardware part such as LM35 sensor, IR sensor and piezoelectric pressure sensor and MQ-3sensor, which senses the changes in the respective parameters and transfers the information to the microcontroller. Data processing module: It contains microcontroller part use for processing and controlling function of system which analyzes the input signals and transfer to data communication.

**Data analysing module:** It is used to analyse data between person and equipment. This is a basic component which compares the collected data with the existing one. If any changes are recorded it will transmit the message to the physician through gsm modem. The doctor in turn will share with the patient the information and the necessary action to be taken through a return message.

In order to monitor the status of the patients various health parameters, a database is created to keep and update the records of parameters and a network is implemented to provide communication between the physician and the patient. A unique patient ID is maintained on wireless health monitoring device. It receives physiological signals and transfers this data to the back end health management server through the wireless network thus creating a patient database at the medical server. The patient parameters communicate with medical server is accomplished by GSM/GPRS wireless communication technology by implementing Wireless body area sensor network (WBASN) at the patient side.

The typical example of data flow from patient side to the physician and from physician to patient side is shown in Fig 1.

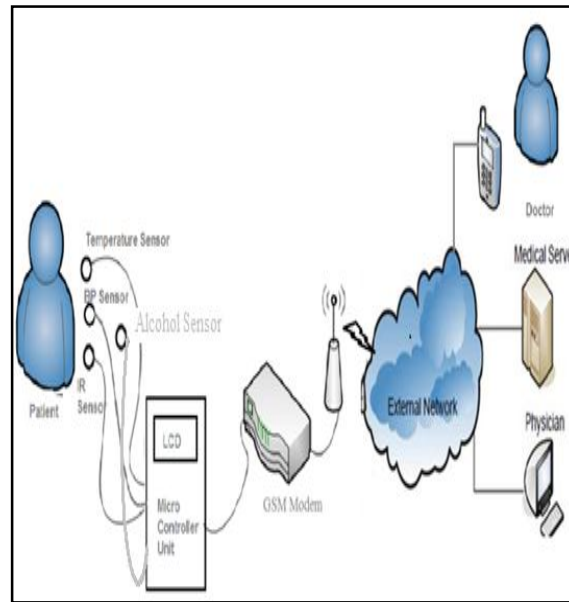


Figure 1: Patient Health Monitoring in WBASN

### 3. Design and Implementation

**Hardware design and implementation:** We also called sender side, using different sensor such as LM sensor for temperature, MQ3 for alcohol, IR for pulse rate, Piezoelectric for BP. ATmega8 Microcontroller, GSM/GPRS SIM300 Modem and LED as shown in fig 2.

#### 3.1. Temperature Sensor

The LM35 (Linear Monolithic) series are precision integrated-circuit temperature device. They have an output voltage which is in linear proportion to the Celsius temperature. The body temperature of a human varies depending on gender, activity, time of day, season wise.

Normal body temperature can range are as follows:

- For baby : 97 - 100.3 degree Fahrenheit;
- For Kids : 97.4-98.6 degree Fahrenheit;
- For Adult : 98.6 degree Fahrenheit.

#### 3.2. Pulse Rate Sensor

Pulse Rate/ Heart Rate is the speed of the heartbeat measured by the number of poundings of the heart typically beats per minute (bpm). The heart rate can vary according to the physical needs of the body, including the need to absorb oxygen and excrete carbon dioxide.

A vital health parameter which is directly related to the human cardiovascular system is pulse rate. The beating of heart is nothing but pumping the blood through the arteries and thus causing the fluctuation in the blood volume at regular interval. This fluctuation of blood in body is sensed by IR (LED) transceiver. This flow of blood can be detected through an IR sensor placed under any finger. The further amplification of the signal is possible for the microcontroller for counting the blood flow rate, which is actually the heart rate. The IR transmission transmits an infrared light into the finger, which sense the flow blood. This flow which is reflected the waves back from the blood to the IR receiver.

It also checks oxygen level in blood called SpO<sub>2</sub>. Normal blood oxygen levels are varies from 95 to 99 percent. Below 95 and upto 90 percent, oxygen level is considered to be low in your blood but it does not necessarily indicate any health issue.

Normal resting heart rate according medical science are given below. The pulse gets progressively slower through from child to adult.

The normal Pulse Rate can range follow:

- Foetus heart beat - 70-190
- Adult person heart rate- 60-100
- Low heart beat is below 60

### 3.3. Pressure Sensor

Piezoelectric pressure sensors are designed especially for digital blood pressure monitors. Blood Pressure monitor is used to check blood Pressure. The analog method operated by sensing the magnitude of oscillations caused by the blood as it begins to flow again into the limb. It is used in long-term measurement where data collect in form of analog signal and converted into digital value with the help of microcontroller. Piezoelectric sensor, is used to measure Systolic and Distolic in the blood. The systolic in normal patient is 100-120 and diastolic is 60-80. For high Bp range from 70-90Diastolic and 90-140 systolic, LowBp 60-80 diastolic and 80-110 systolic.

### 3.4. Alcohol Sensor

MQ-3 gas sensor has high sensitivity to Alcohol, and has good resistance to disturb of gasoline, smoke and vapour. It is sensitive sensor which sense the alcohol gas present in the patient body. The patient want to blow the air on this sensor through the mouth, sensor then detect the what percentage of alcohol is driven by the patient.

The concentration sensing range of 0.04 mg/L to 4 mg/L is suitable for breathalysers. The sensor can operate at temperatures from -10 to 50°C and consumes less than 150 mA at 5 V also low in cost

### 3.5. ATmega8 Microcontroller

Atmega8Microcontroller has low power consumption. The Atmega8 microcontroller is used due to a low-power CMOS 8-bit microcontroller and high density non-volatile memory technology. The Flash Program memory is used for programmed in the microcontroller through an serial port interface (SPI), which is written in c languages. It reduces ADC Noise, Power-save and Power-down. The data is sent to GSM from Microcontroller.

### 3.6. GSM/GPRS Modem

This GSM modem is a highly flexible peripheral band GSM modem for direct and easily used. It is used for Voice, Data/Fax, SMS, GPRS and noise immunity. GPRS class 10: max 85.6 kbps (downlink), PBCCH (Packet Broadcast Control Channel) support, the PBCCH is used in GPRS networks to broadcast control information to mobile phones · Insert SIM card: Properly fixing the SIM card in the tray, insert the tray in the slot provided. .Through this modem, it transfers data from hardware to software and vice versa. The alphanumeric 120 character data only can be transmitted and it also provides Internet service by which data transmission can be done. Microcontroller transmits and receives the data through GSM/GPRS. This modem requires a SIM card for wireless carrier in order to operate.

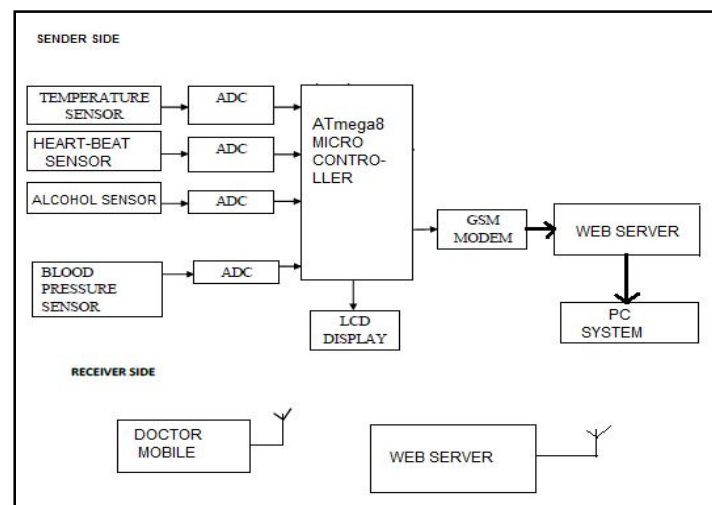


Figure 2: Design and Implementation of H/W and S/W

Software design and implement using PHP software:

Personal Home Pages (PHP) are used to create a patients' database. A unique ID is given to the patient who is having Wireless Body Area Sensor Network (WBASN) attached to his body. The database is thus stored at the medical server. A webpage is designed which is available only to the physicians having the unique ID of the patient. This webpage is accessible whenever required, from anywhere and the status of the health of the patient is checked via internet. Each of the health parameter is shown in the form of graph on the webpage. The values of the parameters and their fluctuations are thus monitored by the physicians. On the same webpage there is a facility of sending message to the patient side and of setting the threshold values of the parameters. The threshold values of every

parameter are set by the physician according to each patient condition. In case the parameter values cross the set threshold, it send messages to the physician. He receives message (SMS) and he will access the internet to initiate a healthcare action as shown in Fig 2.

#### 4. Experimental Results

The parameters result is recorded on the patient as well as physician side. After wearing the wireless body area sensor network (WBASN) gadgets the threshold value varies according to patient condition. If the parameter varies and goes beyond the predetermined threshold, the system generated the message and send on the physician mobile as shown in Fig .3.

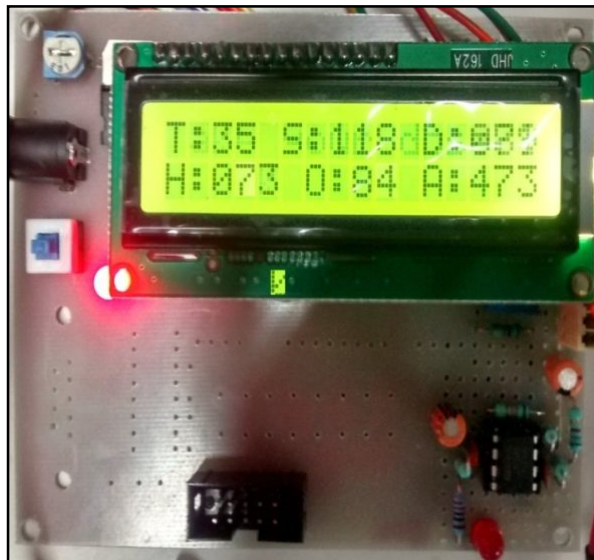


Figure 3: Output of patient health monitoring

On the other side after receiving the message from the patient side. The Physician monitor the value of patient parameters , generate the message and send on the patient side as shown in fig. 4



Figure 4: Output of SMS from physician to patient

As the message are receive from patient at the same time the parameters are save in the patient database in the form of graph on the internet. The value where examine by physician in the form of graph. as shown in Fig 5.

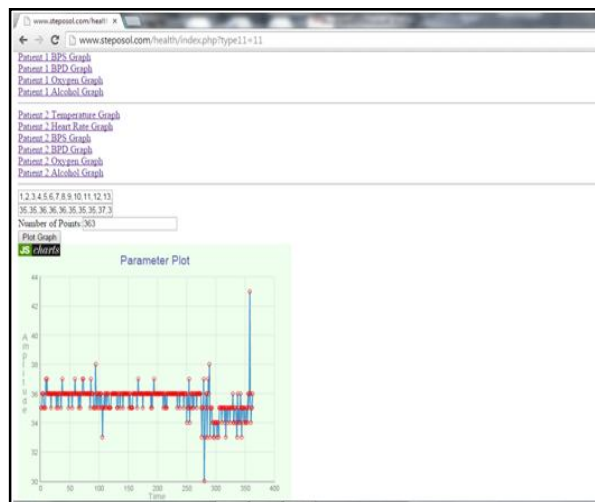


Figure 5: Health parameter graph of the patient through internet

## 5. Conclusion

The system develops for reliance, producing quick and satisfactory result of patient monitoring system. This system enables transmission of data from parameters which is sensed from patient body to the physician server. The doctor x receives messages on his mobile phone and get reports of parameters. The main focus of the system is to provide services, early or in a critical situation that the people can overcome the cautious of their health condition.

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