

Smart Real-Time Healthcare Monitoring and Tracking System using GSM/GPS Technologies

Kaviyarasu.K¹, Manivannan.P² and David William Raj.L³

U.G. Student, Department of ECE, Adhiyamaan College of Engineering, Hosur, TN, India^{1,2}

Associate Professor, Department of ECE, Adhiyamaan College of Engineering, Hosur, TN, India³

ABSTRACT: Health monitoring systems have rapidly evolved recently, and smart systems have been proposed to monitor patient current health conditions, in our proposed and implemented system, we focus on monitoring the patient's blood glucose level, and his body temperature. Based on last decade statistics of medical records, death rates due to hypertensive heart disease, shows that the blood glucose level is a crucial risk factor for atherosclerosis and ischemic heart diseases; thus, preventive measures should be taken against blood pulse rate which provide the ability to track, trace and save patient's life at appropriate time is an essential need for mankind. The patient; in any case of emergency a short message service (SMS) will be sent to the Doctor's mobile number along with the measured values through GSM module. The GPS provides the position information of the monitored person who is under surveillance all the time. This paper demonstrates the feasibility of realizing a complete end-to-end smart health system responding to the real health system design requirements by taking in consideration wider vital human health parameters such as respiration rate, blood glucose level, temperature. The system will be able to bridge the gap between patients - in dramatic health change occasions- and health entities who response and take actions in real time fashion.

KEYWORDS: Arduino Uno, Microcontroller Atmega328, GSM, Mobile, Sensors

I. INTRODUCTION

Based on the analysis of worldwide data of the global burden of hypertension heart diseases, the study shows that the high blood pressure or hypertension affects more than 1 billion people worldwide. Rather than the hypertension heart diseases, the high blood can be a factor and attribute to cause many other disorders, such as stroke aneurysms, ischemic heart, and kidney disease. The risk of heart failure, due to Hypertension is almost increased by factor two or three-fold, and may accounts for about 25% of all heart failure cases. Moreover, the hypertension or high blood pressure in 90% of cases preceded or advanced the heart failure telescopically for elderly. Hypertension was ranked 13th in the leading global causes of death for all ages. A world map shows the distribution of diseases caused by high blood pressure in Figure 1. Statistics for the numbers of heart diseases were not available due to the bad condition of many countries of the middle east region, so this project may encourage relevant institutions to collect such statistics.

II. BLOCK DIAGRAM

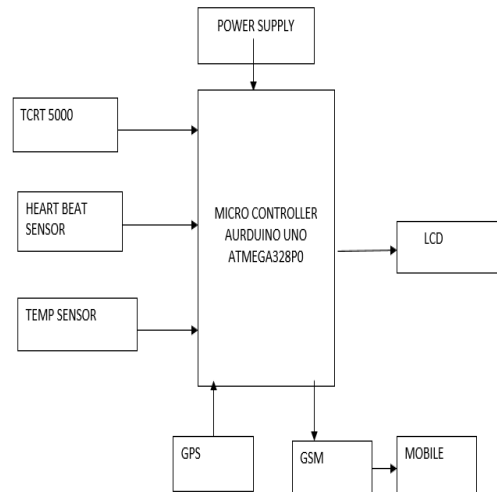


Fig 1: Block diagram of Smart Real-Time Healthcare Monitoring and Tracking System using GSM/GPS Technologies

III. COMPONENTS OF PROPOSED SYSTEM

TCRT SENSOR

The TCRT5000 and TCRT5000L are reflective sensors which include an infrared emitter and phototransistor in a leaded package which blocks visible light. The package includes two mounting clips. TCRT5000L is the long lead version. Detector type: phototransistor. Dimensions (L x W x H in mm): 10.2 x 5.8 x 7. Peak operating distance: 2.5 mm. Operating range within > 20 % relative collector-current: 0.2 mm to 15 mm. Typical output current under test: IC = 1 mA. Day-light blocking filter. Emitter wavelength: 950 nm. Lead (Pb)-free soldering released Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC.

TEMPERATURE SENSOR

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C). You can measure temperature more accurately than a using a thermistor. The sensor circuitry is sealed and not subject to oxidation, etc. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified.

GPS

SKG11B is a complete GPS engine module that features super sensitivity, ultra low power and small form factor. The GPS signal is applied to the antenna to the input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol. It is based on the high performances features of the Media-Tek 3329 single-chip architecture, Media-Tek newest chipset technology. Its-163 dBm tracking sensitivity extends positioning coverage into place like urban foliage environment where the GPS was not possible before. The small form factor and low power

consumption make the module easy into portable devices like PNDs, mobile devices, cameras and vehicle navigation system.

GSM

This GSM modem is a highly flexible plug and play quad band GSM modem for direct and as integration to rs232. It supports like voice, data/fax, SMS, GPRS and integrated TCP/IP stack. It controls via at commands. It uses ac-dc power adaptor with following ratings. Dc voltage is 12v/1A. The current consumption in normal operations is 250ma, can rise up to 1amp while transmission.

LCD Display

We have used 16*2 LCD Display.

Heart Beat pulse Sensor

This shows how the heart beat pulse rate sensor, whereas the pulse measurement is not an easy task; pulse sensor measures the heart rate optically, amplifies the signal and eliminate the noise by connecting the sensor directly to Atmega or any other controller with working voltages from 3 to 5V. Simply plug the sensor on the ear or finger sensor and consider that the maximum wire length of about 60 cm.

IV. SYSTEM FLOW-CHART

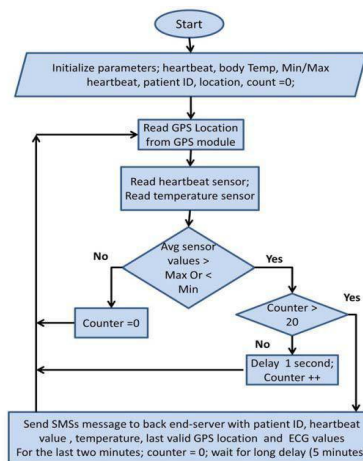


Fig 2: Flow Chart

V. WORKING

The proposed system consists of an end-to-end smart health application that can be building up from two functional building blocks. Main function of the first building block is to gather all sensory data that are related to the monitored persons, whereas the second block functions are to store, process and present the resulted information of this stage to the doctors. The function working is illustrated as, when the patient's heartbeat rate changes badly, the Arduino which recorded Pulse and Arduino Temperature Sensors readings, orders GSM shield to send an SMS message containing these readings, patient ID and the location of the patient which has

been taken via GPS shield, to his doctor's mobile phone, who -by his turn send an ambulance to the patient's location.

VI. ADVANTAGES

1. Multi-uses and services by making some modification on the software, many diseases and illnesses like Alzheimer, mental and motion patients could be benefited from this system.
2. Accurate in scanning, clear in monitoring, intelligent in decision making and reliable in communications are achievable.

VII. CONCLUSION

Aim of Smart City concepts is to provide better life to society and provide innovative and creative solutions in each of the eight pillars of smart city. Healthcare field is one of most delicate and important fields to be developed and enhanced by Smart systems designed to present sustainable medical interventions at manner time where the smart system should be simple, low energy consumption and real time feedback.

REFERENCES

- [1] Sarwant Singh, Smart Cities – A\$ 1.5 Trillion Market Opportunity, Accessed: (29/11/2015), available <http://www.forbes.com/sites/sarwantsingh/2014/06/19/smart-cities-a1-5-trillionmarket-opportunity/>
- [2] Mikhail St-Denis, LifeLine, Accessed:(29/11/2015), available <http://www.mikhailstdenis.com/projects/personal LifeLine.html>.
- [3] Eckerson, Wayne W. "Three tier client/server architectures: achieving scalability, performance, and efficiency in client/server applications." Open Information Systems 3.20 (1995): 46-50.
- [4] P. M. Kearney, M. Whelton, K. Reynolds, P. Muntner, P. K. Whelton and J. He, Global burden of hypertension: analysis of worldwide data, Elsevier Ltd, 15 January 2005.
- [5] A. V. Chobanian, The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure, JAMA, the Journal of the American Medical Association, May 21, 2003