

Embedded Based Patient Monitoring System with First Aid Tracker

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ABSTRACT: The main focus of the paper is to implement a prototype model for the real time patient monitoring system with first aid tracker and immediate medications through voice alert. The proposed is used to measure the physical parameters like body temperature, heartbeat, blood pressure, seizures and, non-invasive blood glucose level (diabetes) monitoring with the help of biosensors through periodic diagnosis by periodic alarms and suitable medicines will be prescribed according to the symptoms using voice alert. The patient health is continuously monitored and the acquired data is transmitted to an Atmel(8051) microcontroller. The acquired bio vital readings will be displayed through the LCD and automatically updated in the database of both in and out patients through text messages using GSM to registered numbers. In mild abnormality, the system will prescribe the required medications through voice alert. In case of abnormal blood glucose level, the system provides automatic insulin injector using servo motor. During the time of an extreme abnormality such as cardiac arrest, an "emergency alert button" can be enabled. In the case of seizures (fits) an "automatic alert button" can be enabled whenever the threshold values of the patients will exceeds. So once the buttons are activated, the monitoring system tracks the location of the user by the use of GPS and meanwhile it indicates the emergency care unit or ambulance using GSM. The implementation of the system is achieved by the Atmel microcontroller and simulation results are obtained by Keil c software and proteus.

KEYWORDS: Atmel 8051, Biosensors, voice alert, periodic alarm, voice alert, GSM, GPS.

I. INTRODUCTION

In the era, where world is advancing day by day towards scientific developments with upgraded solutions solving the need of many crisis. One among the factors will be the biomedical technologies. The growth of bio technology is witnessed every day and everywhere. With increase in stress, pollution and various factors, there have been increased health hazards and there has been an exponential increase in health care costs in the last decade. The reports sites that the increased death rate is due to lack of awareness of medication and detection of diseases. The risk factor involved during abnormalities increases with increase in the delay of arrival of first aid or reaching health care unit. To overcome all these defects, we proposed and designed the prototype on real time patient monitoring system with first aid tracker.

The existing patient monitoring systems are static[2][3] and hence cannot be used for practice in the daily walk of life. As these systems are fixed, the patients should travel to the nearest patient monitoring system before which the condition may become extremely abnormal. These systems can be used in the random diagnosis of patient conditions. As health hazards can occur at any instant of time these systems cannot be implemented in real time. Only limited diseases are diagnosed[9][3] and location is not tracked[4] under emergency conditions. All the systems are handling with high microcontrollers like ARM 7[2], arduino etc. which leads to the high cost. In some systems, usage of zigbee is only used under limited areas (500 meters).[1][2].

I.P. karthick[1] developed a new solution for measuring physical parameters like body temperature, heart rate, ECG, blood sugar and continuously monitored through wireless network called zigbee. Arm microcontroller is

used and all parameters are stored in the database. If any abnormality felt by the patient automatic alarm sound will arrive and the message will be sent to the doctor mobile using GSM.

2.D.Chandana [3] gives a prototype model of monitoring the patient's health by continuous observations and measuring the physical parameters like body temperature, blood pressure and drug level detection. Information's is reported to the doctors using GSM. Arm controller is used and measurements are displayed in LCD.

3.MoeenHassanalieragh, Alex Page[7] worked on the motive of designing health monitoring and measurement using internet of things (IOT)sensing with cloud – based processing :opportunities and challenges.It is same as other concepts of measuring parametersand the intimation is given to the doctors and additionally the innovative idea is added by storing the database through GPRS and GSM which is named as (IOT).

4.Caduffa[12] The aim of this work was to evaluate the performance of a novel non-invasive continuous glucose-monitoring system based on impedancespectroscopy (IS) in patients with diabetes. The measurements obtained by the NI-CGMD and the reference blood glucose measuring techniques were evaluated using retrospective data evaluation procedures. These results indicate that IS in the used technical setting allows retrospective, continuous and truly non-invasive glucose monitoring under defined conditions for patients with diabetes.

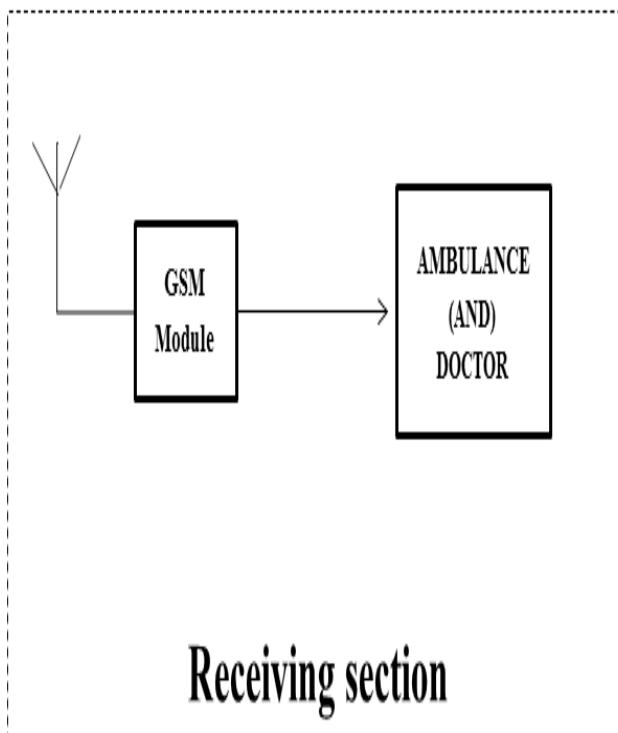
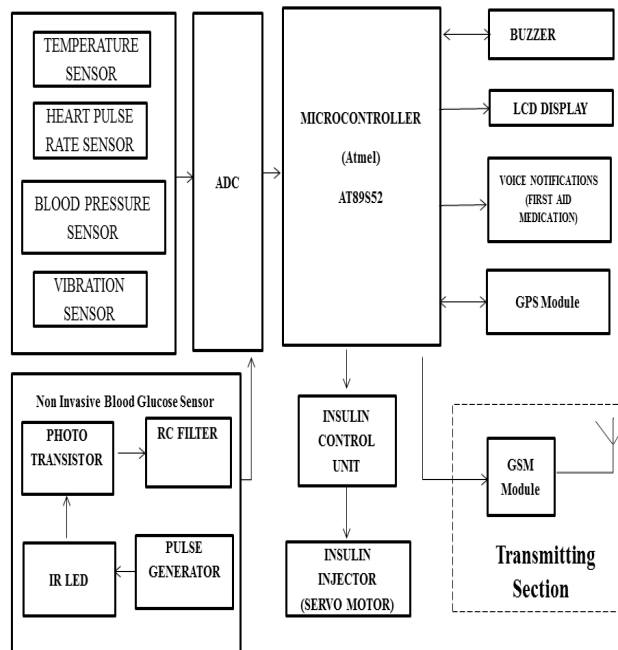
II. METHODOLOGY

It consists of two sections: Transmitter and receiver sections. In the transmitter section, the temperature sensor, heart rate sensor, blood pressure sensor, vibration sensor and non - invasive diabetes sensors are measured through periodic diagnosis by periodic alarms and all these bio signals are converted to digital signals which are in analog signals using ADC converter and then it is fed to the ATMEL microcontroller (AT89S52). If all the measured data's are normal then it is displayed in the LCD and the readings are stored in the database for doctor reports with the statement of everything is correct. If any abnormality occurs, then based on that category, a first aid medication is given to the patient through voice alert. In diabetes, if it is not under prescribed level then an automatic insulin injector is provided using servo motor for the immediate recovery from diabetes through non-invasive method. For non-invasive method photo transistor and led is kept at the fingertip and pulse is given through pulse generator and noise is eliminated through RC filter. Insulin control unit is a place where servo motor is kept tightly in the area where vein can be easily detected.When the glucose level fails then using servo motor insulin is kept at the tip and it penetrates into the body without any pain.The records of the both in and out patients are sent to the prescribed numbers and doctors through GSM(text messages), and it is stored in a database for future purposes.

In the receiver section, during the time of an extreme abnormality such ascardiacarrest,an “emergency alert button” can be enabled. In the case of seizures (fits) an automatic alert button” can be enabled whenever the threshold values of the patients will exceeds. So that the monitoring system tracks the location of the users by the use of GPS and meanwhile it indicates the emergency care unit or ambulance using GSM

III. BLOCK DIAGRAM

TRANSMITTING SECTION:



IV.OBSERVATION

HEART RATE:BODY TEMPERATURE:

| Temperature | Effect |
|-------------|--|
| 44°C | Almost death. Sometimes patient known to survive at up to 46.5°C |
| 43°C | Normally death/brain damage/cardio-respiratory collapse |
| 41-42°C | Fainting, confusion, very fast heart rate, convulsion, Low/high blood pressure |
| 38-40°C | Severe sweating, dehydration, weakness, vomiting, headache, dizziness, fast heart rate, slightly hungry |
| 37°C | Normal temperature |
| 36°C | Mild or moderate shivering. May be normal temperature |
| 34-35°C | Intensive shivering, numbness and bluish/grayness of the skin. Heart irritability. Confusion and Loss of movement of finger |
| 29-33°C | Moderate to severe confusion or complete, sleepiness, progressive loss of shivering or stop, slow heart beat, shallow breathing, unresponsive to stimulus and hallucinations |
| 24-28°C | Breathing may stop. But mostly death. Sometimes patient known to survive at 14.2°C |

BLOOD PRESSURE:

| Pressure level | systolic (mmHg) | diastolic (mmHg) |
|----------------|-----------------|------------------|
| Normal | 90 - 130 | 60 – 80 |
| Low | < 90 | < 60 |
| High | >140 | > 90 |

| TARGET ZONE | TRAINING RECOMMENDED |
|------------------|--|
| Normal (72 BPM) | Normal rate. |
| Low (60- 70 BPM) | Low heart rate. |
| High (>72 BPM) | Indicates the person is in Abnormal state. |

SEIZURES:

| | |
|---------------------------------|-----------------|
| TEMPERATURE | 38.3°C(101°F) |
| HEART RATE | <40bpm &>100bpm |
| HYPOGLYCEMIA (LOW SUGAR) | < 35-40mg\dl |

HEART ATTACK:

| | |
|-----------------------|-----------------|
| BLOOD PRESSURE | 180/110mmHg |
| HEART RATE | <40bpm &>100bpm |

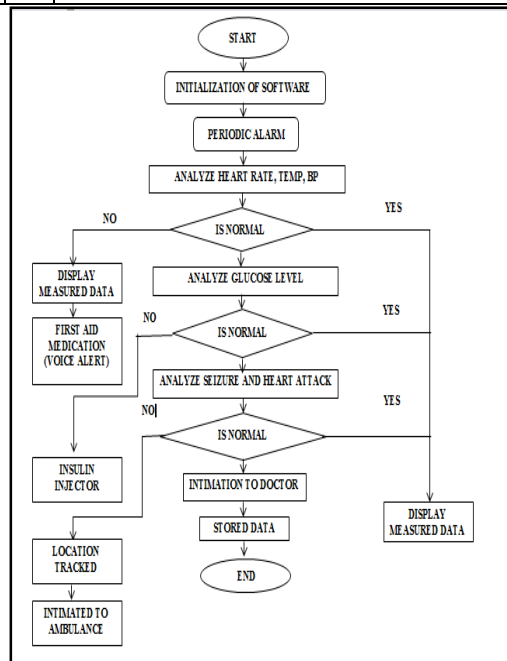
BLOOD GLUCOSE:

| CONDITIONS | FASTING(ATLEAST 8HRS) | AFTER EATING(2HRS) |
|----------------------------------|---|--------------------|
| NORMAL | <100MG/DL | <140MG/DL |
| HYPOGLYCEMIA(LOW SUGAR) | <70MG/DL(MILD) <55MG/DL(MODERATE) <35-40MG/DL(SEVERE) | |
| HYPERGLYCEMIA(HIGH SUGAR) | >126MG\DL | |

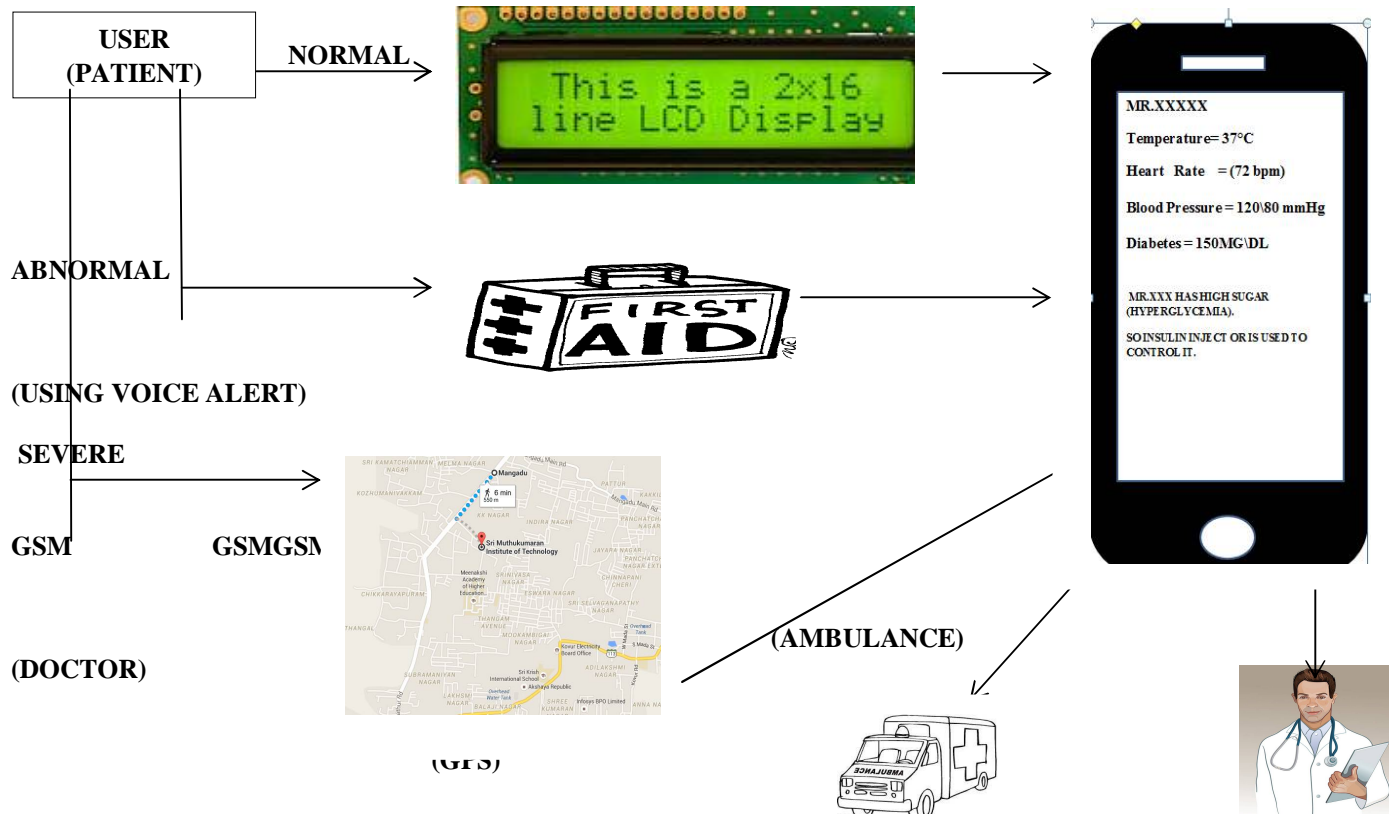
V.ALGORITHM

VI.FLOWCHART

| | | |
|---------|---|--|
| Step 1 | : | Start the program. |
| Step 2 | : | Set the alarm for periodic diagnosis. |
| Step 3 | : | Enter the mode of operation. |
| Step 4 | : | Evaluate operation with switch case. |
| Step 5 | : | Temperature measured. |
| Step 6 | : | Heart rate measured. |
| Step 7 | : | Blood pressure measured. |
| Step 8 | : | First aid medications using voice alert. |
| Step 9 | : | Blood glucose level measured. |
| Step 10 | : | Automatic insulin injector is provided. |
| Step 11 | : | Intimation to doctor through sms. |
| Step 12 | : | Database saved successfully. |
| Step 13 | : | Seizure and heart attack detected. |
| Step 14 | : | Location tracked under emergency. |
| Step 15 | : | Intimated to ambulance. |



VII.EXPECTED OUTPUT



VIII.CONCLUSION

This project helps them to recognize their own body conditions at any time along with first aid facilities and also gives solution by medications for temporary purpose under emergency conditions. This project helps in diagnosing the health of both in and out patients. In the future enhancements , this can be implemented in a watch shaped structure which will be more compact, reliable and a easy access to the users.This project will be a great backbone for the society among the people who is waiting for such kind of innovations and not aware of the current medical hazards in the upcoming future.

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