

Monitoring Biosensors and obtaining Data using Gsm Module

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ABSTRACT

The main focus of the project is to prevent the loss of human life against the discomfort and death caused by the lack of attention towards the patients due to the improper monitoring systems provided in the hospital. The aim of the project is to monitor the bio sensors attached to the persons in their body either internally or externally. The biosensors which are about to be used in this project are EEG sensor (electro encephalogram sensor). An ECG sensor (electro cardiogram sensor) which is very essential for a critical patient, this project also emphasizes on the extended design of a special type of sensor called the oxygen insensitive microscale biosensor which helps in the monitoring of constant oxygen supply in blood thereby detecting blood cancer at the earliest stage. The data from all the sensors are sent to a central wireless node through wifi. From the main node the data is sent to the control station of the hospital through zigbee as the coverage area of certain hospitals is more than the coverage area of a Bluetooth. The control station segregates the data of different patients and stores in the memory location. If any of the patient data exceeds the standard data fed to the control station by the doctor then a message will be sent to the mobile of the attendee and the doctor using the GSM control system.

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1. INTRODUCTION

Nowadays, biosensors play a vital role in the field of medical electronics. Biosensors has created a revolution in the developing medical instruments. This theory involves smart monitoring actions. This project gives a innovative picture about the advanced application of biosensors in the medical field thereby utilising the advanced technologies involved like GSM, ZIGBEE, microcontroller Raspberry PI which can also be called as the super computer. Through this project many lives of people could be saved even if the patient is not under treatment and away from the hospital. In this project a wide range of biosensors are used. The main part of the project is to monitor the bio sensors attached to the persons in their body either internally or externally.

2. REQUIREMENT PHASE

The requirement phase is classified into the hardware requirements and software requirements.

2.1. Hardware Requiremnts

The hardware components which are required for this project include biosensors (ECG Sensor, EEG sensor, Oxygen insensitive sensor), ADC convertor, XBEE module, GSM module, Rapberry Pi and a mobile phone for the reception of the data through GSM from the Raspberry Pi.

2.1.1. ECG Sensor

An ECG sensor is used to monitor the heart beat and the pulses of an individual. In this project the ECG sensors the ECG signal of a particular individual is recorded. In ECG sensor three electrodes are present of which one is to be placed at the left leg one to be placed to the right leg and the other to the left leg node.



Figure 1. ECG Sensor

2.1.2. EEG Sensor

An Electroencephalogram sensor is used to monitor the electrical signals generated in the brain. In this project the EEG signals are also recorded. The EEG sensor used here is of the band type worn on the forehead.

2.1.3. Oxygen insensitive sensor

An oxygen insensitive sensor is used to measure the oxygen content in the blood which regulates the haemoglobin. When the haemoglobin reduces in the blood the individual gets affected by leukaemia which leads to blood cancer so this sensor plays a vital role and also increases the efficient application of this project. The electrode here is through a small needle at the end of the sensor. The below is the specification of the oxygen insensitive sensor is given below

| %o | /°C | 0.0 | 5.0 | 10.0 | 15.0 | 20.0 | 25.0 | 30.0 | 35.0 | 40.0 | 0.0 | 456.6 | 398.9 | 352.6 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 314.9 | 283.9 | 257.9 | 235.9 | 217.0 | 200.4 | 2.0 | 450.4 | 393.6 | 348.1 | 311.1 | 280.6 | | | |
| 255.0 | 233.3 | 214.7 | 198.3 | 4.0 | 444.2 | 388.5 | 343.7 | 307.3 | 277.3 | 252.1 | 230.8 | | | |
| 212.4 | 196.3 | 6.0 | 438.1 | 383.3 | 339.4 | 303.6 | 274.0 | 249.3 | 228.3 | 210.2 | 194.3 | | | |
| 8.0 | 432.1 | 378.3 | 335.1 | 299.9 | 270.8 | 246.5 | 225.8 | 207.9 | 192.3 | 10.0 | 426.1 | | | |
| 373.3 | 330.8 | 296.2 | 267.6 | 243.7 | 223.3 | 205.7 | 190.3 | 12.0 | 420.3 | 368.4 | 326.7 | | | |
| 292.6 | 264.5 | 240.9 | 220.9 | 203.6 | 188.4 | 14.0 | 414.5 | 363.5 | 322.5 | 289.1 | 261.4 | | | |

2.1.4. Xbee

An Xbee consists of a transmitter modem and the receiver modem for the transmission and the reception of the data. It belongs to the IEEE standard 802.15. Xbee is used for the transmission and reception of the data over a long range of distance usually with a range higher than the Bluetooth. It can cover up to 400m of distance with less packet loss which can be later rectified through coding.

2.1.5. Raspberry Pi

A Raspberry Pi is an advanced microcontroller which also can be used as a supercomputer unlike other microcontrollers interfacing can be done directly onto the device. Memory capacity, and peripheral device support makes it unique from the other microcontrollers.

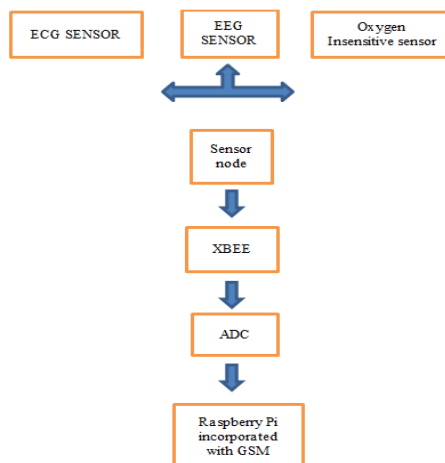
2.1.6. GSM module

The GSM module here has to be incorporated in the Raspberry Pi for the data to be transmitted to the user mobile device through SIM. GSM is the Global System for Mobiles which is an international standard belonging to IEEE standard 802.11.

2.2. Software Requirements

Software plays a major role in both controlling the hardware and also provide a platform for the interfacing of various hardware components. The softwares that are going to be used here run both in the windows and LINUX platforms excluding putty which can only be run on the LINUX platform.

3. BLOCK DIAGRAM



4. WORKING

An ECG sensor (electro cardiogram sensor) which is very essential for a critical patient, this project also emphasizes on the extended design of a special type of sensor called the oxygen insensitive microscale biosensor which helps in the monitoring of constant oxygen supply in blood thereby detecting blood cancer at the earliest stage. The data from all the sensors are sent to a central wireless node through wifi. From the main node the data is sent to the control station of the hospital through zigbee as the coverage area of certain hospitals is more than the coverage area of a Bluetooth. The control station segregates the data of different patients and stores in the memory location. If any of the patient data exceeds the standard data fed to the control station by the doctor then a message will be sent to the mobile of the attendee and the doctor using the GSM control system.

5. CONCLUSION

This project paves a way to decrease the deaths which caused due to the insufficient human resources.

6. FUTURE WORK

A prototype with increased coding accuracy can be done in the future. According to the proposed system the data could be sent only to the control station and to the doctor. In future through GSM data to multiple locations will be shared.

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