

PATIENT MONITORING SYSTEM

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ABSTRACT—Nowadays Health-care monitoring system has made new technologies based on Wireless-Sensing network .But bedded patient's condition are not good and it is found that they are undergoing several attacks for not being monitored properly every time by the family members. But the thing is that it is not possible every time for someone to look after the patient as nowadays every person in a family everyone is either working or a student. In every family at least one person is bedded either due to old age or had undergone through certain accidental case. So, we have introduced an IOT(Internet Of Things)based system which will contain Node-MCU ,Heart Beat sensor, Blood Pressure Sensor and Temperature sensor for monitoring the patient's health condition regularly. It also contains Global System for Mobile communication (GSM) and Global Positioning System(GPS). All these hardware parts are fixed in a single kit and is attached under the patient's bed. If the condition is found to be critical then an alert message will get send to the doctor through GSM. GPS will be used for tracking the location of the patient in case to provide ambulance services. It will also display the symptoms as which food and medicine the patient have to take as well as what all diseases can occur .It will also display the current time and date which will be helpful in maintaining the history of records. So we are proposing an innovative project using sensor technology to identify the patient's problem that uses Internet for communication purpose and for monitoring the patient's health.

Keywords – *Internet of Things, Healthcares, Sensors, GSM, GPS, Node-MCU and Technologies.*

I. INTRODUCTION

Doctor's availability continuously requires exceptional administration. There should be a proper alert system, privacy of patient's information, tracking location facilities and all should be there .But all those hardware's were not attached in a single kit. All those information are recorded

in our existing system. But as at least one person in every family is bedded and every time it is not possible for someone to look after the patient so we are introducing an

IOT based system which will contain all three kinds of sensor i.e. Blood Pressure sensor, temperature sensor and Heart rate sensor. GPS and GSM will also be there for location tracking purpose and for sending alert signal to doctor. The main implementation of our project is that all these hardware will be fixed in a single kit and that kit will be attached on the bottom of patient's wheel chair or bed.

When the patient will touch the sensor his/her Blood Pressure, Heart Rate and body Temperature will get calculated. Simultaneously the average of all heart rate, temperature and blood pressure will get calculated. The normal heart rate is 60-100 bpm. The normal Blood Pressure range is 120/80. More than ninety over sixty (90/60) and fewer than one hundred twenty over eighty (120/80): Your force per unit area reading is good and healthy. Follow a healthy style to stay it at this level. over one hundred twenty over eighty and fewer than a hundred and forty over ninety (120/80-140/90). If the raising are like as shown ninety over sixty (90/60) or less: you'll have low force per unit area a lot of on low blood pressure.

The normal temperature range of a person is 96.7-103 degree Fahrenheit. If it is above 104 degree Fahrenheit then the condition is found to be critical. The average will be calculated and then we will compare the average with the given ranges .If the values are not within the range then the condition is found to be critical. It will also display the recommendation as which food and medicine the person have to take if the condition is critical. It will also display as which all diseases can occur according to the symptoms in the web browser. All these things will also get displayed in an android application. This will make the system more convenient and easy.

II. EASE OF USE

We have used a choice tree algorithmic program for comparison purpose. call Tree algorithmic program associated with supervised learning algorithms in contrast to alternative supervised learning algorithms, this algorithmic program is used for finding regression and also classification issues too. The common aim of mistreatment call Tree is to form a coaching model which may use to spot category or worth of target variables by learning decision rules inferred from previous data(training data).The understanding module of call Trees algorithmic program is very easy compared with alternative classification algorithms. the choice tree algorithmic program tries to resolve the matter, by mistreatment tree illustration. Every internal node of the tree corresponds to associate in nursing attribute, and every leaf node corresponds to a category label.

Decision Tree formula Pseudo code:

- Place the most effective attribute of the dataset at the basis of the tree.
- Split the coaching set into subsets.
- Repeat step one and step two on every set till you discover leaf nodes all told the branches of the tree.

In call trees, for predicting a category label for a record we tend to begin from the basis of the tree. we tend to compare the values of the basis attribute with record's attribute. On the idea of comparison, we tend to follow the branch similar to that price and jump to the subsequent node. We continue scrutiny our record's attribute prices with alternative internal nodes of the tree till we tend to reach a leaf node with foreseen category value.

III. PROBLEM DEFINITION

Many patient monitoring systems has developed but there are only a few which can monitor the patient remotely. Remote monitoring of patient is challenging and costly, to have a nurse or a doctor in the remote areas. There has to be a way to efficiently decide what medicine to give based on the patient history and there should be a mechanism to contact the doctors in case if the machine has failed to recommend or the patient's health is critical. Decision tree is a classifier and is easy to implement and does not require any prior knowledge. Decision tree can be applied to a very large dataset and classification can be done. A decision tree consists of nodes arcs and branches. Leaf nodes consist of classes which are predicted from decision tree.

ID3 algorithm is most important algorithm and d ID3 algorithm is to select the appropriate attribute to test at each node in a tree in an iterative process. It uses top down

approach traverse from top down approach till the value is found. Iterative Dichotomies 3 algorithm main aim is to select the best attribute in dataset obtained. . Here we have a tendency to use entropy that measures the purity of assortment during a dataset. "S" could be a assortment containing each negative and positive examples, and also the attribute will take "n" totally different values "pi" is that the likelihood that the sample example belongs to category base, two is live of the data on the market.

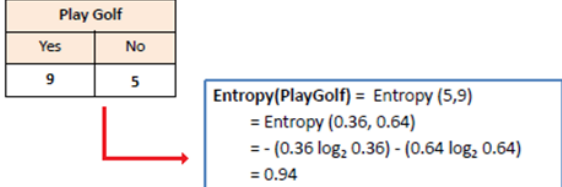
$$E(S) = \sum_{i=1}^c -p_i \log_2 p_i$$


Fig. 3.1: Entropy Formula

IV. LITERATURE SURVEY

For implementation of an Autonomous WBAN, author Taiyuan Wu et. al. projected a wearable device with solar power Harvester. It's controlled by AN output primarily based most point following technique. The BLE transmission technique is employed for transmission device information. For displaying such styles of information and for causation notifications just in case of emergency and net primarily based robot application is meant. most point following technique is employed to extract the best power from a versatile solar battery and experimental analysis illustrate, beneath totally different conditions. solar battery will be controlled by projected most point following methodology for twenty-four hrs work of the device can be achieved, once device node is ready to ten minutes wake-sleep mode. within the future work, for the backup of Energy, battery can also be used as a storage device just in case of unsuitable atmospheric condition[1].

Monitoring patients incessantly is incredibly essential. In WBSN's the physiological measurements are taken sporadically from the biosensors then it sends, the collected data to the organizer wherever within the alternative ordered steps the information fusion happens. Biosensors collect an outsized quantity of knowledge that has got to be processed however they need short amount of period that the task of process the information and taking the right decisions just in case of an emergency could be a huge challenge. The paper proposes a knowledge

management framework that is understood because the changed LED for biosensors which starts its operating right from data assortment to creating the right selection. The planned system works in such the way that it drops the amount of knowledge collected however at the identical time maintains the nobility of the information. In alternative systems, many readings are taken on several amounts and supported it the choices are created but the planned system will take a choice at one period with just one set of reading. the most objective is to pick out a choice that could be a best match to the score via parameters of respiration and vital sign illustrate that the planned system

LED to knowledge loss up to fiftieth. This shows the effectiveness of the planned changed LED that significantly reduces the energy consumption yet because the data collected and every one the whereas maintaining vital range of knowledge integrity [2].

Monitoring of patients pulse rate within the hospitals usually has to be done by remotely. This provides higher level of management and allows a lot of rational work. It detection pulse rate is one in all the most tasks that has been Self-addressed traditionally further as recently whereas the algorithms and analog physics solutions are provided and are well developed, the new technologies from the sphere of web of Things provides new potentialities to make sure the property to the net and also the cloud. In our previous analysis, we've got analysed many setups to produce information to the cloud. The ESP8266 node mcu gathers info from the sensors that are connected and transfer them over the wireless local area network router. A server runs that keeps track of the updated values and transfer them over to a computer, mobile or TV [3].

In medical field IOT, Wireless Body space Network (WBAN) is essential conception that is network of autonomous medical sensors which are deployed inner or outer of the patient body for health observation system. In Wireless Body space Network, deployed wearable sensors senses health conditions like heart rate, heart beats, vital sign and temperature etc. mistreatment IOT exploited devices. Information from multiple device nodes is collected to sink known as data fusion and it's transmitted to instrument. In wireless device networks, information is passes through communication from one finish to a different end. info will be travel hop by hop or multi hop manner within the device network. Cluster technique could be a higher answer for come through energy potency over the network communication [4].

A. Figures

The architecture diagram illustrates microcontroller, Sensors, GSM module and GPS module. For power supply , we use transformer and for conversion we use 230V converter to 12V converter .We use step-down transformer for converting 230V AC to 12V AC and to convert AC into DC we use Dot board, 2 Rectifiers, 4 Diodes and Capacitor circuits. Transformer is connected to Dot Board, Rectifier, Diodes and Capacitor. Capacitor is used for noise reduction. Specially, we gave power supply to GSM module and GPS module which is connected to microcontroller (NodeMCU). It is also use for Sending messages. ECG, ADC (Analog to Digital Controller) is connected to microcontroller as well as Heart Sensor, Temperature Sensor and Blood Pressure Sensor.

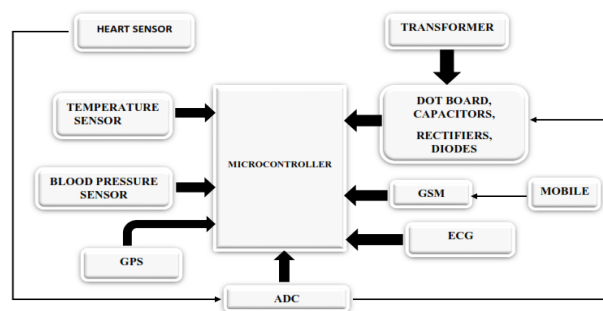


Fig. 4.1: System

Architecture

V. PROPOSED METHODOLOGY:

The patient status is divided into three phases normal, critical and very critical. In the normal phase there is a continuous monitoring and the patient is okay and does not need much attention. In the critical phase a decision tree is made with the dataset trained collected from the heart patients from the SIMS Hospital. The dataset consists of age, pulse, blood pressure, temperature and the type of heart attack they had undergone. in our case all of them had undergone MI cardiac infarction. So our procedure is used to detect and treat patients with MI cardiac infrastructure at a greater accuracy than other models.

In this paper, we have introduced a Arduino based Patient Monitoring System for a bedded person as it will automatically check when the condition is critical and the alert signal will be sent to the doctor and patient's family because every time it is not possible for someone to sit beside the patient. Through a mess of study, experiment, analysis and epitome implementation work, have shown that

projected answer is possible and is capable to succeed in far better classification result than the opposite existing approaches.

A. Technical Module

We are using GPS for location tracking and GSM module for sending alert signal. All the input values get stored in a web server. Input values are given on the basis of calculating heart rate, blood pressure and body temperature. The language we have used for frontend is HTML and for backend is PHP.

B. Module 1-GSM

GSM means mobile communication equipment and it's stands for System International 'Unites for mobile communication (GSM). The proposal of GSM was developed at Bell Laboratories in 1970 and it's wide used for mobile communication system around the world. GSM

is an open and digital cellular technology used for transmission of voice and information.



Fig.5.1:GSM Module

C. Module 3-GPS

GPS stands for Global Positioning System, satellites broadcast microwave signals to modify GPS receivers on or close to the Earth's surface to see location and time and additionally derive rate. The GPS system itself is operated by the U.S. Department of Defence (DoD) to be used by each departments the military and also the general public.

A GPS signal includes move signals and it's accustomed live the gap to the satellite and navigation messages. The navigation messages embrace information, accustomed live the placement of every satellite and knowledge concerning

the time and standing of the complete satellite constellation referred to as the almanac.



Fig. 5.2: GPS Module

VI. WORKING OF CIRCUIT

The circuit consists of the following parts: NodeMCU ESP 8266, ADC, GPS, GSM, ECG, LM35 temp sensors, heart sensors, step down transformers, dot board with capacitors. NodeMCU esp. 8266: it is a microcontroller within built WIFI which lets you connect to the internet. It has analog and digital pins. It receives the data from other sensors and sends it to the server which stores the data.

GPS: A GPS is used for sending location of the patient and is connected directly to the microcontroller.

GSM: A GSM module is a chip or circuit board that will be used to establish a connection between a machine and a GPRS system. This will be used to send alert messages to the patient if his health continuous to go critical or deteriorate.

ECG: An ECG is used to monitor the electrical activity of a heart. It has electrodes that can be attached to the patient on the arms, neck and chest. Step down transformer: It is used to step down the 240V AC coming from the house to 5V AC. This is required to power the GSM module.

ADC: It is Analog to Digital converter. It converts the analog signals coming from the sensors and send it to the processor in digital form. Analog signals like pulse rate, blood pressure and ECG are connected to convert analog values to digital.

Dot board with 15microFarad Capacitor: It is used to convert the AC Voltage coming from the transformer to a DC voltage because our GSM module works only in the DC phase.

VII. CONCLUSION

Working on the project, Patient Health Monitoring we gained a lot of knowledge and information about the health care system. We have tried to ease the life of patient's and their family members. As nowadays in every family at least one person is bedded so this health monitoring system will prove to be very useful for them. IN web browser it will also show an ECG graph as well as a map for current location tracking so that doctor can visit the patient as soon as possible.

Secondly Decision tree algorithm has proven to be very useful.

Decision tree is a supervised learning algorithm. It has root nodes, branches and leaf node. Leaf nodes are mostly the conclusion. It consists of if else logic/ rules for classifying. The advantage of decision tree is that it can be applied to a large data set and inference can be made of the data. A complex data set can be interpreted with easy visualization using decision trees. We conducted much analysis, evaluated our results with test data and got better prediction and classification than other existing systems. Our patient monitoring system takes less than a minute to send the notification to doctors and family members so that paramedics can arrive and the patient's health care.

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