Monitoring of Patients Health in Hospitals using CAN Protocol

Karumuri Anusha Reddy, Narendra Babu Tatini

Abstract: ***In an emergency clinic the observing of various patients continuously is a noteworthy issue if patient isn't in emergency unit. This paper displays a checking framework that has the capacity to screen vital parameters from different patient bodies and caution the specialists if the patient's vital parameters go past basic qualities. In the proposed framework, an Electronic Control Unit has joined close to the patient body to gather all the vital parameters and sends them to the base station. The appended sensors on patient's body can detect the pulse, circulatory strain, temperature, saline level etc. This framework has two units one is Node unit and other is Server unit. Node unit is connected at the patient end it collects all the patients parameters, Server unit is at doctors end when doctor selects particular patients unit his details are shown to the doctor. This framework can recognise the anomalous conditions, issue a caution to the patient and send a SMS to the doctor.***

Key words: Health monitoring, CAN Protocol, IOT, Sensors.

I. INTRODUCTION

The Internet of things (IoT) is significantly connected in every day application, for example, medicinal services , smart homes, and security frameworks. The iot is developing quickly step by step. Loads of gadgets are associated with the web. For instance, Smart medicinal services screens the states of patient wellbeing and contrast and recently put away information from the cloud[1]. The iot gadgets detecting a lot of physical condition information and state of an item, a large portion of the iot gadgets have restricted capacity limit. So detecting information should be put away at an asset rich stage.To screen the patient vital parameters persistently, numerous emergency clinics are presently receiving electronic sensors associated close-by to patient, screens or PC put at bedside and furthermore some alert framework with the steady supervision of a para therapeutic collaborator with a scratch pad containing the full history of the patient .The major draw back while human monitoring is that nurse need to monitor the patient continuously[2]. Be that as it may, this strategy for checking isn't likewise free from mistake and it might prompt any debacle because of human blunder. In this work, a checking framework is purposed with a programmed android base application where a specialist can watch the patient condition continuously. The patients information can be monitored remotely [3]In particular, it uses CAN convention,
which is a protected correspondence convention and can suit numerous clients with no information misfortune.

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We are using many sensors like temperature sensor, pulse sensor, saline level detection sensor etc, even the babies temperature is also monitored by using these sensors[3]. By using sensors health care is being implemented so easily[4].The basic role of the electronic instrument for therapeutic application is to quantify the physical amount present in the human body which helps the restorative work force ahead of time examination and henceforth, numerous sorts of electronic instrumentation frameworks are directly utilized in current medical clinic and different dispensaries. Now-a-days many sensors are directly attached to patients body which causes no harm and detects their health and reduces health risk[5]. The basic highlights of most medicinal instrument frameworks fulfill the regular highlights accessible in the other instrumentation framework. The most widely recognized constituents are measure and, detecting unit, flag handling unit and show unit.The protocol used for communication is CAN protocol. In CAN protocol bus nodes don't have specific address ,the information about the address is contained in the identifier field of the transmitted messages, which indicates the content of message and its priority. The number of nodes that are connected may change without disturbing other nodes. Any device can connect and disconnect without disturbing the working of others. The number of devices that are connected have a fixed number. Controlled Area Network is Low Level Protocol. The CAN protocol like many other protocols has many layers like Application layer, Object layer , Physical layer, Transfer layer .
The object layers looks after

- Message filtering ,
- Message and status handling.

The function of transfer layer is to receives messages from the physical layer and transfer them to the object layer. It has functions like

- Error Detection
- Acknowledgement
- Message Validation
- Arbitration
- Transfer Rate and Timing
- Message Framing
- Information Routing

There are four frame types for CAN Protocol

- Data frame: This frame contains node data for transmission
- Remote frame: This frame requesting the transmission of a specific identifier
- Error frame: This frame transmitted by any node detecting an error
- Overload frame: This frame injects delay between data frames

II. LITERATURE SURVEY

Monitoring of infant body temperature and controlling it by using Arduino Espresso lite 2.0 micro controller. The data collected from the sensors is stored in the cloud and data is sent to an android app which is connected wirelessly by using Wi-if module. The present emergency clinic driven medicinal services framework is getting to be wasteful to treat conditions that request prompt treatment, for example, heart strokes. Along these lines, the center is currently tilting from medical clinic driven treatment to quiet driven treatment. This undertaking proposes a wellbeing observing framework which screens crucial parameters of the patient, for example, temperature and pulse utilizing sensors just as a fitbit which are associated with a raspberry pi board[6]. The task includes cautioning the specialist through SMS if any indispensable parameter of the patient goes astray from the ordinary esteem. Aside from helping the specialist screen the patient's essential wellbeing parameters this wellbeing observing framework additionally guarantees that the patient takes the endorsed medicine at the correct occasions. The raspberry pi goes about as an individual server which logs the subtleties of the patient's prescription. The patient is sent suggestions to take drugs through SMS as indicated by his remedy.A continuous monitoring system using ARM7TDMI which monitors the patients basic parameters . In a crisis facility the checking of various patients dependably is an important issue if tolerant isn't in crisis unit. This paper shows a checking structure that has the ability to screen physiological parameters from various patient bodies and alarm the pros if the patient's physiological parameters go past fundamental characteristics[7]. In the proposed structure, an Electronic Control Unit has associated close patient body to accumulate all the physiological parameters and sends them to the base station. The added sensors on patient's body can recognise the beat, circulatory strain, and so forth. This structure can recognise the irregular conditions, issue a caution to the patient and send a SMS to the specialist. The essential ideal position of this structure interestingly with past systems is to diminish the imperativeness usage to draw out the framework lifetime, quicken and extend the correspondence incorporation to grow the open door for improve tolerant individual fulfilment. We have developed this system in multi-tolerant structure for crisis centre therapeutic administrations.

A checking framework that has the capacity to screen physiological parameters like human body temperature, pulse (BP), heartbeat and the oxygen level from different patient bodies. In the proposed framework, a facilitator hub in patient site has connected to the patient's body to gather every one of the signs from sensors and sends them to the focal base station at specialist site. Both the units involve 8051 arrangement of (AT89S8252) microcontroller and spoke with one another by Controlled Area Network (CAN) convention. The distinctive sensors appended to the patient's body watch the required physiological parameters and are shown in the LCD on the patient unit. At that point the obtained information are transmitted to the focal hub on specialist site. This framework can likewise identify the strange conditions, issue an alert to the patient and send a SMS/E-mail to the specialist. Likewise, the observing signs are at last acquired in an Android cell phone. At last, an android application is created to show the recorded biomedical data graphically to both the specialist and patient progressively[8].

III. PROPOSED WORK

In our proposed work there are two units, server unit and node units .The communication between the server and nodes uses CAN protocol. The server unit is present at doctor cabin while node units are fixed at patients ends. The node units consist of different sensors like temperature sensor, pulse sensor, heart beat sensor etc which continuously monitors the patient. By using the keypad at server unit doctor can select which patients' parameters can be displayed at server unit . These parameters are updated into cloud by using gateway and stored. If any data crosses the limit it automatically sends an alert to the patients and his family through an sms.

IV. BLOCK DIAGRAM

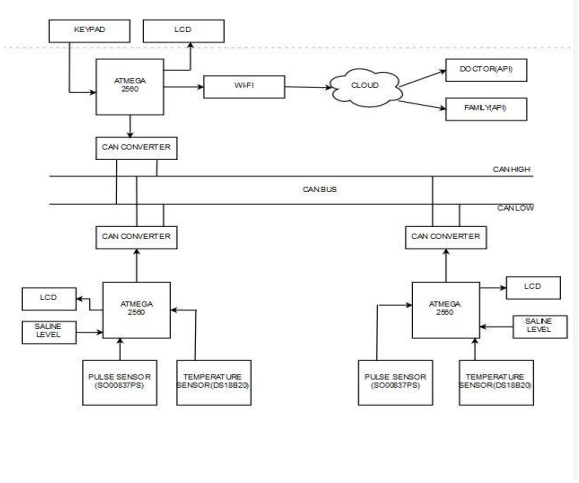

Fig 1: Block Diagram

V. HARDWARE REQUIREMENTS

Arduino mega:

The ATmega 2560 is a microcontroller which consists of 54 digital IO pins out of them 14 are for PWM outputs, 16 for analog inputs, 4 for UARTs , one 16 MHz crystal oscillator, one for USB connections, one for power jack, an ICSP header, and reset button. It consists everything that are needed to support the microcontroller.

Fig 2:ATmega 2560

Pulse sensor:

SO00837PS is a heart rate plug and play sensor for arduino. It is easy to incorporate heart rate live data into projects. The sensor the sensor is attached to either earlobe or fingers.

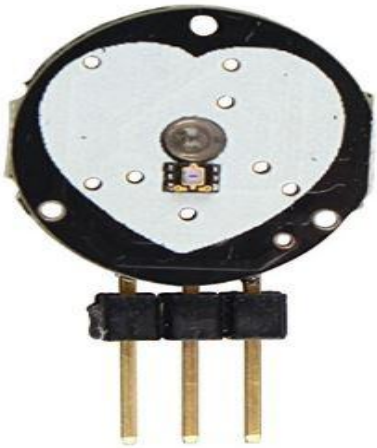

Fig 3: Pulse Sensor

Temperature sensor:

DS18B20 human body temperature sensor is an industrial standard waterproof sensor . It's range varies from -50c to + 125c with an accuracy of +-0.5 c. It has 3 pins VCC, GND and DATA. The DS18B20 can be place either on tongue, forehead and underarm. The Power supply of DS18B20 is 3.0v to 5.5v .It measures the temperature and main feature of this sensor is it powered from DATA line .DS18B20 is used to measure the body temperature of the patient[9].

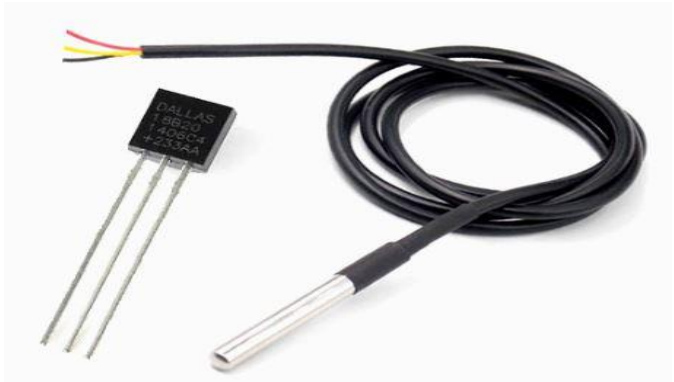

Fig 4: Temperature Sensor (DS18B20)

VI. ANALYSIS

There are two units in our system one is the server unit and other is node unit

Node Unit

In this work, all the sensors (i.e. Blood pressure sensor, temperature sensor, level sensor and the SPO2 sensor) are connected to the patient's body. All the sensors continuously reads the vital parameters and display them in the LCD at Node end. There are many such nodes which continuously monitors all the parameters. The values that are taken are continuously compared with the predefined values that are stored by us . if there is any high deviation in the values while comparison then the concerned staff and their family will get an alert through an SMS.Nodes can communicate with Server only when server sends a request. When the nodes receive an input from the server then they respond by sending the corresponding parameter values to the server. The received sensor values are displayed at the doctors end .

Server Unit

The server unit is otherwise called a Central unit. This unit is present at the doctor's end . whenever the doctor wants to see the parameters of concerned patient, he will first select the node of the patient by using the keypad when the node is selected then doctor can see the all the parameter values of that patient. All the results are stored in cloud by using a gateway by using an API we can view all the details of the patients. In case of emergency an SMS is sent to the doctor and concerned patient's family.All the information uploaded to cloud using an API . we can see the complete information of the patient by logging into the API. There we can all the information in terms of graphs and values . Information is uploaded once in every 5 minutes . once if any information or the value is beyond the predefined value an alert is sent to the concerned doctor and concerned patient family. First the numbers are stored in the systems and messages regarding his health conditions are sent to them through SMS.

VII. RESULTS

The proposed system is implemented by using Arduino Mega 2560 , temperature sensor, pulse sensor. These sensors are interfaced to Arduino board and they conitniously read the information and upload them to the cloud by using Wi-fi and are sent sent to the corresponding doctor and patients family .

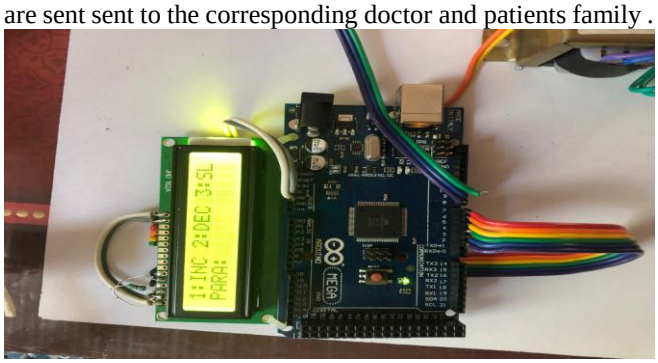

Fig 5: Server Unit

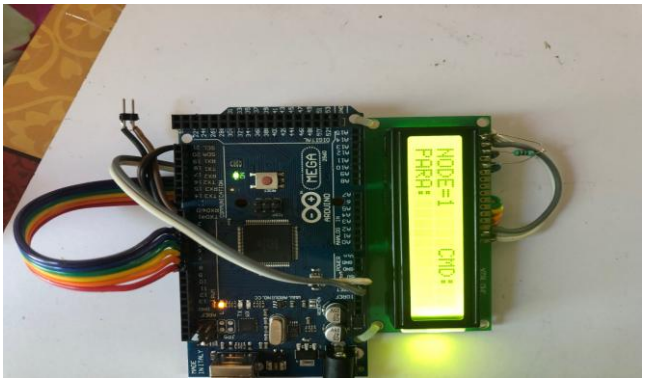

Fig 6:Node Unit

Fig 5,Fig 6 are server unit and nodes units to which different sensors are attached.

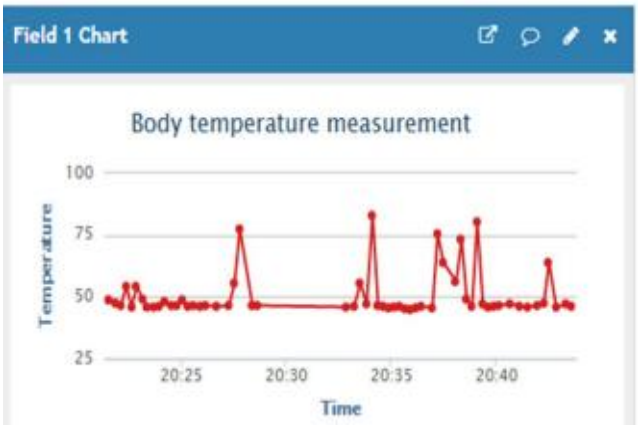

Fig 7:Temeparute graph

Fig 7 : shows us the temperature graph which we are uploading into the cloud continuously.

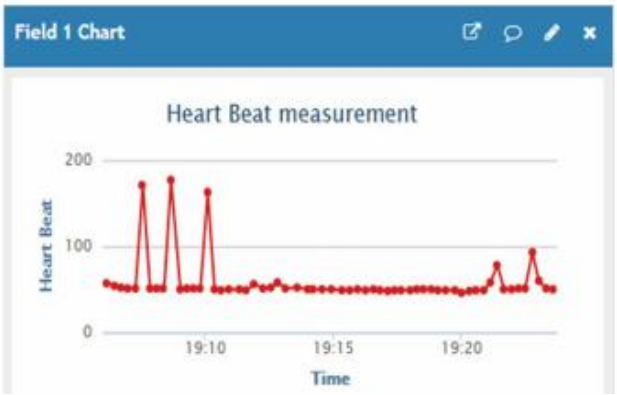

Fig 8: Heart Beat Graph

Fig 8: shows us the heart beat measurement of the patient we are monitoring and displaying them.

VIII. CONCLUSION

The proposed system plays a vital role in the health monitoring system now-a-days. The patients data regarding temperature, pulse, saline level are monitored by using sensors.. It is less expensive as we are using CAN communication. By monitoring the patient continuously we can avoid the risk.

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