

# A Wireless Monitoring Medical Equipment Using GSM during Natural Disasters

<sup>1</sup> Bashyam Soumya & <sup>2</sup> T.Ravi Kumar

<sup>1</sup> M.Tech., Department of ECE (DECS), Dr.K.V.Subba Reddy college of Engineering for Women, Email.Id- [soumya369edu@gmail.com](mailto:soumya369edu@gmail.com), Kurnool.

<sup>2</sup> Assistant Professor, Department of ECE (DECS) Dr.K.V.Subba Reddy college of Engineering for Women, Guide Email id- [ravi3922@gmail.com](mailto:ravi3922@gmail.com), Kurnool.

## Abstract

Electricity worked strong restorative hardware (DME, for example, ventilators, dialysis machines, and patient observing gadgets, are life-supporting machines utilized widely by patients at home. While helpful and efficient, at-home utilization of DME is vulnerable to Electricity blackouts, particularly the ones created by regular calamities that frequently happen in extensive zone and for a long length. There is small existing innovation permitting healing centers to screen DME-subordinate patients without utilizing the present foundation, for example, the landlines, the cell towers, Ethernet link or the Internet. Reported in this is a novel remote System that uses a radio specially appointed system to naturally report the patient's data and area, and the DME data and status to a close-by clinic when a Electricity blackout is recognized. This System comprises of two sections: a doctor's facility based getting gadget, called the Base Station hub, and various transmitting gadgets, called User Nodes, each associated to the DME at patients' homes. The Base Station and User Nodes is each worked with a Teensy® microcontroller, a GPS beneficiary module, and aXbee® radio executing the Zigbee® convention. Moreover, every User Node contains a status LED and an inward lithium-particle battery associated by a charge controller. Client Nodes are customized to acquire the GPS area of the patient, screen

the DME status, speak with adjacent hubs, transmit the information and hand-off data to the Base Station through the radio impromptu system the hubs frame on account of a Electricity blackout. The Base Station gadget is modified to get and pass on the data transmitted from the User Nodes to an adjacent clinic's patient observing PC through a USB association. This System works without depending on the foundation, and permits clinic staff to know the data and areas of DME and their clients and give assistance required amid Electricity blackouts.

Keywords-Ad hoc Network, DME, Durable Medical Equipment, GPS, Radio, Tracker, Tracking System, Wireless, Zigbee, Xbee

## INTRODUCTION

Electricity worked sturdy therapeutic hardware (DME) it's a current innovation permitting healing facilities to screen DME-subordinate patients without utilizing the landlines, Ethernet links and web. The reported novel remote System that uses worldwide System for portable correspondence arrange which naturally report the patient's data, the DME data and status to an adjacent healing facility when a Electricity blackout is recognized. This venture is intended to gauge heart (beat check) and temperature of the patient by utilizing installed innovation. In this venture at the same time we can gauge and

screen the patient's condition. It is to work and accessible at a moderate cost. This venture portrays the plan of a basic, ease controller based remote Patient checking System. Heart rate of the patient is measured from the thumb finger utilizing IRD (Infra Red Device sensors) and temperature of the patient is measured utilizing LM35 sensor. A freeze switch is likewise interfaced to the controller that is to send a flag by the patient on the off chance that anything isn't right or the consequences will be severe if the patient needs some consideration then they can press the switch. Heart rate values, temperature values and the flag through the frenzy switch is sent the remote place utilizing GSM module interfaced to the controller.

As of late, Interest in remote System for medicinal applications has been quickly expanding with a no. of preferences over wired options including:

- Easy of utilization, lessened danger of disappointment
- Reduce tolerant inconvenience,
- Enhance versatility
- Low cost of care conveyance.

Remote innovation could be the best answer for mass crisis circumstances like normal, human included catastrophes and military clash

### **GSM TECHNOLOGY**

#### **Global System for Mobile communication (GSM) :**

GSM, which remains for Global System for Mobile interchanges, rules (essential as the world's most broadly utilized PDA innovation. Mobile phones utilize a PDA administration transporter's GSM arrange via looking for wireless towers in the adjacent region. Worldwide System for portable correspondence (GSM) is an all inclusive acknowledged standard for advanced cell correspondence.

GSM is the name of an institutionalization gather built up in 1982 to make a typical European cell phone standard that would figure particulars for a container European versatile cell radio System working at 900 MHz It is evaluated that numerous nations outside of Europe will join the GSM partnership. GSM digitizes and packs information then sends it down to a channel with other two floods of information.

#### **Need of GSM:**

The GSM contemplate amass meant to give the followings through the GSM:

- Improved range proficiency.
- International meandering.
- Low-cost versatile sets and base stations (BS)
- High-quality discourse
- Compatibility with Integrated Services Digital Network (ISDN) and other phone organization administrations.

### **EXISTING SYSTEM**

In the current **System**, Project portrays the outline of a straightforward, minimal effort controller based remote patient checking **System**. You may be distant from everyone else some time or another and begin feeling sick, unequipped for calling a rescue vehicle or coming to the closest healing center. The application can spare your life in the event of a mishap, inside drain or other medical problem: simply push the red catch and let your relatives or your companions know where you are and that you require prompt care. In the event that your restorative crisis doesn't permit you to address an emergency vehicle administrator, you can utilize the gadget to take a photo or record a short video and send it as further subtle elements of your area and therapeutic issue. The utilization of remote sensor systems can adequately forestall regular catastrophes like blaze surges, seismic tremors and volcanic emissions.

The sensors work with the utilization of remote hubs which have been effectively conveyed in streams and on the earth outside. So that the sensor can screen the adjustments in water level and development under the earth outside layer in genuine time. Then, there is Industrial observing. Where the machine wellbeing observing **System** utilizes remote sensor systems to check the state of the machine in view of support. Consequently, these sensor **Systems** offer noteworthy cost investment funds and better unwavering quality. Also, in wired **Systems** the use of sensors is regularly constrained since the cost for wiring is

high. Thusly already unavailable areas like perilous, limited territories with pivoting apparatus can be achieved utilizing the present high innovation remote sensors, A frenzy switch is additionally interfaced to the smaller scale controller, that is to send the flag by the patient on the off chance that anything isn't right or there will be consequences if the patient needs some consideration then they can press the switch. The flag through the frenzy change is sent to the remote place utilizing GSM module interfaced to the smaller scale controller.

## 2.1 Block Diagram

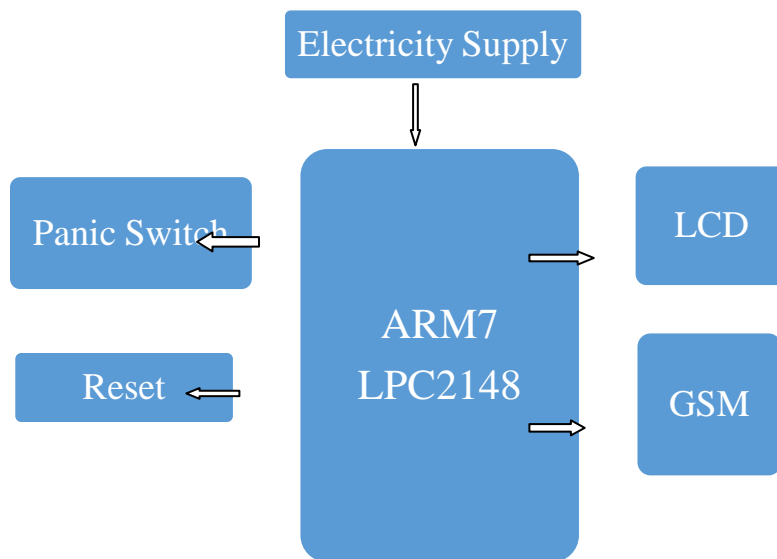


Fig.2.1: - Block Diagram for existing system

### Panic Switch

A panic caution is an electronic gadget intended to help with alarming some individual in crisis circumstances where a danger to people or property exists. A panicfrenzy alert is often yet not generally controlled by a disguised 'Panic caution catch'. These catches can be associated with a checking focus or locally through a noiseless caution or a capable of being heard

chime/siren. The caution can be utilized to demand crisis help from nearby security, police or crisis administrations. A few Systems can likewise enact shut circuit TV to record or survey the occasion. Many frenzy alarm catches bolt on when squeezed, and require a key to reset them.

A catch utilized as a part of comfort stores, service station, or different foundations staffed with a solitary representative amid late hours. Regularly situated under the counter close to the money enroll or safe, the catch can be squeezed in times of misery (Such as burglary, problematic or debilitating conduct, or a circumstance which may warrant help), setting off a quiet caution. On the off chance that the catch alerts a private security organization, an expense might be charged for every time the catch is utilized. This avoids abuse, and frequently helps in the representatives judgment of the circumstance; regardless of whether it warrants the charge to have manage the circumstance.

#### **Applications and Drawbacks**

Panic switch is an idea of spending a flag to a right individual or place in time of, Emergency, this little gadget will comprise of a BLE tag with a switch. In time of crisis individual will press the change to send flag to right individual.

#### **Applications**

- Smart Hospital System
- Remote heart rate monitoring applications
- Local monitoring applications
- Designed for Home and Clinical applications

#### **Drawbacks**

Here the patient himself need to think about his condition and respond and he have to press the

switch, this may not be conceivable constantly and the patient may fall in threat were no sensors used to screen his condition which is real disadvantages and utilizing ,sensors to quantify through Systems.

#### **FUTURE SCOPE**

In this System we are utilizing manual strategy to work Android telephone rather than that in future it makes naturally.

#### **PROPOSED SYSTEM**

Electricity worked sturdy medicinal hardware (DME) it's a current innovation permitting doctor's facilities to screen DME-subordinate patients without utilizing the landlines, Ethernet links and web. The reported novel remote System that uses worldwide System for versatile correspondence arrange which naturally report the patient's data, the DME data and status to an adjacent healing facility when a Electricity blackout is recognized.

Gather intermittent, constant information and transfer it to the specialists. Every one of these applications are composed with the intension to diminish the stay of patients in the healing centers expect for the time required for methodology. Every patient is given with a tag to his/her distinguishing proof what is utilized for past pharmaceuticals. This can likewise be transferred back to the healing center where the patients are being moved.

### 3.2 BLOCK DIAGRAM

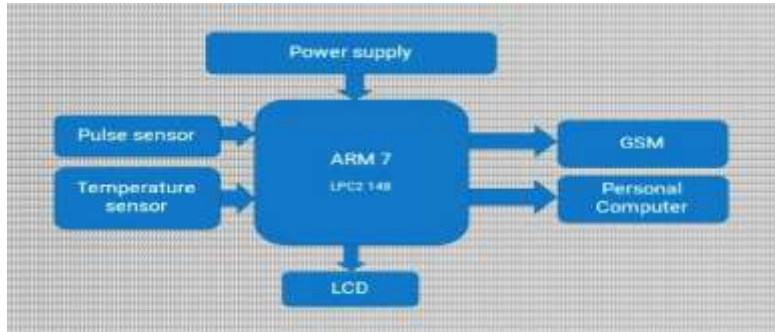


Fig.3.1: - Block Diagram for Proposed System

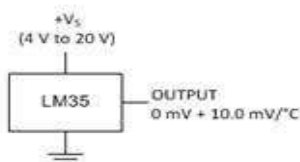
### PROPOSED SYSTEM



Fig.3.2:- Proposed System kit

### Operation performed for Temperature Sensor:

#### Basic Centigrade Temperature Sensor (2°C to 150°C)



#### Full-Range Centigrade Temperature Sensor

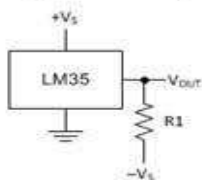


Fig.3.4:- Operation for Temperature sensor





Fig.3.5: - Temperature Sensor LM35 kit

### **PULSE RATE SENSOR (or) HEART RATE SESENSOR**

Heart rate estimation demonstrates the soundness of the human cardiovascular System. This venture shows a method to gauge the heart rate by detecting the adjustment in blood volume in a finger conduit while the heart is pumping the blood. It comprises of an infrared LED that transmits an IR motion through the fingertip of the subject, a piece of which is reflected by the platelets. The reflected flag is identified by a photograph diode sensor. The changing blood volume with pulse brings about a prepare of heartbeats at the yield of the photograph diode, the size of which is too little to ever be distinguished specifically by a microcontroller. In this way, a two-organize high increase, dynamic low pass channel is composed utilizing two Operational Amplifiers (OpAmps) to channel and open up the flag to fitting voltage level so that the beats can be tallied by a microcontroller. The heart rate is shown on a 3 digit seven portion show.

Heart rate is the quantity of heartbeats per unit of time and is normally communicated in thumps every moment (bpm). In grown-ups, an ordinary heart thumps around 60 to 100 times each moment amid resting condition. The resting heart rate is straightforwardly identified with the

wellbeing and wellness of a man and subsequently is essential to know. You can quantify heart rate at any spot on the body where you can feel a heartbeat with your fingers. The most well-known spots are wrist and neck. You can tally the quantity of heartbeats inside a specific interim (say 15 sec), and effortlessly decide the heart rate in bpm. This venture depicts a microcontroller based heart rate estimation System that utilizations optical sensors to quantify the modification in blood volume at fingertip with every heart beat. The sensor unit comprises of an infrared light-discharging diode (IR LED) and a photodiode, set one next to the other as demonstrated as follows. The IR diode transmits an infrared light into the fingertip (put over the sensor unit), and the photodiode faculties the part of the light that is reflected back. The Electricity of reflected light relies on the blood volume inside the fingertip. Along these lines, every heart beat somewhat modifies the measure of reflected infrared light that can be recognized by the photodiode. With an appropriate flag molding, this little change in the adequacy of the reflected light can be changed over into a heartbeat. The beats can be later tallied by the microcontroller to decide the heart rate.

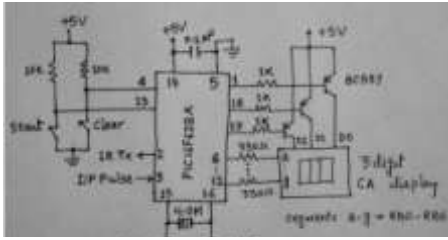


Fig3.6:- Circuit diagram for the Temperature sensor unit

### Circuit Diagram

The flag molding circuit comprises of two indistinguishable dynamic low pass channels with a cut-off recurrence of around 2.5 Hz. This implies the greatest quantifiable heart rate is around 150 bpm. The operational enhancer IC utilized as a part of this circuit is MCP602, a double OpAmp chip from Microchip. It works at a solitary Electricity supply and gives rail-to-rail yield swing. The sifting is important to hinder any higher recurrence commotions exhibit in the flag. The pick up of every channel stage is set to 101, giving the aggregate intensification of around 10000. A 1 uF capacitor at the contribution of every stage is required to obstruct the dc part in the flag. The conditions for computing addition and cut-off recurrence of the dynamic low pass channel are appeared in the circuit graph. The two phase intensifier/channel gives adequate pick up to help the frail flag originating from the photograph sensor unit and change over it into a heartbeat. A LED associated at the yield squints each time a heart beat is recognized. The yield from the flag conditioner goes to the TOCKI contribution of PIC16F628A. The control and show part of the circuit is demonstrated as follows. The show unit involves a 3-digit, basic anode, seven fragment module that is driven utilizing multiplexing system. The sections a-g are driven through PORTB pins RB0-RB6,

separately. The unit's, ten's and hundred's digits are multiplexed with RA2, RA1, and RA0 port pins. A consideration switch info is associated with RB7 stick. This is to begin the heart rate estimation. Once the begin catch is squeezed, the microcontroller enacts the IR transmission in the sensor unit for 15 sec. Amid this interim, the quantity of heartbeats touching base at the TOCKI information is checked. The real heart rate would be 4 times the number esteem, and the determination of estimation would be 4. You can see the IR transmission is controlled through RA3 stick of PIC16F628A. The microcontroller keeps running at 4.0 MHz utilizing an outside precious stone. A controlled +5V control supply is gotten from an outside 9 V battery utilizing a LM7805 controller IC.

### Output

The utilization of this gadget is extremely basic. Turn the Electricity on, and you will see all zeros in plain view for few moments. Hold up till the show goes off. Presently put your index finger tip on the sensor get together, and press the begin catch. Simply casual and don't move your finger. You will see the LED flickering with heart thumps, and subsequent to intersection 70, the outcome will be shown.

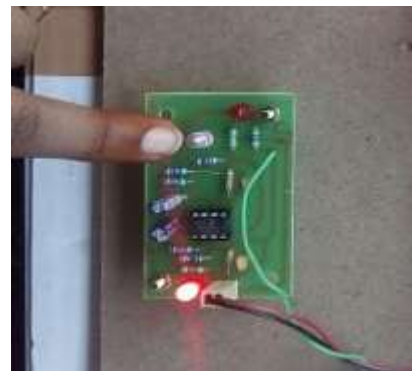


Fig.3.7: - Pulse (or) Heart Sensor kit

**PROPOSED SYSTEM OUTPUTS**

**Proposed System kit**

The equipment required for the System is actualized and tried. Testing is extremely essential to approve the usefulness of the proposed System. The units were executed exclusively at first and they were tried to check on the off chance that they were working appropriately. At that point, they were incorporated and designed as required for the System.

**PROPOSED SYSTEM KIT:-**

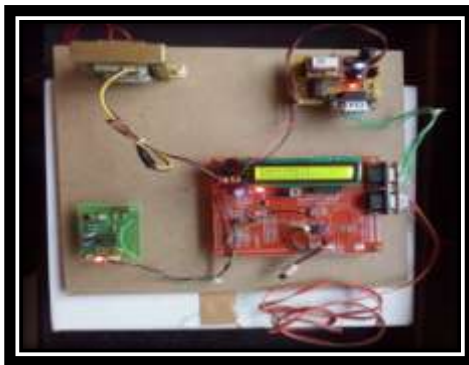


Fig.6.1:- Proposed System

**TEMPERATURE SENSOR OUTPUT:**

The working temperature range is from - 55°C to 150°C. The yield voltage fluctuates by 10mV in light of each o C rise/fall in surrounding temperature, i.e., its scale component is 0.01V/o C 50°C.



Fig.6.2:- Temperature Sensor Output

**HEART RATE (or) PULSE SENSOR:**

The below output is occurred when the pulse (or) heart sensor crossed 70, then the outage Electricity is detected.



Fig.6.3: Pulse Sensor Output

**INITIAL CONDITION OF PROPOSED SYSTEM**



Fig.6.4: - Initial Condition of Proposed System

**OUTPUT FOR THE PROPOSED SYSTEM**



Fig.6.5:- Output of Proposed System



## 6.2 FINAL OUTPUT FOR PROPOSED SYSTEM



Fig.6.6:- Final Output for Proposed System

### FUTURE SCOPE

The future degree for this venture, is we can give many labels to patients at once and after that check the state of numerous patients through this strong medicinal gear when the Electricity blackout is recognized. The accompanying executes can be found in future as takes after:

- ECG, EEG and other wellbeing parameters can likewise be checked.
- Continuous checking and future analysis can be performed by means of a similar System i.e., Telemedicine.
- More than a solitary patient can be checked utilizing a solitary System

### CONCLUSION

The DME status, convey through the GSM correspondence, where DME transmit the information and hand-off data to the healing facility when the instance of a Electricity blackout is recognized. This System works without depending on the foundation, and permits healing facility staff

to know the data of DME and their clients and give assistance required amid Electricity blackouts identified from temperature sensor and heartbeat sensor.

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