AUTOMATIC MONITORING SYSTEM FOR DEMENTIA PATIENT USING LoRA MODULE

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Abstract—**The number of patients with dementia continues to grow , causing a heavy burden on the patients,their families and the society. There is no permanent treatement for most type of dementia. In order to solve the problem of loss of dementia patients, tracking and rescue system is useful for those patients. The system includes GPS receiver, LoRa transmission module, Arduino Nano, Piezoelectric module, Heart beat and Temperature sensor, power supply, MEMS and Buzzer. The Arduino IDE is the software of this project. In this paper, the real time data include location and physiological data of the patient. when the system receives any abnormal data immediately it notifies to the caregivers. when a fall dedection occur, the system gives alarm to the caregivers and if variation of the patient heart beat and temperature rate it give alert to the care takers while patient sleeping. In order to increase the transmission distance this system uses LoRa technology .The transmission distance up to around 2-3km in line of sight.**

Keywords—LoRA module , GPS Receiver piezoelectric module, MEMS , Arduino Nano &Uno.

INTRODUCTION

The number of patients with dementia increasing year by year and causing heavy burden to their family members and the society . dementia is a syndrome consisting of deterioration in cognitive functions sufficient to impair a persons's daily life and activities. these functions include memory, language skills, visual perception, problem solving, self-management, and the ability to focus and pay attention.some people with dementia cannot control their emotions, and their personalities may change. India is the second largest populous country and early 20% of people to affects by dementia .The prevalence of dementia is 3 to 4% in tamilnadu among those aged above 60 years. The number of people affects with dementia is set to rise to 7.6 million by 2030 and there is no permanent treatment for the most

types of dementia. In order to solve the problem of loss of dementia patients, tracking and rescue system is useful. In this paper, the real time data include location and physiological data of the patient when the elderly lost and any abnormal activity of the patient immediately to the system.

SYSTEM FUNTIONALITIES

In order to solve the problem of loss of dementia patient, track and recue system reduce the stress on caregivers and reduce the record of loss of patient,the proposed system provides the following functions for the need of tracking of dementia patient:

1. Automatic fall detection:

when patient fall on a place the system immediately give alert to the patient and system detect if any abnormal activities of the patient. if any abnormal activities occur the system detect and give the information to the caregivers.it lead to reduce the stress of caregivers.

2. Tracking real-time location:

In tracking real-time location to obtain the real time location of the patient.if any emergency occur,a caregivers easily findout the location of dementia patient and it prevent dementia patient from losing or moving to high-risk areas.This real time information very useful to the caregivers for findout the location of dementia patient at any time.
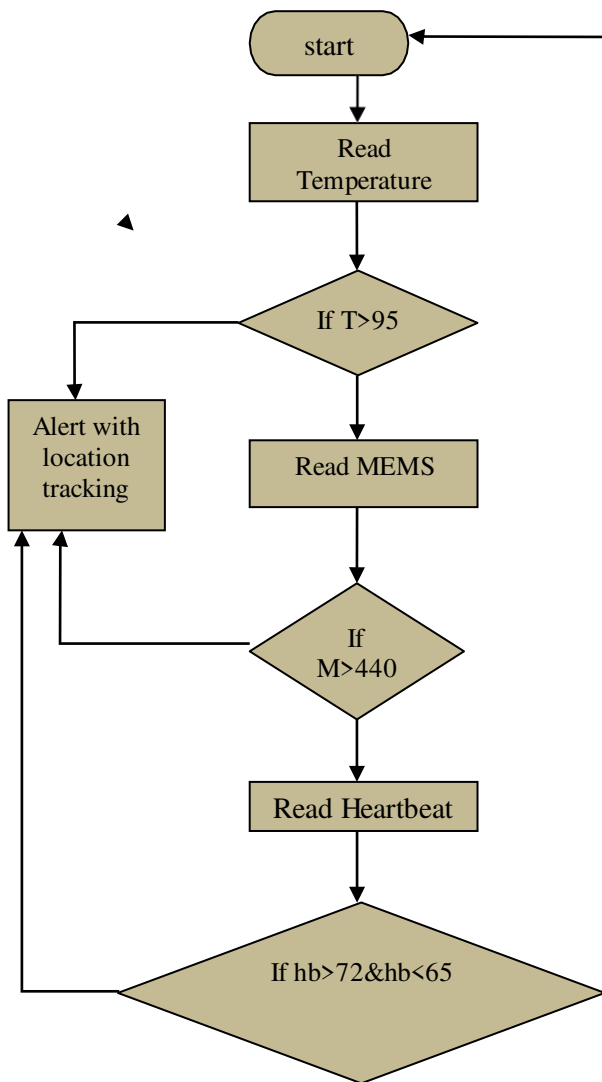
3. Emergency warning:

When the system receive any abnormal data and abnormality occurs to the dementia patient, the system give emergency alarm to the caregivers. This emergency warning is useful to those caregivers for prevent the dementia patient and reduce the stress of caregivers .

4. Monitor heartbeat & temperature:

The system continuously monitor heart rate and temperature of dementia patient while patient sleeping. if any variation occur over the normal value of heart rate and temperature the system monitor the value of dementia patient and the system immediately gives alert to the

caregivers at any time.it lead to prevent the loss of dementia patient.

FLOWCHART FOR SYSTEM ANALYSIS

```
        ┌──────────┐
        │  start   │◄──────────────┐
        └────┬─────┘               │
             │                     │
     ┌───────▼────────┐            │
     │     Read       │            │
     │  Temperature   │            │
     └───────┬────────┘            │
             │                     │
          ◄──┤                     │
             │                     │
          ◇ If T>95 ◇──────┐       │
             │             │       │
┌──────────┐ │             │       │
│ Alert with│◄┤            │       │
│ location  │ │            │       │
│ tracking  │ │   ┌────────▼────┐  │
└──────────┘ │   │  Read MEMS  │  │
             │   └────────┬────┘  │
             │            │       │
             │         ◇ If ◇─────┘
             │         ◇M>440◇
             │            │
             │   ┌────────▼────────┐
             │   │ Read Heartbeat  │
             │   └────────┬────────┘
             │            │
             └──◇ If hb>72&hb<65 ◇
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IMPLEMENTATION

Hardware Functionalities:

- In this method LoRA transmitter/receiver, GPS receiver, piezoelectric module , MEMS , heart beat & temperature sensor is used to produce 5V as input power to the system.

- The Regulator 7805 is used to all the input terminals are connected in order to regulate the power to 5V. When fall detection or any abnormal activities occur , the information passed to the LoRa transmitter and it received at the LoRa receiver side.

- LoRa module is used to low power and long range communication. In this project using LoRa module to achieve distance upto 2-3km line of sight.

- When patient fall on a place,the GPS receiver is used to find out the location and notify to the care givers.

- In this project arduino uno & arduino nano used. Arduino uno is used at the transmitter side and arduino nano is used at the receiver side.

- The heart beat and temperature sensor is used to if any variation in heart beat rate and temperature of the patient the system monitor that variation while patient sleeping and give indication to the care takers.

- Piezoelectric module is used to give the vibration to the system when happen any abnormal activities of the patient .

B.Modules used:

1. LoRA Module:
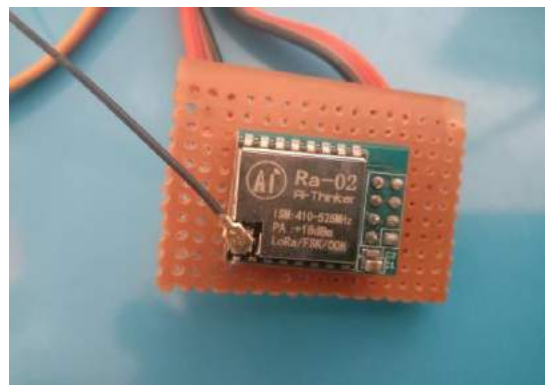
LoRa is a wireless technology that offers long range, low power and secure data transmission. it transmit the information bidirection to long distance.The LoRA transmitter is used to transmit the data of patient abnormal activities at transmitter side.LoRA receiver collect information from LoRA receiver to give this information to the caregivers.Sx1278 type of LoRA used in this project.LoRa module to achieve distance upto 2-3km line of sight. SX1278 LoRa RF Module is one of the latest RF technology and long-range module. SX1278 uses the SPI communication protocol and also uses simple RF communication. The SX1278 transceivers feature the LoRa transmitter long range modem that provides ultra-long range spread spectrum communication and high interference immunity whilst minimising current consumption. The module SX1278 can send the data in nonblocking mode easily. It operates at 433MHz frequency and uses the half-duplex method for SPI communication. The device is a TLL base device and requires 3.3V to operate. It uses the 256-bit FIFO method for transmitting the data. The multiple signals can transmit though the same channel without affecting each other. Programmable bit rate up to 300 kbps. LoRa transmitter provides significant advantages in both blocking and selectivity over conventional techniques.

2. piezoelectric module:

Piezoelectric module is used to give the vibration of the patient to the system.it converts the mechanical energy into electrical energy.if any abnormal activities occur ,piezoelectric module give vibrate to the system and these information immediately notifiy to the caregivers.this vibration mechanical energy convert the electrical enery information to the caregivers. it lead to prevent the dementia patient .

BLOCK DIAGRAM

A. *Transmitter side:*
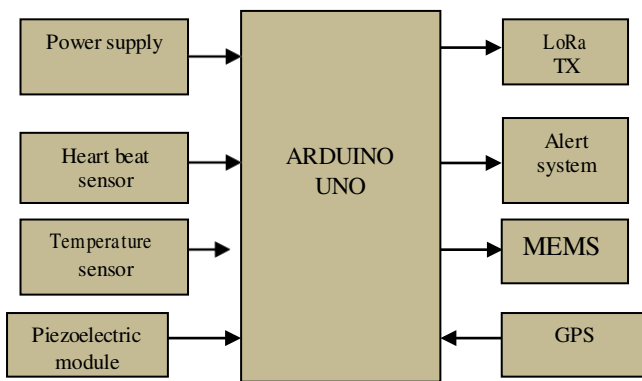
B. *Receiver side:*
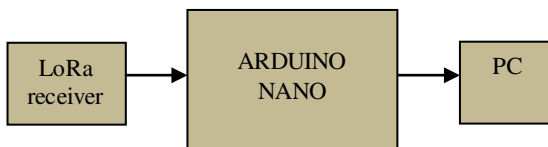
BLOCK DIAGRAM DESCRIPTION

1. *Arduino:*

Arduino uno and nano used in this project.ATmega 328p microcontroller used in this board. Arduino uno is used at the transmitter side and arduino nano is used at the receiver side. Arduino boards are used to read the inputs. The operating voltage of arduino is 5 volts and the input voltage is given to 7 to 12 volts.

2. *LoRA module:*

In this project LoRA module is used to achieve the long range communication with low power consumption.it transmit the information bidirection to long distance.The LoRA transmitter is used to transmit the data of patient abnormal activities at transmitter side.LoRA receiver collect information from LoRA receiver

to give this information to the caregivers.Sx1278 type of LoRA used in this project.LoRa module to achieve distance upto 2-3km line of sight.

3. *GPS Receiver:*

A GPS receiver is used find out the location of patient.in automatic fall detection when patient fall on a place,caregivers can easily find out the location of the patient and the system give alert to the caregivers.whenever caretaker need the location of the those patients,GPS receiver is used to identify the exact location of the dementia patient.

4. *Heart beat & temperature sensor :*

The heart beat and temperature sensor isused to if any variation in heart beat rate and temperature of the patient the system monitor that variation while patient sleeping and give indication to the care takers.A LM35 is used to detect the bodt temperature of the patient.The supply voltage of LM35 is 5v.

5. *piezoelectic module:*

Piezoelectric module is used to give the vibration of the patient to the system.it converts the mechanical energy into electrical energy.if any abnormal activities occur ,piezoelectric module give vibrate to the system and these information immediately notifiy to the caregivers.this vibration mechanical energy convert the electrical enery information to the caregivers. it lead to prevent the dementia patient .

RESULT

Reciver Output :
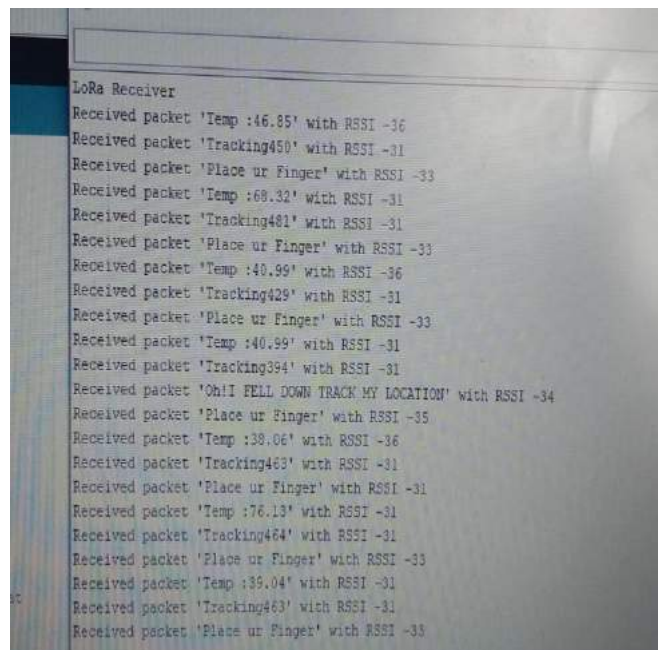
Location Output:
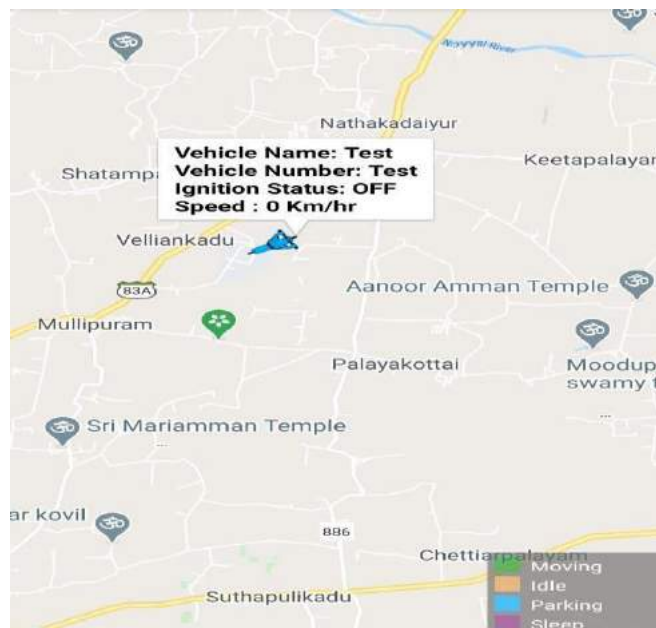
CONCLUSION

The main aim of this analysis performed in this paper is a better and easily adaptable technology to help the care tacker's of dementia patient.The over all framework of the necessity of positioning system as a safety monitor for dementia patient.it is easy to find and guide the dementia patient by sitting on one place.This system reduce the mental stress of the affects of dementia and also reduce stress on caretakers.a newly involved LoRa technology.it achieve the long distance communication to prevent the dementia patient.The purpose of this paper are loss of the dementia patients are rapidly increased year by year so we have to take over this problem,reducing the stress of caregivers,rectify the record of loss of dementia patient.The system can effectively reduce the burden on dementia patients and their families.

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