Monitoring Dementia Patients with IOT

V Subbulakshmi1
Department of Information Technology, Velammal Engineering College, Chennai.
Email: subbulakshmi@velammal.edu.in

S Kanchan Reethika
Department of Information Technology, Velammal Engineering College, Chennai.
Email: reethi2013qa@gmail.com

R Suriya
Department of Information Technology, Velammal Engineering College, Chennai.
Email: surya.tplm@gmail.com

---**ABSTRACT**--

Cognitive state and its connected symptoms in adulthood are one among the foremost common kinds of diseases that the older suffer from now-a-days. This interferes with daily functioning and their regular activities therefore creating their keep troublesome. The common term for such quite illness is named as dementia and it accounts for 60% to 80% of cases. Because of such mental condition, a way of concern and dependence begins to rule the lifetime of the older. Here, we tend to propose a part of the concept behind an automatic home setting wherever the older with such mental conditions feel secured and cared by their favorite ones. It focuses on observance of their two health parameters perpetually and providing intimation to the hospital officials or caretakers if those values transcend a level. SMS is distributed to the older folks as remainders for taking pills.

I. INTRODUCTION

1.1 Dementia

This paper can concentrate on a selected quite illness that affects folks in their early ages known as dementia. It's classified as a neurological disease that causes semi permanent and gradual decrease within the ability to think. Dementia is caused by harm to brain cells. This harm interferes with the flexibility of brain cells to speak with one another. once brain cells cannot communicate ordinarily, thinking, behavior and feelings will be affected. The brain has several distinct regions, every of that is accountable for totally different functions (for example, memory and movement). once cells in a. very specific regions are affected, that region cannot do its functions ordinarily. This typically happens solely in older folks and therefore the symptoms starts terribly slowly

Figure 1 elderly suffering from symptoms of memory loss.

II. STAGES OF DEMENTIA

2.1 Mild or early stage

This can be the primary stage that primarily includes symptoms like forgetfulness, losing or misplacing things, and problem finding the correct words. They may not be able to recall a recent conversation or the name of a well-known object, even if it'd get on the tip of their tongue.

2.2 Moderate or mild stage

People during this stage of the illness might exhibit confusion regarding orientation, like wherever they're or what day it's. They'll even have problem recalling personal info, like their address or phone number or important dates like birthdays or anniversaries. Some people may additionally be at inflated risk for wandering.

2.3 Severe or later stage

Throughout this stage, people usually lose their ability to speak fluently, though they'll still be able to speak. They conjointly expertise a loss of their physical capabilities, together with problem in intake and swallowing, inability to regulate bladder and shitting, and problem walking.

III. SYMPTOMS OF DEMENTIA

Dementia could be a term that refers to an out sized range of brain diseases that has totally different effects on the patient. A number of the foremost affected skills are:-

- Memory
- Communication and language
- Ability to focus and concentrate

- Reasoning and judgment
- beholding

People with dementia might have issues with short-term memory, keeping track of their personal belongings, paying bills, planning and getting ready meals, basic cognitive process appointments and traveling. These changes are usually delicate and have a tendency to involve short-term memory. An associate older person could also be able to bear in mind events that transpire years past however not what they'd for breakfast.

A modification in mood is additionally common with dementia. If you have got dementia, it isn't invariably simple to acknowledge this in yourself, however you will notice this alteration in some other person. Depression, for example, is typical of early insanity. beside mood changes, there may also be a shift in temperament. One typical style of temperament modification seen with insanity could be a shift from being back to outgoing.

IV. DEMENTIA CARE

Traditionally, the look for dementia is undertaken solely by health professionals or just known as caretakers. Once older folks begin developing these symptoms, their favorite ones usually feel that it's better to go away them in a very old age center wherever they'll be taken care off. However this usually is one among the most important misconceptions that exists in our society. Since this can be a sort of illness that doesn't have a very established resolution, folks littered with those diseases become obsessed on others. There are facilities wherever caretakers oftentimes visit their homes and facilitate them do their daily chores. The most role of the caretaker is to create certain that the patients don't do something wrong, absorb their food and pills properly, have decent sleep, monitor their behavior, Supervise them in order that they don't drift away, move with them and build them dump their inability. However, if the older folks become obsessed on others, then they'll conjointly get a sense of insecurity and become unsure of themselves.

V. EXISTING SYSTEM

5.1 The Internet of Things for Dementia Care

This paper discusses a technical style and an current trial that's being conducted within the United Kingdom, referred to as Technology Integrated Health Management (TIHM). TIHM uses net of Things–enabled solutions provided by numerous firms in a very cooperative project. the net of Things (IoT) devices and solutions are integrated in a very common platform that supports practical and open standards.A collection of machine-learning and knowledge analytics algorithms generate notifications relating to the well-being of the patients. {the information|the knowledge|the knowledge} is monitored round the clock by a bunch of attention practitioners WHO take applicable selections in line with the collected data and generated notifications. During this article, we have a tendency to discuss the look principles and also the lessons that we've learned by co-designing this technique with patients, their careers, clinicians, and conjointly our

business partners. we have a tendency to discuss the technical style of TIHM and justify why user-centered style and human expertise ought to be an integral a part of the technological style.

5.2 Building Caring Health care Systems in the Internet of Things

The nature of attention and also the machine and physical technologies and constraints gift variety of challenges to systems designers and implementers. In spite of the challenges, there's a major marketplace for systems and merchandise to support caregivers in their tasks because the variety of individuals needing help grows considerably. During this paper, a structured approach for describing net of Things (IoT) for attention system is bestowed. we have a tendency to illustrate the approach for 3 use cases and discuss relevant quality problems that arise, particularly, the {requirement} to think about caring as a requirement.

5.3 Managing sensor systems for early detection of mild cognitive impairment in community elderly: Lessons learned and future work

The aging population may be a pertinent issue long-faced by governments globally. one among the foremost common and expensive health problems related to the aging population is psychological feature decline, leading up to dementedness. This paper, describes a non- intrusive, continuous and ascendable system for early detection of delicate psychological feature Impairment (MCI) within the senior, that change early medical interventions to be provided. The focus is on the system style and have extraction of the detector system, to validate the hypothesis of the employment of detector systems for early detection of MCI. Lessons learned from deploying the detector system is bestowed, in conjunction with the solutions that are enforced to enhance system responsibleness. This paper focus totally on the technical aspects of in-home detector observance system.

5.4 Exploiting IoT technologies for enhancing Health Smart Homes through patient identification and emotion recognition

This article discusses the employment of patient pictures and emotional detection to help patients and senior individuals inside an in-home attention context. Advances in present computing and also the net of Things (IoT) have provided economical and low cost equipments that embody wireless communication and cameras, like smart phones or embedded devices like Raspberry Pi. Embedded computing allows the readying of Health sensible Homes (HSH) which will enhance in-home medical treatment. the employment of camera and image process on IoT continues to be an application that has not been absolutely explored within the literature, particularly within the context of HSH. though use of pictures has been wide exploited to handle problems like safety and police work within the house, they need been very little utilized to help patients and/or senior individuals as a part of the home-care systems. These pictures will facilitate nurses or

caregivers {to assist|to facilitate} patients in want of timely help, and also the implementation of this application is very straightforward and low cost once power-assisted by IoT technologies.

5.5 We-care: An IoT-based health care system for elderly people

This paper suggests AN IoT-ready answer for the senior living help that is ready to observe and register patients important data yet on give mechanisms to trigger alarms in emergency things. The net of Things may be a new reality that's utterly dynamical our lifestyle, and guarantees to revolutionize fashionable attention by sanctioning a additional customized, preventive and cooperative sort of care. Its effective low-power/low-cost and wireless characteristics turns this answer appropriate to be used anyplace and by anyone, in a very separate and cozy wristband.

5.6 Medicine reminder and monitoring system for secure health using IoT :

The senior individuals and also the individuals victims of chronicle diseases WHO have to be compelled to take the medicines timely while not missing ar affected by dementedness, that is forgetting things in their daily routine. rather than the care takers making an attempt to require care of the senior every time, an automatic drugs remainder system was designed to supply such timely reminders for medicines. Considering this, the paper presents the technologies of home health care that ar presently used for rising this example by reminding the scheduled of medication, remote observance and update new drugs knowledge of patients, which may be done by prescriber through internet.

5.7 Home Telehealth by internet of things(IoT) : Telehealth

This paper discusses regarding Home primarily based Telehealth that may be a combination of communications, imaging, sensing and human pc interaction technologies targeted at identification, treatment and observance patients while not distressing the standard of mode. This paper proposes development of a coffee price medical sensing, communication and analytics device that's period observance net enabled patients physiological conditions. net of Things (IoT) network can give active and period engagement of patient, hospitals, caretaker and doctors. Massaging and synchronisation the system has been the primarily based focus during this paper, wherever it applies the prompt formula to predict the minimum fundamental measure that separates 2 consecutive bursts of messages and measures the minimum queue sizes for the health care personals nods, to manage the traffic and avoid the dropping of messages. NS2 machine was utilized to simulate the Telehealth surroundings formula.

5.8 Web-based design and Implementation of smart home appliance control system :

Minimising energy wastage is important for economic development. This paper deployed a web-based style and implementation of sensible electrical home appliances management, that change homeowners to remotely use internet access to expeditiously management their home appliances energy usage. Node MCU, breadboard, light-weight emitting diodes (LED), relays, resistors, electrical wires, Wi-Fi device (smart phone, tablets or computer), jumper wires, transistor, electricity (DC) motor, universal serial board (USB) cable, computer circuit board (PCB), C artificial language and Arduino IDE (Integrated Development Environment) were used, for circuit style and implementation. C programming codes were written and compiled in Arduino IDE device, then uploaded into Node MCU through USB cable to regulate energy usage of electrical appliance (DC motor) connected to the circuit. The management was achieved by turning ON the DC motor once required and OFF, once not in use, remotely via internet. Whenever appliance was OFF, LED showed red color and inexperienced LED lights up once appliance was ON. Developed system performed excellently and expeditiously by considerably minimizing energy wastage, once appliances don't seem to be in use. Future analysis ought to contemplate sensible home management systems ready to record quantities of energy consumed at any amount of the day.

5.9 The Future of Assistive Technologies for Dementia

This paper discusses the present progressive AT-design, its use and assessment in regard to dementedness care and projected future trends which will be incorporated into analysis currently. the employment of helpful Technologies (ATs) for residential dementedness care is increasing, however there's a spot between what people need, what developers style, and the way outcomes are evaluated. Despite widespread acceptance that ATs improve quality of living (QOL), there's comparatively very little knowledge to support such claims. By reviewing a history of ATs employed in residential dementedness care, incorporating social and attention trends and applying theories of science, a futurist read of AT-development and use is bestowed.

6.0 Support dementia : using wearable assistive technology and analysing real-time data :

Support provided to sufferers of dementedness by the hospitals is especially within the sort of personal attendants like nurses and social employees. the most focus of this paper is to gift however the employment of helpful technologies will facilitate early sufferers of dementedness patients to beat barriers in achieving their daily activities and as an example however knowledge analytics, like advanced Event process (CEP) in period will enable higher observance of those patients. This give an appropriate framework to accurately analyze period knowledge from helpful technology and wearable devices for remote attention, significantly observance early sufferers of dementedness so as to market sensible quality freelance living.

6.1 Home health hub internet of things (H3IoT) : An architectural framework for monitoring health of elderly people :

Internet of Things (IoT) has paved a path towards the digitisation of everyday things connecting one another through net. because of the large advent of IoT in recent years, researches have stared to accomplish the long cherished can of person to form life less complicated and higher in some ways. Health being the foremost valuable wealth of human, ought to tend most priority. although health connected analysis implying IoT has been neglected because of heterogeneousness and ability problems. This literature presents H3IoT a completely unique fine arts framework for Home Health Hub net of Things for observance health of senior individuals reception. The framework is promising in terms of its style and future envision of usage of reality implementation H3IoT.

VI. INTERNET OF THINGS (IOT)

The Internet of Things (IoT) is associate setting within which objects, animals or folks are supplied with distinctive identifiers and therefore the ability to transfer information over a network while not requiring human-to-human or human-to-computer interaction. IoT has evolved from the convergence of wireless technologies, Micro Electro Mechanical Systems (MEMS) and therefore the net. The idea may additionally be named because the net of Everything.

A thing, within the Internet of Things, will be an individual with a cardiac monitor implant, a eutherian mammal with a chip electrical device, associate automobile that has intrinsic sensors to alert the motive force once tire pressure is low -- or the other natural or semi synthetic object which will be assigned associate scientific discipline address and supplied with the flexibility to transfer information over a network.

Fig 2: Internet of Things.

An IoT system consists of web-enabled good devices that use embedded processors, sensors and communication hardware to gather, send andact on information they acquire from their environments.
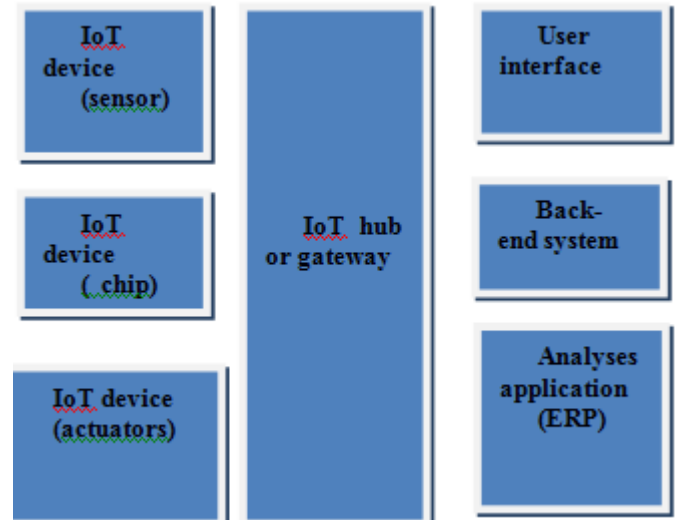

Fig 3: Workflow in an IOT system.

IoT devices share the sensing element information they collect by connecting to associate IoT entry or different edge device wherever information is either sent to the cloud to be analyzed or analyzed domestically. Sometimes, these devices communicate with different connected devices and act on the data they get from each other. The devices do most of the work while not human intervention, though folks will move with the devices.

In fig 3, a transparent illustration of the flow of information and process mechanism is given. Information are collected from varied sources like sensors, IC chips and different antennas. This data is then collected along at a middle known as because the IoT hub. From here, the collected information is then taken for analyses purpose. it's during this stage that the information collected begins to provide patterns and becomes additional helpful.

This paper discusses however the thought of IoT is accustomed facilitate a simple approach of living for the senior.

VII. PROPOSED SYSTEM

This paper focuses on a tiny low phase of the house machine-driven attention resolution for the senior. We have a tendency to attempt to analyse all the factors that ought to be thought of for a healthy style for the senior. This method offers them the prospect to steer their support while not being obsessed on others. The caretakers associated their members of the family are able to monitor their pet ones from completely different places and if an distinction in their health level is known, they are quickly notified.

In this paper, we have a tendency to attempting to supply a attention resolution for the senior folks that square measure within the delicate or early stage of insanity. For the opposite a pair of stages of dementia, any sort of human help is needed as a result of in these stages. Their

brain becomes utterly non functioning and there remains the upper risk of forgetfulness and lack of spare rest. They may fall under the sensation of being lonely. thus for such reasons, it's necessary that within the later stages of dementia, human help in any for is needed.

we have a tendency to take into account a pair of health parameters – heart beat and temperature. These square measure the two parameters that we'll be unendingly observation via sensors. The detected information are uploaded onto the cloud. The doctors or the caretakers will closely monitor the patients via ThinkSpeak web site wherever all the detected information of their patient are created offered. The information is understood within the sort of graphs and may be foreign as stand out sheets for additional analyses.

The ThinkSpeak server, provides with channels wherever we will visualize varied information from the sensors and perform location following and standing update. In laptop world, all the websites and devices that square measure connected via the net have a informatics address that unambiguously identifies it. We have a tendency to gain access to the ThinkSpeak channels by exploitation its informatics address. Once we've gained access, we want a mechanism through that communication between this server and therefore the Arduino board will happen. Here is were the API comes into play. API stands for Application Programming Interface that has the communication service between a client and a server. API of ThingSpeak permits process of numeric information like averaging, median, summing, miscalculation and time scaling.

Also in our proposed work, if any of the detected information goes on the far side a threshold value, then associate alert is given to their individual caretakers intimating them to require applicable actions.
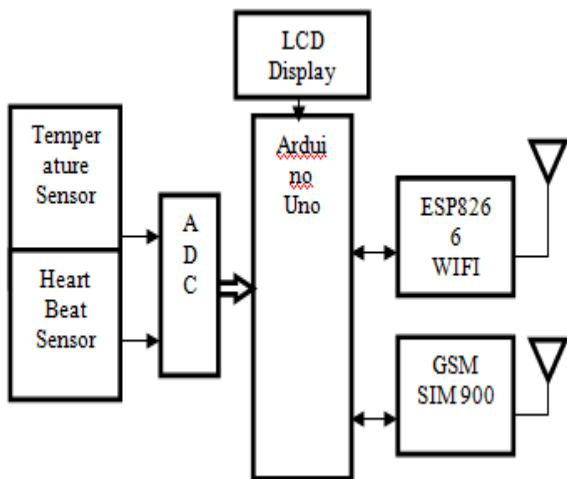

Figure 4 Circuit diagram of the proposed system

Additionally a remainder system has been enclosed wherever the senior patients square measure provide with SMS remainder alerts to require medication and different necessary data.Except for the two sensors used, the most key part for this work is that the Arduino Uno board. This microcontroller servers as the hub and co-ordinates all the actions of the sensors. We've a Wi-fi module that connects the devices to the net for accessing cloud storage and its

information. To implement our SMS alert system, we've a GSM module. Fig 4 offers the diagram of the proposed system.

VIII. IMPLEMENTATION RESULTS

Simulation for this idea has been administrated with the Proteus package wherever we've nearly enforced the system to envision however it works. Fig 5 may be a screenshot of the enforced system in Proteus package.
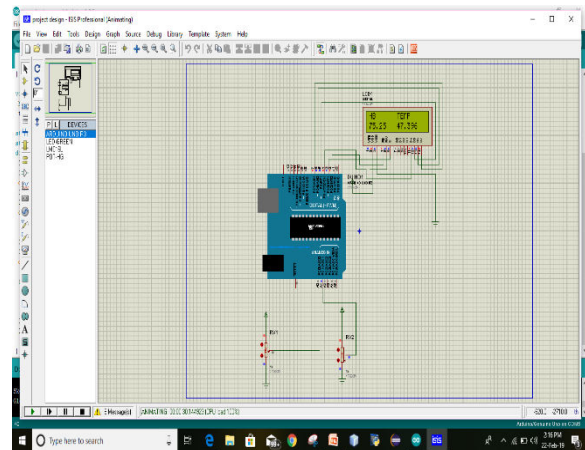

Fig 5: Simulation using Proteus Software

8.1 Sensors

A sensing element may be a device that detects and responds to some form of input from the physical setting. The particular input may well be lightweight, heat, motion, moisture, pressure, or anyone of a good variety of different environmental phenomena. The output is mostly an indication that's regenerate to human-readable show at the sensing element location or transmitted electronically over a network for reading or additional process. The sensing elements we have a tendency to square measure exploitation square measure heart beat sensing element and temperature sensor.

8.2 Heart beat sensor

It measures the modification in volume of blood through any organ of the body that causes a modification within the candlepower through that organ (a vascular region). Just in case of applications wherever heart pulse rate is to be monitored, the temporal order of the pulses is additional necessary. The flow of blood volume is determined by the speed of heart pulses and since lightweight is absorbed by blood, the signal pulses square measure similar to the center beat pulses.

Fig 6: Heart beat Sensor

8.3 Temperature sensor

Temperature is that the degree of hotness of the body that may be a live of the warmth content within the body. The sensing element is brought into physical contact with the article to be monitored.

Fig 7: Temperature Sensor

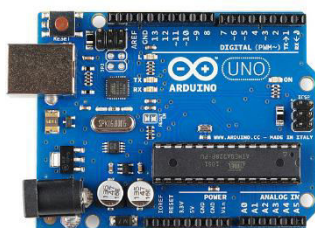### 8.4 Arduino uno microcontroller

Fig 8: Arduino uno.

Arduino is associate ASCII text file platform used for building electronics projects. Arduino consists of each a physical programmable board (called as a microcontroller) and a chunk of software, or IDE (Integrated Development Environment) that runs on the pc, used to write and transfer code to the physical board. The Arduino doesn't want a separate piece of hardware so as to load new code onto the board, we will merely use a USB cable. in addition, the Arduino IDE uses a simplified version of C++ known as as embedded C artificial language.

8.5 Wi-fi module

The ESP8266 local area network Module is integrated with TCP/IP protocol stack that may provide any microcontroller access to your local area network network. The ESP8266 is capable of either hosting associate application or offloading all Wi-Fi networking functions from another application processor. Every ESP8266 module comes pre-programmed with associate AT command.
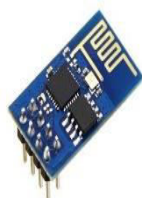

Fig 9: ESP8266(Wi-fi module)

8.6 D. GSM module

Global System for Mobile communication (GSM) is digital cellular system used for mobile devices. It's a global normal for mobile that is wide used for long distance communication. SIM900A module permits users to send/receive information over GPRS, send/receive SMS and make/receive voice calls.

The GSM/GPRS module uses USART communication to speak with microcontroller or laptop terminal. AT commands square measure accustomed tack the module in numerous modes and to perform varied functions like occupation, posting information to a website, etc.

Fig 10: GSM module

8.7 LCD display

The liquid crystal display unit is employed for visualizing the detected knowledge. They have a port, that means that the microcontroller must manipulate many interface pins promptly to regulate the show. The interface consists of the subsequent pins: A register choose (RS) pin that controls wherever within the LCD's memory you're writing knowledge to. A Read/Write (R/W) pin that selects reading mode or writing mode. An Enable pin that allows writing to the registers. 8 data pins (D0 -D7). The states of those pins ar high or low. Power provide pins (+5V and Gnd). LED Backlight (Bklt+ and BKlt-) pins that controls the facility of the liquid crystal display, and its distinction. For displaying text on the screen, we have a tendency to ar employing a 2x16 liquid crystal display in 4-bit mode.

Fig 11: LCD Display

8.8 Implementation result

The final result consist of the health care module and graph representation of heartbeat and temperature parameters using think speak website.
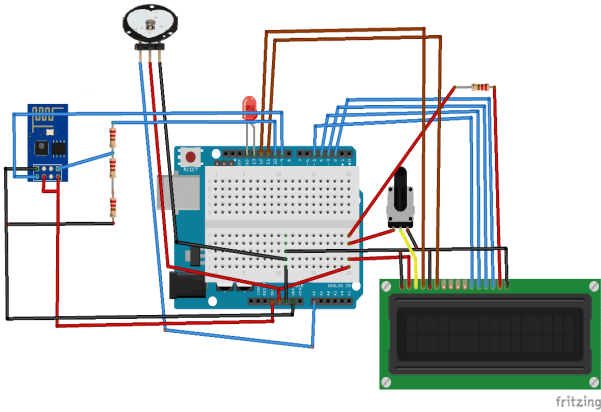
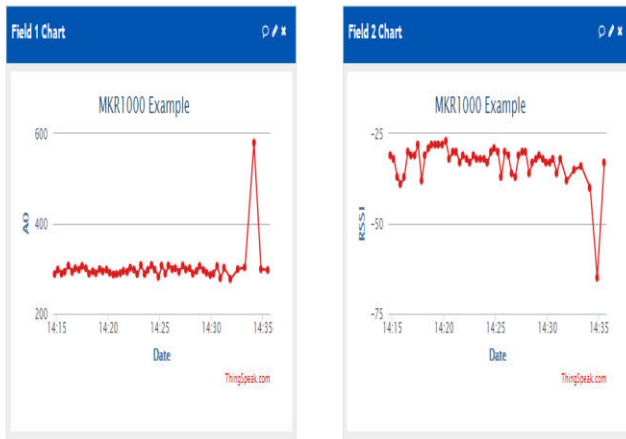Fig 12: Final implementation of dementia care IoT device.

Fig 13: Heartbeat and temperature reading's graph representation using think speak.

IX. ADVANTAGES

- This projected work provides an answer to observe the senior folks in a very additional economical manner and it's the subsequent advantages:-
- This method helps in creating the insanity affected folks understand their true potential and helps them live severally.
- This IoT based mostly resolution for the insanity patient is additionally a profit for the attention trade
- The caretakers will currently simply monitor their patients from anyplace within the world.
- Additionally any abnormalities that square measure detected within the health of the patient square measure quickly notified to the caretakers.
- The caretakers additionally realize it simple to observe the health of the patient with ease. They

need access to antecedently detected information and so will perform different analyses on that.

- The SMS alert system serves the patients as a notification system so serving to them to cope up with their blackout.

X. CONCLUSION

The IoT is quick turning into a part of our life as we have a tendency to are encircled by good connected devices. IoT has found its presence in varied fields together with agriculture, medication and animal farming. within the attention sector, they supply the hospitals with vast capabilities to diagnose the patients and supply skilled attention solutions.

REFERENCES

[1] Internet of Things(IoT) https://en.wikipedia.org/wiki/Internet_of_things

[2] Dr.A.A.Gurjar, Neha A. Sarnaik, "Heart Attack Detection By Heartbeat Sensing using Internet Of Things : *IoT" International Research Journal of Engineering and Technology (IRJET) ,* Volume: 05 Issue: 03 (Mar-2018)

[3] B.N. Karthik, L. Durga Parameswari, R. Harshini, A.Akshaya, "Survey on IOT & Arduino Based Patient Health Monitoring System" *International Journal of Scientific Research in Computer Science, Engineering and Information Technology , Volume 3 , Issue 1.*

[4] Phillip A. Laplante , Mohamad Kassab, Nancy L. Laplante, and Jeffrey M. Voas, IEEE "Building Caring Healthcare Systems in the Internet of Things" IEEE systems journal, vol. 12, no. 3, september 2018.

[5] R. Chouffani, "Can we expect the Internet of Things in healthcare?"2015. http://internetofthingsagenda.techtarget.com/

[6] feature/Can-we-expect-the-Internet-of-Things-in-healthcare Shirin Enshaeifar, Payam Barnaghi, Severin Skillman,

[7] Andreas Markides, Tarek Elsaleh, Sahr Thomas Acton,

[8] Ramin Nilforooshan, Helen Rostill "The *Internet of Things for Dementia Care" , IEEE Computer Society* 2018

[9] Boon Thai NG, Hwee-Pink TAN, Hwee Xian TAN Managing sensor systems for early detection of mild cognitive impairment in community elderly: Lessons learned and future work

[10] Ho Ting Cheng and Weihua Zhuang, University Of Waterloo *"Bluetooth-enabled in-home patient monitoring system: early detection of alzheimer's disease" IEEE Wireless Communications February* 2010.