Automated Monitoring System for Heart Patients using Ambubot

Karthikeyan M , Arvind M, Jagan Sandibp NS, Karthik V, Vijayalakshmi S

Abstract: Robotic systems are one of the key options for presenting clever services. Time is a fundamental problem when dealing with human beings who face a sudden cardiac arrest that regrettably may want to die due to inaccessibility of the emergency treatment. Therefore, an on the spot treatment the usage of Automated External Defibrillator (AED) should be administered to the victim inside a few minutes after collapsing. Hence we have designed and developed the Ambulance Robot, shortened as AMBUBOT, which brings along an AED in a surprising tournament of cardiac arrest and helps various modes of operation .The prototype with biomedical sensors are utilized for monitoring the affected person health continuously, the region of the patient can also be tracked in case of emergency by using GSM.

Key words: AMBUBOT, GSM,AED, Health care, Patient Monitoring, IoT.

I. INTRODUCTION

Emergency circumstances refer to any unforeseen incident that can put at risk and convey good sized accidents on a person's life. This state of affairs can be damaged down into two basic types, natural and manmade calamities[1]. Natural disaster is the incident of nature induced through surrounding atmosphere elements that can cause catastrophic consequences. Several varieties of natural disaster like drought, earth quake, severe temperature, storm and volcano strike in accordance to the exposure of the area in the globe. On the different hand, the catastrophe can also be brought about as the outcome of technological or human dangers, along with industrial accident and transport accident, the place it is typically known as manmade disaster[2].The arrival time of ambulance is some distance above the ten minutes. This is because of numerous obstructions in the course of the method of send out an ambulance and it may postpone the patient from receiving the services on time.

Karthikeyan M* , Under graduation , Electronics and Instrumentation Engineering at R.M.K.Engineering College.
Arvind M, Under graduation , Electronics and Instrumentation Engineering at R.M.K.Engineering College.
Jagan Sandibp NS, Under graduation , Electronics and Instrumentation Engineering at R.M.K.Engineering College.
Karthik V, Under graduation , Electronics and Instrumentation Engineering at R.M.K.Engineering College.
Vijayalakshmi S, Professor, Department of Electronics and Instrumentation Engineering. She obtained her B.E degree in EEE from Madras University, Chennai

Substantially deferent elements prevail in this trouble ranging from site visitors congestion, problem to detect the address, long distance and so forth. Any one of these can lead to make bigger response time. The fundamental challenges for the healthcare domain of clever cities are using ICT and far flung help to prevent and diagnose diseases, and deliver the healthcare service in addition to imparting all citizens with get right of entry to to an environment friendly healthcare machine characterised through sufficient facilities and services. The Internet ofThings revolution is redesigning modern healthcare with promising technological, economic, and social prospects[2].Robotic structures are one of the key options for imparting clever services. AMBUBOT is desired for an instant cure the use of Automated External\Defibrillator (AED) to administer the victim inside a few minutes after collapsing through facilitating various modes of operation from manual to self sustaining functioning to store someone's life in the smart cities The prototype with biomedical sensors are utilized for monitoring the patient fitness continuously. The area of the patient can also be tracked in case of emergency with the aid of GSM. The thinking of excessive tech machines that can help the people properly or relieve humans of irritating tasks has been an object of human imagination. It can be viewed with many of today's occupations have been changed by way of automation to prevent guide handling accidents in the workplace. The smart world is normal to contain ubiquitous sensing, computing, and conversation to reap complete interconnections of physical perception, cyber interaction, social correlation, and cognitive thinking. Increasing population density in urban environments demands enough provision of services and infrastructure[3].The ambulance has to carry the affected person to the medical institution as rapidly and safely as soon as it can. Conversely, in many cases like life-threating emergencies the affected person desires immediate first useful resource and clinical interest to prevent serious danger. Meanwhile, the destiny of patients can't be influenced by using ready the ambulance but it should be changed if some treatments should be given within a short period of the patient's fall down. For example, persons suffering unexpected cardiac arrest may want to be saved if the Automated External Defibrillator machine recognised as AED is utilized inside a few minutes after the prevalence of cardiac arrest. Meanwhile, anybody who tries to help the patient require to be capable to function CPR (Cardiopulmonary Resuscitation) and connects an AED to a person in cardiac arrest[4].Most saviours take place rapidly after the event of a disaster occurs. Human saviours will arrange the saving method to discover the victims, and help them as fast as possible[11].

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They do not have sufficient time to find the victims in any disaster circumstances; or else the possibility of discovering the victims nonetheless alive is almost zero[12]. In such a quintessential circumstances, technological know-how can be utilized to aid saviours in exclusive tasks[14]. Intelligent cellular robots and cooperative multi-agent robotic structures are more and more being utilized in many distinct approaches to discover and shop the victims in a faster and more environment friendly way. The robotic that can do such tasks is nicely acknowledged as rescue robot[5]Further work has been carried out to discover emerging new and rising wireless network schemes with an quantity of work tackling IoT community traits and improvements to create smarter IoT networks [10].In such a serious circumstances, technology can be utilized to assist saviours in exceptional jobs. Intelligent mobile robots and cooperative multi- agent robotic systems are being utilized more in numerous ways to find and retailer the victims in a quicker and more effective way[6].To reduce these issues and hold affected person staying alive earlier than the creation of ambulance, we recommend an thought of using AMBUBOT (Ambulance Robot) that ought to carry an AED and as per the format it would be able to function CPR to a individual in cardiac arrest[8]. Existing System to takes greater response time. In clever cities, due to traffic, on occasion ambulance does not arrive at the emergency spot on time, it can also reasons death. Proposed device to overcome these problems, Ambulance robot(AMBUBOT) is utilized[10].smart ambulance that can acquire and transmit the bleeding person's health reputation to the close by clinic thru the internet[15]. So, the docs can be aware of the bodily conditions, whether the circumstances of the victim is genuinely vital before the victim arrives to the hospital itself[13]. If so, the arrangements for the treatment can be made quicker through the health center and the health reputation can be ship to the health center by using the sensors that solely discover the parameters like heartbeat rate, amount of blood loss, temperature etc[9].

II.   METHODOLOGY

In our paper the physique condition of the injured man or woman is been fetched thru a sensor and this device is to avoid the lateral arrangements in the medical institution for the therapy till the arrival of the ambulance and informing the accidents to the medical doctor as nicely the injured sufferers family. The proposed Block Diagram as proven in Figure 1.The proposed ambulance robot for smart cities offers the provider of ambulance with AED to help any individual having a cardiac arrest. No require to wait for the ambulance to provide first resource solutions. An emergency message and cutting-edge role of sufferer will be produced. Also, message can be transmitted to the household participants regarding current circumstances of the victim. It performs time-consuming tasks. It can be operated in auto or manual mode.
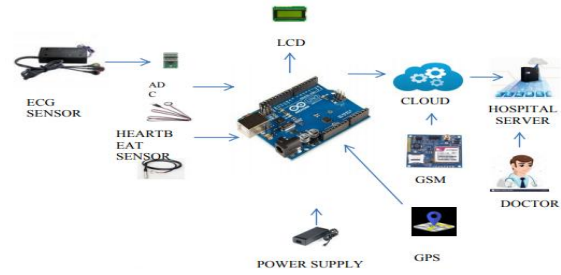

Figure 1 Proposed Block Diagram

A. Patient Section

This section has the IoT , GPS and Relay devices followed with the aid of a Micro-controller which is latterly linked with the ECG Sensor, Heart beat sensor and the Fall down sensor. The LCD display is utilized to grant the output in a digitalized and viewable manner as proven in Figure 2. IOT is the machine of physical gadgets or "things" installed with digital gadgets, programming innovations, sensors, and system presence, which promotes these paper to collect and exchange data for benefiting one-of-a-kind administrations[7].
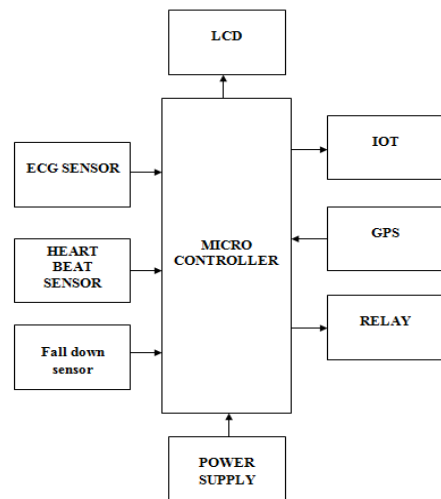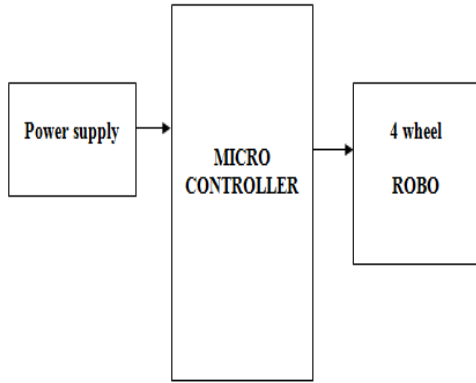

Figure 2. Patient Monitor

The AED represents a most important strengthen in the effort to acquire early defibrillation and similarly enhance survival following out-of-hospital surprising cardiac arrest. By responding to the task to advance an AED that is extra accurate, lightweight, affordable, and handy to use, AED manufacturers have helped make public get right of entry to to defibrillation feasible. With help from the nation and federal governments, manufacturers have helped overcome many of the barriers to AED implementation[8].

B. AMBUBOT SECTION

Figure 3. AMBUBOT

The proposed ambulance robotic for clever cities offers the facility of ambulance with AED to help any individual having a cardiac arrest. An emergency message and modern-day role of patient will be produced. Also, the message can be despatched to the household participants involving modern state of affairs of the victim. It performs time - consuming tasks. It can be operated in auto or guide mode. two This part of our project has the Micro-controller phase connected with the Power furnish with the 4 wheels of the robotic vehicle as proven in Figure 3.

III.   HARDWARE IMPLEMENTATION

ATMEL MICROCONTROLLER

Figure 4. ATMEL MicroController

AVR is a modified Harvard architecture machine, the place program and statistics are saved in different physical reminiscence systems that show up in distinct address spaces, but has the potential to read records items from software memory the use of specific instructions. AVR is a family of microcontrollers developed due to the fact that 1996 by way of Atmel, obtained through Microchip Technology in 2016. These are transformed Harvard structure 8-bit RISC single-chip microcontrollers. AVR was once one of the first microcontroller households to use on-chip flash reminiscence for application storage, as adversarial to one-time programmable ROM, EPROM, or EEPROM utilized by using other microcontrollers at the time as shown in Figure 4.

POWER SUPPLY

Approximately all electronic gadgets utilized in digital circuits require a dc source of energy to function. The source of dc energy is utilized to set up the dc operating factors (Q-points) for the passive and active electronic gadgets included in the system. The dc electricity grant is normally linked to each and every stage in an electronic system. It denotes that the requirement, frequent to all phases of electronics is needed for offering dc power.

ECG SENSOR

ECG (Electrocardiogram) sensor measures the pathway of electrical impulses thru the heart muscle, and can be measured on resting and ambulatory objects, or at some stage in exercise to furnish data on the heart's reaction to bodily exertion. The ECG Sensor as shown in Figure 5. ECG electrodes are normally moist sensors, requiring the use of a conductive gel to enlarge conductivity between pores and skin and electrodes. This sensor is a good value board utilized to record the electrical endeavor of the heart. This electrical undertaking can be registered as an ECG or Electrocardiogram and output as an Analog reading.

Figure 5. ECG Sensor

HEART BEAT SENSOR

Figure 6 is Heart Beat Sensor, the function of the board is too easy. The board is powered from a 3-5.5V supply, the Enable (EN) pin must be pulled excessive to set off the IR sensor. The tip of the forefinger is located on the face of the sensor. Your finger ought to be nevertheless and require to now not press too challenging on the sensor. The circuit stabilizes is short time and you will see the LED flashing along with your coronary heart beat. You can supply the output sign (Vout) to both a digital I/O or an ADC enter pin of the microcontroller for size of the heart beat charge in BPM. The output voltage waveform can also be viewed on an oscilloscope.   related

Digilent's Analog Discovery device to test the enter PPG and the output waveforms from the two LPF stages.

Figure 6. Heart Beat Sensor

Fall Down Sensor

Fall down emergency button works with wireless alarm machine for help people to get indispensable assistance on fall down incident or on emergency circumstances. With built-in a clever fall detection technology, the fall down emergency button can recognise when customers falling down, regardless of whether or not or no longer consciousness. two Works with wireless GSM alarm system, customers can get emergency help right now if customers experiencing an proper fall incident, furthermore, press the SOS button on pedant can ship alert sign to alarm system too. The Fall Down Sensor as proven in Figure 7.

Figure 7.Fall Down Sensor

GSM

Figure 8. GSM

It is a parcel arranged far flung records correspondence administration for transportable interchanges on 2G and 3G cell correspondence frameworks. It is non-voice,

speedy parcel changing innovation expected for GSM structures as shown in Figure 8.

GPS

Figure 9 is Depicts GPS (Global Positioning System) is utilized to tune the live vicinity of the clever ambulance by way of the health center server in order to make the facilities for the remedy quicker.
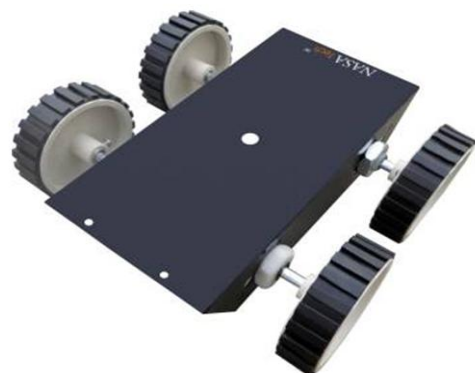

Figure 9. GPS

RELAY

Figure 10. RELAY

It consists of a set of enter terminals for a single or more than one control signals, and a set of operating contact terminals. The change may additionally have any variety of contacts in a couple of contact forms, such as make contacts, damage contacts, or combinations thereof, the RELAY as proven in Figure 10.

ROBO

Figure 11. 4-Wheel ROBO

Medical robots can be categorised into two classes comply with their usage which are medical robots to help humans and clinical robots to help scientific staffs. There are two awesome corporations of robots that generally utilized to help people, as like rehabilitation and friend robots. Rehabilitation robots are devoted to give assistive gear for those humans with impairment subsequent stroke. Hybrid Assistive Limb 5 , Lokomat two and Bionic Limbs two are most broadly utilized in hospitals for rehabilitation. Companion robots provide exceptional possible for improving the satisfactory of human lives in the future. Four wheeled robots are usually utilized to elevate higher payloads and/or traverse tough terrain. You will additionally discover omni wheel and Mecanum pushed robots which provide elevated manoeuvrability. Figure. 11 is a two 4-Wheel-Drive Robotic Platform and demonstrates some of its skills along with the capability to traverse mud, snow and debris.

LCD

Parallel LCD Display that gives a simple and low cost answer for including a White on Liquid Crystal Display, a very clear and high contrast white textual content upon a blue background/backlight.

Figure 12 is the LCD Display is very convenient to interface with Other Microcontrollers. an I2C adapter is immediately soldered proper onto the pins of the display. So all you want to join are the I2C pins, which shows a appropriate library and little of coding.

Figure 12. LCD Display

IoT

The Internet of Things (IoT) is a machine of interrelated computing devices, mechanical and digital machines, objects, animals or human beings that are provided with unique identifiers (UIDs) and the ability to switch facts over a network except requiring human-to-human or human-to-computer interaction. that guide one or greater common ecosystems, and can be managed by means of gadgets related with that ecosystem, such as smartphones and clever speakers.

4.SOFTWARE REQUIREMENTS

EMBEDDED C

Embedded C is a widespread term given to a programming language written in C, which is associated with a unique hardware architecture. Embedded C is an extension to the C language with some extra header files. These header files may also exchange from controller to controller. Embedded C is a set of language extensions for the C programming language by way of the C Standards Committee to address commonality troubles that exist between C extensions for one-of-a-kind embedded systems.
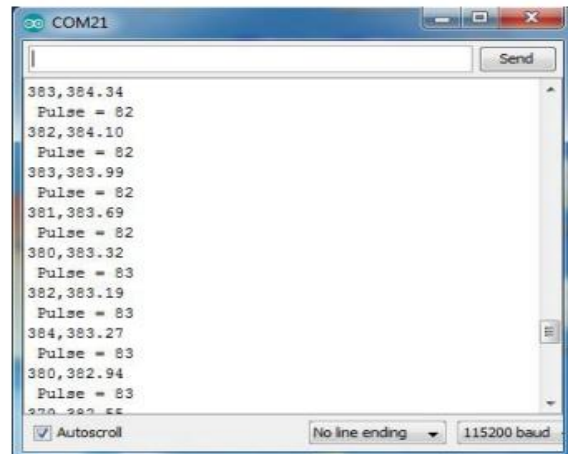
IV. RESULT

Figure 13. Heart beat Sensor output

When the Heart beat sensor is related to the person's finger, It will feel the price of the heartbeat and show the Heart price per 30 seconds and calculate it for one minute that gives the accurate coronary heart beat per minute as shown in the figure.13.
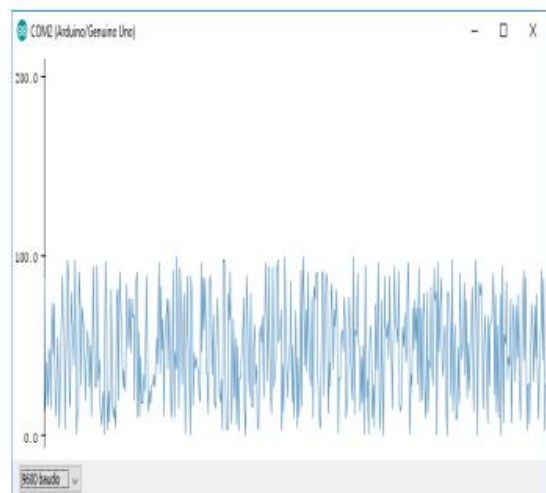

Figure 14. ECG Sensor output

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Figure 15. Fall down Sensor output

Once when the coronary heart price is calculated then ECG sensor will fetch the muscular functioning of heart, the three electro pads are connected to a patient's Right arm, Left arm and Right leg it will sense the person and display the effects in a wave shape as proven in the determine 14.The Fall down Sensor as shown in Figure 15.

V.   CONCLUSION

The AMBUBOT is meant to improve on manual search assistance of discovering AED with the help of the data technological know-how so that an immediate therapy can be delivered to help victims in cardiac arrest. There are three dispatching techniques of AMBUBOT to attain vicinity of victim namely telecontrol, partially autonomous, and wholly autonomous. an immediate treatment the usage of automatic external defibrillator (AED) ought to be administered to the sufferer inside a few minutes after collapsing. Hence, we have designed and developed the ambulance robot, which brings along an AED in a sudden tournament of cardiac arrest and enables a variety of modes of operation from guide to independent functioning to shop any person lives in clever cities. which can be applied to shrewd automobiles based on their architecture the usage of a easy sequence of three steps: sense, plan, and act . Some of that science has comfortably reachable on the market nowadays and the rest of them are still on the investigation step to assurance protected and reliable operation.

REFERENCE

1. Hemavathi, Karthigayini, Kushma, Megala, Nithyapriya, " Robotic Ambulance for Emergency Medical Service in Smart Cities", International Journal of Innovative Research in Science, Engineering and Technology, 2017.
2. Somashekhar , Shivaranjani , "Multipurpose Ambubot for Disaster Management to Assist The People from Cardiac Arrest", Journal for Research, Volume 04 , Issue 02 , April 2018,ISSN: 2395-7549.
3. Nasir Ahmad, "Robotic Automated External Defibrillator Ambulance for Emergency Medical Service in Smart Cities", International Journal of Trend in Scientific Research and Development IJTSRD) Volume: 3 , Issue: 2 Jan-Feb 2019 Available Online: www.ijtsrd.com e-ISSN: 2456 - 6470.
4. Mohammad Arif, Hooman Samani, " AMBUBOT: Ambulance Robot Automated External Defibrillator Robotic Ambulance", ICACT, 2014.
5. Hooman Samani, "Robotic Automated External Defibrillator Ambulance for Emergency Medical Service in Smart Cities", IEEE Access, January 2016.
6. Gajendiran, " An Automated External Defibrillator In Robotic Ambulance (Ambubot)", International Research Journal In Advanced Engineering And Technology (Irjaet) E - Issn: 2454-4752 P - Issn : 2454-4744 Vol 3 Issue 2 (2017).
7. Suganthi1, Elavarasi, " Tele-Health Monitoring System In A Rural Community Through Primary Health Center Using Internet Of Medical Things", International Journal of Pure and Applied Mathematics ,Volume 119 No. 14 2018, 695-703, ISSN: 1314-3395.
8. Jaiganesh1, Prasanth , Ajith ,Sai Rushidhar,Lohith, "Ambubot Replacing Ambulances For Emergency", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056, Volume: 06 Issue: 03 , Mar 2019.
9. Irin Sherly , Maria Sobitham Princy , Monisha , Nandhini, "Smart Ambulance Rescue System With Patient Health Monitoring Using Iot", International Journal Of Advancedresearch In Science, Engineering And Technology Vol. 6, Issue 2, February 2019.
10. Philip A. Catherwood, David Steele, Mike Little, Stephen McComb, and James McLaughlin , "A Community-based IoT Personalized Wireless Healthcare Solution Trial", IEEE Journal , 2018, DOI 10.1109/JTEHM.2018.2822302.
11. Nalini , M., Balaji, Vinitha Kumar, UlaganayakiA., PriyaS.S, " Blood glucose regulation system using model predictive controller ", IEEE International Conference on Innovations in Green Energy and Healthcare Technologies - 2017, IGEHT 2017.
12. Andrews, Leo John Baptist, and Linesh Raja. "A study on m-health in line with the sensors applying for a real time environment." Journal of Statistics and Management Systems 20.4 (2017): 659-667.
13. Minimized interference in CRN using conjunction analysis and resource utilization over the network DinokumarKongkham, M Sundararajan International Journal of Innovative Technology and Exploring Engineering 8(4),pp. 368-375 2019
14. Dual Sink Based-Energy Aware Unequal Clustering Routing Algorithm for Continuous Monitoring Applications in Wireless Sensor Network M Alagirisamy, CO Chow, KAB Noordin   2018 IEEE Conference on Open Systems (ICOS), 47-53.
15. Andrews, Leo John Baptist, Linesh Raja, and Suresh Shanmugasundaram. "Mobile android-based remote patient monitoring system through wearable sensors." Journal of Discrete Mathematical Sciences and Cryptography 22.4 (2019): 557-568.

AUTHOR PROFILE

Mr.Karthikeyan M is currently pursuing his fourth year of Under graduation in Electronics and Instrumentation Engineering at R.M.K.Engineering College. His area of Interest includes Biomedical Engineering and Industrial Instrumentation. He has presented 2 papers on national technical Conference (IEI) on the field of biomedical engineering and another on IOT. He can be reached at karthikeyanmbe19@gmail.com

Mr.Arvind M is currently pursuing his fourth year of Under graduation in Electronics and Instrumentation Engineering at R.M.K.Engineering College. His area of Interest includes Industrial Automation, Transducer Engineering and Process Control. He has presented 1 paper in National technical Conference (IEI) on the topic of OLED Technology.

Mr. Jagan Sandibp NS is currently pursuing his fourth year of Under graduation in Electronics and Instrumentation Engineering at R.M.K.Engineering College. His area of Interest includes Transducer Engineering and Industrial Instrumentation. He has presented 1 paper in National technical Conference (IEI) on the topic of OLED Technology.

Mr.Karthik V is currently pursuing his fourth year of Under graduation in Electronics and Instrumentation Engineering at R.M.K.Engineering College. His area of Interest includes Transducer Engineering and Industrial Instrumentation. He has presented a paper on national technical Conference (IEI) in field of IOT.

Dr. S.Vijayalakshmi, M.E., Ph.D., is a Professor, Department of Electronics and Instrumentation Engineering. She obtained her B.E degree in EEE from Madras University, Chennai, M.E in Applied Electronics from Anna University and PhD in Information and communication from Madras Institute of Technology, Anna University, and Chennai. She has been in the teaching profession for the past 19 years. Her areas of interest include Circuit Analysis, Electrical Machines, Biomedical Instrumentation, Control systems and Process control. She has organized conferences, workshops, Short Term Training Program and attended FDP related to her area of interest. She is a Life member of ISTE and ISOI and IEI. She has published papers in International journals and conferences.