International Journal for Modern Trends in Science and Technology
Volume 10, Issue 04, pages 159-163.
ISSN: 2455-3778 online
Available online at: http://www.ijmtst.com/vol10issue04.html
DOI: https://doi.org/10.46501/IJMTST1004025

IoT Based Automated Paralysis Patient Healthcare System using Aurdino and GSM

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To Cite this Article
Karri Naga Sai Raghava Durga Balaji, Shaik Mahammad Shahid and V. Kaviya, IoT Based Automated Paralysis Patient Healthcare System using Aurdino and GSM, International Journal for Modern Trends in Science and Technology, 2024, 10(04), pages. 159-153. https://doi.org/10.46501/IJMTST1004025

Article Info
Received: 20 March 2024; Accepted: 06 April 2024; Published: 09 April 2024.

ABSTRACT

We come across hospitals and NGOs serving paralytic patients who have their whole or partial body disabled by the Paralysis attack. These people in most cases are not able to convey their needs as they are neither able to speak properly nor do they convey through sign language due to loss in motor control by their brain. In such a situation we propose a system that helps disabled person in displaying a message over the LCD by just simple motion of any part of his body which has motion abilities. This system also takes care of the situation where in no one is present to attend the patient and thus sending a message through GSM of what he wants to convey in SMS. There are several instructions of movement gesture sensors presented in the paper in order to assist health officer in helping the paralyzed patient to complete their needs. The user now just needs to tilt the device in a particular angle to convey the message. Thus, by tilting device one can convey message easily. So, this system can help them out to convey a message.

KEYWORDS: paralysis, paralytic patient, GSM

1. INTRODUCTION

Paralysis is the inability to move muscles on your own and with purpose. It can be temporary or permanent. The most common causes are stroke, spinal cord injury, and multiple sclerosis. Paralysis can be a complete loss of movement known as plegia, or a significant weakness called paresis. Paralysis is most often caused by damage in the nervous system, especially the spinal cord. Other major causes are stroke, trauma with nerve injury, poliomyelitis, cerebral palsy, peripheral neuropathy, Parkinson's disease, ALS, botulism, spina bifida, multiple sclerosis, and Guillain—Barre syndrome. For example, monoplegia/ mono paresis is complete loss of movement or weakness of one limb. Hemiplegia/hemiparesis is complete loss of movement or weakness of arm and leg on same side of the body. Paraplegia/paraparesis is complete loss or weakening of both legs. Tetraplegia /tetra paresis or quadriplegia/quadriparesis is complete loss or weakness of both arms and both legs. Paralysis is caused by injury or disease affecting the central nervous system (brain and spinal cord) which means that the nerve signals sent

to the muscles is interrupted. Paralysis can also cause a number of associated secondary conditions, such as urinary incontinence and bowel incontinence. Though, there are innovative approaches for curing or treating paralysis patients, but the aim of treatment is to help a person adapt to life with paralysis by making them as independent as possible. Where we see a problem with these types of devices that are being developed is that theyare very large and expensive machines.They seem to be only available in hospitals and not able to be used at the patient's home or at their convenience. Our goal is to make a will be able to retrain patient's motion but have them be able to use the device themselves and have it be cheap enough for them to afford without much debt.

2. DISCUSSION

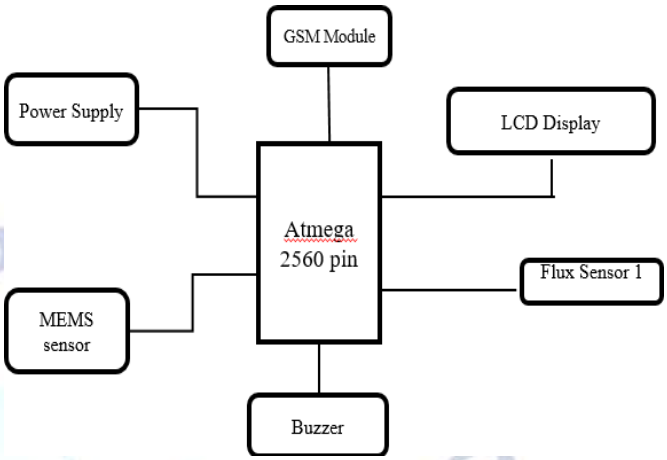
The proposed IoT-based automated paralysis patient healthcare system represents a significant advancement in addressing the complex challenges faced by individuals living with paralysis. By leveraging the interconnected nature of IoT devices and sensors, this system aims to provide comprehensive monitoring, timely intervention, and personalized assistance to enhance the quality of life for patients while alleviating the burden on caregivers and healthcare facilities. The system comprises a network of wearable sensors, smart home devices, mobile applications, and backend servers, working together to monitor various aspects of the patient's health in real-time. Wearable sensors track vital signs, movement patterns, and other physiological parameters, while smart home devices ensure environmental control and safety within the patient's living space. Through continuous data collection and analysis, the system can detect anomalies, predict potential health issues, and alert caregivers or healthcare providers to take appropriate action promptly. Automated interventions, such as adjusting the patient's position to prevent pressure sores or reminding them to take medication, further enhance the system's ability to support patient health and well-being. Moreover, stringent measures are implemented to ensure the security and privacy of patient data, including encryption, access controls, and compliance with healthcare regulations. Seamless integration with existing healthcare infrastructure enables seamless communication and collaboration among healthcare professionals, facilitating coordinated care and decision-making. User experience and accessibility are prioritized in system design to accommodate the diverse needs of patients, including those with limited mobility or technological literacy. Looking ahead, the system holds immense potential to improve patient outcomes, reduce healthcare costs, and empower individuals with paralysis to live more independently and actively engage in their own care. Future enhancements may involve the integration of advanced technologies such as artificial intelligence and robotics to further augment the system's capabilities and adaptability to evolving patient needs and preferences. Overall, the IoT-based automated paralysis patient healthcare system represents a transformative approach to healthcare delivery that promises to revolutionize the way we support and empower individuals with paralysis to lead fulfilling lives. In thecircuit implementation will be explain briefly the whole circuit in the project system and also explain about the bock diagram and component to be used in the circuit. Regarding to the project design, the operation of this project is automatic paralysis healthcare system is aid and facilitate the paralysis patient either patient in home or get treatment at Hospital. Besides, the system of this project also aids the family patient or medical staff to take care of them easier and not 24 hours to treat them. The operation of gesture sensor is detecting any movement with any part of the body mostly by hand which used to convey instruction to help them for example medical staff or nurse at hospital which responsible to treat and care of the patient almost 24 hours every day. There are several hand movement directions set up and each movement direction will indicate different type of instructions for example to help for meals, assist to toilet and etc. So, this system will use to facilitate those caretaker of the paralysis patient. The Arduino is one of the electronic components that use the microcontroller ATmega328 interface where the hardware this board used consist of simple open- source hardware board designed around an 8-bit Atmel AV microcontroller, or a 32-bitAtmel ARM. The GSM Module used in this project is GSM Module SIM 900A due to 2G capabilities in Malaysia was used GSM900 and GSM1800. In this project, GSM Module SIM900A used for sending simple message (SMS) to the consumer after receiving signal from ARDUINO UNO. The APDS- 9960 RGB and gesture sensor is a one of the sensors that combine human and machine interface. This sensor is

only requiring the gesture by swiping hand over the sensor. This sensor used to detect some movement or gesture of human and this sensor aware is the device that consists of five inbuilt sensors depending on internet of sensors. For the gesture sensing example, it has some requirement to make this sensor to function. There are some types of gesture will use in this project which is up, down, right, left, near and far. For up, down, left and right are different way to detect.

3. METHODOLOGY

This circuit was created with the help of microcontroller-based circuitry. An memessensor detects the angle of hand movement in a specific direction in this gadget, and this information is subsequently communicated to the microcontroller. The microcontroller then analyses this data to determine the angle and direction of the hand movement. After that has been determined, the microcontroller generates a specific message that has previously been pre-programmed if the hand is slanted at a specific angle and in a specific direction. So, if the paralyzed patient tilts their hand in the direction of the +x-axis, -x-axis, +y-axis, or -y-axis, the microcontroller will generate a specific message for that direction, which it will then send to the LCD panel (16X2) to be shown on it. When the microcontroller generates a message when the paralyzed patient wants to transmit a message by tilting his or her hand at a specific angle and in a specific direction, the attendee or doctor will be alerted by an audible alarm 9 created by a buzzer.

The first unit in this project is memes sensorthat is capable of detecting the gestures due to change in position. On the change of position, the sensor gives the Analog variation of the voltage on its x, y and z pins. We convert this Analog variation into digital format using Op-Amp As comparator in which we set a threshold voltage (comparison) using preset and the according to the input voltage the voltage is either high or low. LM324 is quad op-amp IC used here. This circuit generates various 4-bit binary sequences on the change of its position. This sequence is transmitted over RF channel. The transmitter section will be attached to accelerometer circuit which will give parallel binary data as input to the HT12E encoder that encodes the parallel data to serial data. Now this serial data is transmitted over 434Mhz carrier channel using ASK modulation through a short dipole antenna.



The ESP32 microcontroller is illustrated in this block diagram receiving a 3.3V power supply from a power source. The Esp32 is then connected to the MPU6050, which delivers data about the patient's hand movement to the ESP32, which generates a customized message based on the patient's hand movement's specific direction and set angle. Every message generated by the ESP32 is shown on an LCD (16X2) screen attached to the ESP32. When the Call Attendant message is generated, the IFTTT app sends a message to the doctor's phone, instructing him to go aid the patient immediately. When the ESP32 sends a message. A buzzer will also beep whenever the ESP32 generates a message, providing an auditory alarm. As a result, this technology assists paralyzed patients in meeting their most fundamental demands at the appropriate time, allowing them to overcome their challenges.

4. CONCLUSION

This system is really helpful for paralyses patients. When they need help then they can ask by using some movements they can also survive in this world like normal people by using this movement detection. This system is reliable and cheap and less weight. So they can buy without debt. This system will make paralyses patients to achieve a independent of mobility. This is not a trivial task just because it varies from person to person in its nature and type. Therefore, different methods are essential to support these people, and it is our duty, as future engineers, to develop new technologies to help paralyzed patients-as the conclusion, the project was developed to create a system using ARDUINO as the

main controller. Aligned with current technologies, this project was created to ensure the paralyze patient obtain the best treatment and care during in hospital without family members to help them just only giving some easy movement gesture to the sensor. Other than that, it also created to analyse the performance of GSM module to give attention so that easy to assist their patient before asking what they want. Last but not least, a few improvements still need to be done regarding to the research of automatic healthcare system using GSM system. To ensure the system still efficient and improve the already system has, a few modifications should be made to create the more sophisticated idea for this system. Thus, the automatic Healthcare System using GSM can be upgraded by using several improvements of components, align with the latest technology. A few recommendations can be applied such as upgrading the system at transmission system from GSM Module to the wireless system communication because this system not depending the coverage network from services provider and this system is more sophisticated than GSM system. Use the memes sensor to ensure that the gesture movement capable read the distance almost 5 meters than this sensor able to read 20cm maximum and by using accelerometer able to make sign language via fingers because this system use x, y, z concept. Add the memes sensor which able to detect if a patient falls down and make this project more useful for patient.

FUTURE SCOPE

Paralytic patients who have their whole or partial body disabled by the Paralysis attack. Various conditions such as stress, blood pressure and improper functioning of central nervous systems are reasons which lead in paralytic attacks. Patient who had paralytic attack have their whole or partial bodies disabled. This paralytic patient can neither speak nor express their demands or wishes. These patients cannot have quick reflex system, hence there is no or less coordination between vocal systems, limbs and brain. The future scope of the project: In future, the system can be made smart and efficient by making the goggle wireless for eye blink detection. It can be made by using Bluetooth and Wi-Fi technology. So as to make system efficient and secure as well as easy to handle. Also, for constant patient monitoring some indications for security can be added like light indicators. Instead of using GSM module monitor patient's parameters on mobile in case of if patient is in hospital. So, it becomes useful in hospitals for continuous monitoring of body parameters on doctors mobile or main mobile of hospital ward. According to the availability of sensors or development in biomedical trend more parameter can be sensed and monitored which will drastically improve the efficiency of the wireless monitoring system in biomedical field. A graphical LCD can be used to display a graph of rate of change of health parameters over time. The whole patient's healthcare monitoring system which we have framed can be integrated into a small compact unit as small as a cell phone or a wrist or smart watch. This device is easy to handle the patients or other persons.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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