

Efficient User Friendly Robot for Aged and Physically Disabled People

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Abstract

Nowadays due to their busy schedule people leave their parents alone at home and stay abroad. Due to this there is rapid need for care taker one who looks after old aged people like their near and dear ones efficiently. So, this is need to design and implement efficient robot one who take care as human. Efficient user-friendly robot for aged and physically disabled people is designed and developed that is capable to take care of senior citizens in terms of their health monitoring systems. Communicates patients through camera and interacts them by knowing the patients temperature, SPO2, heart rate and room temperature. We address the creation of user-friendly robot for aged people and physically disabled in a proper indoor environment. We propose a design based on multimodal robot which take care of the aged and physically disabled people. Robot allows the user to specify in a natural way, in which it helps in health monitoring, obstacle avoidance, gas leakage detection & communication. The knowledge which we gain in this robot is that to plan and execute effective personal take.

Keywords

Gas leakage detection, Health monitoring, IOT communication, obstacle avoidance.

INTRODUCTION

In past some years we have seen a wearable sensor but now a days several devices are available for personal health care. In health care system, we must provide a better health service to people in an affordable way. The traditional health care approach is changing to modern approach. The doctor role was very important in the traditional. For the checkup and regular follow, up then need to visit the doctors. There are two problems for this approach. Firstly, the doctors or nurse should be there all time. Secondly patient should get admitted in hospital for all the checkups. For solving these two problems there is a patient-oriented approach. In recent survey from United Nations, they predicted that 2 billion older people by 2050. Therefore, researchers estimate that 89% of aged people will live independently. By the way medical researchers has found 80% of aged people are aged. 65% are suffering with minimum of one chronic diseases or allergy, so for them caring themselves has become difficult. This has become a social issue of the aged people at this moment. Nowadays internet of Things (IOT) has become most powerful communication prototype. In our daily life activities, everything has come to IOT with the proper communication and computing. Heart beat rate has become one of the most important essential for monitoring and diagnoses health of patients. For senior citizen to maintain good health is very crucial. It is very easily accessible health monitoring prototype to provide an effective in cost saving and reduce illness. The purposed work is to develop a health monitoring prototype for aged and physically disabled individuals. The system will provide real-time monitoring of the user's vital signs and alert medical professionals in case of any anomalies. It will use a combination of sensors, microcontrollers, and wireless communication. The system

will display vital health information such as heart rate, body temperature and oxygen saturation levels in real-time. The user will monitor their health and take the necessary action. The system will provide reminders to take medication, this will help the user to manage their daily routines more effectively and independently. This uses a Blynk IoT app for remainder. A system that uses a Wi-Fi module to provide monitoring capabilities for the elderly and physically disabled. The system will consist of a camera module, an audio record and play module. The ultrasonic sensor can be used to develop a system for the aged and physically disabled to navigate safely using an ultrasonic sensor. The system will provide real-time monitoring of the distance between the user and objects in their surroundings and produce sound alerts when obstacles are detected. This will help the user avoid obstacles and navigate safely. They will use an ultrasonic sensor, microcontroller, speaker, and a mobile application. The purpose of this project is to develop a gas detection system for the aged and physically disabled using a gas sensor. The system will provide real-time monitoring of the air quality in the user's environment and produce alerts when hazardous gases are detected. This will help the user avoid potential health risks and improve their overall quality of life. The leakages happening due to some internal fault can cause huge blasts and accidents, resulting in injuries and loss of lives affecting a large array of people.

OBJECTIVE

The objective of developing this proposed paper for aged and physically disabled people where health monitoring system is to provide a solution that can assist elderly and physically disabled people in monitoring their health status more effectively, helping them to manage chronic conditions and prevent health complications. Tablet reminder using

Blynk IoT app is to provide a solution that can assist elderly and physically disabled people in managing their medication schedule more effectively, ensuring that they take their medications on time and in the correct dosage. Wi-Fi-module for camera, audio record & play module is to provide a solution that can enhance the safety and security of elderly and physically disabled people, as well as provide a means of communication and interaction with caregivers or medical professionals. LCD for displaying healthcare system is to provide a solution that can assist elderly and physically disabled people in monitoring their health status more effectively. Ultrasonic sensor is to provide a solution that can assist people with mobility and vision impairments to navigate their surroundings more safely and independently. A gas sensor that can detect harmful gases in the environment and provide accurate readings.

LITERATURE SURVEY

In [1], author has proposed in this paper “Heart rate Monitoring and Pulse Oximeter System” a patient by placing the fingers on sensors the device measure the patient's heart rate and the outcome will be shown on LCD later. Patient health abnormalities are shown on an LCD and audibly signaled by a buzzer. The change in heart rate can be graphed using a graphical LCD, and this system is inexpensive and usable by non-professionals.

A [2], author has proposed “Heart rate Measurement from the Finger using a Low-cost Microcontroller” using internet of things, health monitoring system is designed and are presented. IOT has a wide range of applications and developed for Wireless sensor network (WSN). New technologies help to solve some problems related to health monitoring and IOT by providing better quality and security. Pulse oximeter, blood pressure, temperature, WIFI modules, Arduino board, sensors are used to identify the cardiac rate in an IOT setting.

A [3], author has proposed “Health Monitoring System” the designed system is efficient and easy to understand. this system measures the various parameters of human body and later the measured doctors can access data via the internet. The author suggested a health monitoring system based on Arduino. Health-related issue can be found using sensors online and reported to a consulted doctor or specific individual. The doctor will automatically receive an alert message in the event of an emergency while the patient is unconscious. It is possible to use patient health parameters records right now. The system acts as a communication link between the doctor and the patient. With the help of this technology, diseases can be detected early and diagnosed as necessary.

In [4], author has proposed a smart healthcare system using network of things. The primary objective of this system is to transfer patient health information. Through the use of a pulse sensor, this system measures both temperature and heart rate. IOT offers a variety of sensors, and by using these sensors, we can access the body's numerous parameters. All

of the patient's input data will be sent to the patient's family and doctors for consultation. Thus, the use of IOT technologies in the contemporary health monitoring system has provided various advantages for patients.

In [5], author have proposed a healthcare assistant robot named ADIO which performs several different features. robot provides medications and check basic parameters like spo₂(oxygen saturation level), pulse rate, temperature and maintain the database through an android app. Different machine learning and AI techniques are used for implementation of the system. designed system reduce the person-to-person contact and maintain cleanliness.

In [6], author has proposed a gas leakage detection system using MQ-2 gas sensors are used to find LPG leaks. The amount of LPG in the cylinder will be continuously checked.

In [7], author proposed a robot that monitor the health and can detect illness and alert the patient. this system can be used in aged center or personal care or in hospital. The main aim of the robot is to combine all the medical parameters like monitoring of necessary signs, such as Blood pressure, heart rate, spo₂, body temperature and galvanic skin response. robot has a friendly environment and have a two-way communication with the doctors and patient.

In [8], author has proposed the leakage is sensed through the MQ5 sensor and the load cell measures the gas threshold level and booking are automatically done when the threshold drops to 20%.

In [9], author has proposed obstacle avoidance robot using ultrasonic sensor and arduino board on which microcontroller is placed. for the movement of the robot dc motor is used which is connected to Arduino board actuators are utilized to move the robot forward, backward, left, and right using the motor driver board (pins 10, 11, 12, and 13). Anytime an obstruction is detected in the path by an ultrasonic sensor, the robot's movement will stop. When an object is detected by an ultrasonic sensor, signals are bounced back and are termed sensor input.

MOTIVATION

The motivation for developing this work is designed and developed a robot for aged and physically disabled people where health monitoring is to provide an innovative and practical solution for improving the health. The aged and physically disabled people often face significant challenges in managing their health due to mobility limitations, chronic conditions, and the need for regular medical monitoring and assistance. The aged and physically disabled people often have multiple chronic conditions that require regular medication management. However, they may have difficulty remembering to take their medications on time or keeping track of their medicine on time, which can lead to adverse health outcomes. A Wi-Fi module for a camera, audio record, and play module is to address the challenges faced by this vulnerable people in terms of communication and healthcare monitoring. They may also require regular medical monitoring and assistance, which can be challenging for

caregivers and family members to provide consistently. Ultrasonic sensor is to address the challenges faced by people in terms of safety. Aged and physically disabled people often experience, which can increase their risk of accidents and injuries. Gas sensor is to address the health and safety concerns faced by the people due to their susceptibility to respiratory illnesses.

METHODOLOGY

The robot reads the temperature of the old aged people using an DS1820 and asks the aged people to place their finger on the Oximeter MAX30100 to collect important data regarding their heart rate, pulse rate and blood oxygen

saturation level. Tablet remainder will send tablet remainder time using blynk app. Through the Wi- Fi camera, the patients are then enquired about their travel history and present symptoms or allergy history. These data are collected using a voice & video recording camera module and are directly sent to the doctor. The doctors have live access to the patient and their data. Describes the working protocol of the medical assistant robot. Ultrasonic Sensor is used for obstacle detection while robot is in motion. If the obstacle range is less than 2-3 feet, robot will stop to avoid stop to avoid collusion.

The gas sensor (MQ5) is to mainly detect gases such as LPG which prone to cause serious damage to the environment.

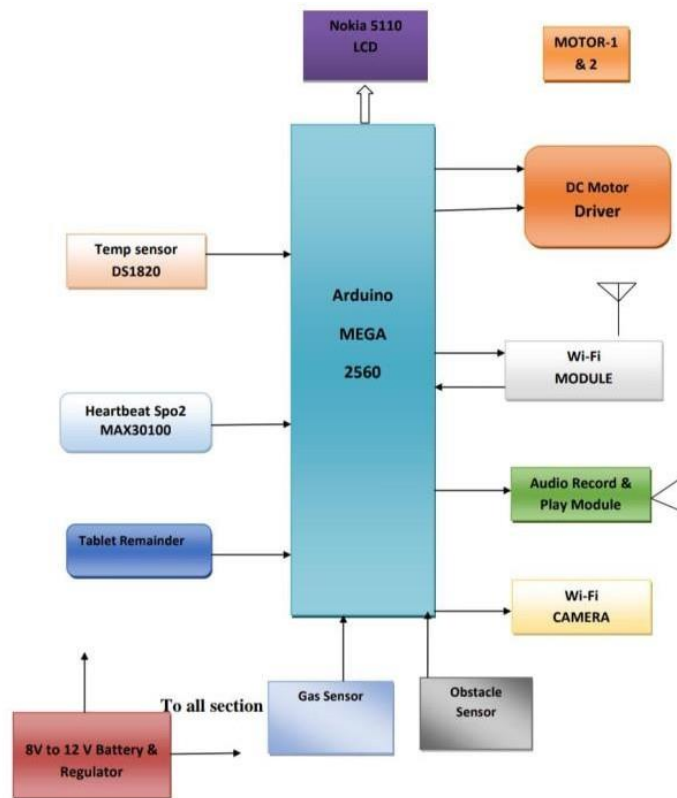


Figure 1. Efficient User Friendly Robot

COMPONENTS HARDWARE USED:

a. Arduino Mega



Figure 2. Arduino Mega

Arduino Mega can be connected to sensors such as heart rate monitors, pulse oximeters, or temperature sensors to

measure and track vital signs of patients. These readings can be transmitted wirelessly to a central monitoring system for healthcare professionals to analyze and respond accordingly.

b. Temperature Sensor DS1820



Figure 3. Temp Sensor DS1820

A digital temperature sensor made by Maxim Integrated is the DS1820. It is a 1-Wire device that uses a single data line to connect to the host system. The DS1820 is made to measure temperatures with an accuracy of 0.5°C over the range of -10°C to +85°C between -55°C and +125°C.

c. Heartbeat SPO2 MAX30100



Figure 4. Heart beat SPO2 Sensor

MAX30100 sensor measures the oxygen saturation level in the blood, known as SpO2. By analyzing the light absorption patterns of oxygenated and deoxygenated blood, it provides an estimate of the percentage of oxygen saturation in the bloodstream.

d. DC Motor



Figure 5. DC Motor

DC motors are commonly used in electric wheels. The motor drives the wheels, allowing users to move around independently.

e. LCD DISPLAY



Figure 6. LCD

LCD displays can be integrated into health monitoring devices, such as blood pressure monitors, glucose meters, or pulse oximeters. These displays provide visual feedback and easy-to-read measurements, allowing individuals to monitor their health parameters independently.

f. GAS SENSOR MQ-5



Figure 7. Gas Sensor

MQ-5 sensor can be integrated into gas leak detection systems to monitor the presence of combustible gases in homes. In the event of a gas leak, the sensor can trigger an alarm.

g. ULTRASONIC SENSOR



Figure 8. Ultrasonic Sensor

Ultrasonic sensors, such as ultrasonic range finders, can be used to measure distances and detect objects in the environment. These sensors send out ultrasonic waves and time how long it takes for the waves to return after striking a target.

h. ENEM WQ11 MINI WI-FI IP WIRELESS



Figure 9. MINI WI-FI IP

The transmission of information across a distance is known as wireless communication. The distances involved may be short or long.

i. 11v Battery



Figure 10. Battery

The 11V battery system can be used in a variety of applications, such as powering small motors and electronic devices. It can also be used as a backup power supply for critical systems in case of a power outage or other emergency.

j. Wi-Fi module esp8266

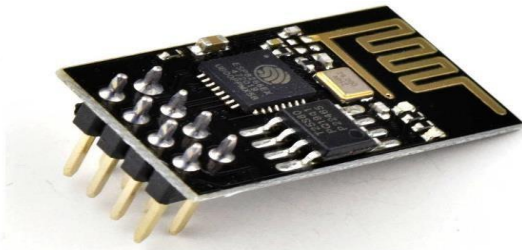


Figure 11. Wi-Fi Module

Wi-Fi modules can be integrated in health monitoring device system to enable remote monitoring and communication.

SOFTWARE USED:

The Arduino IDE.

An open-source platform for user projects and user communities that plan and create microcontroller-based inventions for the construction of digital devices and interactive objects that can detect and manage the physical world is provided by Arduino, a sort of computer software and hardware firm. The Arduino proposal offers a software application or IDE based on the Processing project, which contains C, C++, and Java programming software, for programming the microcontrollers. Additionally, Java, C++, and embedded programming languages are supported.



a. How Blynk Works



For use with the Internet of Things, Blynk was created. It can store data, visualize it, display sensor data, remotely control hardware, and perform many other fascinating things.

The platform consists of three main parts:

- **Blynk App** - using a variety of our provided widgets, you may design stunning user interfaces for your projects.
- **Blynk Server**- which handles all correspondence between the smartphone and hardware. You can host your private Blynk server locally or utilize our Blynk Cloud. It can even be started on a Raspberry Pi, is open-source, and is readily able to manage thousands of devices.
- **Blynk Libraries**- enable communication with the server and process all incoming and outgoing commands for all popular hardware platforms.

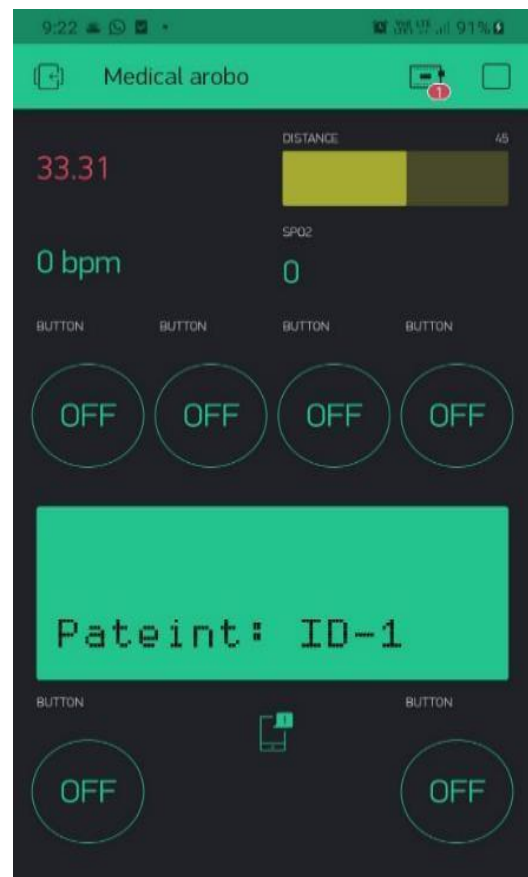


Figure 12: Patient Remainder

RESULTS

The health monitoring system for the aged and physically disabled people was successfully developed and tested. The system was able to monitor the user's vital signs in real-time and alert caregivers or medical professionals in case of any anomalies. The system was also able to provide historical data, allowing for trend analysis and early detection of health issues. The system was well-received by the test subjects and their caregivers, who appreciated the peace of mind provided by the system. The tablet reminder using Blynk IoT app was successfully developed and tested. The system was able to provide visual prompts to the user, reminding them to take medication. The health monitoring system using an LCD display for the aged and physically disabled people was successfully developed and tested. The Wi-Fi module-based assistive device for the elderly and physically disabled people was successfully developed and tested. The safe navigation system for the aged and physically disabled using an ultrasonic sensor was successfully developed and tested. The system was able to measure the distance between the user and the objects in their surroundings accurately and produce sound alerts when obstacles were detected. The system was able to detect the presence of hazardous gases in the user's environment accurately and produce alerts when detected. The alerts were customized according to the user's preferences.



CONCLUSION

The modern technologies have developed that promote comfortable and better life. user friendly robot is easier to handle by making the design sleeker. it is portable and easy to use. robot helps the aged people and physically challenged people in their day-to-day routine by monitoring their health and reminding the medicine, avoiding the obstacles in their path at same time it also provides two-way communication and detect gas leakage.

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