Smart Voice Activated Wheel Chair with Sensor Based Communication and Health Monitoring System for Enhanced Patient Care

Karri Sireesha[1], Raguthu Ramakrishna[2], Uppala Yaswanth[1], Kemburu Sahithi[1*],

Pukkalla Harini [1], Nalla Pallavi[1]

[1] *Undergraduate Student, Department of Electrical and Electronics Engineering, GMR Institute of Technology, Rajam-532127, Andhra Pradesh, India*
[2] *Assistant professor, Department of Electrical and Electronics Engineering, GMR Institute of Technology, Rajam-532127, Andhra Pradesh, India*

[*]Email: sahithi.kemburu02@gmail.com

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Abstract - The Accidents has been increasing drastically which may cause many injuries to the humans. Accidents cause the persons to become physically handicapped. This makes the persons difficult to move independently from one place to other. Guardians are required to look and take care of them for the whole day Smart Voice Activated Wheel Chair makes easier not only for the injured but also for old-aged persons to move independently. [1] Smart Voice Activated Wheel Chair move "forward", "backward", "left" and "right" according to the commands given by the user. This device can also provide the health condition of the patient to the guardian through GSM module. This makes easier to enhance the patient condition from any place. [2] The main objective of implementing Smart Voice Activated Wheel Chair is to reduce the designing cost and making available even for poor people to buy Smart Voice Activated Wheel Chair can make lives of physically handicapped persons easier and can overcome from the disable ness.

Key Words: WHEELCHAIR, RELAYS, DC MOTOR, ARDUINO, TEMPERATURE SENSOR, PULSE SENSOR

1. INTRODUCTION

Driving a manual wheel chair for long time while cause pain and injury in wrist, elbow and shoulder. It becomes even very difficult if the disability is one sided. Physically handicapped and old aged people always in need of someone to move. The health condition of the disable people should be monitored and medicine should be provided within the time. It becomes difficult for the deaf and dumb people in order to express their needs and emotions. Smart Voice Activated Wheel Chair with Sensor Based Communication and Health Monitoring System for Enhanced Patient Care has been developed for the physically handicapped people in order to overcome the disable ness. [3] An *innovative* assistive technology called a smart wheelchair with an integrated health monitoring system offers to enhance the mobility and health of people with

disabilities or limited mobility. These devices offer in-depth real-time monitoring of key indicators including temperature and heart rate. Traditional wheelchairs have a number of drawbacks, including the need for manual operation and assistance, which can be mentally and physically demanding for both the user and their guardian, as well as the inability to monitor the user's health status, which can lead to a delay in the diagnosis of health problems.[4] Paralysis is a severe illness that requires the use of a wheelchair. This tool's value is frequently seen as a provision for handicapped persons. It is generally accepted that wheelchair assistance is necessary for these individuals to receive the required jogging therapy. [5] Wheelchairs have many advantages that can assist people in their daily routines. Unfortunately, most wheelchairs still need to be moved by other people. However, there are times when people in wheelchairs need to be able to move themselves. Due to the high number of disabled people there, Indonesia needs wheelchairs.
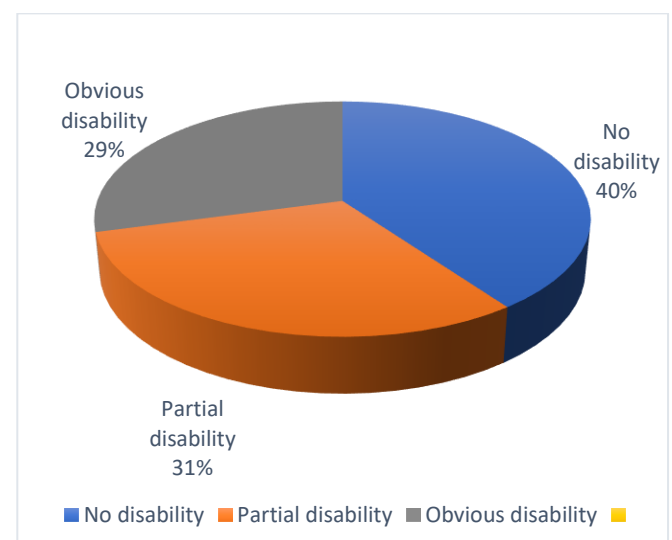
From the pie-chart we can observe that more than 50% of the people are disabled either due to accidents or by birth. Nearly 30.8% of the people are of Partially disable and 29.2% are of oblivious disability and out of 100% only 40% are of no disability. [6] As there are more disabled persons compared to healthy persons. So, some device is required to the people in order to assist the disable persons. Smart wheel chair can overcome their needs.

2. BLOCK DIAGRAM
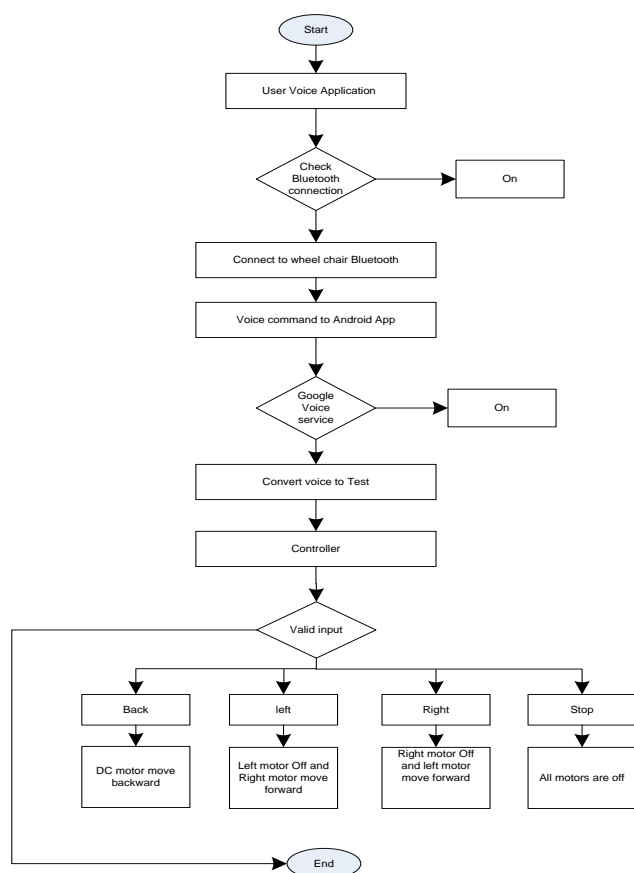
Open the User Voice Application Software and check whether the Bluetooth Connection is tethered or not. If not pair the mobile phone with the Bluetooth module. [7] Give the commands to User Voice Application Software. If the commands given by the user to the Application Software are not similar to user predefined commands, then the software display as voice speech not recognized so the user should give the commands again. [8] The Voice Signal will be converted into Text by the Arduino. The Arduino responds according to the user commands and the Arduino converts the Analog signal to Digital signal and the digital signal will be sent to the Relay Controller. The Relay performs the action by sending the power to the corresponding motor if the given signal is valid. If the given signal is invalid then there will be no response in the wheel chair.

3. COMPONENTS

3.1. PULSE SENSOR:

A pulse sensor measures the alteration in blood vessel volume that occurs while the heart pumps blood. The pulse sensor is connected to the Arduino Uno. The operational voltage ranges for this sensor are +5V or +3.3V. 0.625 inches length and 0.125 inches width make up the sensor. The fingertip contains a fixed sensor.

3.1.1: Pulse Sensor

3.2: ARDUINO UNO:

The ATmega328P microprocessor from Microchip serves as the foundation for the Arduino Uno microcontroller board. In total, there are 14 digital input/output pins and 6 analogue pins. The operational voltage is 5 volts, with an input voltage range of 7 to 12 volts. An Arduino Uno serves as the centerpiece of the project.

3.2: Arduino UNO

3.3: JUMPER WIRES:

An electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them - simply 'tinned') is known as a jumper wire. It is typically used to connect the parts of a breadboard, other prototype circuit, or test circuit internally or with other equipment or parts without soldering. A breadboard, a circuit board's header connector, or a piece of test equipment can all be used to create slots for the "end connectors" that hold individual jump wires.

3.3: Jumper wire

3.4: RELAY:

Relay is a switch that is activated by electricity. Solid-state relays are one type of working principle, although many relays employ an electromagnet to mechanically operate a switch. Relays are employed when multiple circuits need to be controlled by a single signal or when a separate low-power signal is required to control each circuit separately. an electric motor or other loads directly with the use of a relay that can manage the high power needed. To safeguard electrical circuits from overload or defects, relays with calibrated operating characteristics and occasionally several operating coils are employed. In contemporary electric power systems, digital instruments still go by the name "protective relays" to accomplish these tasks.

3.4: Relay

3.5: TEMPERATURE SENSOR:

An LM35 temperature sensor can be used to determine body temperature. The Arduino Uno is connected to this sensor. 4V to 30V is the operational voltage range. It draws 60 uA of current. The typical accuracy is 0.5°C at room temperature and 1°Cover the entire temperature range of 55°C to +155°C.

3.5: Temperature sensor

3.6: DC GEARED MOTOR:

A DC (direct current) geared motor is made up of a gearbox (also known as a gearhead) and a DC (direct current) motor. The gearbox functions by reducing the motor's speed and increasing its output of torque. Due to this, DC geared motors are suitable for a range of applications requiring high torque and accurate speed control, such as in robotics, conveyor systems, automotive systems, and various industrial equipment.

3.6: DC geared motor

3.7: LCD DISPLAY:

LCD stands for "Liquid Crystal Display" in the acronym. It is a widely used flat-panel display technology found in TVs, computer monitors, cellphones, and other devices. LCDs display pictures or text on a screen by controlling the light's propagation via liquid crystals. They are recognized for their energy efficiency, sleek design, and sharp image clarity.

3.7: LCD display

3.8: GSM MODULE:

The widely used mobile communication system component known as the wireless Global System for Mobile Communication (GSM) module is included with the Arduino Uno. It can deliver text messages to the host server after receiving serial data from radiation detecting equipment.

3.8: GSM Module

4. WORKING

Smart Activated Voice Controlled Wheel chair is a device which moves automatically without using any man force. The wheel chair can be moved from one position to other position without applying any force on the Wheel chair. Here the wheel chair is interfaced with some Sensors. [9] The wheel chair moves forward backward, left and right according to the commands given by the user (with the help of "Arduino Voice Control Software").

Fig: Wheel chair

The Android mobile phone must be interfaced with the Arduino using the Bluetooth module. The user can use Arduino Voice Control Software application to assist the commands. The commands will be given to the Arduino using Bluetooth module. These analog commands will be converted into digital commands and will be analyzed. If the command given is "forward" the Arduino Supply Power from the battery to both the motors in forward direction (positive to Negative). [10] If the command given to the Arduino is "backward" then the Arduino supply power to both the motors in backward direction (positive to Negative). If the Command if the given is "Left" to then the Arduino passes power to the Right-side placed motor and if the Command given is "fight" the Arduino passes power to Left side placed motor keeping the right-side placed motor ideal. This Smart Activated voice-controlled wheel chair helps the physically handicapped not only in moving but also helps in determining the health conditions. The temperature sensor and heart beat pulse sensor are interfaced with the Arduino. The temperature sensor used to sense the temperature. and the sensed temperature will be displayed on the LCD Display The heart beat sensor used to sense the heart beat in terms of BPM (Beats per minute) and the value is displayed. These values

will be sent to the user guardian. This makes easier to analyze the patient's health condition for time to time and from any place.
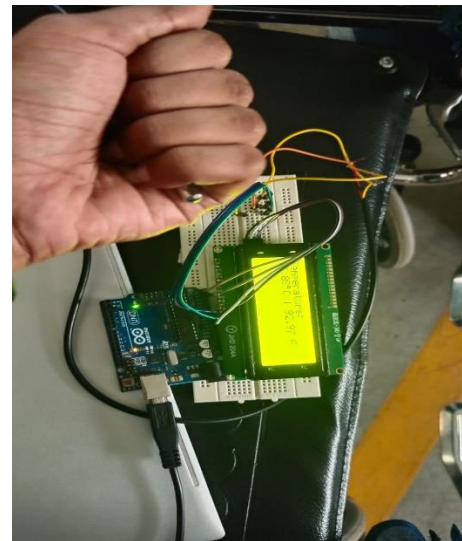

Fig: Health Monitoring

5. CONCLUSIONS

Smart Voice Activated wheel chair helps in overcoming the disable ness. This makes easier for the guardian in knowing the health condition of the physically handicapped people as the guardian may not be present with them at any time. This project's main objective is to make even poor people to use the Smart Activated Voice control wheel chair by designing this project at very low cost. This project makes easier and more useful to the physically Handicapped people to move more independent without taking help of some other.

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