

Smart Wheel Chair

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Abstract—People who are physically impaired and have various physical disabilities encounter numerous difficult issues in their daily lives when commuting from one location to another, and occasionally they even have to use public transportation. need to rely on someone else to get from one place to another another. Over the past few years, numerous substantial initiatives have been made to create intelligent wheelchair platforms so that the user may do so with ease. without any misunderstanding in functioning. Our paper's primary goal is to construct the smart wheelchair for those with physical disabilities. This smart wheel chair with voice control and upgraded features like obstacle sensing, emergency buzzer will help to ease their life.

Index Terms—Voice, Wheelchair, Sensor, Euclidean distance

I. INTRODUCTION

A wheelchair that uses navigational technology to maneuver is referred to as a smart wheelchair. It can be moved without using human power by employing controls and an electric motor. The typical method of controlling the navigational controls is with a tiny joystick that is chin-operated joysticks, head switches, eye blinks, and other features that offer several functions of the wheelchair

The majority of physically challenged people utilize standard wheelchairs. They are operated manually or, if the patient is unable to do so, by a second person. If another individual is not present to provide assistance, this is quite challenging for that person. There is always a need for a second person in that scenario. The sufferers must rely on someone else as a result. What would happen if a wheelchair began to move in response to aural input such as left, right, forward, and backward? The impaired person is autonomous and can move anywhere he wants to go without assistance. The wheelchair can be moved without the need of hands. With the help of our "Smart wheelchair" project, we are attempting to put this idea into practice. The symbolism of the wheelchair is obvious from the name alone. This wheelchair responds to human inputs and travels in the desired direction. This wheelchair can be maneuvered by someone who is unable to operate a chair with their hands alone. This is a blessing for those who are disabled. The patient may now independently travel anywhere

by utilizing this chair. The smart wheelchair also has obstacle detection and emergency buzzer.

II. RELATED WORK

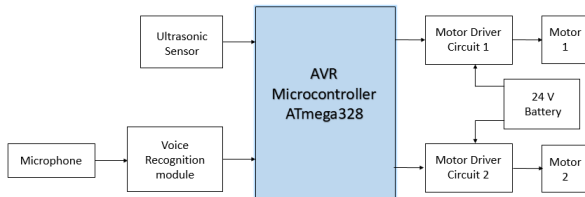
The study field of intelligent wheelchair control is drawing the researchers' attention. The wheelchair is designed in particular for those who can only move their head and neck. An in-mouth position sensor is used to detect the motions. Also being researched are intelligent wheelchairs. These wheelchairs detect obstructions in the user's route. To sense the items, sensors are installed in the circuit. Along with sensors, these wheelchairs have a speech recognition circuit. The majority of systems offer a variety of solutions to complete tasks that are thought to be challenging for a handicapped individual. We designed a voice command system to simplify and develop the control system in order to make using a wheelchair by impaired people much simpler and easier. With a few brief speech instructions, this voice command system aids in maneuvering the wheelchair. As a result of escalating conflict and an aging population, the number of physically handicapped persons in society has significantly increased during the past ten years. The requirement for upgrading the quality of life for such individuals has been of great concern. The main issue that handicapped, paraplegic, and crippled people have is their inability to move around without the use of an artificial method of transportation. Wheelchairs are the most popular and widely utilized solution in this case, although they have a number of drawbacks. A physically weak user cannot use a wheelchair on his own because of the amount of user effort needed to pull and push the wheels, as well as the lack of security and stability. He must rely on assistance from another person. This may be highly expensive given the hectic lifestyles of individuals in today's culture. A typical wheelchair cannot be used by someone who is unable to use their arms.

Although the traditional wheel chair, which requires the user to push it, has benefits like independence in movement, exercise, and cost-effective transportability, it also has drawbacks like ineffective assistance on inclines and irregular terrains,

fatigue, and repetitive stress injuries. Present-day motorized wheelchairs eliminate these drawbacks. The joysticks on power wheelchairs that are located close to the arm rests make it easy to assist. However, the majority of patients are unable to move the joysticks due to limb damage. Therefore, in the suggested systems, voice instructions are used to move the wheelchair rather than a joystick. The system was able to prevent collisions and mishaps thanks to the mounting of sensors, line detectors, and obstacle detectors. By adding a temperature sensor, the family and worried doctors will be informed about the patient's temperature. This allows the patient to walk around independently without the need for assistance, and it also provides the patient's family peace of mind with a collision prevention system.

III. PROPOSED WHEELCHAIR SYSTEM

The "Smart Wheelchair" has a Voice Recognition Module, a Micro controller, Ultrasonic sensor with obstacle detection, and Motor driver. The block diagram of the proposed model is shown in Fig. 1.

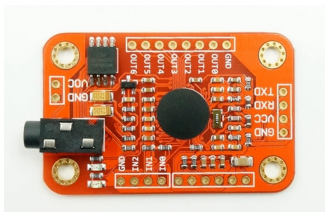


A voice recognition module Elechouse Voice Recognition Module is first trained by the voice of the patients for certain commands such as FORWARD, RIGHT, LEFT, BACK, STOP, HELP etc. The biggest advantage of our proposed system is that it doesn't have any language barrier. Then according to the command recognised the microcontroller module takes the decision to execute the command through the motor drivers.

IV. COMPONENTS

A. Elechouse Voice Recognition Module

ELECHOUSE Voice Recognition Module is a compact and easy-control speaking recognition board. This product is a speaker-dependent voice recognition module. It supports up to 80 voice commands in all. Max 7 voice commands could work at the same time. Any sound could be trained as command. Users need to train the module first before letting it recognize any voice command.



For training purposes, we used Arduino IDE and the serial monitor. This is very user-friendly and only takes a few minutes to train the patient's voice.



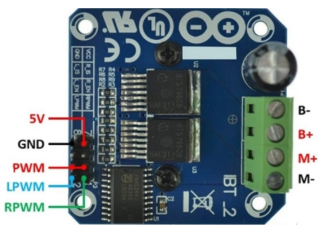
B. Microcontroller

Arduino UNO was used as the microcontroller module. The microcontroller was coded to drive the motors through the motor drivers.



C. Motor Driver

We used BTS7960 to drive the motors. It is a H-bridge motor driver. The main reason that we chose this motor driver is its feature of withstanding high current. It can handle up to 43A current.



D. Motors

We used 12V wiper motors to drive the wheels. These motors can draw up to 7.5A current and are used in cars.



E. Sensor

Ultrasonic sensors have been used for the purpose of obstacle avoidance.



V. FEATURES AND SPECIFICATIONS

- Voice-controlled automatic wheelchair
- smooth speed variations for patient comfort
- The text in the entries may be of any length.
- collision avoidance, soft start and stop,
- facility to command in multiple languages,
- controlling the wheelchair using bangla language

VI. FUTURE SCOPES

- Health Monitoring using smart watch
- Emergency call alert to relatives
- Manual easy Breaking System
- Speed variation
- Integration with smart home
- Artificial intelligence and deep learning

VII. CONCLUSION

In order for smart wheelchairs to be a commercial success and be widely utilised, there are a number of difficulties that manufacturers and researchers must overcome. Cost versus accuracy is a typical major problem. Affordable and sophisticated sensors can aid in resolving this issue. There are yet no smart wheelchairs that can be utilised for all different kinds of disabilities. Additionally, intelligent wheelchairs have to be able to keep an eye on the patient's condition and respond appropriately. Smart wheelchairs that are already on the market are simple to operate indoors, but they need to be supervised outside by a partner for safety. Additionally, research should be done on intelligent wheelchairs for mentally challenged persons to utilise independently.

VIII. REFERENCE

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IX. THE WHEEL CHAIR

