# AUTOMATED MULTI MODES WHEELCHAIR

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***Abstract*—** This paper is to develop a wheel chair control which is useful to the physically disabled person using multiple modes. The modes are Joystick, voice command, hand gesture and Android app. This mode will help persons with almost all sorts of disabilities. There are many wheelchair systems for physically disabled persons available in the market but as we move towards automation its more costly so, the main objective is to lower the price of the wheelchair while advancing the same. Raspberry pi is used as a controller for the system. Smart Wheel Chair is mechanically controlled devices designed to have self-mobility with the help of the user command. This reduces the user's human effort and force to drive the wheels for wheelchair. Furthermore it provides an opportunity for visually or physically impaired persons to move from one place to another. The wheelchair is also provided with obstacle detection system, which reduces the chance of collision while on the journey.

***Keywords*—** Raspberry Pi, Motor, Motor Drivers, voice recognition, ultrasonic sensors.

## I. INTRODUCTION

Smart Wheel Chair is automatically controlled devices designed to own self-mobility with the assistance of the user command. This reduces the user's human effort and force to drive the wheels for chair .Furthermore it additionally provides a chance for visually or physically impaired persons to maneuver from one place to a different.

The chair is additionally given obstacle detection system that reduces the possibility of collision whereas on the journey. good chair has gained heaps of interest in recent times. These devices are helpful particularly in transportation from one place to a different. The machines may also be employed in adulthood homes wherever the adulthood persons have issue in their movements. The devices function a boon for people who have lost their mobility. This project intends to facilitate the disabled individuals to maneuver victimization technology at an awfully low value and in an exceedingly good means.

To perform functions that someone desires a chair that need him/ her to maneuver around. He/ she will do this manually by pushing the chair with his/her hands. But several people have weak higher limbs or notice the manual mode of operational effortful. Thus it's fascinating to present them with a wheelchair that is controlled by voice commands, Hand Gestures or Joystick. The wheelchair is in a position to avoid obstacles mechanically in real time. Additionally The chair will move at a good speed. value of the chair is cheap for several of disabled individuals as attainable, additionally as for the organizations that support it. With these needs in mind we have a tendency to propose an automatic chair with period Herald shunning capability. the facility chair management interfaces presently still not enough to produce quality for a few variety of individuals with disabilities. Through analysis and style wise, the chair to maneuver around safely with freelance and self-use mobility.

Chair is also equipped with ultrasonic sensor which prevents the chair from any collision with any object. This is very much effective to prevent wheelchair from accidents. Additionally wheelchair works at a constant and controllable speed. The design of the wheelchair insures the total safety of the person sitting on the chair.

Wheelchair is equipped with IR-Sensor which allows chair to move in a straight path. In areas like hospitals the patients can move around without any assistance once a path is given to chair it will follow without interruption. This will allow the free menu ever of patients in the hospitals or any other place where line following can be possible.

We're wanting to build a product which can be user friendly, notable and additionally value economical.

## II. RELATED WORK

Several studies concluded that the independent mobility or movement which is included powered wheelchair, manual wheelchair and walker access the benefit to all the disabled human beings. Independent mobility increases reliance and undependability. Independent mobility plays a vital role in building the foundation for much early motivation that leads to undependability.

In recent times there are many automated wheelchairs introduced in the market. But the thing is either they are costly or with basic functionalities. There are manual wheelchairs. But wheelchairs with manual control are not feasible for the people of all sorts of disabilities. That is some people have not only disabled legs but disabled hands too so they are not able to maneuver around without depending on someone. To overcome this we require a chair which can be useful for persons with all sorts of disabilities. Some of the wheelchair fulfills this requirement but they are non affordable to most people.

We have studied the market and our main objective is to build a highly functional system which is also a cost efficient.

## III. PROPOSED SYSTEM

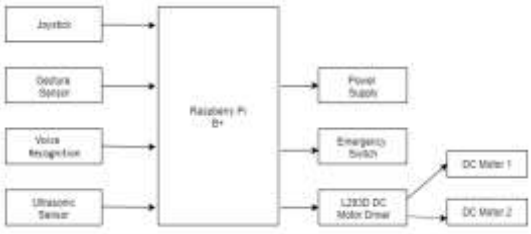


Fig 1. Block Diagram of system

Components of Wheelchair :

i) Joystick :

Joystick is mechanically controlled device which is used to control the by moving the stick. When user moves the joystick it takes the user input and sends it to the controller that is Raspberry pi. Raspberry pi activates the motor drivers and wheelchair moves in requested direction.

ii) Gesture Control :

For gesture control we are using gesture pad which can read the hand movements as a gesture and drive the chair. When hands moves over gesture pad it captures the gesture and convert into signal which is transferred to the controller and controller get the chair moving.

iii) Voice Recognition :

Voice command will send signal through user interface. When user gives voice commands like, Forward, backward, left, right the voice recognition system will send the signal to raspberry pi and wheelchair will move as per command. Voice recognition will sends the signal through wifi or bluetooth.

iv) Ultrasonic Sensor :

Ultrasonic sensor is used for obstacle detection. When any object comes in way of chair the ultrasonic sensor detects the object and inform the controller. Then controller try to avoid obstacles in its way.

v) Raspberry Pi :

We are using raspberry pi as a controller of this system. Raspberry Pi has huge processing power in compact board. All the motors, sensors are connected to raspberry pi and raspberry pi controls them on user commands

vi) Motors :

Motors are connected to wheels for the movement of the wheelchair. Motor Drivers are required to drive the motors and wheelchair.

vii) Emergency switch:

If wheelchair is not responding as per instruction and not giving desired output then an emergency switch is mounted to stop the chair immediately.

## IV. METHODOLOGY

The Wheelchair system using Raspberry Pi as a controller. All the components are connected and controlled by a Raspberry Pi. Raspberry Pi has huge processing power and compatible with all the component connected to it.

Multiple different modes can be used to operate the wheelchair. The modes can be Joystice, Speech Control, Hand Gesture control, and Android application. Multiple modes provides multiple features of usability for the wheelchair.

The chair is equipped with sensors, Ultrasonic sensor, IR sensor etc. which helps in obstacle detection and also line following mechanism.

User needs to select the mode as per his/her requirement. Once mode is selected then wheelchair will work accordingly. User will give inputs using joystick,gesture pad, voice recognition, android application any of this. Then input will be sent to Raspberry Pi which will operate the system and activates the motors and

operates the chair. Two DC motors are used to drive the chair.

To reduce the pricing of the chair we are using pipes to build the chair. The pipe structure makes the chair lightweight and cost effective and also solid pipes can carry the weight of any human being wants to use the chair.

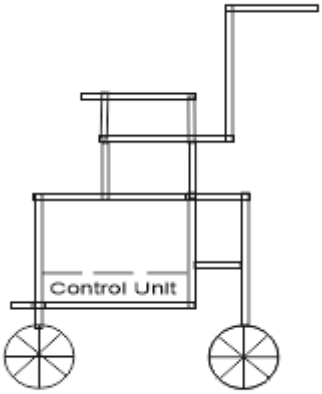


Fig 2. Structure of Wheelchair

## IV. FUTURE SCOPE

In future, we will try to design and implement fully automated wheelchair so that the user will have to contribute less to move the wheelchair. Also the wheelchair will run on the natural energy.

The wheelchair will not have any delay time in working so that the wheelchair will respond instantly to the command.
We can make the chair to stand up and also can provide recliner sits which will be more comfortable.

Wheelchair will having own navigation system and movements of the wheelchair have decent speed to move around on the sidewalk so that the user can use wheelchair in the nearby neighbourhood.

Also the wheelchair will have ramp assist also we will possibly use the wheelchair on stairs and also on steep climbing.

## V. CONCLUSION

In this project we developed a wheelchair system which enables the disabled patient to move their wheelchair independently in their own direction. In the real time application, we can use joystick, gesture sensor, speech synthesizer, android remote, emergency switch and ultrasonic
sensor depends on their application. The wheelchair movement operation with some delay time.

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