1. Summary:

Technology has made a drastic change in medical field but there are still some people facing some problems. Our motive is to make the locomotor disabled person, self-dependent. So, we are working on intelligent wheel chair so that it can be more user friendly for disabled person. The wheelchair will be fully automated by the user's tongue muscle. This is the solution to remove all barriers of cultural, physical, social inequality that prevent persons with disabilities from equally accessing opportunities and participating fully in all aspects. The full mechanism of the system will be on simple voice commands. We implement GPS tracker to give utmost security to the user. Parallelly this project focuses to the obstacle detector technology.

We are trying to give convenience to physically disabled person in their lifestyle. That's why we are focusing on smart wheelchair so that it will be much easier for them to lead a regular life. Our first aim is to make the wheelchair fully controlled by the user's voice.

The result of this design will allow certain people to live a life with less dependence on others. Speech recognition technology is a key which may provide a new way of human interaction with machines or tools. Today, this is done on a computer with ASR (automatic speech recognition) software programs. Thus, the problem that they are faced can be solved by using speech recognition technology to move the wheelchair. This can be realized with used the microphone as an intermediary. In this project, interface is designed therefore to develop the program for recognizes a voice in turn controls the movement of wheelchairs. This project consists of IOT (cloud computing) technology with Raspberry pi4 SBC (Single Board Computer) which helps in storing the command over cloud platform so that the recorded voice gets compared to the data already present and respond automatically with accuracy. This project also uses ARM Processor and ARM controller-based circuit and Direct Current Motor to create the movement of wheelchair. The results and analysis of this innovation will describe in this synopsis. The results of this project show that this project can be used for future research works and to design excellence innovation that meets market need and public interest.

Not only voice recognition system we are also implementing very striking features. In today's world GPS tracker plays a very significant role for getting instant information for someone's live location. As we are dealing with physically challenged person, we must be aware of their security also. User can be traced using GPS module through IoT, in the wheelchair embedded system that tracks and sends the information to smartphone application (app) of registered guardian via GPS locator.

The another feature we are trying to implement in our project is, obstacle detection technology. It will helpful very much for user, if the user is too close to any kind of obstruction wall or obstacle the wheelchair will slow down using IoT. We will upscale our idea for different elevation like hill and slopes.

2. OBJECTIVES:

- The goal of this system will allow certain disabled people to live a life with less dependence on others for their movement as a daily need.
- To control a wheel chair by using speech recognition module.
- To know the live location of the user by GPS tracker.
- To detect and overcome the obstacle in the path of the wheelchair.

3. IMPORTANCE OF THE PROPOSED PROJECT:

In the global population around 2.08% people are physically not abled to move on their own. In India around 61 lakh people are physically not independent and feels as burden to the society. Our aim is to make them normal in their daily life with the help of this wheelchair which will be their locomotive organ.

The wheelchair will simply work on voice commands like forward and backward and it will be very much easy to access by the people who are not aware of emerging technologies too.

Generally, after an accident or from birth if there is a mishappen people goes under depression and consider themselves nothing just a stone to the society. The wheelchair will definitely help people to get rid of their anxiety and loneliness and they can be independent at a certain limit.

Taking care of the user we will also interface a GPS tracker which would be directly accessible through mobile application by the registered guardian and it would be definitely helpful for them in case of any emergency.

4. WORK PLAN:

The construction of the wheelchair and programming the system will need proper planning then only we will be able to execute the idea successfully.

In the 1st half we will prepare the wheelchair with appropriate motor and power supply so that it can be operated through current.

In the 2nd part we will program the instructions and built the logic of operating the system to make it voice controlled.

And finally we will implement it as a whole and check its performance and calculate its drawback for the final outcome.

4.1 METHODOLOGY:

Smart wheelchairs have been used to explore a variety of alternatives to the more "traditional" input methods associated with power wheelchairs (e.g., joysticks, pneumatic switches). Voice recognition has often been used for smart wheelchairs because of the low cost and widespread availability of commercial voice recognition hardware and software. More exotic input methods that have been implemented include detection of the wheelchair user's sight path.

I. Construction of motor driven wheelchair:

The wheelchair will be driven directly by voice command so it need to be connected by a motor. We will use BLDC hub Motor which will be pre-installed with wheels.

There will be 2 BLDC hub motor for 2 wheels and a small wheel which will be free in nature to drive and change the direction from its path when instructed.

The approximate size of the wheels (BLDC interfaced) will be 12 inches, and the small wheel will be around 5 inches to 6 inches.
The wheel will be able to carry a load up to 150-200 kg with a driving speed of 8km/hr.

The seat will be supported with a suspensor which will absorb the jerks and leads a comfortable and smooth journey to the user.

II. Power Supply:

We need Direct Current to drive the wheel. We will use LiFePO battery for supplying power to the system. The battery will supply the power to the motor which will drive the wheels and it will also deliver power to the control unit (Raspberry pi) of the system.

The battery will take 6-8 hr. to charge up completely and in full charge condition the battery can drive up to 15km(approx.). The LiFePO battery is very much safety conscious of its configuration and it can resist sparking.

III. Control Unit:

For executing best performance of the smart wheelchair we will use Raspberry pi 4 B. It has 2GB ram and quad core cortex with microSD slot.

The full control of the motor will be conducted by Raspberry pi itself.

IV. Voice Recognition Module:

The main component of the system which is the backbone of the wheelchair is Voice Recognition Module. We are using HM2007 which can be easily interfaced with Raspberry pi. The voice commands will be directly transmitted to the control circuit and further to driver circuit of motor which will instruct the motor to rotate and will make the wheel drive.

It can store upto 40 words at a time and is 48 pin DIP IP.

It also consumes less amount of energy.

V. Obstacle Detection:

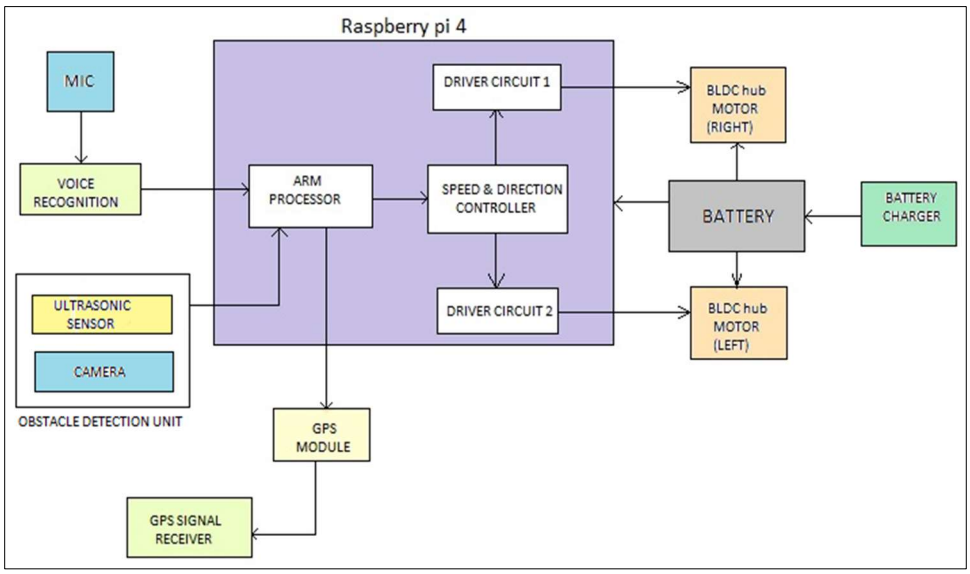
For the safety of the user there will be a obstacle detection technology. It will be conducted very efficiently by Ultrasonic Sensor HC-SR04. It can detect obstacle at a range from 2cm to 5m and can instruct the driver circuit to make the wheel slow and move to its safest direction until further command is approaching from the user.

VI. Live Location:

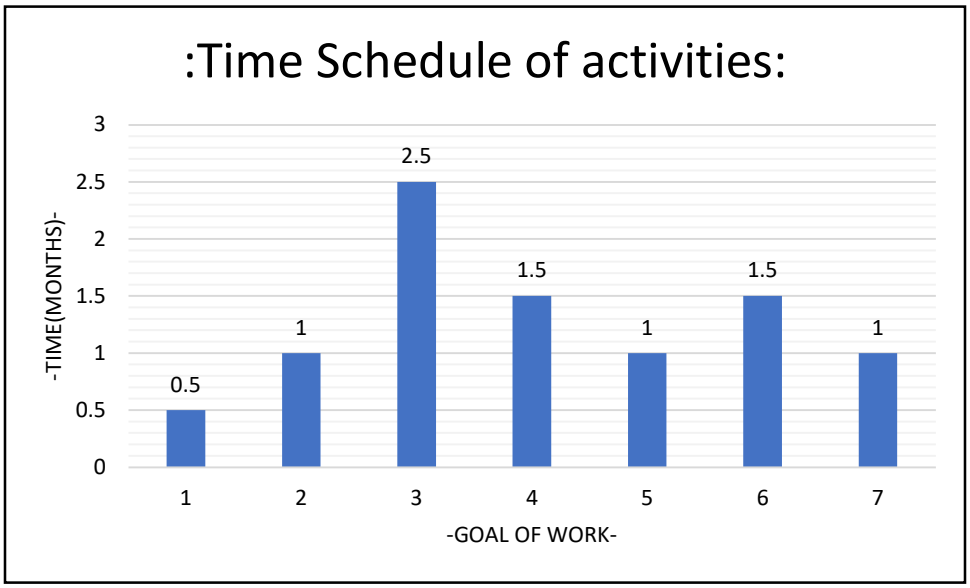
The system will be incorporated with a GPS tracker which will provide a live location to the registered guardian through mobile application.

ST-906 has no competition in this field. It can send SOS alarm, shock alarm in case of any emergency and also helps in voice monitoring.

VII. BLOCK DIAGRAM:



4.2. Time Schedule of Activities:



1. **Primitive Planning:**
   In this section we are going to plan about upcoming targets and formation of a primitive idea for required components. We will take around 10-15 days to complete this goal.
2. **Circuit Blueprint:**
   After the planning we will design a blueprint for our system which includes the design of wheelchair, installation of motor and full connection and wiring of it to the control unit. It will take around 20-30 days.
3. **Construction of Motor, Battery & Raspberry pi Installation:**
   According to the blueprint created before we will modify the wheelchair and install the motor and power supply which is a LiFePO4 battery. After that we will install Raspberry pi and interface it with the motor to make it controllable which is the control unit of the system which will consume majority of the time approximately around 60-75 days.
4. **Voice Setup And Coding:**
   The main function will be conducted by the voice modulation. It will be interfaced with Raspberry pi which will be connected to the speed control drive of the motor. Direction control will be controlled here. We have allotted around 30-45 days to complete the goal.
5. **GPS Setup And Coding:**
   Another striking feature which is GPS tracker will be installed after voice setup. In this phase of work, we have to construct a GPS receiver (either by mobile app or a separate device) and will be transmitted by Raspberry pi which will be programmed as per requirement. To fulfill this goal, we have to work for 30- 35 days.
6. **Camera And Ultrasonic Sensor Setup:**
   In this phase, we will install a Ultrasonic Sensor which will detect obstacle with limitations and will provide safety primarily. This sensor will be directly interfaced with the programed Raspberry pi. On other hand there will be a camera which will give the finest extent of obstacle decision and will alert the system for any kind of disturbance and obstacle in the path of moving so that the user can change the voice command. This will be fully controlled by Raspberry pi. We need about 45 to 50 days to execute the performance.

7. Testing and Finishing:

After preparing the full system we have to test the system in all aspects and in all conditions along with all types of platforms to move.

After crossing all the required test we will be focused on finishing and giving it a professional attractive look which will give the wheelchair a soul. This finishing part would be done in about a month.