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# AUTOMATIZED PERAMBULATOR FOR DISABLED PERSON

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**Abstract -** *There is a massive growth in the field of science and technology. Science and technology are the part of day to day life. In case of people with physical disability, the growth and involvement of technology is less. The physical disability arises with many reasons like accidents, by birth, health issues and age. Therefore wheelchair is a must requirement for handicapped people. These people require help from other people and also for controlling wheelchair. Therefore, the objective of this work is to design, a fully developed automatic wheelchair which is equipped with head gestures, hand gestures and voice recognition. The developed wheelchair will be able to recognize the commands given by the user and perform the actions. It can also be tracked with the help of GPS for safety measures. The developed wheelchair consists of WiFi module, motor system, ultrasonic sensor, LDR, GPS which are being operated using Blynk application and the voice recognition is made simple with the help of IFTTT application. The wheelchair is equipped with automatic obstacle detection with the ultrasonic sensor to recognize any obstacle coming the way. LDR is playing an important role by illuminating the place depending on the darkness. Thus, the developed smart wheelchair can provide the ease for disabled people and making their daily activities easier with simple commands.*

***Key Words*: Blynk, GPS, Node MCU, WiFi, LDR.**

## 1. INTRODUCTION

Wheelchair is an important equipment for physically disabled person for traveling. The wheelchair are of two processing, Iris and many other. However, the voice controlled operation is simple compared to other. There are people with speech impairment, thus it requires another mode for operation which is made by head gestures or by using the software application.

In view of the above, it is simplified that the fully automatic wheelchair will all the mechanisms of head gestures, hand gestures and voice types , self controlled and helper controlled with joystick. These both require the muscle strength for movement. Therefore this causes the major issue with hand impairment. This growth lead to other aspects of controlling the wheelchair with signals, face, image recognition will be able to help the people with physical and speech impairment. Since the wheelchair is equipped with GPS, it is an add on advantage to the user in providing the social security by sharing the location. In addition, the wheelchair is allowed to automatically detect the obstacle and even provide the light during darkness with the help of LDR. Therefore, these methods are able to provide the natural lifestyle for the disabled people.

With the expansion in the improvement of innovation, their is a fast development in the field of science. Numerous works have been made in the field of wheelchair to give a legitimate life to the debilitated individual. Smart wheelchair is furnishing the capacity of movement with the gestures and voice recognition.[1] The wheelchair is having the option to move forward with voice recognition [2]. At the point where the individual cannot walk and accomplish work. The person can be followed by the assistance of GPS with the goal that the individual will have the option to comprehend the prerequisites. Indeed, even it can control the speed of the wheelchair with simple voice commands [3]. The wheelchair is additionally be constrained by the head movement without any issues [4]. The wheelchair is associated with gestures for the movement along with the signals given by the hand [5]. The viable remote controlled wheelchair is worked for the disabled which does not require a lot of exertion to work and utilise colossally well known android framework [6]. These sources have been utilised for the development of a smart wheelchair which is worked with simple transmittable controls and they are easy to be driven by the individual.

## 2. PROBLEM STATEMENT

Even with the fast development in the innovation, there are issues going with it. The problems can be illuminated with finding expected solutions to them. If there should arise an occurrence of disabled individual the issue accompanies with the movement. It is lead a normal life even with solid mental and physical wellness. So, with regards to the incapacitated individual driving an ordinary quiet life is difficult.

In general, the wheelchairs are not economical so that every disabled people can afford. Therefore their has to be a low cost implementation of the technologies which can make it easy for the disabled people. Eventually the wheelchairs cannot adapt to the changing environment as per the requirements and even the wheelchair does not allow for location sharing if any consequences occur. Therefore a properly working wheelchair with all the technologies can actually reduce the problems of the disabled people.

Generally wheelchair are given physically with the assistance of other individual or by methods of self moving. So as to lessen the weight on them, an appropriately co-ordinated wheelchair ought to be fabricated. With the disabled one as well as for dazzle individuals the framework ought to be successful for decreasing their concern.

## 3. EXISTING WORK

1. Individual wheelchair lacks the total functionality of head, hand and voice recognition.
2. There is no wireless controlling operation of wheelchair.
3. Training the wheelchair with complex words leading to complexion of driving.
4. Initial investment on the wheelchair is way too high.
5. The adaptability towards the changing environment is absent.

## 4. BLOCK DIAGRAM

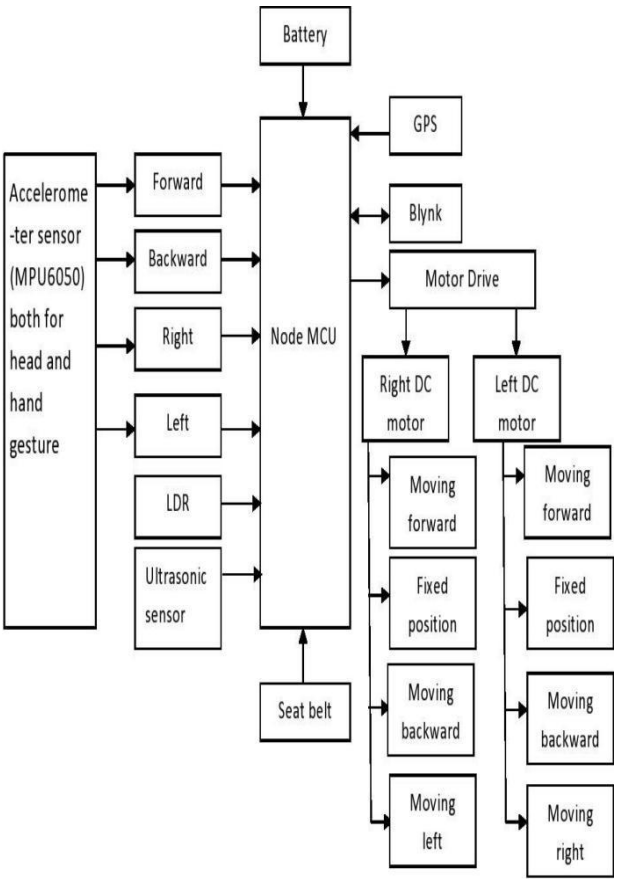


**Fig 1** : Block diagram of smart wheelchair

### 4.1 NodeMCU

NodeMCU is a very powerful and compact arduino that also allows inbuilt Wi-fi functionality with the memory of 128k Bytes. It is a low cost open source Iot Platform for hardware and software development. The Operating system is XTOS with the Storage of 4M Bytes and the power is supplied to the NodeMCU through USB.

### 4.2 Accelerometer-MPU 6050

The MPU 6050 is a 6 DOF (degrees of freedom) sensor, which means that it gives six values as output. The MPU 6050 is a sensor based on MEMS (micro electro mechanical systems) technology.

The Chip is MPU-6050, the power supply given to the sensor will be 3-5V Onboard regulator. It contains 16 bit data output with the Chip built-in 16bit AD converter.

### 4.3 LDR-5800B

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. Its diameter will be 5mm. It contains high sensing medium with dark resistance> 200 MΩ corresponding to dark current and light Resistance <2.4KΩ corresponding to light current.

### 4.4 DC motor-12V

An electric motor is an electrical machine which converts electrical energy into mechanical energy. Here Dc motor is used to drive the wheelchair. It contains the operating voltage of 12V with the speed about 150rpm.

### 4.5 Motor Driver L298N

This L298N based motor driver module is a high power motor driver perfect for driving DC motors and stepper motors. It can control upto 2 - 4 DC motors with directional and speed control. The Maximum operating voltage will be 46V. It consists of Peak output Current per channel 2A.

### 4.6 Ultrasonic sensor - HC-SR04

Ultrasonic sensors work by emitting sound waves at frequency too high for humans to hear. It possess the operating voltage of 5V and theoretical measuring distance about 2cm to 450cm with the practical measuring distance 2cm to 80cm with the Operating current less than 15mA

## 5. METHEDOLOGY

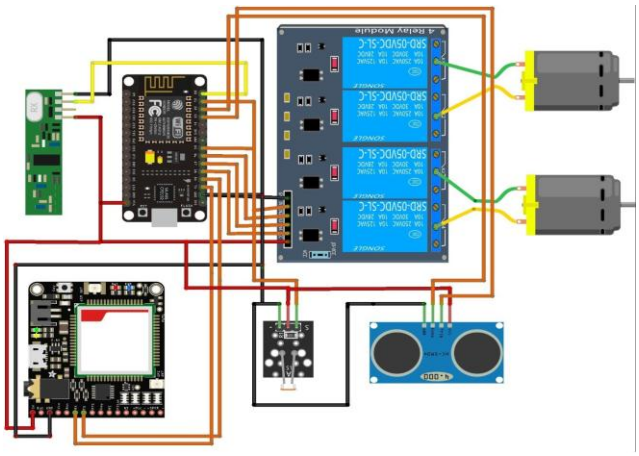

**Fig 2:** Main circuit diagram

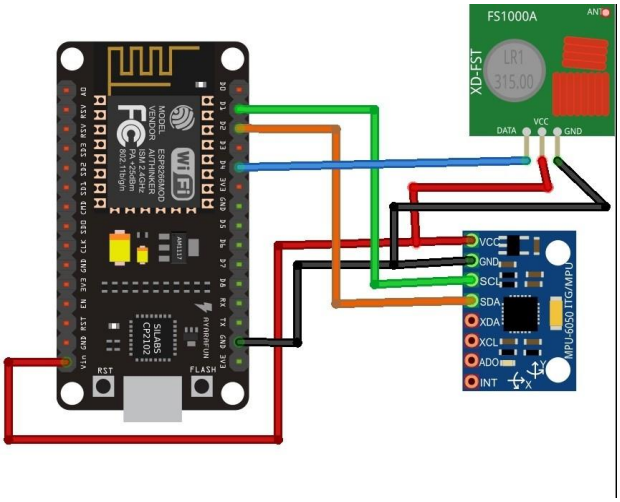


**Fig 3**: Circuit diagram for hand and head gestures

Battery is connected to provide power to NodeMCU and the two DC motors are operated respectively. NodeMCU is the controlling unit here. Input will be given to the NodeMCU through different postures of head and hand movements, such as forward movement, backward movement, right and left movements and finally holding a fixed position. By sensing certain gestures of head and hand movements the accelerometer sensor will send the command to the NodeMCU. The NodeMCU will send the command to the Right and left DC motor respectively. Right DC motor is associated with forward, backward and left movements. Left in clockwise direction and the wheelchair moves forward. DC motor associated with forward, backward and right but if head gesture does not tilt to the direction assigned by the user then the system checks movements. The Light Dependent Resistor LDR is the obstacle detecting to the NodeMCU. The NodeMCU will give further information to the Ultrasonic sensor. Seat belt switch is provided to protect the user from the getting injuried. To get the location of the user, the GPS tracking system is used in proposed project work.

As per the given circuit diagram in the fig 2 and 3 it is clear we are using Node MCU as the main controller. This is inturn connected with the accelerometer sensor in order to get the signals of head and hand for the movement of wheelchair. The motor moves depending the given directions by the user. There is also a ultrasonic sensor which helps in stopping the wheelchair if any obstacles comes. The LDR which is connected in the circuit provides the ability of sensing the darkness and provide the light. So, depending on the requirement of the user the directions will be given.

## 6. FLOWCHART

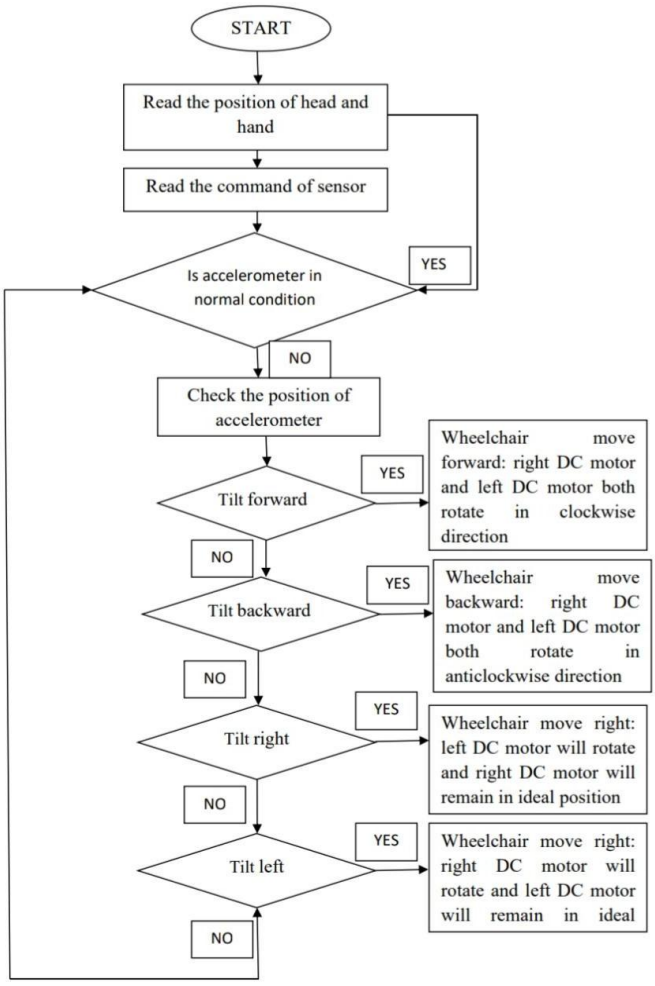


**Fig 4**: Flow chart for head and and gesture

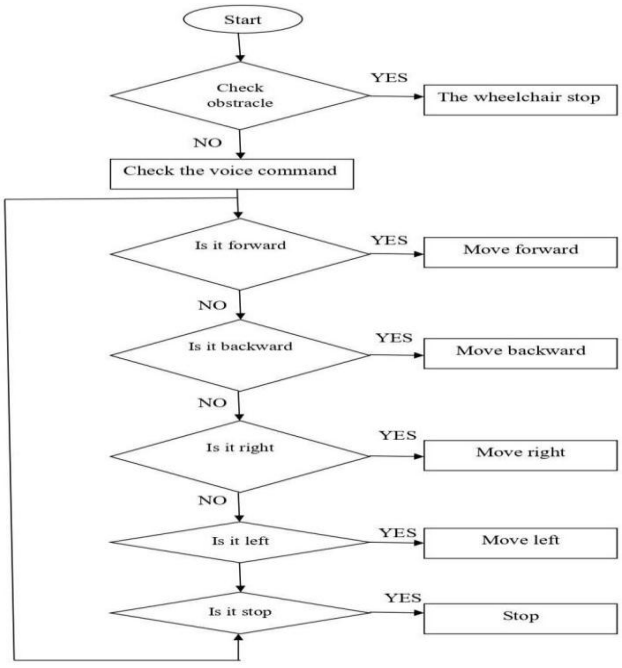


**Fig 5**: Flow chart for voice recognition

The above fig 4 and 5 shows the system flowchart of the proposed smart wheelchair, where the accelerometer sensor will navigate the two DC motors according to the different head and hand signals. The NodeMCU will get the command from the accelerometer sensor. Once the accelerometer sensor is in stable condition, it initializes the position of head and hand movements and reads the commands of the sensor. If accelerometer sensor is not in stable condition, it checks the position of accelerometer assigned by the user. Based on the commands the wheelchair moves in the directions given by the user. In the voice control, it checks the presence of obstacle, if the obstacle is detected the wheelchair stops. If there is an absence of obstacle, it initializes with the commands assigned by the user. Based on the voice command the wheelchair checks for an obstacle and moves in the direction assigned by the user.

## 7. RESULT

### 7.1 Hardware implementation

Hardware implementation is shown in fig 6.

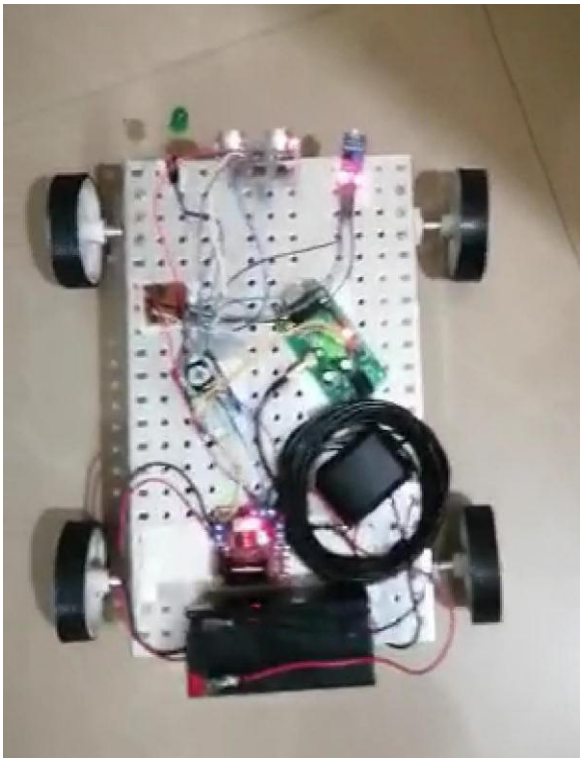

**Fig 6**: Hardware implementation

It represents the completed structure of wheelchair. In this project accelerometer sensor provides the gesture to the node MCU. The obstacles will be tracked by ultrasonic sensor and darkness cab be eliminated with LDR.

### 7.2 Software implementation

The hardware equipment is controlled with the Blynk app. It provides an area for controlling through WiFi. The location of the person will be visible on the project screen of app.

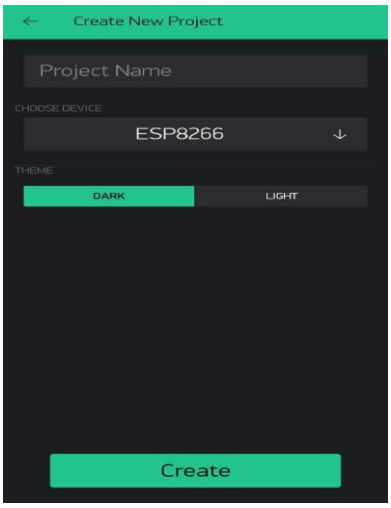


**Fig 7**: Blynk app

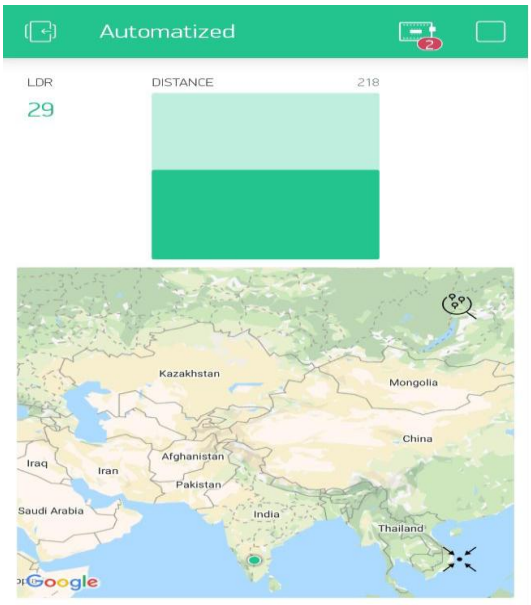


**Fig 8:** Distance and location

The voice recognition is made simple using IFTTT app. This takes simple voice commands and tally with the stored commands and produces the action. The screenshot of the app is working state is shown in fig 9 and 10.

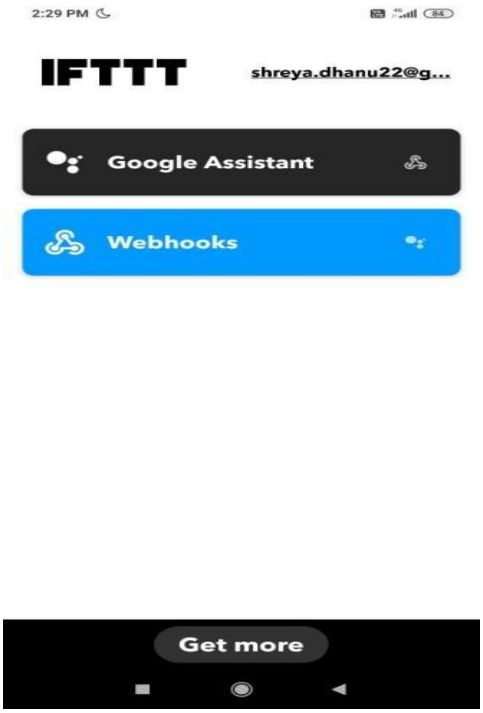


**Fig 9:** Screenshot of IFTTT

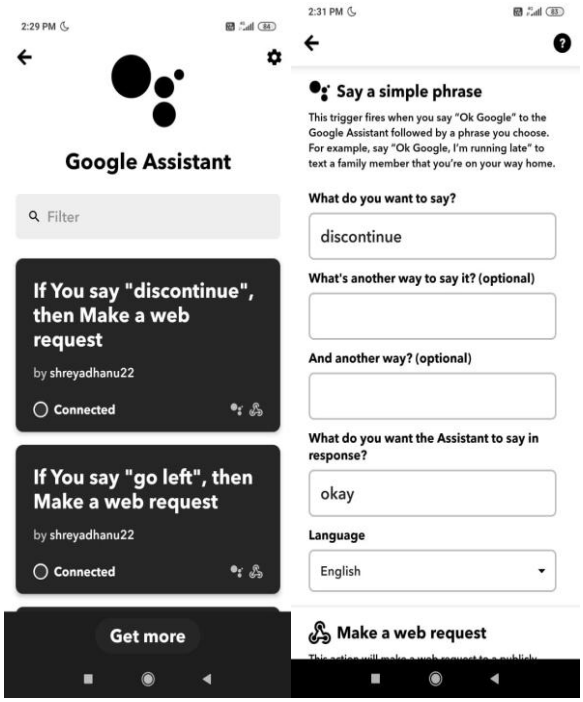


**Fig 10**: IFTTT software implementation

## 8. CONCLUSION

The development of a smart wheelchair with excellent facilities is represented in the project. Automated wheelchair, is used to help the disabled people, those who are not able to move themself independently. This smart wheelchair could make a disable one independent and make to feel easy and comfortable.

Node MCU has been used as the main control part. The implementation of hardware is performed with the help of accelerometer sensor, Node MCU, Ultrasonic sensor, LDR and GPS. The system is successfully implemented to move the wheelchair front, back, right, left or stay in same point. The system offers movement of wheelchair using hand movement, head movement and voice command based on the requirement.

As a result by considering these applications, the disable people can move anywhere carefully and independently without any assistant.

## ACKNOWLEDGMENT

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