

# Android Controlled Wheelchair

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## ABSTRACT

The widespread prevailing loss of limbs is day-to-day scenario due to accidents, age, health problems, and wars. A wheelchair monitored with the Android mobile application is developed to help the disabled patients by using an android application to control the movement of a wheelchair in different directions. The main criteria are to design a wheelchair that will be controlled wirelessly and will be very convenient to operate it with no physical efforts. The wheelchair controlled by the android application will be a boon for many patients who are dependent on a wheelchair for their mobility. This project will help the disabled to function the wheelchair on their own.

Keywords — Android phones, Micro-controller Atmega-16, DC Motors, Wheelchair.

## 1. INTRODUCTION

The Project is designed to develop a robotic wheelchair using the android application as for remote operations. The wheelchair provides a new life for the mobility of disabled people. Android platform will provide ease of availability to control the wheelchair. Android phones provide an inbuilt Bluetooth function which will reduce hardware requirement and form a cost-efficient, powerful and extensible remote controller.

The main focus is on the human interrupts that control the wheelchair. Thus, the wheelchair is going to move as we feed interrupts by human touch. This will provide a really convincing way to control the wheelchair independently.

Bluetooth is used for data exchange. Availability of Bluetooth has changed the use of data exchange way to digital from

analog. With the dramatic increase in smartphones users, it has been a backbone in the evolution of portable devices for their daily use. The capability of Bluetooth host to connect to multiple users within ten meters especially enhances its usability without having to approach to the wheelchair.

## 2. BACKGROUND

Let us take a brief look at Android smartphones and its specifications, how they will help the digital evolution. Hardware and software along with communication techniques are important suitable to the application. Let us take a brief review of the background of Android Phones and Bluetooth.

### 2.1. Android Platform

Android phones are as powerful to name mobile computers and the reason behind their popularity is the impact they had on developers because of their impressive functionality and compact designs. It has java programming which again attracted developers with its open architecture. As java programming language offers the development of Interface with ease of configuration; the API is open and provides an easy interface for software to the hardware components of the device. Android phone provide multiple connectivities such as WIFI, Bluetooth module, GPS, and accelerometer sensors are available to access the control of wheelchair. Thus, android platform is the perfect platform to use.

## 2.2 Connectivity:-

For the communication of the robot with the smartphone, we are using Bluetooth device. There is HC-05 on the robot which can transmit as well as receive the data. It is a wireless communication protocol running at 2.4 GHz with no fear of interference.

The device uses MAC address to connect to the Bluetooth module. We can pair and use multiple android mobiles to control the wheelchair which ensures ease of connectivity. Hence android devices can be easily connected with the wheelchair.

## 3. SOFTWARE DESIGN

Android studio software is used to program the android application based on java programming language. It allows the developer to code the application and also design the user interface. To control the movement of wheelchair we use five buttons in total those are Forward, Reverse, Left, Right and Stop. Another button provided is to view the Paired devices with the android phone. Tapping the button shows the list of current paired and past paired devices with their name and MAC addresses. The flowchart of Bluetooth connection is shown in Fig-1. A connection status bar provides the current status of connectivity. Pairing the device connects the android application remote with wheelchair module. Once the device is successfully paired the status bar shows “Connected” and the buttons are activated to control the wheelchair. The connection is established between both the devices through MAC address. Thus, whichever button is pressed the data is transmitted to the wheelchair’s Bluetooth module and the wheelchair processes

on the data received which is dependent for the motions of the wheelchair. Hence, we can access the wheelchair remotely with the android phone.

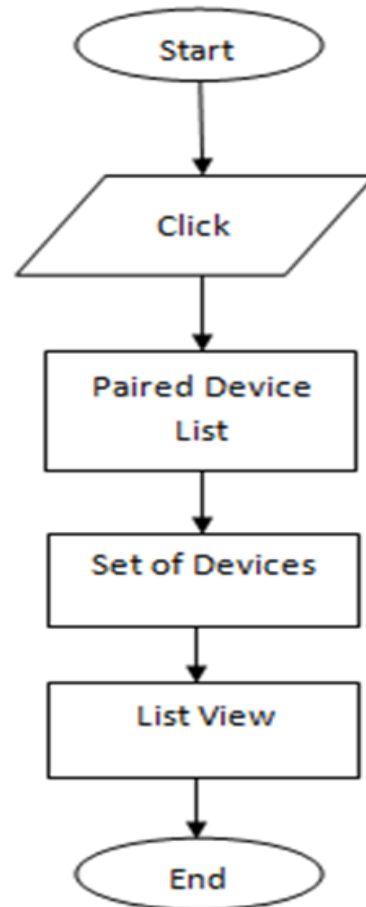


Fig-1: Android Application Flow Chart

## 4. METHODOLOGY

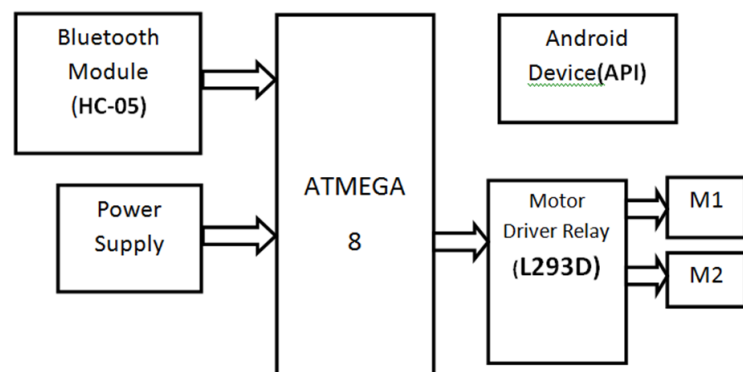


Fig-2: Block Diagram

Fig-2 shows a block diagram of the hardware. Atmega-16, Bluetooth module, Motor driver relays and Motors are the components required. Selection of Atmega-16 provides powerful instruction cycle at one clock. Atmega-16 controls and processes the data exchanged from Bluetooth module. The data is fed to Motor driver in the form of electrical signals which in turn guides the motors.

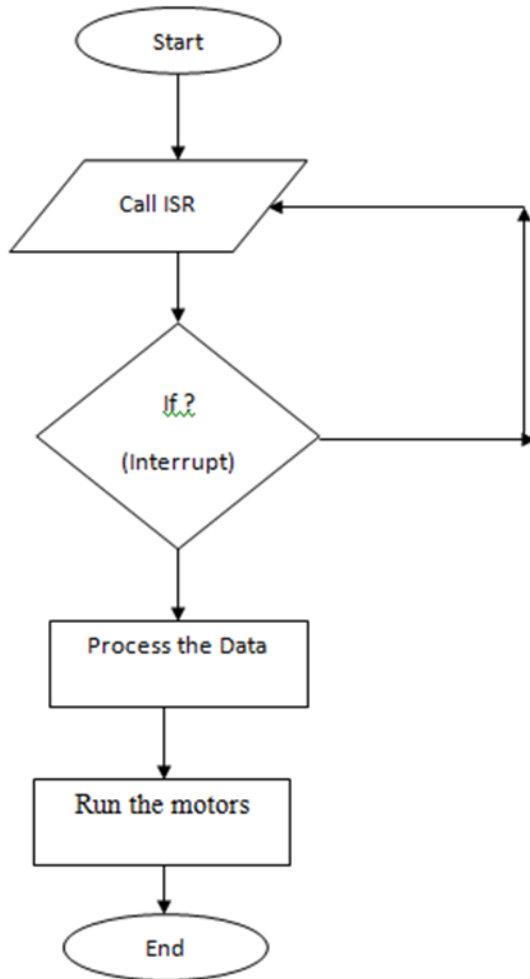


Fig-3: Microcontroller Processing Flowchart

Fig-3 explains the flowchart of Data processed in Microcontroller. The ISR (INTERRUPT SERVICE ROUTINE) inform microcontroller to receive and access the data. Thus, as the data is received, Microcontroller processes it to control the wheelchair that is running by motors. The battery box is implemented at the back of wheelchair as per the power requirement.



Fig-4- Application Screenshot

## 5. CONCLUSIONS

We have successfully designed and built a cost effective system which works the requirements. The wireless technology implemented in the application is helpful for disabled individuals for efficient movability.

The PCB is designed in EAGLE software. The power supply was simulated in proteus simulation software for a prototype. Thus, we have successfully developed the interface of the application and wheelchair. The speed and control of the robot can be controlled or increased with the help of fast motors. We can interface camera and sensors on the wheelchair so that anyone can monitor the wheelchair for safety reasons.

## 6. ACKNOWLEDGMENT

We are grateful to Prof .D. D Pradhan for her guidance on this project and we are sincerely thankful to Rajashri Shahu College of Engineering and Research (E&TC Department), Pune University, for giving us the opportunity to work on this project.

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