



## Android Based Wheelchair Control Using Bluetooth

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### ABSTRACT

*In this project android mobile-based wheelchair controller is used. The system is designed to control a wheelchair by using an android device like mobile [3]. The main objective of this project is to help the movement of disable people or handicapped and also the elder people who are not able to move well. The result of this design will allow the special people to live a life with less dependence on others. Android knowledge is a key which may provide a new approach of human communication with machines. Thus their problem can be solved by using android technology to control the movement of a wheelchair. In this project, Basic 4 android interfaces are considered to program the android device that will be able to control the movement of wheelchair [1]. This project integrated IOIO board and direct current motor to create the movement of wheelchair. The results of this project showed that this project can be used for future research works and to design quality innovation that meets market need and public interest.*

**Keywords:** Android application, Wheel chair, IR Sensors, Bluetooth, Micro-controller.

### 1. INTRODUCTION

While the needs of many individuals with disabilities can be satisfied with power wheelchairs, some members of the disabled community find it is difficult or impossible to operate a standard power wheelchair. This project could be part of an assistive skill. It is for more self-governing, productive and agreeable living. This Android-based wheelchair controller is a system where the DC motor is used to travel the wheelchair.

Nowadays, handicapped people face problem to control wheelchair by themselves. Sometimes they need other people to help them. This system will provide a new way to control the movement of wheelchair such as turn direction to left, right, forward and reverse direction. The overall wheelchair operation uses DC motor and motor driver module combines with microcontroller system for instance IOIO board [2]. The Android-based wheelchair controller that consists of automaton device and a control box that can be attached to wheelchairs to control the movement by using a DC motor. In this project Bluetooth module 2.4GHz communication protocol is used to communicate sensory and command information between the android device and the control box. There are 4 options for basic motions of a wheelchair to be applied by the user. The four conditions of the wheelchair can be described as the following:

- a. Moving forward
- b. Moving backward

- c. Turning to the right
- d. Turning to the left

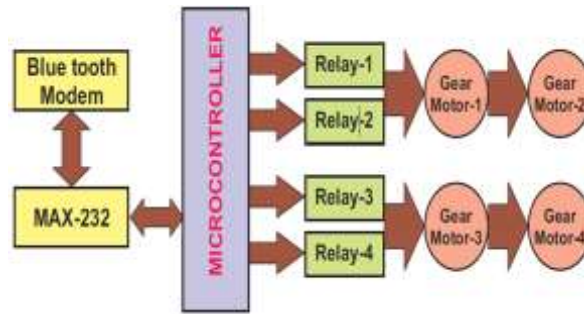


Figure 1.1 Block Diagram

## 2. LITERATURE SURVEY

By referring to a study conducted by World Health Organization [3], nearly every one person in fifty is suffering from paralysis due to damaging of nervous system. The causes of paralysis are mainly due to spinal cord injury, strokes and cerebral palsy. The graph titled “PROPORTION OF DISABLED POPULATION BY RESIDENCE INDIA: 2001-11” describes percentage of disabled persons in India has increased both in rural and in urban areas during last decade.

The paralyzed person gets restricted to wheelchair and become dependent on other humans for their movement and daily needs. Many attempts have been made to customize the wheelchair by adding accessories to the wheelchair. The existing wheelchair in market like voice controlled wheelchair, joystick wheelchair and head control wheelchair have some or other drawbacks such as environmental disturbances, mechanical problems or expensive. So in this paper we have made the disabled people independent so that they are free to move on their own wish and need. The complexity is decreased and hardware requirement is also less.

## 3. METHODOLOGY

### 3.1 Transmitting Unit

The Android Mobile is used as an input. The Application is developed on the Android platform. The graphical user interfaces provide the user with direction options and an SOS help part. When the application (app) is opened at that time an announcement comes to turn on the mobile Bluetooth. When the user touches the virtual button at that time a sequence is passed that and then transmitted from the transmission unit to the receiving section through the mobile phones Bluetooth.

At the receiving end the Bluetooth accepts the sequence and sends it to the PIC Microcontroller 16F877A which is a 40 pin programmable suspend microcontroller. It operates on 5V supply and has clock cycle of 20MHz and crystal oscillator of 4.47MHz.

The microcontroller converts the sequence into ASCII code and then this code is decoded and according to it the motors are given supply and turned to have linear motion of the wheelchair. Bluetooth module is used for wireless transmission of data, operated on 5V. Single Battery of 12V is used to drive the wheelchair. Battery is used for the purpose of mobility. DC motors are driven by driver IC. The driver IC is a dual bridge IC. For forward movement the motors are moved forward and for reverse movement the motors are moved in backward direction. For left movement the left motor is stopped and right motor in forward direction and for right movement the right motor is stopped and left motors are moved in forward direction.



**Figure 3.1 Control Box**

### 3.2 RF Transmitter and RF Receiver

RF transmitter have to turn ON the section when data transmit and turn OFF after done transmit the data. This is because when the RF transmitter always ON, new data will not send to the RF receiver. To make this happen, the interface for switch button need a separate program.

When the application is opened at that time an application is generated if the Bluetooth is not turned on. Connect virtual button is present which is used to connect the Android mobile phone with the hardware Bluetooth for wireless transmission of data. When the Bluetooth is switched on the application scans the input when the user touches the virtual button. If the requirement is forward then all the dc motors are supplied with 5V and moved in forward directions for linear movement.

If the requirement is reverse then all the dc motors are supplied with 5V and moved in backward directions for linear movement. If the requirement is to turn left then the left dc motors are stopped and the right dc motors are supplied with 5V and the wheelchair moves in left direction. If the requirement is to turn right then the right dc motors are stopped and the left dc motors are supplied with 5V and the wheelchair moves in right direction.

If the stop virtual button is touched then all the dc motors are stopped. A help virtual button is also present in order to send an SOS message to the concern person in case of any help. When the person reaches his/her destination at that time disconnect virtual button needs to be touched so that the wireless connection is turned off.

**Table 3.1: Movement of the Wheelchair**

Button Command	Left Wheel	Right Wheel	Condition Of Wheelchair
↑	Forward	Forward	Move Forward
↓	Reverse	Reverse	Reverse
→	Forward	Reverse	Turning To The Right
←	Reverse	Forward	Turning To The Left
---	Stop	Stop	Stop

When RF receiver receives data 0001 from the RF transmitter module relay 1 gives output. The output from the 3 pin plug socket can be switch ON by using android phone.

#### **4. DISCUSSION & RESULT**

The project was tested for the movement of the wheelchair using Bluetooth and development of the self-automated wheel chair with its various interfacing units.

For the controller wheelchair, user is provided with 4 buttons to move according to the direction required. There are total 4 buttons are present to control wheelchair which are forward (Fwd), Right, Reverse (Rev) and left. The restriction of this project is user only can touch one button at one time. When users discharge the button, wheelchair will automatically stop.



**Figure 4.1 Model of android Wheelchair**

#### **5. CONCLUSION**

- The main aim of this project implementation is to help all the people who are dependent on wheelchair for their mobility.
- Wheelchair is simple to operate and does not need any external help.
- The objectives of this project have been achieved successfully. This project was able to develop an android system that can control the movement of the wheelchair.
- The application built can be useful for many android phones.

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