

Universal Wheelchair

Ujjwal Aima¹, Snehal Choudhary², Deepali R.Wakdkar³,

^{1,2,3} Student, Department of Electronics Engineering, All India Shri Shivaji Memorial Society's College of Engineering Pune, Maharashtra, India

ABSTRACT

Now a days robotics technologies have the power to ease the ways people live their lives, suffering with one or more physical disabilities.[2] The work in this domain is termed as Assistive Technologies. This project is an attempt to help restore human mobility, which has been lost due to an accident or a disease. People with disabilities can be satisfied with the power of a wheelchair. But, this does not provide an absolute solution. This project provides a scope of mobility with a manual control for left, right, forward and back ward control with the help of a microcontroller. In addition to on board control to add to the uniqueness of the project the wheelchair can also be controlled wirelessly using RF and also with an android application using Bluetooth control which can be controlled by a mobile to help the access in a far better way.

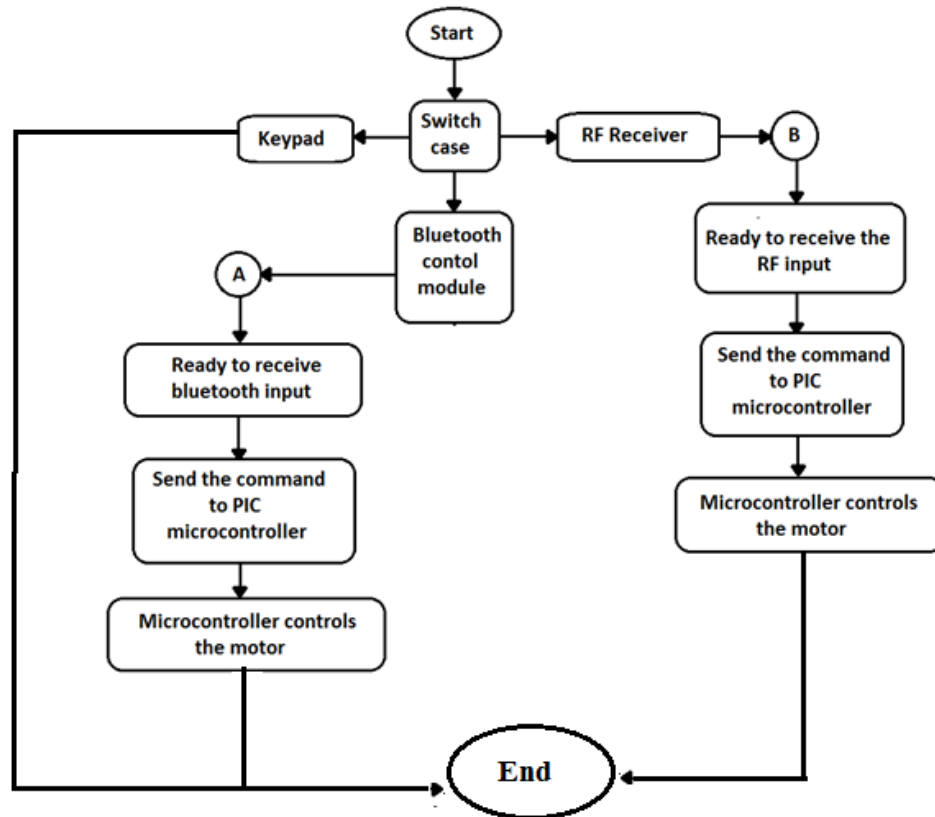
Keywords: - Robotics, Assistive Technologies, Manual Control, Microcontroller, wireless, RF, Android, Bluetooth.

1. INTRODUCTION

Universal Wheel Chair, as the name defines itself, is concept of packing three different modules or controlling ways together in a single unit to help the physically impaired people in their mobility. Physically disabled people tend to loose heart as they become a liability to others. This combination will not only help them boost their moral returning them their access to free mobility as well as making them independent.

The concept uses a manual keypad control in the form of push buttons for the control in the four directions that is left, right, forward and backward. The project uses a Microcontroller PIC16F877A for its controlling applications. Also, the project is backed with the help of wireless technology, here in this case RF radio frequency module as well as using a Bluetooth controlled android application. The manual keypad helps in a way that people who have access to their hands can control the chair by themselves. The wireless technology gives a way for the attendant or care takers to help reduce their time and energy in pulling the chair and the distance of access also becomes easy because of RF. The concept of android will give the access of the chair to every person easily. Now a days smartphones and application are a thing that is available with almost everyone and a simple application would make things way easier than a remote control and will also make the access easy, as phone can be reached easily every time. It also reduces the need of batteries to be changed for a remote control and in case of malfunction of keys.

2 FLOW OF THE SYSTEM



Algorithm

Step 1: Start

Step 2: Selection of control action using mode selector.

Step 3: Mode 1 manual keypad module mode.

Step 4: Then select right, left, front, back options.

Step 5: Mode 2 serial communication mode control moves to A.

Step 6: Use the android mobile app for controlling.

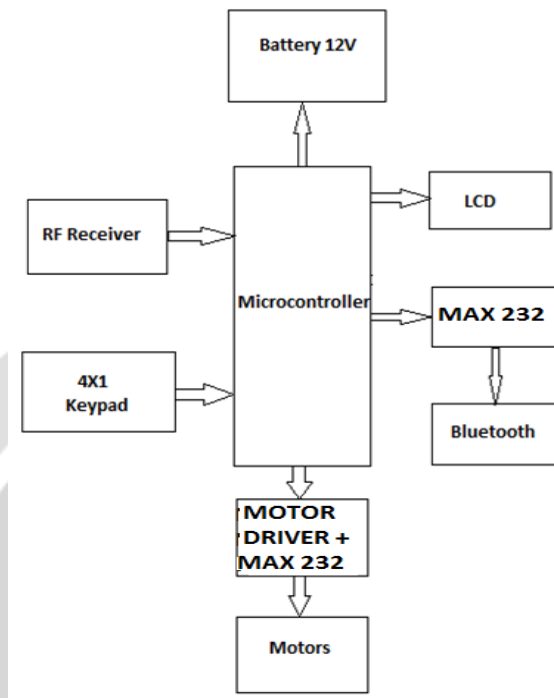
Step 7: Mode 3 wireless communication mode, control moves to B.

Step 8: Use the remote control for the wheelchair control.

Step 9: End

3. DESIGN OF THE SYSTEM

3.1 Block Diagram



3.2 Component Specifications

1. MAX232

The MAX232 is an integrated circuit first created in 1987 by Maxim Integrated Products that converts signals from a TIA-232 (RS-232) serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. The drivers provide TIA-232 voltage level outputs (approx. ± 7.5 volts) from a single five volt supply.[3]

2. MICROCONTROLLER 16F877A

Microcontroller is the heart of the system. We have used PIC16F877. It is made by Microchip. The PIC16F877 is a PIC microcontroller with 256 Bytes ROM & 368 Bytes of data RAM, 2 comparators, 8 channels of 10-bit A/D converter[4]

3. LCD

LCD stands for liquid crystal display. 16X2 LCD is used for displaying the result.

4. KEYPAD

Keypad is used for manually controlling the Universal wheelchair model. It is helpful for the physically impaired people who can use their hands to operate chair's movement.

5. MOTOR DRIVER IC

L293D is a typical motor driver IC, which allows motors to drive in either direction. It is a 16 pin IC which can control a set of two D.C. motors simultaneously in either direction. It works on the concept of H-Bridge.[5]

6. D.C.MOTOR

Four 30 rpm geared DC motors of 500mA current rating will be used for drive purpose. So here we are using low power 12V brushed DC motor with a torque of 1 Kg.

7. Bluetooth to Serial Port Module:

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).[6]

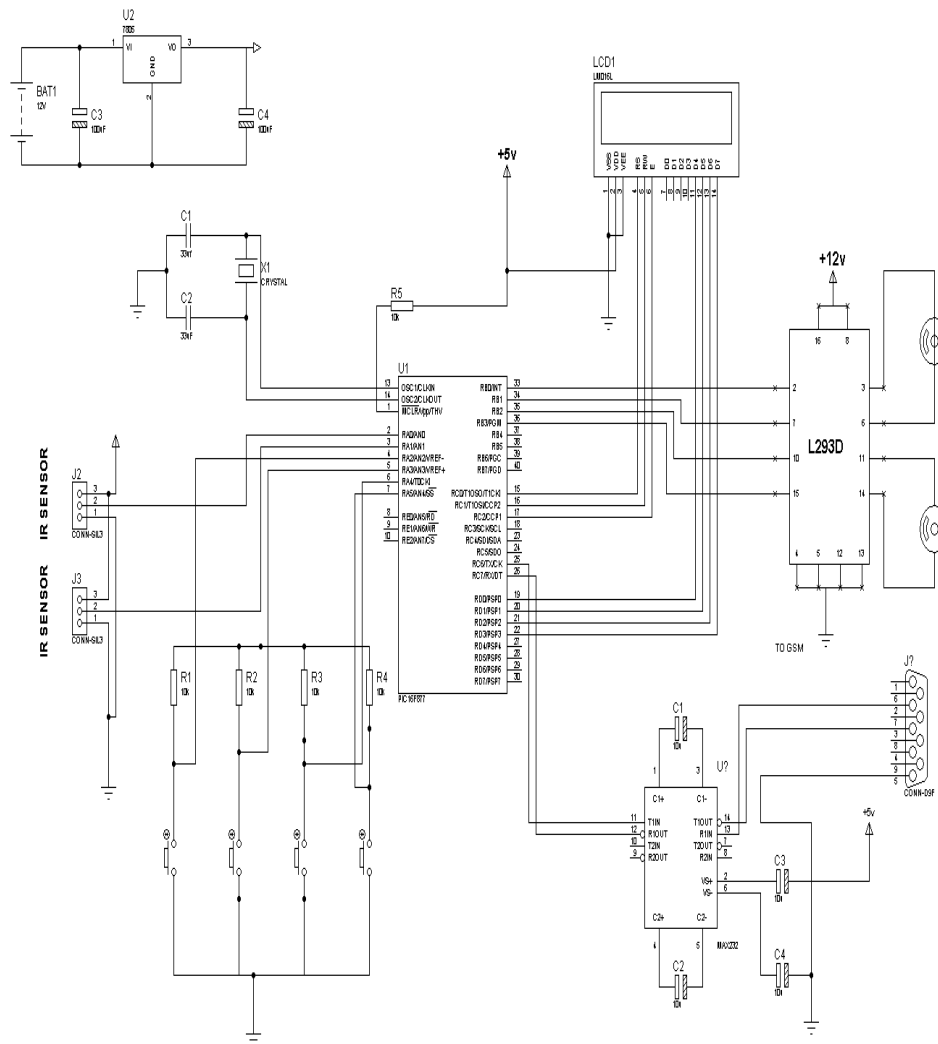
8. R.F. Transmitter & Receiver Module

The RF module comprises of an RF Transmitter and an RF Receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of **434 MHz**. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps. The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter. The RF module is often used along with a pair of encoder/decoder. The encoder is used for encoding parallel data for transmission feed while reception is decoded by a decoder. [7]

9. ANDROID

Android is an open source and Linux based operating system for mobile devices such as smart phones, and tablet computers. Android was developed by the open Handset Alliance, led by Google, and other companies. Android's user interface is mainly based on direct manipulation, using touch gestures that loosely correspond to real-world actions, such as swiping, tapping and pinching, to manipulate on-screen objects, along with a virtual keyboard for text input.[8]

3.3 Circuit Diagram



4. CONCLUSION

We are implementing automatic wheelchair which has various advantages. It is operating with three different modes i.e. keypad mode, remote mode and Android mode. Also there are two types of sensors which increases accuracy of wheelchair. This Wheelchair will be economical and can affordable to common people. We can also add new technology in this wheelchair. A system for reliable recognition of speech and face and also GSM based navigation system will be a boon for the project. This system can be made highly efficient and effective if stringent environmental conditions are maintained. The setup for maintaining these environmental conditions will be a onetime investment for any real life application. The running cost of this system is much lower as compare to other systems used for the same purpose.

5. REFERENCES

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