

WHEELCHAIR CUM STRETCHER FOR SMART HEALTHCARE

Dr.P.Ranjith Kumar, S.Chitra Devi, S.Deepa, R.Jeyalakshmi

1Associate Professor,2,3,4UG Student, 1,2,3,4Department of Electronics and Communication Engineering,
1,2,3,4P.S.R Engineering College,Sivakasi,India.

Abstract : Throughout the world wheelchair and stretcher are the most commonly important equipment for the transportation of disabled people. Various mobility aids are useful for disabled peoples to transfer from one place to other place at hospital and other place.This project is specially design for disabled people to transfer from wheelchair to stretcher and vice versa .In this work a motorized system is connected to the wheel chair that converts the wheel chair into stretcher. The motors are controlled by a Bluetooth enabled smart phone with a specially developed app. The stretcher can also be remotely navigated using the same app. The following forward, reverse, left and right movements are controlled by the motorized unit. The remote system also has a fall detection unit. In the case of wheel chair stumbling, an alert message is sent to the mobile phone through Bluetooth.

INDEX TERMS—Smart Phone,Bluetooth,Android app,Microcontroller.

I. INTRODUCTION

A wheelchair is a wheeled by mobility device designed especially for disabled individuals. The device is propelled either manually or via various automated systems.Wheelchair are used by that people for whom walking is impossible due to some problems physiological or physical. Mobilizing or shifting of patient from wheelchair to stretcher ir vice versa.With the help of Wheelchair cum stretcher a patient can be seated on wheelchair on which he can also be operated by converting it to stretcher also it will be convenient for hospital staff to move a patient,also it will be easy if we provide a electrical system to control the overall movement and functioning of wheelchair cum stretcher.The development of wheelchair cum stretcher with ability to transfer patients from normal staircase.

Our objective is to create a

- To design an adaptive system that can be converted from wheel chair to stretcher and vice versa.
- To design an android based wheel chair control system.
- To recognize the android commands to control the chair motors .
- To notify the wheel chair stumbling through mobile network.

II. To establish the communication between the smart phone device using bluetooth.

III. PROPOSED METHODOLOGY

The wheel chair which is recognized as one of the one most important mobility aid for the physically injured people. The proposed project is developed for mobilizing the patient without external efforts. Here the users input is applied to the smart phone screen. Based on the user input, the micro controller section controls the gear motors. The controller receives its commands through blue tooth devices. If the input matches with pre stored signal, then signal will be sent to the micro controller through RF. Then the micro controller issues an appropriate command to the relay drivers. Correspondingly the motor direction and flow is controlled. The blue tooth input is then converted into RF device. RF based traffic signals are identified and the robotic motion is controlled appropriately.

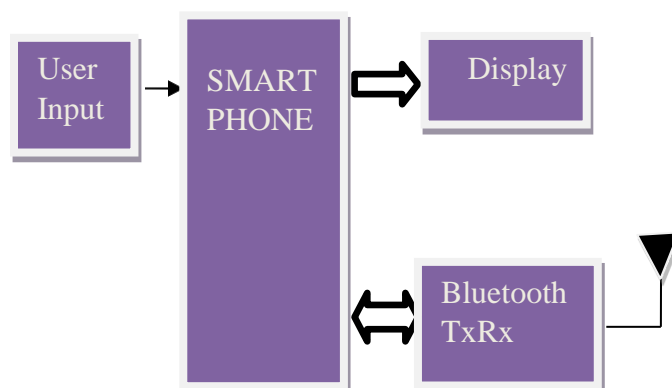


Fig: (a) Transmitter

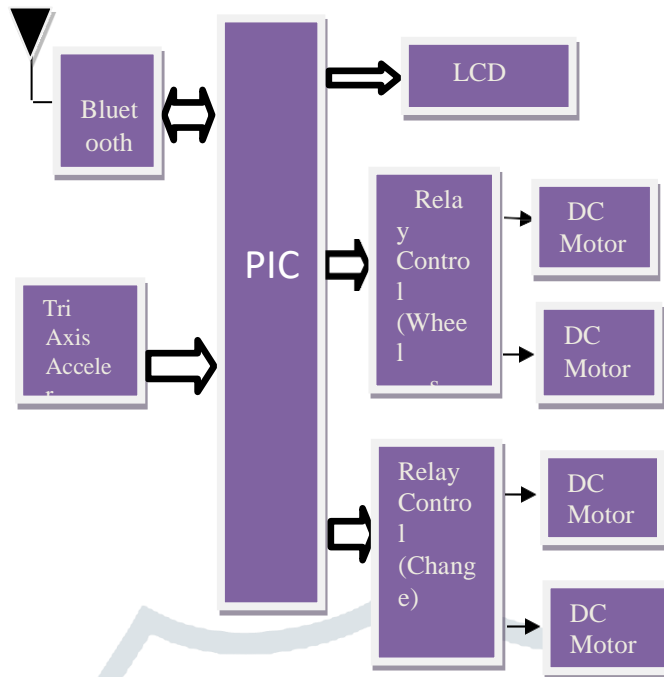


Fig: (b) Wheelchair Control

IV. PIC MICROCONTROLLER

Microchip provides a wide variety of Microcontrollers from PIC family. Each MCU has its own advantage and disadvantage. There are many parameters that one has to consider before selecting a MCU for his project. The below points are just suggestions which might help one to select a MCU.



- If you are a beginner who is learning PIC then, selecting a MCU that has good online community support and wide applications will be a good choice. PIC16F877A and PIC18F4520 are two such MCUs
- Consider the operating voltage of your system. If they are 5V then select a 5V MCU some sensors or devices work and communicate on 3.3V in such case a 3.3V MCU can be selected
- If size and price is a limitation then you can choose small 8-pin MCUs like PIC12F508. These are also comparatively cheaper.
- Based on the sensors and actuators used in your project, verify which modules you might need in for MCU. For example is you are reading many Analog voltages then make sure PIC has enough ADC channels and supportive resolution. The details of all modules are given in the table above.
- If you project involves communication protocols like UART, SPI, I2C, CAN etc make sure you PIC can support them. Some MCU can support more than one module of the same protocol

V. Applications

- Multiple DIY Projects
- Very good choice if you are learning PIC
- Projects requiring Multiple I/O interfaces and communications
- LCD

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.



A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

ACCELEROMETER

An accelerometer is an electromechanical device that measures acceleration forces. The forces may be static or dynamic. If you have the amount of static acceleration due to gravity, you can find out the angle the device is tilted at with respect to the earth's surface. If you have the amount of dynamic acceleration, you can analyse the way the device is moving. It can be used to measure vibration on vehicles, safety monitoring devices, industrial machines and process control systems. These are also used to measure seismic activity, inclination, dynamic distance, and speed with or without the influence of gravity.



APPLICATIONS

- Monitoring devices in biology, engineering cars, industry, volcanology and more.
- Guidance devices in for telemetry in rocketry.
- Image orientation in smartphones.
- Input in smartphones, tablets and game controllers.

TILT SENSOR

It's like a type of on/off level switch. It simply tells you that it has tilted. Its contact opens when tilted and closes when not tilted. The contact doesn't open through other logic unless it is physically tilted. Normally, a tilt sensor doesn't measure motion. A full motion detector would use at least three axes and often additional sensors. A tilt sensor often measures the tilting in two axes of a reference plane. A sensor is a device that responds to some type of the input from the environment such as heat, light, motion, temperature, pressure and moisture. Sensors are used to switch currents and voltages. Every sensor has three terminals: Vcc, GND and output. Vcc is used to power up the sensor; to provide a fixed negative reference, ground is used, and the output of the sensor is analog. But in some sensors, there may be more than one output terminals.



RELAY

A relay is an electrical switch that opens and closes under control of another electrical circuit. The switch is operated by an electromagnet to open or close one or many sets of contacts. A relay is able to control an output circuit of higher power than the input circuit, it can be considered, in a broad sense, to be a form of electrical amplifier.

RELAY DRIVER-ULN 2003

ULN 2003 is a high voltage and high current Darlington array IC. It contains seven open collector darlington pairs with common emitters. These ICs are used when driving a wide range of loads and are used as relay drivers, display drivers, line drivers etc. ULN2003 is also commonly used while driving Stepper Motors.

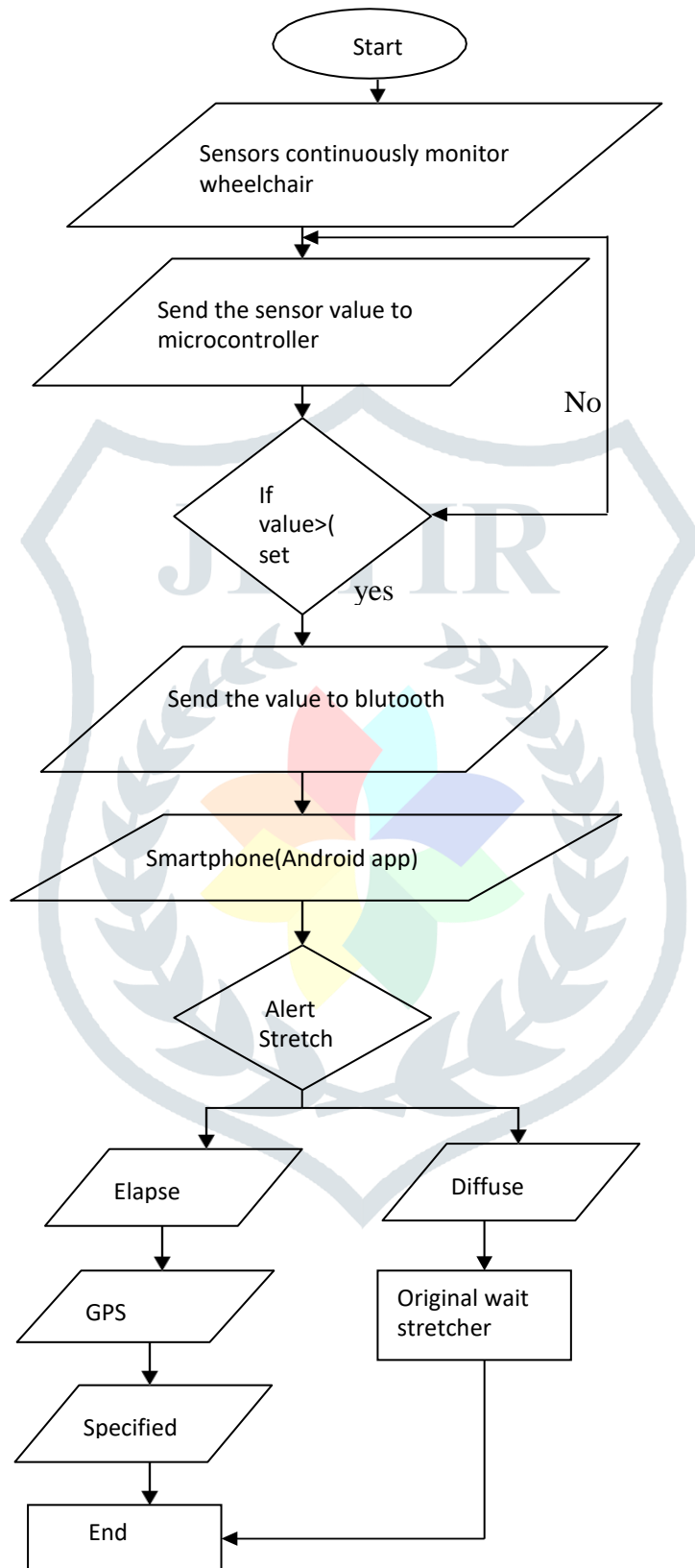
BLUETOOTH

HC-05 module is an easy to use the Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. 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). HC-05 Bluetooth Module is one of the most popular Bluetooth module used in embedded projects. It can be easily interfaced with Arduino Board, Raspberry Pi, Microcontrollers through serial UART interface. HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup.

DC Motor

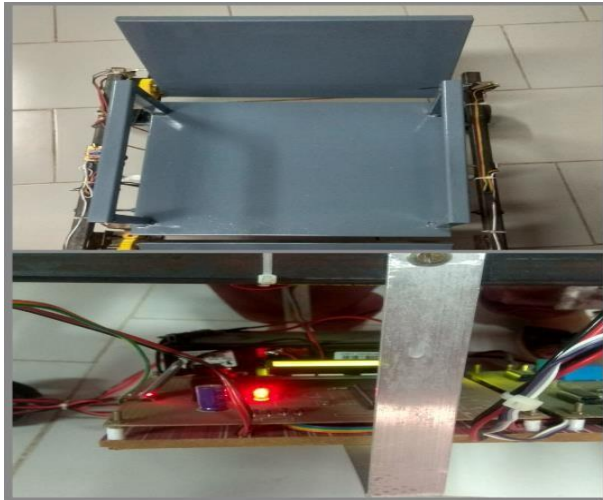
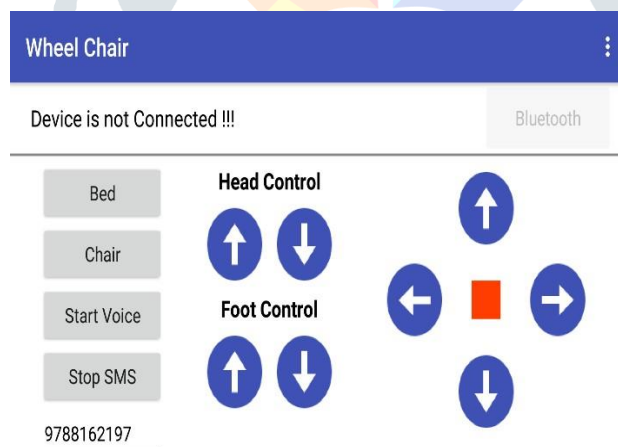
A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor. DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills.

VI. FLOW CHART



VII. RESULT AND DISCUSSION

- our proposed project display the different controls like head control, foot control, bed mode , chair mode , voice control , forward , reverse , left and right conditions.
- Switch on the kit and connect the wheelchair android app using the bluetooth device.
- The mobile app controls the whole process of wheelchair cum stretcher.
- The information or datas are collected and stored by pic microcontroller and displaying in LCD.
- Then it start to detect the movements by using sensor.

**Wheelchair Control App**

REFERENCES

1. Mr.Arunkumar P,Dr.Shanthini J,Dr.Karthik S,Ms.Sanjana Prakash and R,"Design and fabrication of pneumatically operated wheelchair convertible stretcher" ,International conference on soft computing and network security,2018.
2. Li Yingda,Yang Jianping,"Intelligent Wheelchair Based on brainwave", International conference on intelligent transportation,big data & smart city,2018.
3. Akshay hitukar,Chetan Bhusari,Akshay Khedkar,Akshay Parekar and S.P.Daf,"Automatic wheelchair cum Stretcher",International Research journal of engineering and Technology ,Volume:04 ,Issue:03,2017
4. Baltha Manoj kumar and Baltha Sravanthi,"Design of wheelchair cum stretcher",International advanced research journal in science,engineering and technology,volume:4,issue 10,oct 2017.
5. Shridevi Soma,Nanq dita Patil,Selva.F and Vaishnavi Jadhav,"An Approach to Develop a Smart and Intelligent Wheelchair",IEEE-2017.
6. Dr. R. Josephine Leela and Dr. A. Joshi , B. Agasthiya and Varshitha.S, "Android Based Automated Wheelchair Control", International Conference on Recent Trends and Challenges in Computational Models,2017.
7. Utkarsh Sinha,Priyanka Saxena and Kanthi M,"Mind controlled wheelchair",IOSR Journal of electrical and electronics engineering,Volume: 12,issue:3,June 2017.
8. Dr. Sukanta Roga, Abhijeet Kumar, Aman, Animesh Singh and Bijesh Kumar," Design and Fabrication of Wheelchair cum Stretcher with Multi Fold", International Journal of Application or Innovation in Engineering & Management, Volume: 6 , issue:6,June 2017.
9. Narendra Wagdarikar and Shraddha Uddhav Khadikar,"Android phone controlled voice,gesture and touch screen operated smart wheelchair",International conference on pervasive computing,2016.
10. Atharv Gumphalwar, Pranay Shende, Krunal Kamdi, Anmol Chahare, Akash Barai and Shubham Gupta,"Design and development of automatic wheelchair and bed for old-age home", International conference and innovation research technology,2016.
11. Soniya D.makwana and Anuradha G.Tandon," Touch screen based wireless multifunctional wheelchair using ARM and PIC icrocontroller " , International conference .Jan 2016.
12. Dr.Ramachandra C.G,Shashank S,Ragavendra M.J,Kaushik Ranganath T.G,"Wheelchair cum stretcher",International Journal of Engineering Research and Technology,volume:6,issue:10,oct 2016
13. Nutthanan Wanluk , Sarinporn Visitsattapongse, Aniwat Juhong and C.Pintavirooj,"Smart wheelchair based on eye tracking",International conference,Dec 2016.
14. Mohammed Hayyan Al Sibai and Sulastri Abdul Manap," A Study on Smart Wheelchair Systems",International Journal of Engineering Technology and Science,volume:4,Dec 2015.
15. Rashid Ahmed K., Safar Abdul Razack , Shamil Salam , Vishnu Prasad K.V and Vishnu C. R." Design and Fabrication of Pneumatically Powered Wheel Chair- Stretcher Device", International Journal of Innovative Research in Science,Engineering and Technology, Volume :4 ,issue :10,oct 2015.
16. Yoon Heo ,Eung-Pyo Hong and Mu-seong Mun,"Development of power add on drive wheelchair and its evaluation",International conference.June 2013.
17. S. Shaheen and A. Umamaheswari, " Intelligent Wheelchair for People With Disabilities ",International Journal of Engineering and Technology,volume:5 NO 1,feb-2013.
18. Mohd Razali M d Tomari, Yoshinori Kobayash and Yoshinori Kuno , " Development of Smart Wheelchair System for a User with Severe Motor Impairment " , International Symposium on Robotics and Intelligent Sensors,2012.