Smart Phone Operated Wheel Chair Using Voice And Body Gesture

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Abstract: -- Wheelchairs are used by physically disabled people. Now a days technology promises a wide scope in developing smart wheelchair. This paper is to describe a smart wheelchair using smart phone to control the rotation of wheel chair based upon the body gesture and voice of the physically challenged people. In build voice and gesture are used to control the movements of wheelchair as well as by using smart phone. 8 sensors are used among which 2 of them are IR sensors the remaining 6 are for temperature, smoke detection, light detection sensors. This system that allows the user to effectively interact with the wheelchair at various levels of the control and sensing. The system is divided into 3 main units Gesture recognition through Android, Voice recognition through Android, Motor control by signal conditioning. The system is based on grouping an android phone with a Sensors and AVR micro-controllers.

Keywords: -- Android phone, AVR microcontroller, Gesture recognition, IR sensor, HC-05 Bluetooth module, H-bridge.

I.   INTRODUCTION

1.1 Background

"World report on disability" jointly presented by World Health Organization (WHO) and World Bank says in this world there are 70 million people who physically disabled. Unfortunately now a days there is continous increase in number of handicapped people due to road accidents as well as disease like paralysis. Among the percentage of all the other disabilities, physically handicapped people are more. If a person is physically disabled then he/she is dependent on other person for his/her day to day work like orientation transport, food etc.

11.2 Disability Statistics in India

We know that every second the World's population well as India is increasing very rapidly. In India 120 million people are disabled out of which 42.02% are physically disabled.
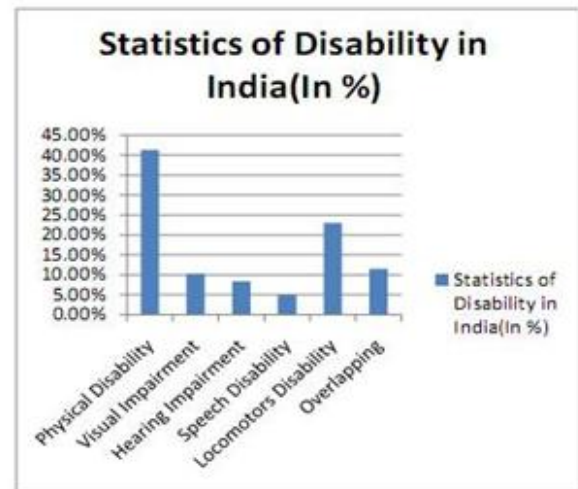

Fig a): Disability Statistics in India

The main aim of the project is to use wheelchair automatically and operate by using voice and gesture control for moving forward , backward ,left and right by smart phone. Traditionally wheelchair have some limitations in content to, bulkiness flexibility, and limited function a wheelchair is fitted with a obstacle sensors , temperature sensor , Gas sensor , smoke sensor , motor and smart phone to help user to achieve some independent mobility function.

By just tilting the smart phone wheelchair can be moved in 4different directions. The obstacle sensor can help the user tocontrol the wheelchair by talking over some of the responsibility for steering and avoiding crashing until the user is able to handle the job. The approach allows the user to use human voice, gesture movement smart phone and synchronize with the movement of wheelchair comfortably

The difficulties is reduced by making use of smart phone so that size of the system is user friendly. The wheelchair is integrated with voice, body gesture and smart phone. So handicapped person who cannot walk, can drive chair by gesture movements using smart phone. Taking advantage of technological development in order to increase the quality of life for handicap people and facilitate their performance into the working world.

To operate a wheelchair various situations can be used. If the user is capable of controlling by voice the ideal solution is use of voice recognition through smart phone otherwise by using body gesture recognition through smart phone. The next part is by using temperature, smoke and gas sensors then parameter value is detected. There is facility of panic button in case of any emergency with the wheelchair so he / she may call /SMS to the police , relative , hospitals.

II. APPLICATIONS OF SMART WHEELCHAIR
- ♣ Physically handicapped individuals
- ♣ Hospitals Sports

III. IMPLEMENTATION PLATFORM
- ♣ -Software Requirement
- ♣ -Keil for Embedded Programming
- ♣ -Eagle for PCB Design
- ♣ -Eclipse for Android Application Design

Hardware Requirement
- ♣ AVR microcontroller (ATMega 32)
- ♣ Android Phone (Smart Phone)
- ♣ Sensors
- ♣ Temperature sensor
- ♣ LM 35 -IR proximitysensor
- ♣ TTL31/38 -Smoke sensor
- ♣ IR

- ♣ Gas sensor
- ♣ M06
- ♣ Light sensor
- ♣ LDR
- ♣ L293D motor driver IC
- ♣ Bluetooth controller
- ♣ HC05 -Power supply 5○
- ♣ ULN 2803
- ♣ High Voltage high current Darlington array for logic circuitry and multiple peripheral power loads

IV. BLOCK DIAGRAM

In the project we have made use of voice and bodygesture operation using smart phone to control the location of wheelchair. The system is controlled by AVR microcontroller (ATMega 32) which is also controls the Temperature, Light, Smokes sensors.
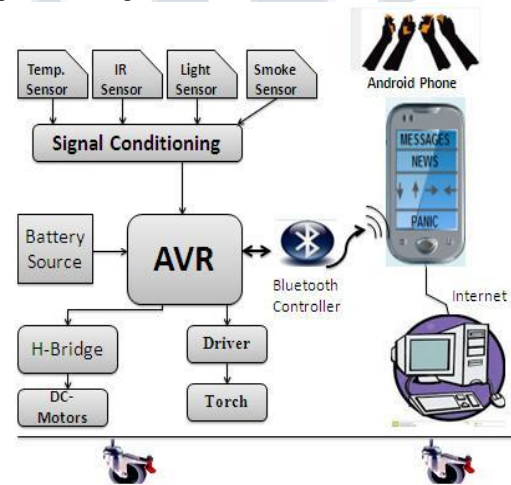

Fig. b) Block Diagram of Smart Wheelchair

The Panic button, SMS reading are controlled by smart phone. DC motors are attached to the wheels of the wheelchair hence based on rotation of motor direction of wheelchair can be operated. Motors are interfaced to microcontroller by using motor drivers. The AVR microcontroller is interfaced with Android phone through Bluetooth controller .depending on the user the voice operation or body gesture operation is done.

If any emergency problem happened with the wheelchair user by using panic button the message (SMS) will be sent to the caretaker or nearly hospital. In this project AVR microcontroller and Bluetooth module are communicating over UART 9600bps. The module comes in SMD package and works on 3.3V power supply. In this profile the data send and receive to module directly comes on the RX pin of microcontroller. It becomes really easy to make your device Bluetooth compatible.

HC-05 has only 4 pins: 5V, GND, TX and RX. The 5V pin and the GND pin are used for power and the TX and RX pin implement a serial interface. The TX pin is used by the module to send information and the RX pin is used to receive information.

To test the module, I first connected it to my Laptop. This makes it easier to see whether the module is receiving characters or not. By simply using a terminal program like Hyper terminal to visualize what the module is sending from its serial interface.

V. APPLICATION INSTRUCTIONS

Fig c) Flowchart showing operation of AVR with smart phone.

VI. APPLICATION INSTRUCTIONS

♣ First make sure that HC-05 Bluetooth module is paired with the Android mobile.

♣ The default password for pairing is "1234".

♣ Click on SELECT DEVICE icon to select paired Bluetooth module.

VII. RESULTS

By using the procedure hardware setup is done Fig. d) shows the interfacing of Android Smart phone and the wheelchair.
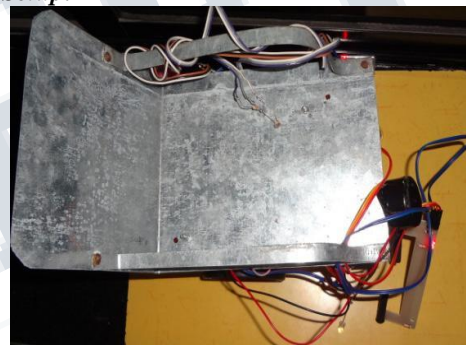
Final Setup:

Fig. e) indicates the Android app for the operation of Wheelchair.

For Gesture Recognition the results showing the

Very simple hardware setup.position and the output as description. The above done app is totally based on Android system. Android is an operating system based on the Linux kernel. The project responsible for developing the Android system is called

the Android Open Source Project (AOSP) and is primarily lead by Google.

Features of Android :

- ♣ Open source
- ♣ Media Support
- ♣ Huge memory
- ♣ Fast processor
- ♣ Built in I/O devices
- ♣ Native support for more sensors
- ♣ Improved battery efficiency
- ♣ Multitasking
- ♣ Have open source software development

Position of Smart Phone	Description
	Go Forward
	Go Backward
	Go Right
	Go Left

Table 2 : The Tilt Of Mobile Corresponding Angle And Output Of Accelerometer

Gesture Direction	X axis	Y Axis	Z axis
Forward	0.45	-8.58	5.36
Backward	-0.45	7.20	6.74
Right	-9.50	-1.99	5.82
Left	8.73	-0.91	5.66
STOP	0.30	0.15	9.80

VIII. CONCLUSION

By using this system physically handicapped people find easy way to navigate within the house using wheelchair without the external help. This provides ease of operation. As the system ses Smart phone so that the accuracy is increased. The Reading of SMS. The sensor describes the parameters like light, temperature , smoke ,gas etc. The IR sensor is used for obstacle avoidance. If any emergency then the Panic button is there for help.
Advantages :

1) Helpfull for physically disabled
2) Easy to use
3) No risk at hardware implementation
4) Physically disabled person can be independent

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