Automated Voice Based System for the Elderly and the Physically Challenged

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Abstract- In this project, we propose an Automated Home Navigation System which comprises of a wheelchair, voice module and navigation module. It can be used by a handicapped person to move inside the home without any difficulty. It's common that the elders forget the way to the different rooms in house and the handicapped people find it hard to move the wheel chair without external aid. By making use of this system, handicapped person can go to different rooms in the house like kitchen, living room, dining room etc by just speaking a word which is predefined to that particular room.

Index Terms- **ARM processor, RF module, MTLAB.**

I. INTRODUCTION

Wheelchairs are used by people who find themselves unequipped to move without external aid. The special needs of the aged people may differ from that of a handicapped person or a large individual but they all have "special needs" and often require some assistance to perform their daily routine as shown. The required assistance may be due to ageing, physical limitations, medical conditions or other issues. The handicapped people who use a normal wheelchair for navigation, usually requires an external person to move around. In this busy world, the aged people may be left alone at home and also may not find an apt person for external help. Here comes the need of an automated home navigation system, which consists of a wheelchair which can be used by the aged and the handicapped people without the help of an external person.

The proposed system can be operated using voices which is recorded into it. Studies have shown that the aged people forget the path to the different rooms in the home due to ageing. This problem is also dealt in system as it navigates automatically. Some handicapped people may find problems in talking while others may find problems in their body parts or find disability in moving their body parts. These problems are also taken care here, as there is an option in this system to customize it with voice. Another important feature is that the personal security of the person who is using the wheelchair is also taken care. If the person feels uncomfortable or insecure, he can avail the emergency service like police or hospital by making use of the predefined voices to it.

II. THE DESIGN OF SYSTEM STRUCTURE

Here block diagram consist of Microcontroller ARM-7 2138, Accelerometer, 16*2 LCD, RF module and DC Motor. This system presents the construction and design of voice based wheel chair robot. The voice of the person is detected by voice capture module which will be compared by voice recognition module with predefined voices loaded in to the system. According to the received voice, the destination is automatically understood and the wheelchair moves according to the route which is predefined. It is also equipped with obstacle avoidance technique, where the person may not be able to provide proper voices at the right time. The wheel chair can automatically navigate from one point to the other in the home as per command from the voice module. Thus the above proposed system can be used

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by handicapped people in day to day life even if they are alone at home.

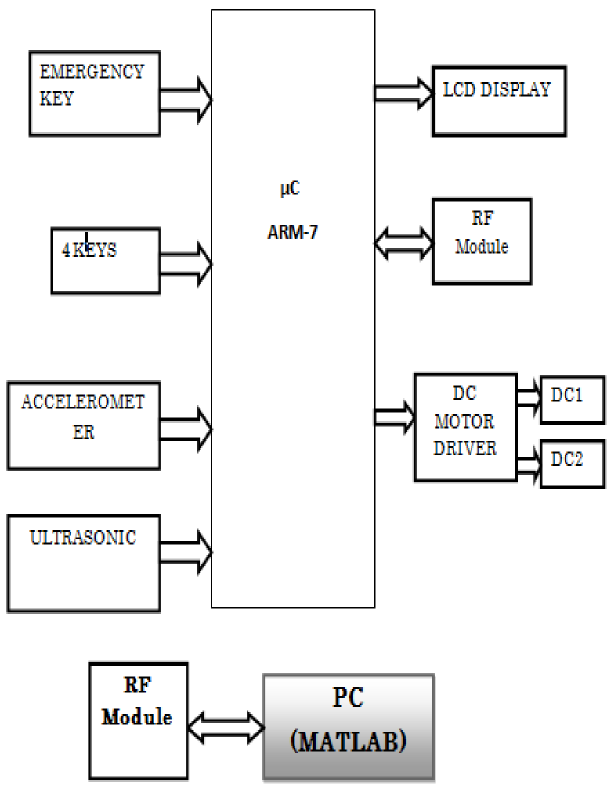

Fig 1. Block diagram of proposed system

III. THE DESIGN OF HARDWARE

A. LIQUID CRYSTAL DISPLAY:

LCD is used in a project to visualize the output of the application. We have used 16x2 LCD which indicates 16 columns and 2 rows. So, we can write 16 characters in each line. So, total 32 characters we can display on 16x2 LCD. LCD can also used in a project to check the output of different modules interfaced with the microcontroller. Thus LCD plays a vital role in a project to see the output and to debug the system module wise in case of system failure in order to rectify the problem.

B. ACCELEROMETER:

An accelerometer is an electromechanical device that will measure acceleration forces. These forces may be static, like the constant force of gravity pulling at your feet, or they could be dynamic - caused by moving or vibrating the accelerometer.

By measuring the amount of static acceleration due to gravity, you can find out the angle the device is tilted at with respect to the earth. By sensing the amount of dynamic acceleration, you can analyze the way the device is moving.

Accelerometer will be used to locate the vip person on the z, y, and z axis parameters. The accelerometer will provide the location of the vip within the parliament location. Accelerometers use the piezoelectric effect - they contain microscopic crystal structures that get stressed by accelerative forces, which cause a voltage to be generated. Another way to do it is by sensing changes in capacitance. If you have two microstructures next to each other, they have a certain capacitance between them. If an accelerative force moves one of the structures, then the capacitance will change. Add some circuitry to convert from capacitance to voltage, and you will get an accelerometer. The three axis accelerometer are basically used to identify the movements across the three axis i.e. x-axis, y-axis, z-axis. Accelerometer is an electronic device which is interfaced using I2C protocol and provides the reading after every 1msec. According to the requirement of the application, the microcontroller will take the reading from the accelerometer within a fixed interval of time and do the necessary operation according to the requirement of the application.

C. RS232:

RS 232 is a serial communication cable used in the system. Here, the RS 232 provides the serial communication between the microcontroller and the outside world such as display, PC or Mobile etc. So it is a media used to communicate between microcontroller and the PC.In our

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project the RS232 serves the function to transfer the edited notice (or data) from PC (VB software) to the microcontroller, for the further operation of the system.

D. DC MOTORS:

DC motors are used to physically drive the application as per the requirement provided in software. The dc motor works on 12v.To drive a dc motor, we need a dc motor driver called L293D. This dc motor driver is capable of driving 2 dc motors at a time. In order to protect the dc motor from a back EMF generated by the dc motor while changing the direction of rotation, the dc motor driver have an internal protection suit. We can also provide the back EMF protection suit by connecting 4 diode configurations across each dc motor.

E. ULTRASONIC SENSOR:

Ultrasonic sensors are basically used to measure the distances between the obstacle / object and the sensor. The ultrasonic sensor works on Doppler Effect. It consists of a ultrasonic transmitter and a receiver. The transmitter transmits the signal in one direction. This transmitted signal is then reflected back by the obstacle and received by the receiver. So the total time taken by the signal to get transmitted and to received back will be used to calculate the distance between the ultrasonic sensor and the obstacle.

IV. SOFTWARE DESIGN

Fig 2 shows the flowchart for the process of accepting the values from accelerometer and send to microcontroller for further processing.

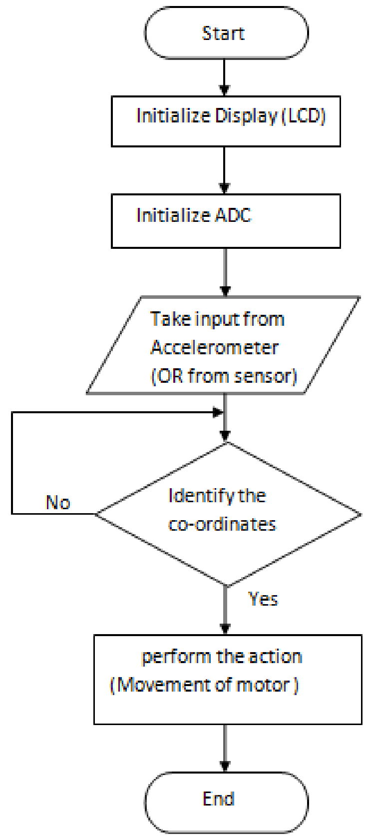


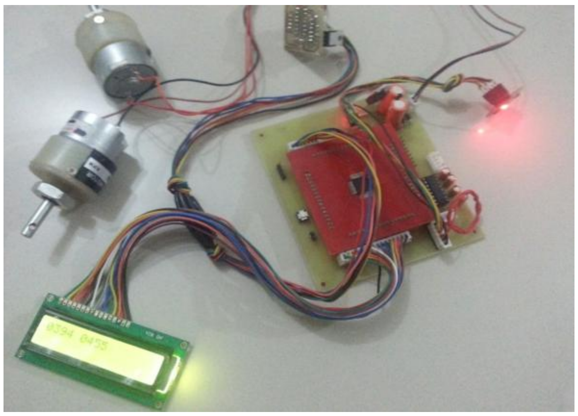
Fig.2

ISSN: 2278 – 7798

V. RESULTS OF EXPERIMENT

As shown in above fig. 1 implementation of A part of the system is done. In order to check if the hardware is working as per the requirement, an experimental setup is done. In this, system is continuously monitored on the display unit which is on LCD module. Below images shows the results of hardware implementation.

Total Hardware



LCD shows Left Movement

LCD shows Right Movement

LCD shows forward Movement

VI. CONCLUSION

This system is low cost system which is very helpful for the aged and the handicapped people. As it is controlled using voices, it can be regarded as a very user-friendly system. It has some special features integrated into it like the personal security module and the obstacle avoidance techniques. This is very useful since the elders or the handicapped people's medical assistance at any time during the day.

VII. REFERENCES

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