

Self-Assistive System for Disabled People

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Abstract: A unique idea is presented in this paper to fulfill the requirement of disabled people based on embedded system. This system is developed for disabled people. This is the system called assistive domestic focus on making it possible for disabled to motivate them that they can live independently at home. For improving quality of life for disable individuals with innovation in technology in this paper, the system will develop so that individuals can operate wheelchair using remote control and they can control home environment. In this system we design and implement 3 modes wheelchair control using remote control and home environment control and we also provide on obstacle avoidance technique which detect the obstacle present in the real time environment and provide a available path to the wheelchair.

Keywords: Embedded system, RF wireless communication, Obstacle avoidance, wireless home environment control system.

I. INTRODUCTION

Increasing number of elderly population is accompanied with rapid increasing number of people with age-related disease and impairment. Some physically disabled people who have lost control of hands as well as legs both or either hands and legs or one hand, one leg as a result of higher level spinal cord injury, nervous system disorder, warfare fortuity and aging etc[1]. Before deciding the objective of developing system with advance system control came across various cases of disable person who need wheelchair in their daily routine are army soldier, handicapped/ disabled persons who are born with disability.

This system is developed for those persons who are either handicapped or paralyzed from legs and who cannot walk and particular those person who use wheelchair [2]. In market number of automatic wheelchairs are present which are automatic but that are costly. This system is developed for those who can not walk. So some patient can not use standard wheelchair they depends on arms muscular force[3].

There are many problems faced by handicapped/disabled people such as they can't operate wheelchair themselves and the house lighting switch design that is placed at a height of 1500mm, as shown in fig.1. Where this situation they cannot ON and OFF the lighting switches this is difficult to disabled/handicapped people.

Therefore to developed a system and provide a facilities that can help the disabled/ handicapped to give them the best quality of life, this could encourage their enthusiasm and encouragement to carry out their lives and improved their life. By considering all these problems and disorder of disabled persons, wheelchair having advanced control movements are developed they are remote control mode depends on users when user press the key of keypad and wireless home environment control system using Morse code. In this part the RF wireless communication is used[4].

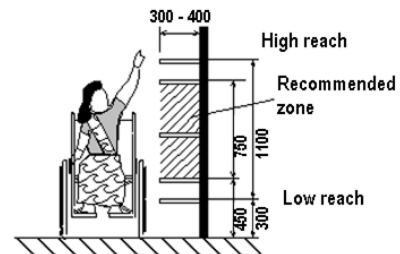


Fig. 1 Wheelchair user

Objective of System

- 1) To develop a communication device using two switches input for people living with disability
- 2) To control the wheelchair with the help of switches.
- 3) To provide a suitable path if obstacle is on the way of wheelchair.

II. BLOCK DIAGRAM

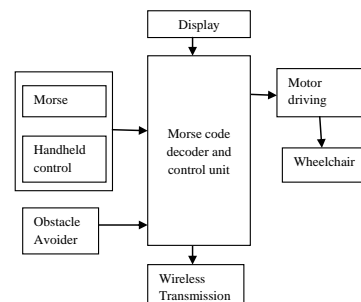


Fig a. Block diagram of wireless transmission system

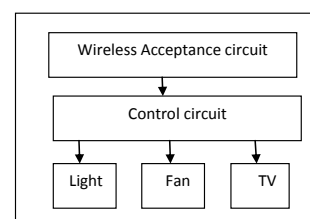


Fig b. Block Diagram of electronics facility control system

Fig 2. Block diagram

Fig 2.shows the block diagram of proposed system. This system consists of following parts. The main part of this system is remote of this system on which switches are placed. The remote is interfaced to the microcontroller. The controller unit receives the signal from pressing the switch and according to that control signal the movement of wheelchair is changed. The obstacle detection circuit is interfaced to the controller. The controller receives the control signal from obstacle detection and according to that the direction of wheelchair changes. The output of controller is connected to the motor driver circuit which consist of relays, which is used to control DC motor’s direction of rotation giving the wheelchair movement in four direction. In this system second part which is wireless home environment control circuit. The home environment control using the Morse code. The signal is transmitted through the RF transmitter and receiver receives the signal and according to that controls the electronic facility. The charger is used to charge the battery which is main source of system. The system consists of following component and software used.

A. PIC16F877A

Microcontroller PIC16F877A is designed to play an important role in this system. PIC has 33 input-output pin [6]. Its main advantage is, it has immunity to noise. It works in two mode of operation i.e. manual, mode and automatic mode. It decodes the Morse code which is for home environment control part. The RF modules which are for wireless communication and motor driver circuits are interfaced.

B. Motor driver circuit

Motor driver circuit is designed to control the motor in particular direction. In consists of 4 relays. This circuit is useful for converting 16F877A output 5V to relay operating voltage 12V[11].



Fig. 3 Motor driver circuit

C. Liquid Crystal Display (LCD)

Liquid crystal display of size 2x16 is used to show the status of electronic facility which are present in home such as TV, Light, Fan etc.

D. Morse code

The second part of this system is wireless home environment control system using Morse code. There are 2 keys are used for generating the Morse code. Morse code is a simple, fast, and low-cost communication method collected of a series of dots, dashes, and intervals in which each character entered can be translated into a predefined

sequence of dots and dashes. A dot is represented as a period (“.”), while a dash is represented as a minus sign (“-”) [4]. Each element, dot or dash, is transmitted by sending a signal for a regular length of time.

E. RF Module

For controlling the wireless home environment the RF transmitter and receiver is used, which is used to give an output from a faraway place. By pressing the keys generate the Morse code and this signal is transmitted through the RF transmitter at frequency of 434 MHZ, this signal is received by receiver at same frequency. The encoder HT12E and decoder HT12D is required in this RF communication.HT12E encoder converts parallel to serial set of signal and decoder converts serial to parallel i.e. original signal .The LED works as indicator to indicate a transmission and reception[9]-[10].

F. Microcontroller 89C52

This is an 8 bit controller, 8K byte flash memory [12]. The RF receiver is interfaced to the controller and according to that the controller controls the electronic facility such as light, fan, TV.

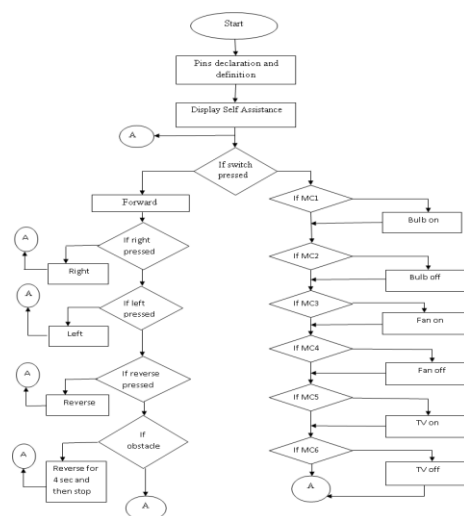
G. Obstacle Avoidance

In obstacle avoidance circuit IR sensor is used. This infrared sensor offers simple, user friendly and fast obstacle detection using infrared; it is non contact detection. It requires 5v power supply and it is low current consumption, which is less than 10 mA. The adjustable sensing range is 2cm to 8cm.

H. Software of system

Embedded C language is used for the programming of microcontroller. MPLAB X IDE is used to convert C to hex language [7].

III. SOFTWARE DEVELOPMENT OF SYSTEM



IV. EXPERIMENTAL RESULTS

The wireless home environment control system using Morse code has been tested. The implementation of Morse code is shown in fig 4. For wireless communication RF is

interfaced to the PIC controller shown in fig.6. For obstacle avoidance the IR sensor is interfaced to the PIC controller as shown in fig 8. When obstacle is detected then wheelchair is moved to particular direction. DC motor is interfaced to the PIC controller for movement of wheels as shown in fig 7. The whole system of wheelchair control system with battery as shown in fig 8. The home environment control system using morse code is shown in fig.9.

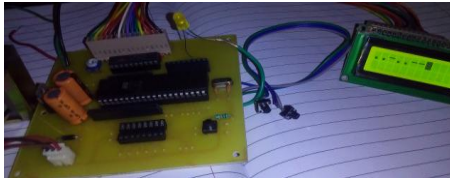


Fig.4 Morse code implementation

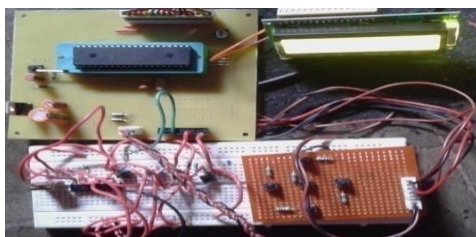


Fig. 5 Interfacing of RF transmitter to the PIC controller

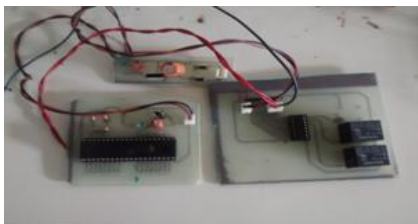


Fig. 6 Electronic facility control circuit

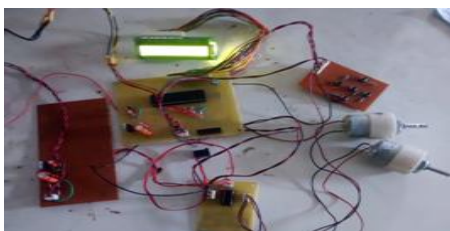


Fig.7 DC motor interfaced to the PIC controller

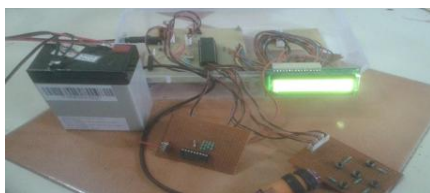


Fig.8 Whole system of wheelchair control

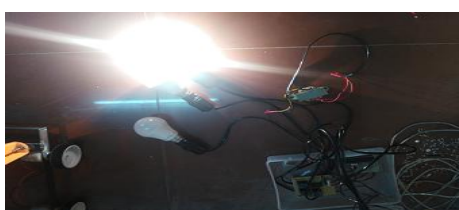


Fig.9 Home environment control system

V. CONCLUSION

This system consists of two modes of operation remote control and automatic control. This work presents a solution for the old as well as people who are handicapped/ disabled from legs i.e. who are not able to walk and particularly those who use wheelchairs. Furthermore, obstacle detection and target tracking, all these things are implemented on a wheelchair as well as a wireless home environment control system using Morse code implemented on a wheelchair. It is an intelligent assistive system for disabled people so they can lead their normal day-to-day life.

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