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Smart Wheelchair

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Abstract: The objective of this project is to design an intelligent motorized wheelchair for physically handicapped person using dependent user speech control and flex sensor technology. In this project, to drive the wheelchair we are using flex sensor bending oriented commands passed such as “forward, backward, left, right and stop”. The direction of the wheelchair is controlled by flex sensor application and also we design an embedded system for a voice input voice output communication as an aid for people with service speech impairment.

Keywords: HM2007, speaker, LCD, microcontroller, flex sensors, decoder and encoder, RF transmitter and receiver, driver circuit and relay

I. INTRODUCTION

Present industry is increasingly shifting towards automation. Two principle components of today’s industrial automations are programmable controllers and robots. In order to aid the tedious work and to serve the mankind, today there is a general tendency to develop an intelligent operation. The proposed system “SMART WHEEL CHAIR ” is designed and developed to accomplish the various tasks in an adverse environment of an industry. This project is an owe to the technical advancement. Microcontroller is the heart of the device which handles all the sub devices connected across it.

II. EXISTING SYSTEM

Manual self-propelled wheelchair: A self-propelled manual wheelchair incorporates a frame, seat, one or two footplates (footrests) and four wheels: usually two caster wheels at the front and two large wheels at the back. There will generally also be a separate seat cushion. The larger rear wheels usually have push-rims of slightly smaller diameter projecting just beyond the tyre; these allow the user to manoeuvre the chair by pushing on them without requiring them to grasp the tyres. As this causes friction and heat build-up, particularly on long downslopes, many wheelchair users will choose to wear padded wheelchair gloves. Manual wheelchairs often have two push handles at the upper rear of the frame to allow for manual propulsion by a second person, however many active wheelchair users will remove these to prevent unwanted pushing from people who believe they are being helpful.

Manual attendant-propelled wheelchairs: An attendant-propelled wheelchair is generally similar to a self-propelled manual wheelchair, but with small diameter wheels at both front and rear. The chair is maneuvered and controlled by a person standing at the rear and pushing on handles incorporated into the frame. Braking is supplied directly by the attendant who will usually also be provided with a foot- or

hand-operated parking brake.

Drawbacks of existing system:

One of the main disadvantages of using manual wheelchairs has to do with the upper body. however, over time this same motion can lead to injury. Other disadvantages of a manual is having to inflate the tires and keeping the body of the chair in line.

III. PROPOSED SYSTEM

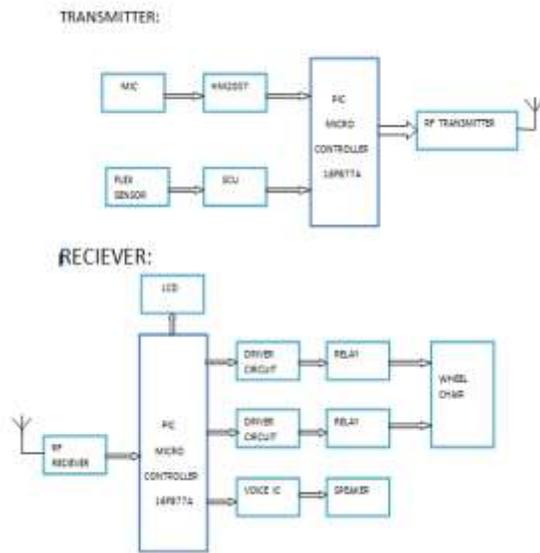
There are various types of wheelchair, differing by propulsion method, mechanisms of control, and technology used. Some wheelchairs are designed for general everyday use, others for single activities, or to address specific access needs. In the proposed system we use flex sensor technology to move the wheelchair and also provides aid for speech impaired people with service speech technology.

HM2007 is a device, which stores different voices through microphone, and if it recognizes the same voice after, it will provide its corresponding binary value. Depends upon this binary output, we can perform any operations. According to the flex sensor motion the signal is decoded transmitted via RF transmitter and in receiver section the signal is decoded the controller activates the driver circuit and relay so motor runs.

A microcontroller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of NORflash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications. By using this device, we can produce the stored voice which the user needs at the particular time. By practicing regularly, HM2007 is a device that can store a voice command and if it recognizes the voice input then, it will provide its address where we have saved. Depends upon the address, it will play the voice by using voice IC and generates the voice output through speaker.

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IV. SYSTEM DESCRIPTION



Flex sensor: Force-sensing resistor (flex sensor) is a material whose resistance changes when a force or pressure is applied. They are also known as "force sensing resistors" or "force-sensitive resistor", and are sometimes referred to by the initialism "FSR". But note that FSR and "Force Sensing Resistor" are trademarks of Interlink Electronics, Inc.



Properties: Force-sensing resistors consist of a conductive polymer, which changes resistance in a predictable manner following application of force to its surface.[2] They are normally supplied as a polymer sheet or ink that can be applied by screen printing. The sensing film consists of both electrically conducting and non-conducting particles suspended in matrix. The particles are sub-micrometre sizes, and are formulated to reduce the temperature dependence, improve mechanical properties and increase surface durability. Applying a force to the surface of a the sensing film causes particles to touch the conducting electrodes, changing the resistance of the film. As with all resistive based sensors, force-sensing resistors require a relatively simple interface and can operate satisfactorily in moderately hostile environments. Compared to other force sensors, the advantages of FSRs are their size (thickness typically less than 0.5 mm), low cost and good shock resistance. However, FSRs will be damaged if pressure is applied for a longer time period (hours). A disadvantage is their low precision: measurement results may differ 10% and more.

RF transmitter: A radio communication system requires two tuned circuits each at the transmitter and receiver, all four tuned to the same frequency. The transmitter is an electronic device which, usually with the aid of an antenna, propagates an electromagnetic signal such as radio, television, or other telecommunications. Whenever the high output pulse is given to base of the transistor BF 494, the transistor is conducting so tank circuit is oscillated. The tank circuit consists of L2 and C4 generating 433 MHz carrier signal.

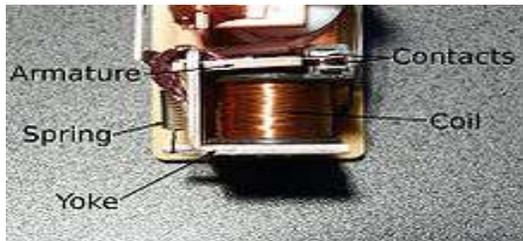
RF receiver : A radio receiver consisting of a number of amplifier stages that are tuned to resonance at the carrier frequency of the desired signal by a gang capacitor; the amplified signals at the original carrier frequency are fed directly into the detector for demodulation, and the resulting audio-frequency signals are amplified by an a-f amplifier and reproduced by a loudspeaker.

Relay :

HM2007: HM2007 is a device, which stores different voices through microphone, and if it recognizes the same voice after, it will provide its corresponding binary value. Depends upon this binary output, we can perform any operations. The speech recognition system is a completely assembled and easy to use programmable speech recognition circuit. Programmable, in the sense that you train the words (or vocal utterances) you want the circuit to recognize. This board allows you to experiment with many facets of speech recognition technology. It has 8 bit data out which can be interfaced with any microcontroller for further development. Some of interfacing applications which can be made are controlling home appliances, robotics movement

Microcontroller: Microcontroller is a general purpose device, which integrates a number of the components of a microprocessor system on to single chip. It has inbuilt CPU, memory and peripherals to make it as a mini computer. A microcontroller combines on to the same microchip. The microcontroller that has been used for this project is from PIC series. PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complimentary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory. The main advantage of CMOS and RISC combination is low power consumption resulting in a very small chip size with a small pin count. The main advantage of CMOS is that it has immunity to noise than other fabrication techniques.

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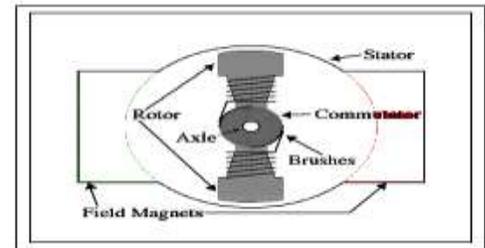
A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism, but other operating principles are also used. Relays find applications where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another. Relays found extensive use in telephone exchanges and early computers to perform logical operations

DC motor:

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.



Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization). Every DC motor has six basic parts -- axle, rotor (armature), stator, commutator, field magnet(s), and brushes. In most common DC motors, the external magnetic field is produced by high-strength permanent magnets. The stator is the stationary part of the motor -- this includes the motor casing, as well as two or more permanent magnet pole pieces. The rotor (together with the axle and attached commutator) rotate with respect to the stator.



The rotor consists of windings (generally on a core), the windings being electrically connected to the commutator. The above diagram shows a common motor layout -- with the rotor inside the stator (field) magnets. The geometry of the brushes, commutator contacts, and rotor windings are such that when power is applied, the polarities of the energized winding and the stator magnet(s) are misaligned, and the rotor will rotate until it is almost aligned with the stator's field magnets. As the rotor reaches alignment, the brushes move to the next commutator contacts, and energize the next winding. Given our example two-pole motor, the rotation reverses the direction of current through the rotor winding, leading to a "flip" of the rotor's magnetic field, driving it to continue rotating.

V. SOFTWARE DESCRIPTION

MPLAB: MPLAB IDE is an integrated development environment that provides development engineers with the flexibility to develop and debug firmware for various Microchip devices. MPLAB IDE is a Windows-based Integrated Development Environment for the Microchip Technology Incorporated PIC microcontroller (MCU) and ds PIC digital signal controller (DSC) families.

MPLAB simulator: MPLAB SIM is a discrete-event simulator for the PIC microcontroller (MCU) families. It is integrated into MPLAB IDE integrated development environment. The MPLAB SIM debugging tool is designed to model operation of Microchip Technology's PIC microcontrollers to assist users in debugging software for these devices

IC PROG: The PRO MATE II is a Microchip microcontroller device programmer. Through interchangeable programming socket modules, PRO MATE II enables you to quickly and easily program the entire line of Microchip PIC micro microcontroller devices and many of the Microchip memory parts.

Compiler-high tech C: A program written in the high level language called C; which will be converted into PIC micro MCU machine code by a compiler. Machine code is suitable for use by a PIC micro MCU or Microchip

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development system product like MPLAB IDE.

PIC start plus programmer: The PIC start plus development system from microchi technology provides the product development engineer with a highly flexible low cost microcontroller design tool set for all microchip PIC micro devices. The pic start plus development system includes PIC start plus development programmer and MPLAB IDE.

VI. FUTURE SCOPE

Design of Automated wheel chair which can be operated by a wireless remote which can reduce the wiring arrangements. Instead of using acceleration motion we can use eye retina using optical sensor to move wheel chair accordingly. This system can be extended by including GSM which sends an SMS during emergency.

VII. RESULT

TRANSMITTER



RECIEVER



ROBO MODEL



VIII. CONCLUSION

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place. The proposed system based on microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform. Though it is designed keeping in mind about the need for industry, it can be extended for other purposes such as commercial & research applications. Due to the probability of high technology (Atmel microcontroller) used, this "SMART WHEEL CHAIR" is fully software controlled with less hardware circuit. This feature makes the system a base for future systems.

REFERENCE

- [1] "Hand Gesture Based Mobile Robot Control Using PIC microcontroller" U. Rajkanna Assistant Professor, Dept. of EIE Dr. Mahalingam College of Engineering and Technology, Pollachi, India .
- [2] "Hand Gesture Recognition using Microcontroller & Flex Sensor" . Prapat Parab¹, Sanika Kinalekar², Rohit Chavan³, Deep Sharan⁴, Shubhadha Deshpande⁵ public. PVPP College of Engineering
- [3] ".Speech and flex sensor controlled wheelchair for physically disabled people 1 Shruti Warad, 2 Vijayalaxmi Hiremath, 3 Preeti Dhandargi, 4 Vishwanath Bharath, 5P.B.Bhagavati.
- [4] "Indian Sign Languages using Flex Sensor Glove" Solanki Krunal M.

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www.google.com
<http://www.google.com>
<http://www.google.com>
<http://www.google.com>
<http://www.google.com>
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