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Hand Gesture Wheelchair

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ABSTRACT: The main aim of this project is to control the devices and to ask the basic needs like water, food or medicine by using MEMS (Micro Electro-Mechanical Systems) technology. MEMS is a Micro Electro Mechanical Sensor which is a highly sensitive sensor and capable of detecting the tilt. The MEMS based sensor detects the tilt and provides the information to the microcontroller. And the controller judges whether the instruction is right movement or left movement instruction and controls the operation respectively.

KEYWORDS: Arduino, MEMS, Sensors, L293D, Motor diver.

1. INTRODUCTION

In today's time, an estimated 1% of the world's population needs a wheelchair. An increased percentage of elderly and disabled people who want to enhance their personal mobility, for them wheelchair is the best assistive device. A disabled or an invalid individual (usually the disability of the lower part of the body) can find it convenient to move around and maneuver using the help of a chair constructed on wheels which can either be pushed by another individual or propelled either by physical force or electronically. Such a chair is called as a Wheelchair. Traditional wheelchairs have some limitations in context to flexibility, bulkiness and limited functions. Our approach allows the users to use human gestures of movement like hands and synchronize them with the movement of the wheelchair so that they can use it with comfort and ease on all kinds of terrains without the hurdle or cardiovascular problems or fatigue. Some existing wheelchairs are fitted with pc for the gesture recognition. But making use of the pc along with the chair makes it bulkier and increases complexity. This complexity is reduced by making use of the MEMS accelerometer, the size of which is very compact and can be placed on the fingertip of the patients.

1.1 Principle
In this project wheelchair is operated using hand gesture and to sense the hand gesture MEMS accelerometer is being used. Micro Electro Mechanical Systems (MEMS) is the integration of mechanical elements, sensors, actuators, and electronics on a common silicon substrate through micro fabrication technology. An accelerometer is an electromechanical device that measures acceleration forces. MEMS accelerometer is a single chip with small size and low cost. Because of their small size and weight, accelerometers are attached to the fingertips and back of the hand. In this model we are using MMA7660FC accelerometer, which is 3axis accelerometer and gives digital output.

1.2 Significance of the work
This paper to develop a wheel chair control which is useful to the physically disabled person with his hand movement or his hand gesture reorganization. With the help of the wheel chair physically disabled person would

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able to move himself to the desired location with the help of hand gestures which controls the movement of the chair. This paper aims to provide a feasible solution to those handicapped people who do not have the ability to maneuver the wheelchair by themselves. These include people with serious paralytic condition. Wheelchair automated control systems proved to be versatile tools for many problems in human-computer interface systems. Basically, they are used for providing better usability of a computer or a system for people, including disabled people.

2. ARDIUNO

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.
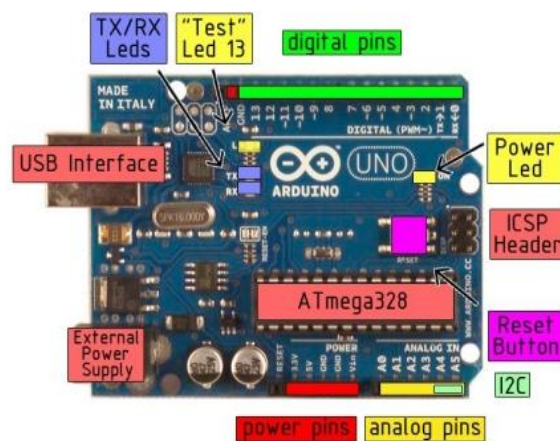

Fig.1 Arduino Board

Programming:

The Arduino Uno can be programmed with the Arduino software. The ATmega328 on the Arduino Uno comes pre burned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol.
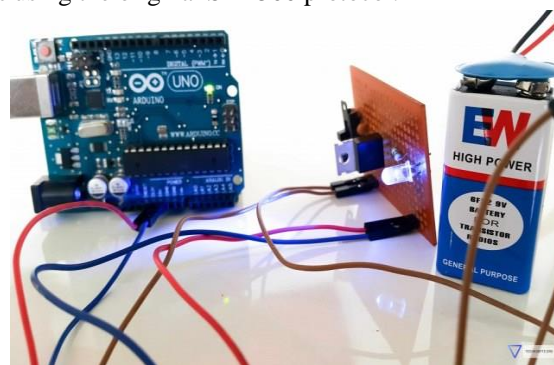

Fig.2 voltage regulator can be used to supply fixed 5V

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Working Principle:

The system was successfully implemented to move the wheel chair Left, Right, Forward, Backward or Stay in the same position. The wheel chair detect the obstacle at the front and stop the movement.
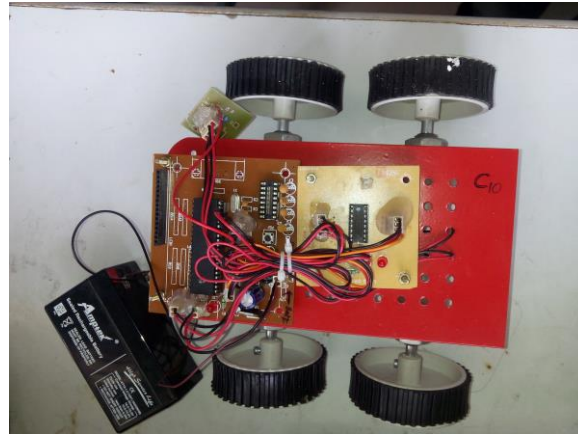

Fig.3 Hand Gesture Wheel Chair

3. CONCLUSION

This project is implemented using various components, the project is just a proto type if we make this project as commercial project, then definitely useful to all the disabled people, who are unable to move and unable to drive normal wheel chair their own. With their hand movements they can move wheel chair right, left, front, and back directions with 3-axis accelerometer(MEMS SENSOR) which is a highly sensitive sensor and capable of detecting the tilt. The future scope of the project can be extended using wireless technology, and intelligent hand gesture wheel chair.

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