Research Paper

Stephen Hawking Wheelchair Model controlled by MEMS motion

K.D. Mohana Sundaram[1], K. Kethavardhan[2], G. Jaya Prakash[3], K. Lava Kumar[4], K. Kishore[5]

[1,2,3,4,5]Department of Electronics and Communication Engineering Siddharth Institute of Engineering & Technology (Autonomous),Puttur - 517583, Andhra Pradesh.

ABSTRACT:
This project is to develop a wheelchair control which is useful to the physically disabled person with his hand movement or his hand gesture recognition using acceleration technology. Tremendous leaps have been made in the field of wheelchair technology. However even these significant advances haven't been able to help quadriplegics navigate wheelchair unassisted. It is wheelchair which can be controlled by simple hand gestures. It employs a sensor which controls the wheelchair hand gestures made by the user and interprets the motion intended by user and moves accordingly. In Acceleration we have Acceleration sensor. When we change the direction, the Sensor registers values are changed and that values are given to microcontroller. Depending on the direction of the Acceleration, microcontroller controls the wheelchair directions like LEFT, RIGHT, FRONT, and BACK. The aim of this project is to implement wheelchair direction control with hand gesture reorganization.

KEY WORDS:
Acceleration sensor, Position LEFT, Position RIGHT, Position FRONT, Position BACK, MEMS technology, Gesture Reorganization

I.   INTRODUCTION

Robotics is the system which deals with construction, design and operation. This system is related to robot and their design, manufacturer, application. Robotics research today is focused on developing systems that modularity, flexibility, redundancy, fault tolerance and some other researchers are on completely automating a manufacturing process or a task, by providing sensor based to the robot arm. In this highly developing industry and man power are critical constraints for completion of task. To save human efforts the automation playing important role in system. This system is useful for regular and frequently carried works. One of the major and most commonly performed works is picking and placing of jobs from source to destination. In the earlier system, the motion of the human hand are sensed by the robot through sensors and it follow the same. As the person moves their hand, the accelerometer also start moving accordingly motion of the hand sensor displaces and this sensor senses object or parameter according to motion of hand. In this system, a gesture driven robotic vehicle is developed, in which how the vehicle is moving i.e., control and handling is depend on user gesture. This type of control is mostly used in virtual world compute games. This control make switching system is more real and give more freedom to user.

An embedded system is one kind of a computer system mainly designed to perform several tasks like to access, process, and store and also control the data in various electronics-based systems. Embedded systems are a combination of hardware and software where software is usually known as firmware that is embedded into the hardware. One of its most important characteristics of these systems is, it gives the o/p within the time limits. Embedded systems support to make the work more perfect and convenient. So, we frequently use embedded systems in simple and complex devices too. The applications of embedded systems mainly involve in our real life for several devices like microwave, calculators, TV remote control, home security and neighborhood traffic control systems, etc.

II. LITERATURE SURVEY

Ronny mardiyanto, heri suryoatmojo "Development of hand gesture recognition sensor based on accelerator and gyroscope for controlling arm of underwater remotely operated robots". In this paper hand gesture sensor depends on accelerometer and gyroscope. Gyroscope is the sensor which is used to capture the position the operator hand when he is working in underwater operated vehicle and it is attached with a hand. The expert operator may use the joystick for aquatic manage system easily and it is little bit complex for the starting users. This system has two main part, ground station and aquatic remotely operated robot arm. Here accelerator and gyroscope are fitted in arm join. The device assess the 3Dimensional spot of every part for making 3Dimensional spot of hand. Here we used the CAD software. This device can be operated without any training. Underwater application can be easily done with this device. Anala pandit, Dhairya Dand A simple wearable hand gesture device using institute of medical and early modern studies. Interacting with systems is done with the help touch screen, wired or wireless mouse and with the keyboard. In this paper people machine communicating device, most intuitive communicating device, to interacts to the device and the other appliance. In case of communicating to the machine commands re being implemented use of hand gesture. Here accelerometer used to migrate the touchpad to revolve 3Dimensional object. Accelerometer changed to wireless communication 3Dimensional graphics can be done easily. Effective interaction.

III. PROPOSED METHOD

To regulate the robot's motion in this suggested system, we use a MEMS sensor (Accelerometer sensor). Accelerometer is used to give commands for robot movement. The MEMS Sensor will send the changes to the Robot. The robot will then move in the appropriate direction if any threshold value is exceeded.
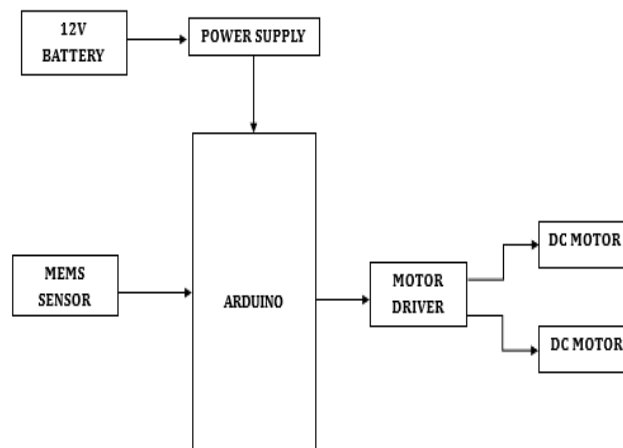

Fig 1 : Block Diagram of Proposed System

IV. HARDWARE REQUIREMENTS

The hardware requirements we are used in this project are:

4.1.   Arduino :

An Arduino is actually a micro controller-based kit which can be either used directly by purchasing from the vendor or can be made at home using the components, owing to its open-source hardware feature. It is basically used in communications and in controlling or operating many devices. It was founded by Massimo Banzi and David Cuartillas in 2005. The Uno with Cable is a micro-controller board base 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 ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything need to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.
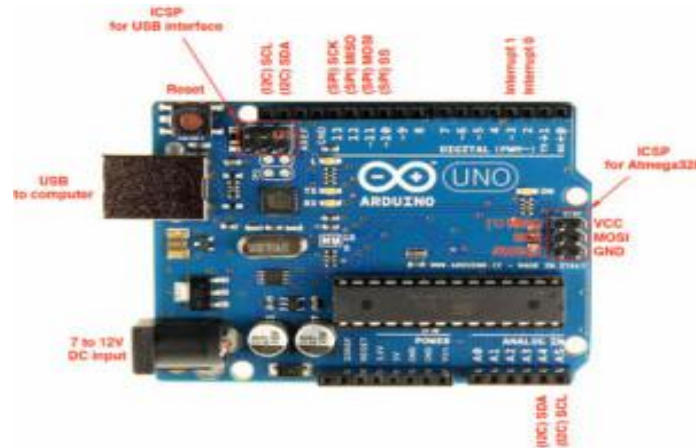
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Fig 2 : Structure of Raspberry Pi

4.2. MEMS Sensor:

The term MEMS stands for micro-electro-mechanical systems. These are a set of devices, and the characterization of these devices can be done by their tiny size & the designing mode. The designing of these sensors can be done with the 1- 100-micrometer components. These devices can differ from small structures to very difficult electromechanical systems with numerous moving elements beneath the control of incorporated micro-electronics. Usually, these sensors include mechanical micro-actuators, micro-structures, micro-electronics, and micro-sensors in one package. This article discusses what is a MEMS sensor, working principle, advantages and its applications
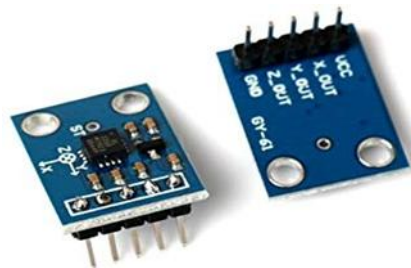

Fig 3: MEMS Sensor

4.3. DC Motor :

A machine that converts D.C power into mechanical power is known as a dc. motor. Its operation is based on the principle that when a current carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force.

4.4. Battery:

A rechargeable battery is an energy storage device that can be charged again after being discharged by applying DC current to its terminals.
Rechargeable batteries allow for multiple usages from a cell, reducing waste and generally providing a better long-term investment in terms of dollars spent for usable device time. This is true even factoring in the higher purchase price of rechargeable and the requirement for a charger.

4.5. L293D Motor Driver:

L293D is a dual H-Bridge motor driver, So with one IC we can interface two DC motors which can be controlled in both clockwise and counter clockwise direction and if you have motor with fix direction of motion the you can make use of all the four I/Os to connect up to four DC motors.

4.6. Capacitor:

Capacitors are used to attain from the connector the immaculate and smoothest DC voltage in which the rectifier is used to obtain throbbing DC voltage which is used as part of the light of the present identity. Capacitors are used to acquire square DC from the current AC experience of the current channels so that they can be used as a touch of parallel yield.

4.7. Voltage Regulator:

The 78XX voltage controller is mainly used for voltage controllers as a whole. The XX speaks to the voltage delivered to the specific gadget by the voltage controller as the yield. 7805 will supply and control 5v yield

voltage and 12v yield voltage will be created by 7812. The voltage controllers are that their yield voltage as information requires no less than 2 volts. For example, 7805 as sources of information will require no less than 7V, and 7812, no less than 14 volts. This voltage is called Dropout Voltage, which should be given to voltage controllers.

V. SOFTWARE REQUIREMENTS

Embedded C:

Implanted C makes use of KEIL IDE programming. The framework program written in implanted C can be placed   away in Microcontroller. The accompanying is a portion of the actual motives behind composing applications in C as opposed to get collectively. It is much less disturbing and much less tedious to write down in C then amassing. C is less traumatic to trade and refresh. You can utilize code available in capacity libraries. C code is compact to different microcontrollers with subsequent to 0 alteration. Genuine, installed C programming need nonstandard expansions to the C driver with a view to bolster charming components, as an example, settled point range catching, numerous unmistakable reminiscence banks, and fundamental I/O operations. In 2008, the C Standards Committee prolonged the C data to deal with these problems via giving a normal well known to all executions to purchaser to contains numerous additives not handy in standard C, for example, settled factor wide variety catching, named address spaces, and vital I/O equipment tending to. Installed C utilize the greater part of the grammar and semantics of well-known C, e.g., number one() paintings, variable definition, facts type statement, contingent proclamations (if, switch. Case), circles (even as, for), capacities, exhibits and strings, structures and union, piece operations, macros, unions, and so on.

VI.   RESULT

This robot is meant to move in response to human hand gestures. When we move our hand, the robot moves in the   order of suitable responses. Left, right, forward, and backward hand motions can be used to move the robot in different directions.
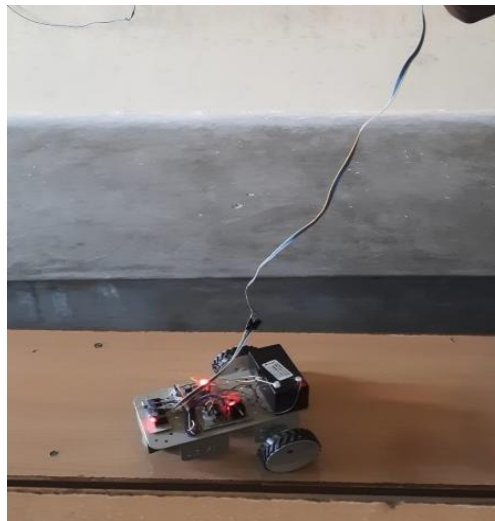

Fig 4: Electronic Wheelchair

REFERENCES

[1].   Ghani, M. A., Mallet, J. "Switched capacitors multilevel converter design for robotics application employing arduino microcontroller. In Ubiquitous Robots and Ambient Intelligence (URAI)", 2014 11th International Conference on, pp. 472-476. IEEE. 2014.
[2].   Gourab Sen Gupta, S.C. Mukhopadhyay, Matthew Finnie-" WiFibased Control of a Robotic Arm with Remote Vision" I2MTC International Instrumentation and Measurement Technology Conference, Singapore, (2009)
[3].   Carlos Cardei and Jose Sa da Costa, in Industrial Electronics Societ, p. 1-6., (2005)
[4].   Johan, Pramudita, "Sistem Kontrol Keseimbangan Statis Robot Humanoid Joko Klana Berbasis Pengontrol PID". Elektronika dan Instrumentasi. Universitas Gadja Mada. Yogyakarta, (2013)
[5].   I. Maulana, Susilo, A,"Robot Humanoid dan Kecerdasan Buatan",, Jurusan Teknik Komputer, Fakultas Teknik, STIMIK-AKI, Semarang (2010)