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A PATH FOR HORIZING YOUR INNOVATIVE WORK

SPEED AND DIRECTION CONTROL AUTONOMOUS VEHICLE USING HAND GESTURE WITH TILT AND FLEX SENSOR

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Abstract: Industrial automation is the booming sector in implementation industries. Moving bulky parts from one place to another by heavy machinery is the most tedious job to do. Hence we are interested in manufacturing a gadget that performs operation as per user gesture. This driverless Autonomous vehicle will perform the task as per the hand indications of driver sitting at remote place. Here we are using flex sensor and accelerometer for controlling the functions and operation of vehicle, which will carry the heavy machinery parts from one place to another. Arduino processor will control the operation which works on 5V. ADXL3XX will control the direction and flex sensor will handle the to and fro motion of autonomous vehicle. User will be provided by two gloves embedded by the sensors and power supply. This project will certainly reduce the human efforts to great extend. This also provides 100% automation to manufacturing industries.

Keywords: Speed, Direction, Industrial Automation

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INTRODUCTION

Finalizing the decision of making a gesture controlled autonomous vehicle that will be manoeuvred by a hand gloved mounted on the transmission circuit assembly. The circuit assembly will consist of Arduino UNO board and L293D motor driver, which together function as a input device to the autonomous vehicle. We decide on this topic because we wanted to do a basic application of controlling a vehicle with your hand. The controls of our autonomous vehicle are based on gesture of hand, which becomes simple for any person to handle it. The basic working principle for our vehicle is passage of the data signal of accelerometer readings to the arduino board fitted on the autonomous vehicle. The program compiled in that arduino runs according to that value, which make autonomous vehicle function accordingly.

While we have used two sensors. In which, one flex sensor will control the speed in forward or backward direction and other tilt sensor will control the turning mechanism.

Variables are sensed by different types of sensors and converted into digital form. These variables are compared with desired values stored in the processor and displayed on the LCD display. If these are not within the safe limit then message is send to the surgeon through GSM mobile phone. This number is stored in the controller.

BLOCK DIAGRAM

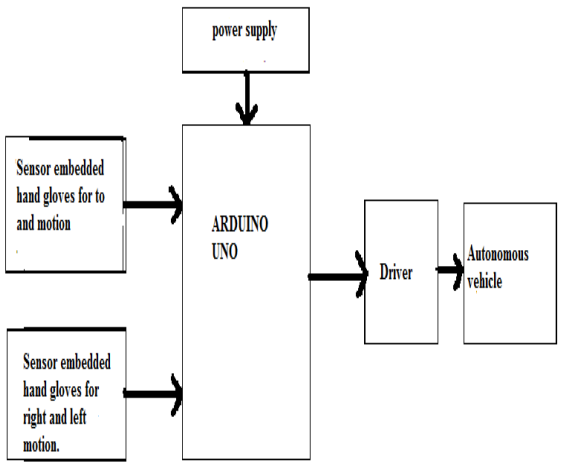

Fig.1 block diagram

The above figure shows the basic block diagram of the speed and direction controlled autonomous vehicle using hand gesture with tilt and flex sensor. Here in this system the arduino board is used, which act like a bridge for ATmega328 microcontroller. As shown in block diagram two sensors as tilt sensor and flex sensor are used for movement of vehicle in left and right direction and to and fro motion respectively.12v supply is required for this system. The L293D motor driver is used to drive the DC motor which is used in autonomous vehicle.

COMPONENT

Arduino UNO

DC Motors

L293D

Flex Sensor

Tilt Sensor

Power Supply

Arduino UNO

The Arduino UNO is a microcontroller board based on the ATmega328. It has 14 digital input/output pins, 6 analog inputs, a 16MHz ceramic resonator , a USB connection , a power jack, an ICSP header & a reset button . It contains everything needed to support the microcontroller. Simply connect it to of computer with USB cable or power with AC-to-DC adapter or battery to get started.

SUMMARY

Microcontroller- ATmega328

Operating Voltage-5v

Input Vtg. (recommended)- 7-12V

Input Voltage(limits)- 6-20V

Digital I/O pins-14(of which 6 provides PWM output)

Analog input pins 6

DC current per I/O pins - 40mA

DC current for 3.3V pins-50mA

Flash Memory-32K(ATmega 328)of which 0.5KB use

SRAM-2KB(ATmega328)

EEPROM-1KB(ATmega328)

Clock speed-16MHz

DC MOTOR

Almost every mechanical movement that we see around us is accomplished by an electric motor. Electric machines are means of converting energy. Motors take electrical energy and produce mechanical energy. Huge motors that can take loads of 1000's of horsepower are typically used in the industry. Some example of large motor applications include elevators, electric trains , hoists & heavy metal rolling mills. Examples of small motor applications include motors used in automobile, robots, hand power tools & food blenders . Micro-machines are electric machines with parts the size of red blood cell, & find many applications in medicine . Electric motors are broadly classified into two categories: DC (Direct Current) & AC (Alternating Current). Within these categories are numerous types, each offering unique abilities that suit them well for specific application. In most cases , regardless of type , electric motors consist of a stator & a rotor & operate through the interaction of magnetic flux & electric current to produce rotational speed & torque . DC motors are distinguished by their ability to operate from direct current.

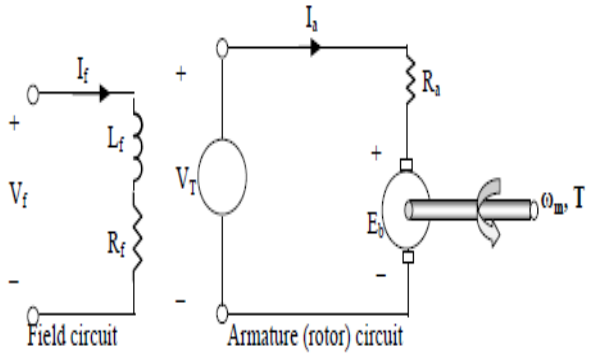

Figure : DC Motor

Fig. 3 DC MOTOR

A DC motor has two distinct circuits: field circuit & armature circuit. The input is electrical power & the output is mechanical power .In this equivalent circuit, the field winding is supplied from a separate DC voltage source of voltage Vf. Rf & Lf represent the resistance & inductance of field winding. The current if produce in the winding establishes the magnetic field necessary for motor operation. In the armature circuit, VT is the voltage applied across the motor terminals, Ia is a current flowing in the armature circuit, Ra is the resistance of the armature winding & Eb is the total voltage induce in the armature.

Construction:-

DC motors consist of one set of coils, called armature winding, inside another set of coils or a set of permanent magnet, called the stator. Applying a voltage to the coil produces a torque in the armature, resulting in motion.

STATOR:-

The stator is a stationary outside pare of motor .The stator of a permanent magnet pole pieces. The magnetic field can alternatively be created by an electromagnet. In this case, a DC coil (field winding is wound around a magnetic material that forms part of the stator.

ROTOR:-

The rotor is inner part which rotates. The rotor is composed of windings (Armature winding) which are connected to the external circuit through a mechanical commutator. Both stator and rotor are made of Ferromagnetic materials. The two are separated by air gap.

WINDING:-

A winding is made up of series or parallel connection of coils. Armature winding-The winding through which the voltage is applied or induced. Field winding-The winding through which a current is passed to produce flux .Windings are usually made of copper. This is basic theory by which all DC motor operate. The force exerted upon the conductor can be expressed as follows

F=B i l Newton(1)

Where, B is the density of magnetic field, l is the length of conductor and I is the value of current flowing in the conductor. The direction of motion can be found using Flemings left hand rule.

L293-MOTOR DRIVER

The L293 and L293D are quadruple high current half –H drivers. The L293 is designed to provide by directional drive currents of upto 1A at voltages from 4.5v to 36v.The L293D is designed to provide bidirectional drive currents of upto 600mA at voltages from 4.5v to 36v.Both devices are designed to drive inductive load such as relays, solenoids, DC and Bipolar stepping motors, as well as other high current/high voltage loads in positive supply applications. All inputs are TTL compatible. Each output is complete totem-pole drive circuit, with a darlington transistor sink and a pseudo-Darlington source. Drivers are enable in pairs, with drivers 1&2 enabled by 1,2EN & drivers 3&4 enable by 3,4EN.When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled, and their output are off & in the high impedance state. With the proper data input, each pair of drivers forms a full-H (or Bridge) reversible drive suitable for solenoid or motor application.

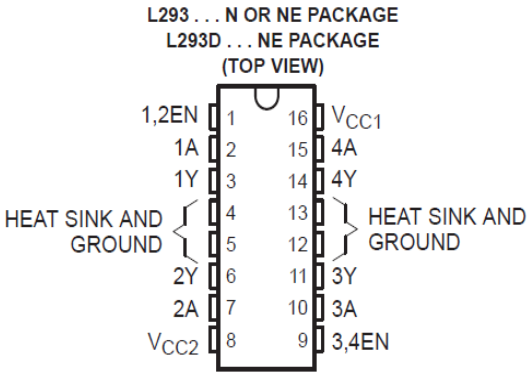

Fig. 5 pin diagram

SENSOR:-

It is the device that detect the changes in the abient condition or in the state of anther device of system.

Tilt Sensor:

Tilt sensors allow you to detect orientation or inclination. They are small, inexpensive, low power & easy to use. If used properly, they will not wear out. Their simplicity makes them popular for toys, gadgets & appliences. Sometimes they are referred to as a “mercury switches” , “tilt switches” . When the sensor is oriented so that end is downword, the mass rolls on to the poles & shorts them, acting as a switch throw. Tilt switches used to be made exclusively of mercury, but are rare now since they are recognize as being extremely toxic. The benefit of mercury is that the blob is dense enough that it doesn’t bounce & so the switch isn’t susceptible to vibrations. On the other hand, ball type sensors are easy to make, wont shatter, & pose no risk of pollution.

Flex Sensor:-

The purpose of our project is to control a vehicle using flex sensors attach to a glove.The flex sensor are intended to replace the remote control that is generally used. Additionally we also created another mode which will allow us to use an accelerometer (tilt sensor)to control the forward and backward and left and right movements, while using a flex sensor to control the speed and breaking vehicle. We have to gloves one with flex sensor attach to it. One of the gloves has an a accelerometer attach to it. The flex sensor changes resistance when bend. It will only change resistance in one direction. An unflex sensor has a resistance of about 10,000ohms.As the flex sensor is bend, the resistance increases to 30-40Kohms at 90degrees.The sensor measures ¼ inch wide,4-1/2 inches long and 0.19inches thick.

CONCLUSION:-

The system is very efficient and useful keyboard in manufacturing industries for transporting heavy material from place to place, due to this one can be save the manpower. This system has much future application regarding e industrial day to day work.

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