

Hand Gesture Controlled Robot Car

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Abstract: The role of automation is very vital and it is making life easier by reducing the task and increasing the efficiency of work. The proposed system deals with the design and implementation of a "hand gesture controlled robotic four wheel car". It uses a ADXL335 accelerometer motion sensor to sense the hand gesture and so the robot car follows the motion of hand on which the accelerometer sensor is mounted. The proposed setup is easy to use and no extra effort is required and it provide four different gesture for controlling robot, these are forward, reverse, left and right. The robo-car has different number of degree of freedom (DOF) as per the requirement. There are number of application of robo car in industry and can also be used for personal assistance. The proposed system can be used in gaming, transportation, can work in hazardous area, for military use and can also be used where human intervention is not possible. Like in NASA's Mission to Mars, the spirit and opportunity drone etc.

Keywords: ADC (Analog to digital converter), Embedded C, PU(processing unit), MCU (microcontroller), Hex file, ADXL335 Accelerometer, L293D Motor driver.

I. INTRODUCTION

Usually a robot is an electro-mechanical machine that can perform tasks automatically [5]. With the advancement of technology and following the habitual tradition, using a robotic car with gesture control is much better than the remote control cars. In the robotics field, several research efforts have been directed towards recognizing human gesture [6], motion capture sensors [7] or using finger gesture recognitions systems based on active tracking mechanisms.

This set up of hand gesture control robot performs very critical tasks for no harms. Our main concern is to reduce the delay and make the response time faster and we have made this project in an inexpensive way that it's cheaper than the traditional gesture control robotic car [2]. As this is a high end application so we have made this project on the valid frequency of 8 MHz and can be changed according to the need of different application.

The ADXL335 accelerometer sensor allows a free and smooth operation which has wired connection with the robotic car. The length of connected wire between the sensor and robotic car can be increased or decreased with the requirement of operation. The whole task is performed by MCU ATmega8 mounted on robotic car.

The whole set-up is designed in a way that the robot starts movement as soon as the operator makes a gesture or posture of hand. This project is made by keeping in mind that it can be used by everyone including industry as well as for domestic

purpose. NO advance knowledge is required for performing the operations like RIGHT, LEFT, FORWARD and REVERSE. For example if operator makes a gesture of moving hand right so the robot starts moving right and the same valid for other gesture.

II. DESCRIPTION OF HARDWARE

A MCU is a small computer containing PU, memory and different input and output peripherals. They are used for performing certain specific tasks very efficiently. There are five ADC pins in MCU ATmega8 which are used to convert analog data to digital data. The data received from ADXL335 accelerometer sensor is analog in nature and given to MCU and further converted to digital data.

The ADXL335 is a low power and low cost 3-axis accelerometer sensor with signal conditioned voltage outputs. The sensor is a analog device. The output signals are analog voltage that is proportional to the acceleration. It measures the acceleration produced by motion, shock or vibration [4]. So the analog data is provided by ADXL335 and further processed by MCU [4].

The L293D is a motor driver IC which is basically a current amplifier, it takes low-current signal and provides higher-current and this higher current signal is used to drive the motors. It can provide bidirectional current of up to 600-mA at voltage from 4.5V to 36 V [2]. A 9 volts power supply is used which supplies the required voltage to the whole circuitry. A 7805, 5 volts dc voltage regulator is used to regulate the

output of 9v power supply to the MCU because the ATmega8 microcontroller only operates on 5v supply.

III. DESCRIPTION OF SOFTWARE

Embedded C language is used to write the source code for the MCU and an Embedded C compiler software code vision avr is used to create the hex file. After the generation of hex file hardware simulator software is used to check the functionality of prepared code, which confirms the integrity of code. Another software Khazama avr programmer is used to burn this hex file into the MCU.

IV. ADVANTAGES

It can be used for desired application with high accuracy. No technical knowledge is required for performing operation. Wheel chair based on gesture technology. It will open a new era in home automation and security system.

V. WORKING

MCU name ATmega8 is the brain of our robotics car and all the functions are handled by this part. The proposed system includes the robotics car and accelerometer. They are connected to each other through wire. The sensor data received from accelerometer is accurate and sensitive in nature. The accelerometer can measure the static acceleration of gravity in tilt-sensing application as well as dynamic acceleration of hand in a particular direction. This analog data is given to MCU by ADXL335 accelerometer sensor module.

This analog data is processed by the MCU and actions are decided as forward, reverse, left and right as shown in figure 1. ADC in micro controller is responsible for the conversion of analog sensor data to digital signal [5].

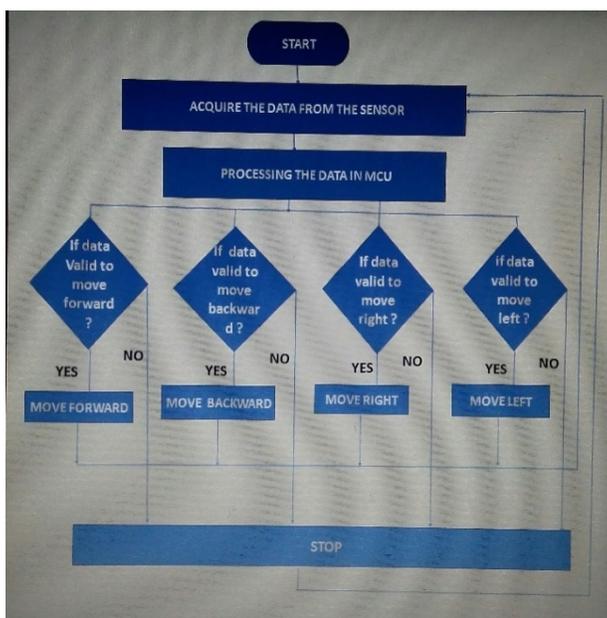


Figure 1: flow chart of working

IV. CONCLUSION

The above system has wide range of applications and can be used in military, transportation etc. There is no need of knowing any programming language by the operator to operate. The whole set-up is of very low cost including hardware and software and thus it is affordable by any organization or for a person to fulfill his/her personal tasks. The proposed model will soon replace the remote control system in market.

V. FUTURE SCOPE

An on board camera module can be installed over the robo car so that monitoring system will improve. Robotic arms can be installed for special uses. Gesture technology can provide more entertainment opportunity for any type of user. Many different ways of entertainment like x-box, high end games etc.

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