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Automated Gesture Control Robot

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Abstract

We have approached the era of robots being used in transport as well as military applications. Pick and place mechanisms are used in robotic vehicles for goods transport as well as military applications like bomb defusal. Robots are usually controlled through remotes with joysticks and a buttons. These remotes are not always comfortable to use and also have a strain on fingers after constant use. So here we use a motion controlled approach to tackle this issue. We propose a completely hand motion controller robotic vehicle using tilting motions which does not need a single button press. This allows us to control vehicle motion as well as the pick and place arm simultaneously. We make use of an atmega based microcontroller circuitry in the transmitter section to transmit the motion commands sent by accelerometer sensor through rf to the receiver unit. The receiver unit is equipped with an rf receivers to receive the transmissions parallely from both the transmission units. We then use an 8051 family microcontroller to convert the received in to motion commands. These motion commands operate the vehicle as well as the pick and place arm parallely to achieve complete robot movement without any button press.

Introduction

Recently, strong efforts have been carried out to develop intelligent and natural interfaces between users and computer based systems based on human gestures. Gestures provide an intuitive interface to both human and computer. Thus, such gesture-based interfaces can not only substitute the common interface devices, but can also be exploited to extend their functionality.

Robots are playing an important role in automation across all the sectors like construction, military, medical, manufacturing, etc. After making some basic robots like line follower robot, computer controlled robot, etc; we have developed this accelerometer based gesture controlled robot by using Arduino Uno. In this project we have used hand motion to drive the robot. For this purpose we have used accelerometer which works on acceleration.

Methodology

This work covers material selection, design, programming and fabrication of a basic robotic arm system. It

also covers the implementation of the kinematics of the arm but does not consider the details of the derivation of the kinematic equations

- select a suitable material for the fabrication of a 2-DoF robotic arm;
- Obtain suitable design parameters for the robotic arm;
- Create a 3-d model of a robotic arm based on the design parameters;
- Fabricate the robotic arm
- Calculate the torque required
- Calculate the power required.

The availability of a robotic arm that can be used for demonstrating and educational purposes in the Department of Mechanical Engineering will go a broad way in stimulating the interest of students in robotics. It will provide a tool to use for learning and experimenting with robotics. Students with a flair for programming can reprogram the robot to adapt it to different tasks. In this chapter covers the detailed design and method of construction of the robotic arm and its controller.

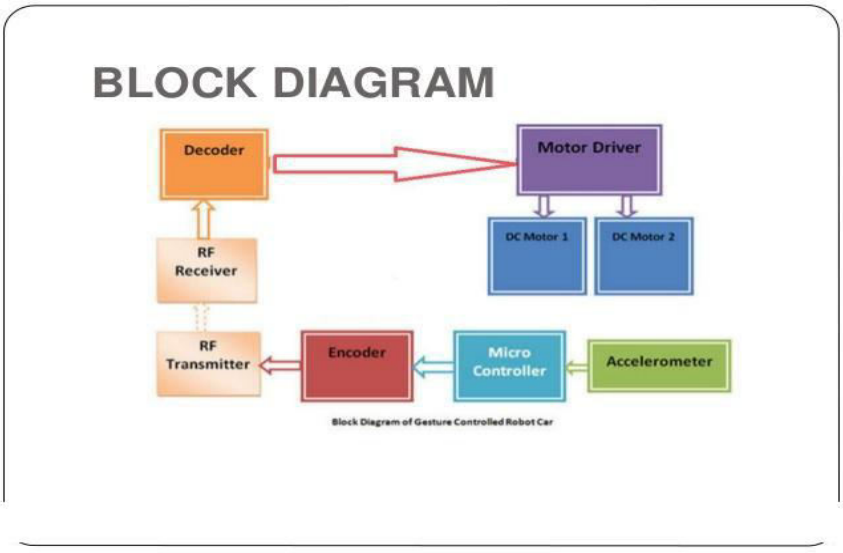
Application of Robotic Arm

The aim of the present work is to design and fabricating a robotic arm that can be used for demonstrating and educational purposes. It will be used to pick and place things which are having special properties or handle with care objects.

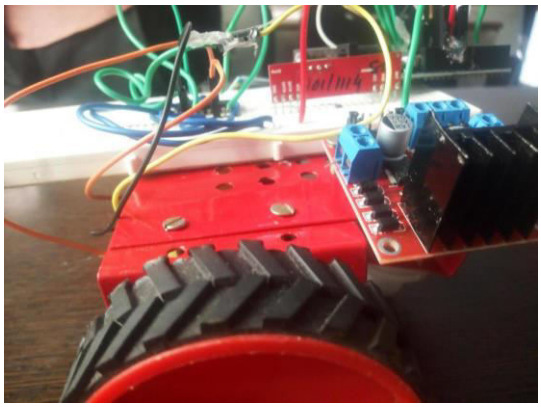
Choice of Material

The following material properties were put into consideration during the material selection process: strength, lightness, availability and Ease of cutting. The material should possess sufficient strength so as to ensure that each link of the arm is able to bear the load imposed on it by motors, other attached links and the payload. Lightness of the material minimizes the torque requirement of the robotic actuators, thereby minimizing cost. The material also had to be readily available and easy to cut because the fabrication of some parts of a robotic arm involved the cutting of intricate shapes.

Block diagram



Project Figure



Conclusion

Designing and fabricating of the robotic arm has been successfully completed. The line diagram of robotic arm is drawn in CATIA. The design for the manipulator has been recognized. The torque exerting at each of the joints is calculated for different loads. The power is estimated based on the torque. The servo is selected for each joint based on torque requirement. Selecting a suitable servo controller and control software for the Robotic arm is developing using Microsoft's C++ programming language. The experiments are conducted on the pick and place robot and the results obtained were very satisfactory. Motors with higher torque ratings can used to power the joints so as to ensure that the robotic arm remains in position even when electric current is not supplied to the motors. Object detection and collision avoidance can implement by adding proximity sensors to the robotic arm.

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