

# An Intelligent Gesture Control Robot

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**Abstract** - The biggest beneficiaries of robotic vehicles driven by hand gestures are disabled persons, who may just point in the direction they wish to go without having to click any buttons. This system incorporates a glove with a receiver circuit mounted on top and an At Mega microcontroller connected to an accelerometer that the user is expected to wear while operating the device. The vehicle's circuit incorporates a PIC microcontroller, RF receiver, and Driver IC to control the motors. The RF transmitter sends the commands to the RF receiver once they have been received by the IC on the circuit. The PIC microcontroller subsequently receives the command from the RF receiver and decodes it.

**Key Words:** Accelerometer, A/D Converter, Encoder, RF transmitter, Micro Controller, Decoder, Motor Driver, RF Receiver.

## 1. INTRODUCTION

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, sometimes with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use. Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or increasing the reliability and performance. Some embedded systems are mass-produced, benefiting from economies of scale. Physically, the embedded system range from portable device such as digital watches and mp3 players to large stationary installations like traffic lights, factory controllers or the system controlling nuclear power plants.

## 2. PROPOSED SYSTEM

In this proposed system Gesture controlled robot is basically a robot which can be controlled by simple gestures. The wireless communication enables the user to interact with the robot in the more friendly way. In the existing system, human hand movements are sensed by the robot through sensors and it follows the same.

### 2.1 Gesture Recognition

Gesture recognition is the process of understanding and interpreting meaningful movements of the hands, arms, face, sometimes head. Gesture recognition is to recognize specific human gestures and process them to control device. In gesture recognition, the human gesture are transmitted via special glove or read by a camera. The captured data is processed and used as an input to handle applications or devices.

### 2.2 Gesture Based

A glove-based recognition system consists of glove or sensors for data processing and power supply.

Example: "accelelove" created by George Washington University translates American sign language gestures into text.

## 3. WORKING PRINCIPLE

Our gesture-controlled robot works on the principle of accelerometer which records hand movements and sends that data to a comparator which assigns proper voltage level to record movements. The information is then transferred to an encoder which makes it ready for RF transmission. On the receiving end, the information is received wirelessly via RF decoded information. These decisions are passed to the motor driver that is which triggers the motors in different configurations to make the robot move in specific direction.

## 4. BLOCK DIAGRAM

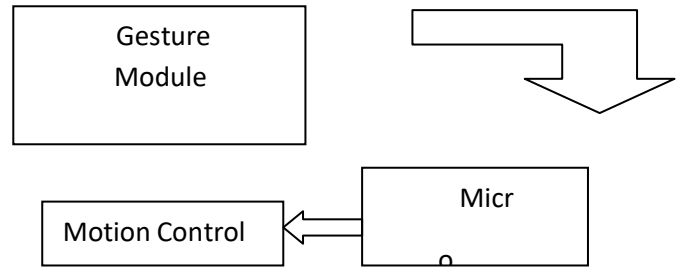


Fig1. Block Diagram

## 5. HARDWARE MODULE

### 5.1.1 Analog to digital convertor

LM324 is used for Analog to Digital Conversion. It has four embedded op amps, which requires Vcc(5V) and ground only. Analog signal is fed to the parallel combinations of comparators, which produces an encoded signal corresponding to input analog signal. The encoded signal is then applied to Digital Code Converter (a combinational circuit), that will produce binary output. If the analog input exceeds the reference voltage to any comparator that comparator turns ON.

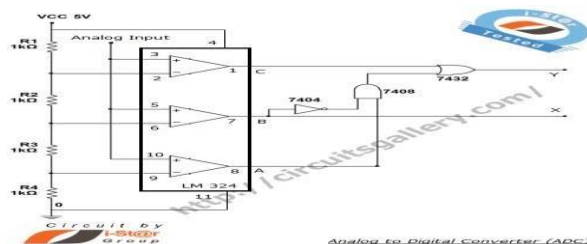


Fig2 Analog To Digital Convertor

### 5.1.2 Accelerometer

An accelerometer is an instrument for measuring acceleration, detecting and measuring vibrations, or for measuring acceleration due to gravity (inclination). Accelerometers can be used to measure vibration on vehicles, machines, buildings, process control systems and safety installations. They can also be used to measure seismic activity, inclination, machine vibration, dynamic distance and speed with or without the influence of gravity.

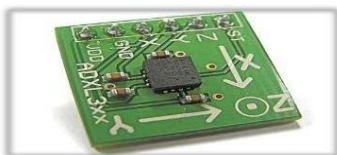


Fig3 Accelerometer

### 5.1.3 RF Transmitter

RF module is a small size electronic device, that is used to transmit or receive radio signals between two devices. The main application of RF module is an embedded system to communicate with another device wirelessly.



Fig4 RF Transmitter

#### Micro Controller

Microprocessors and microcontrollers are widely used in embedded systems products. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical



Fig5 Micro Controller

#### 5.1.4 RF Receiver

RF receiver module receives the modulated RF signal, and demodulates it.



Fig6 RF Receiver

#### 5.1.5 Motor Driver

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.



L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven



simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

## 6. EXPERIMENT AND RESULT

### Gesture Controlled Robot

All the components after integration give us the working skeleton model for the robot. The robot model works perfectly according to the hand gestures. The various gestures were tested and the outputs were studied to check if the right codes were transmitted. Therefore the project is seen to be working successfully with an artificial human-machine interaction system.

Through the use of gesture recognition, remote control with the wave of a hand of various devices is possible. Gesture controlling is very helpful for handicapped and physically disabled people to achieve certain tasks, such as driving a vehicle. Gestures can be used to control interactions for entertainment purposes such as gaming to make the game player's experience more interactive or immersive

## 6. CONCLUSIONS

Enormous amount of work has been done on gesture controlling of robots. In this paper, various methodologies have been analyzed and reviewed with their merits and demerits under various operational and functional strategies. Thus, it can be concluded that features like user friendly interface, light weight and portability has overtaken the sophistication of technologies like programmable glove etc., making them obsolete. Although recent researches in this field have made wireless gesture controlling a ubiquitous phenomenon, it needs to acquire more focus in relevant areas of applications like home appliances, wheelchairs, artificial nurses, table top screens etc. in a collaborative manner.

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