



Hand Motion Controlled Pick and Place Robot

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Abstract: People are always working hard on it Find new ways to interact with your machine The interaction between humans and machines today Far away from the mouse or pen, there by making it ubiquitous and it is much more compatible with the current physical world. When Gap between people introducing new technologies Therefore, existence and machines are reduced and there are gestures. It played an important role in reducing this abyss. Great progress has been observed along this path Gestures were used to interact with the machine. Gestures are now a non-verbal kind Communication to find a specific message Communication through visible physical behavior The project is basically Try to build a robot that will be total It is controlled by hand gestures. There are two types of gestures Static and dynamic gestures. Here we will work on statics Gestures are specific hand gestures or configurations and poses with a single image.

Index Terms - Arduino UNO atmega328p, Flex sensor, mpu-6050, RF module, Servo

I. INTRODUCTION

Advanced mechanics is field where we are having loads of extension for developments and to accomplish something creative. It is extremely intelligent field with parcel of mechanical variations. With each spending day the hole between machines and people is getting decreased with the acquaintance of new advancements with work with the norm of living. In mechanical technology research, automated arms are utilized with novel highlights and plan standards. A large portion of the automated arms are constrained by utilizing accelerometer sensor and with a counterfeit astute calculation. The automated arms can accomplish solid far off communication. User cordial robot control is a significant open area of exploration to mechanical technology. Automated frameworks are presently a day the fundamental piece of practically every one of the enterprises. In enterprises, an automated arm perform different undertakings like welding, managing, picking and setting little items and so forth [1]. The greatest benefit of these arms is that they can work in unsafe regions and furthermore in the areas which can't be gotten to by people. Motions assumed a critical part in numerous replacement applications where human connection is fundamental. Motions can be caught with the assistance of an accelerometer, in any case, with the improvement of cell phone its free use has been delivered futile. Numerous specialists chipped away at the execution of mechanical arm. MEMS accelerometer is utilized to give the hand motions. MEMS implies miniature electro mechanical framework which has 3 hub of x, y, z and a power supply port with ground is created [2]. The greater part of modern robots are as yet modified utilizing the run of the mill instructing process. A modern robot framework was planned utilizing two minimal expense and little 3-pivot remote accelerometers. These accelerometers were connected to the human arms, catching its way of behaving (motions and stances). Fake Brain Network prepared with a back-proliferation calculation was utilized to perceive arm motions and stances, which would be utilized as contribution to the control of the robot. The point was that the robot begins the development nearly simultaneously as the client begins to play out a signal [3]. A thought was of utilizing mechanical arm plan programming to plan a 6 - DOF (level of opportunity) virtual mechanical arm which thus control a real automated arm was carried out [4]. The hand motion acknowledgment framework for cutting weeds in the yield field was planned by utilizing MEMS accelerometer and PIC miniature regulator [5]. The movement innovation was examined by the creator to catch signals through an android Smartphone with an inbuilt accelerometer and a RF module to control the energy of a robot [6]. A vigorous MEMS based Gesture Controlled Robot can be intended for perceiving hand movement based signal points of interaction. An imaginative Formula for signal acknowledgment was produced for recognizing the particular activity signs made through hand development [7] [8]. Flex sensors alongside accelerometer connected to hand or can give better precision in motion recognition [9] what's more, gyro-meter with accelerometer can work on the steadiness and to identify the rotational token of human arm [10]. The automated arms are accessible on the lookout, however the remote execution utilizing accelerometer is seldom utilized. Mechanical arms are with the buttons or joysticks are utilized for controlling in businesses. Our point was to foster a model which will be proficiently used to limit human endeavors. In this paper we explored a system where an embedded accelerometer was used to track the movements and a robotic arm assembly was controlled by micro controller.

II. PROPOSED METHOD

The hardware part of the system was divided into two sections as transmitter section and receiver section as follows,

2.1 Transmitter section

In the transmitter section, sensors interfacing WITH arduino atmega328p that's our microcontroller And rf transmitter is designed. right here we used a flex sensor to govern the gripper motor connected to the robot arm and accelerometer gave angular function values, those values are in X,Y,Z co-ordinates with inside the variety of 0.00 to 1.00. In wi-fi rf module turned into used for transmitting the ones values. Further those values are acquired at receiver section.

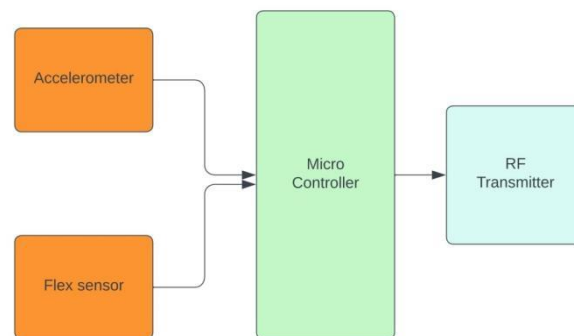


Fig 1. Block diagram of Transmitter Section

2.2 Receiver Section

In the receiver section again arduino atmega 328p microcontoller(process) used for controlling the motors.The rf receiver at the receiver side will received the X,Y,Z values and flex sensor values and those values are transmitted to controller.According to these values the motors will rotate and the movement of robotic arm will take place. To drive the motors driver circuitry was used. The block representation of the system is shown in figure 1 and Figure 2.

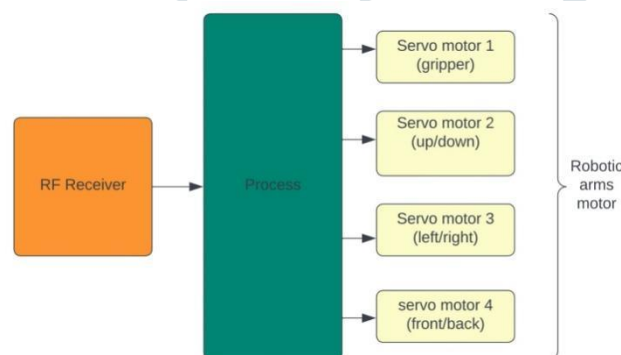


Fig 2 .Block diagram of Receiver Section

III. HARDWARE REQUIREMENTS

3.1 MPU6050 GYROSCOPIC & ACCELEROMETER SENSOR

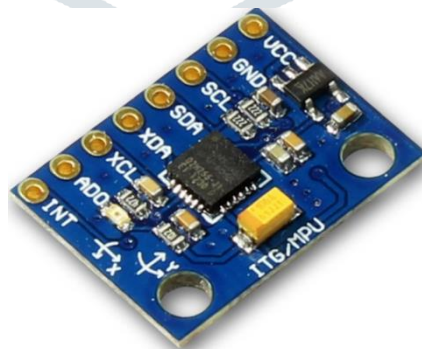


Fig 3. MPU6050 Gyroscopic & Accelerometer Sensor

Accelerometer sensors are very useful in digital technology. Smart phone, smart vehicles, automation industries where smart management is required are some areas where accelerometer are used. MPU6050 is based on Micro-Mechanical Systems (MEMS) technology. This sensor has a 3- axis accelerometer, a 3-axis gyroscope, and an in-built temperature sensor. It can be used to measure parameters like Acceleration, Velocity, Orientation, Displacement, etc. It have Communication: I2C protocol with configurable I2C Address ,Input Power Supply: 3- 5V,Built-in 16-bit ADC provides high accuracy,Built-in DMP provides high computational power,Can be used to interface with other I2C devices like a magnetometer,In-built temperature sensor.

3.2 FLEX SENSOR

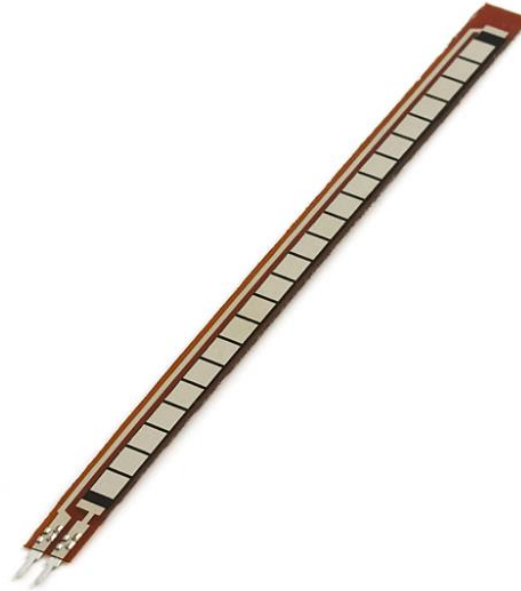


Fig 4. Flex sensor

Flex Sensors are nothing but a variable resistor. The flex sensor resistance changes when the sensor is bent. They are usually available in two sizes 2.2 inches and 4.5 inches. In this Gesture controlled Robotic Arm, a flex sensor is used to control the gripper of the robotic arm. When the flex sensor on the hand glove is bent, the servo motor attached to the gripper rotates and the gripper opens

3.3 ATMEGA328P MICROCONTROLLER



Fig 5. ATmega328P microcontroller

ATMEGA328P is high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards, and this microcontroller is sufficient to run the codes for our sensors and control them .

3.4 RF MODULE

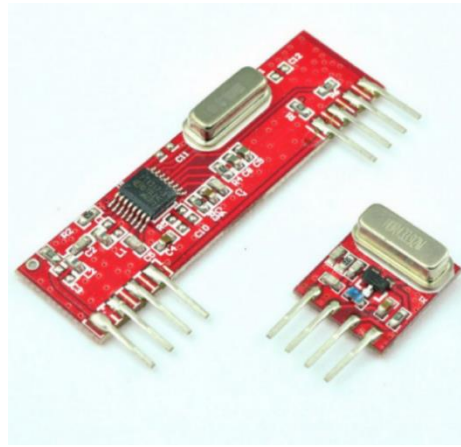


Fig 6. RF module

The RF module, because the call suggests, operates at Radio Frequency. The corresponding frequency variety varies among 30 kHz & three hundred GHz. In this RF system, the virtual information is represented as versions within the amplitude of service wave. This type of modulation is called Amplitude Shift Keying (ASK). Transmission via RF is higher than IR (infrared) due to many reasons. Firstly, alerts via RF can journey via large distances making it appropriate for lengthy variety applications. Also, whilst IR broadly speaking operates in line-of sight mode, RF alerts can journey even if there may be an obstruction among transmitter & receiver. Next, RF transmission is greater sturdy and dependable than IR transmission. RF conversation makes use of a selected frequency not like IR alerts which might be stricken by different IR emitting sources. In our mission we used rf module to transmit and acquire the mpu6050 and flex sensors values.

3.5 SERVO MOTORS

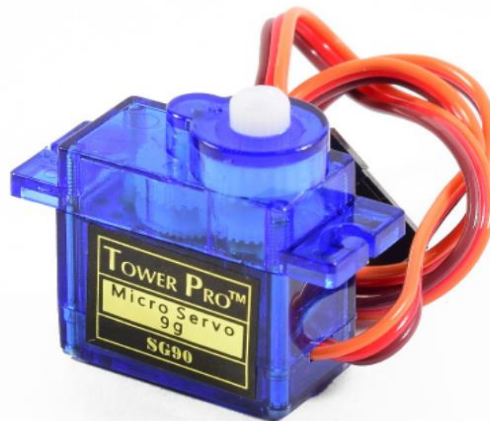


Fig 7. Servo motors

A traditional servo motor converts electric power into rotational motion. To do this, a servo motor typically includes a stator, which acts because the housing, a everlasting magnet rotor and a comments device The servo motor is secured to the body of a gadget or load this is to be controlled. The stator accommodates the motor's electromagnetic feature. When electric cutting-edge flows thru its copper winding, a part of the stator frame may be made magnetically appealing to the rotor. The rotor is the rotating a part of the motor this is coupled to the load. It is made from an output shaft this is focused in an iron mass built of metallic laminates. The rotor is suspended through a couple of bearings retaining the output shaft with inside the middle of the stator. The rotor's magnetic area is made from everlasting magnets which can be embedded with inside the rotor. we've got used them for controlling the gripper , up/down ,left/right, front/back ,actions of our 3d published robot arm.

IV. SOFTWARE REQUIREMENTS

4.1. Arduino IDE

```

sketch_may20a9
#include "Wire.h"
#include "I2Cdev.h"
#include "MPU6050.h"
#include "Servo.h"

MPU6050 mpu;
int16_t ax, ay, az;
int16_t gx, gy, gz;
Servo servo1;
Servo servo2;
Servo myservo;

int val1;
int val2;

int preVal1;
int preVal2;
int pos = 0;

```

Fig 8.Arduino IDE

Arduino IDE (Integrated Development Environment) is the software for Arduino. It is a text editor like a notepad with different features. It is used for writing code, compiling the code to check if any errors are there and uploading the code to the Arduino.

V. SYSTEM IMPLEMENTATION AND RESULTS

When the power supply of both transmitter and receiver was turned ON, then the rf device of transmitter choice connect to the rf device of receiver section. The mpu6050 and flex sensor was mounted on the hand. As it moved in any direction, the X, Y, Z values of current position were changed. When the accelerometer was tilted in right direction it gives X value (angular value) in positive sign and when the accelerometer is tilted in left direction then it gave value in negative sign and at that time the Y value was approximately zero and Z value was approximately one in positive sign. When accelerometer was rotated by 180 degree then value of z become negative. And when the flex sensor is bent its value rises above 500 analog value which is also transmitted. These values were received by another rf in the receiver section. The second Micro controller selects the appropriate motor, out of four motors, wrist motor, grip motor or base motor present in the arm assembly depending upon the range of the values of X, Y, Z coordinates that has been received and that motor was driven.

VI. CONCLUSION

Robots play the vital role in human life where number of tasks can be performed with ease. Robots are having wide range of applications in various fields. Robots are well suited for the areas where human can't enter. The accelerometer based robotic arms can be used in industries where heated metal plates, tablets or other objects are lifted. Such type of systems can be also used to ease handicapped people to drive their wheelchair. This would be a measure application for the society.

VII. REFERENCES

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