

HAND MOTION CONTROLLED ROBOTIC ARM

K Rishika Ravi¹, Komala K V²

Department of Electronics and Communication Engineering, K.S Institute of Technology, Bangalore, India¹⁻²

ABSTRACT: Robotics is one of the emerging technologies in the current science field. Robots are nowadays being used in many different areas to make some complicated works easier in industrial areas, for military purposes, etc. Several universities are working in this field. A robot can perform many physical tasks using human control. Many robots are being developed to work in dangerous conditions which are impossible for humans to do directly, one of them is the Robotic arm. This research aim is to describe simple robot arms that must be controlled by human hand movements. The main component of the system is an accelerometer which depends on the gestures of the hands. With the accelerometer, the data signal which is received is processed with help of Arduino used. The microcontroller is the one that gives the command to therefore move in the desired direction. Here it has technologies of robotics and communications together used. The robot arms can be semi-autonomous which is being used to perform a variety of tasks with great accuracy.

KEYWORDS: Robotics, Accelerometer, Microcontroller, Arduino

INTRODUCTION:

As technology advancement is being developed, the human efforts of doing work are reduced. Apart from using an external device for controlling, it is much easier to communicate by using hand gestures and some applications require human-controlled robots which work accordingly. From the medical field to the industrial field, it cannot work without any commands. A hand gesture-controlled robot is controlled by using hand in place of any other method like buttons, joystick, remotes, or switches. The Robots move according to the gestures made by the finger and hand movements. It requires a person to move their hand to control the robot. This system has a transmitting device that is used in the hand which contains an accelerometer. This system also functions using Arduino where the computer locomotion of the robot is controlled by human hand movements. An accelerometer is a device used to sense the acceleration of gravity of directions. This is used to command the robot to do the required task like moving forward, reverse, left, and right which is performed by the hand movements, the other parts are being controlled by Arduino in which the code is written. These types of wireless robots are being developed and are used in a variety of applications and users. Robotic device not only helps humans to save time but also to increase the productivity, efficiency, reliability, and cost, etc. Robotic technology has played a vital role by providing faster productivity in work results.

METHODOLOGY:

BLOCK DIAGRAM

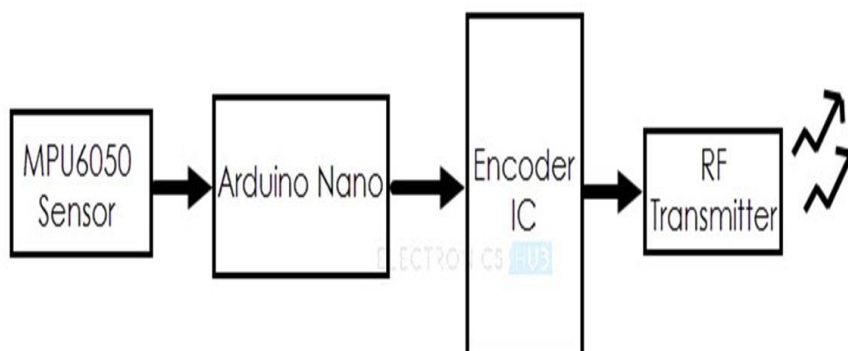


Fig 1 Block Diagram of Transmitter

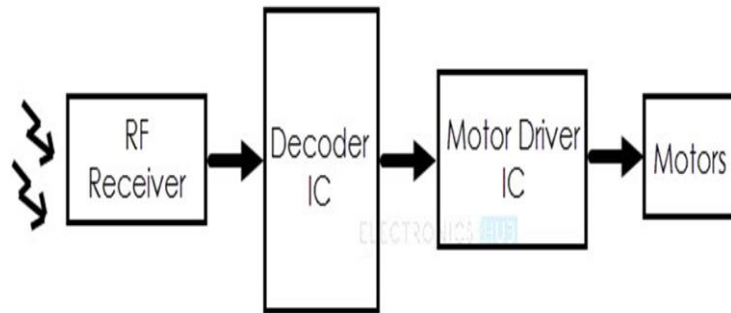


Fig. 2 Block diagram of Receiver

CIRCUIT DIAGRAM

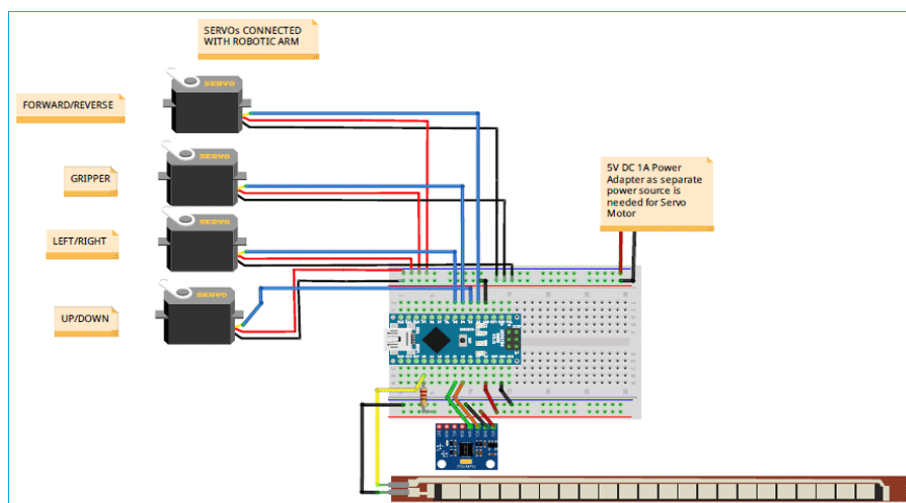


Fig. 2 Circuit Diagram

WORKING:

In our work, a 3D printed robotic arm is used to make a Hand Gesture controlled robotic arm using Arduino Nano, MPU6050 and a Flex Sensor. The position of a robotic arm is being controlled by a hand glove which is attached with an MPU6050 accelerometer and a flex sensor. Arduino Nano is used for controlling the unit. A flex sensor is used to control the motion of the robotic arm and an accelerometer MPU6050 for the movement of robotic hands. Both Arduino Nano and MPU6050 are connected to a regulated 5V supply. The input power supply given to the accelerometer is 3-5V, typically +5V is used. Flex sensors are also called variable resistors in which the resistance changes when the sensor is bent. The MPU6050 accelerometer and flex sensors are mounted onto a hand glove. A wiring connection is used to connect hand gloves and robotic arms it also can be made wireless by using a Bluetooth or RF connection. For programming Arduino Nano for a robotic arm, a complete code is being written where necessary library files are included for controlling servo motors. Once the code is uploaded to Arduino Nano wear the hand glove which is mounted with the MPU6050 and flex sensor. Now when the hand is moved forward, the robotic arm is also moved forward and move the hand up to move the robotic arm upwards. To move the robotic arm left or right, tilt the hand left or right. The flex cable is bent which is attached with the hand glove's finger to open the gripper and then release it to close it.

APPLICATIONS:

- Wireless controlled robots are very useful in many applications like remote surveillance, military etc.
- Hand gesture controlled robots are often employed by physically challenged in wheelchairs.
- Hand gesture controlled industrial-grade robotic arms are often developed

CONCLUSION:

With the advancement in the field of computers, the internet and communication which is made easier for the man for his use. The gesture control using human hand movements can change the technology, it can be easily controlled by hand gestures only. The user can control the robot just by using their hands. This robotic arm is developed to reduce manpower in many fields.

Through this paper, we are in the position to control a robot through gestures. This is the easier way to interact with robots without any special pieces of training. This is a more natural way of controlling devices. The command is given for the robot to navigate in a particular direction in the environment. This can very useful in Bomb diffusion applications and fireworks handling where human life is at risk which helps to save the lives of humans. This will be of great use in future programs.

RESULT:

The Robotic Arm moves when there is the movement of the Human Hand.

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