GESTURE BASED ROBOTIC ARM

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ABSTRACT

In recent years, there are development of robotics and communication on a large scale. Here we are using both the technologies together. This robot can be make more useful by adding applications we are using a robotic arm to the robot which can pick & place object wirelessly.

This is how we can use this robot for research purpose in different field by further manipulation in programming it can use accordingly. The navigation and locating of the mobile robot platform, the motion control of the robotic arm, as well as monitoring, learning, program editing, debugging and execution are embedded in a multiprocessor system developed around a Motion Control solution for which a structured programming language was developed in a microcontroller in today's world, in almost all sectors, most of the work is done by robots or robotic arm having different number of degree of freedoms (DOF's) as per the requirement. This Paper deals with the Design and plementation of a "Wireless Gesture Controlled Robotic Arm ". The system design is divided into 3 parts namely: Accelerometer Part, Robotic Arm and Platform. It is basically an Accelerometer based system which controls a Robotic Arm wirelessly using a small and low cost, 3 axis (DOF's) accelerometer via RF signals.

Keywords: Accelerometer, DOF, Embedded, Microcontroller, RF module,

I. INTRODUCTION

Nowadays, robots are increasingly being integrated into working tasks to replace humans especially to perform the repetitive task. In general, robotics can be divided into two areas, industrial and service robotics. International Federation of Robotics (IFR) defines a service robot as a robot which operates semi- or fully autonomously to perform services useful to the well being of humans and equipment, excluding manufacturing operations. These robots are currently used in many fields of applications including office, military tasks, hospital operations, dangerous environment and agriculture.[1] Besides, it might be difficult or dangerous for humans to do some specific tasks like picking up explosive chemicals, defusing bombs or in worst case scenario to pick and place the bomb somewhere for containment and for repeated pick and place action in industries. Therefore a robot can be replaced human to do work. The robotic arm can be designed to perform any desired task such as welding, gripping, spinning etc., depending on the application. For example robot arms in automotive assembly line perform a variety of tasks such as welding and parts rotation and placement during assembly. In space the space shuttle Remote Manipulator System have multi degree of freedom robotic arms that have been used to perform a variety of tasks such as inspections of the Space Shuttle using a specially deployed boom with cameras and sensors attached at the end effector. The robot arms can be autonomous or controlled manually and can be used to perform a variety of tasks with great accuracy. The robotic arm can be fixed or mobile (i.e. wheeled) and can be designed for industrial or home applications. Robotic hands often have built-in pressure sensors that tell the computer how hard the robot is gripping a particular object. This keeps the robot from dropping or breaking whatever it's carrying. Other end effectors include blowtorches, drills and spray painters which improves their performance. In medical science: "Neuroarm" uses miniaturized tools such as laser scalpels with pinpoint accuracy and it can also perform soft tissue manipulation, needle insertion, suturing, and cauterization.

II. BACKGROUND

George Devol and Joe Engleberger design the first programmable robot „arm‟. This later became the

3. PROPOSED METHOD

STEP-1

We fix one high speed dc gear motor on the rear wheel for forward and backward motion.[2] On the first industrial robot, completing dangerous and repetitive tasks on an assembly line at General Motors (1962).Conventionally, wireless-controlled robots use RF circuits, which have the drawbacks of limited working range, limited frequency range and limited control. Use of a mobile phone for robotic control can overcome these limitations. It provides the advantages of robust control, working range as large as the coverage area of the service provider, no interference with other controllers and up to twelve controls.

Sng Hong Lian developed an obstacle avoidance mobile robot which is controlled by a Fuzzy logic controller which can also measure the distance and climb up the walls in which the Fuzzy logic concept was adopted. Dong-ying Ju worked on the development of Remote control and Monitors system by using GPRS networking concept. Karthi Balasubramanium worked on developing a robot for object recognition and obstacle avoidance using the concepts of image processing and SONAR technology. Yen-Sheng chen developed the wheeled mobile robot that utilizes signals of the ultrasonic sensors to avoid obstacle and fuzzy theory with sensor signals is used to control the speed of the wheeled mobile robot and make it move to target location.

front wheel we fix slow speed dc gear motor for turning right and left position.

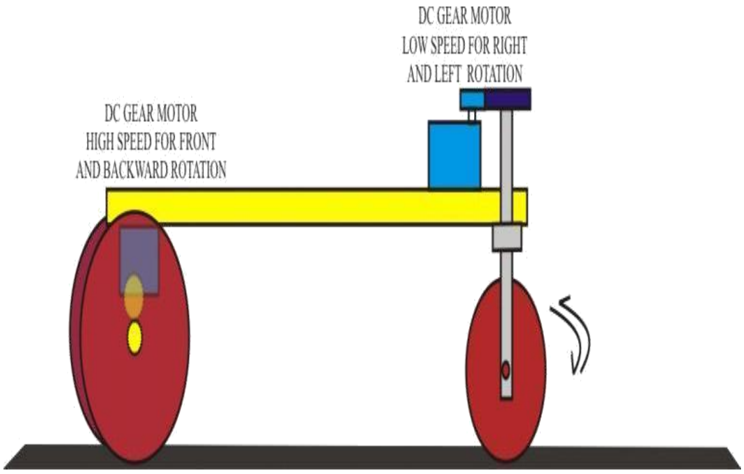


FIG1- Arrangement of motors

STEP-2

We fix three slow speed dc gear motor in our arm to work slowly. We attach one gripper on top of our arm to hold the object.

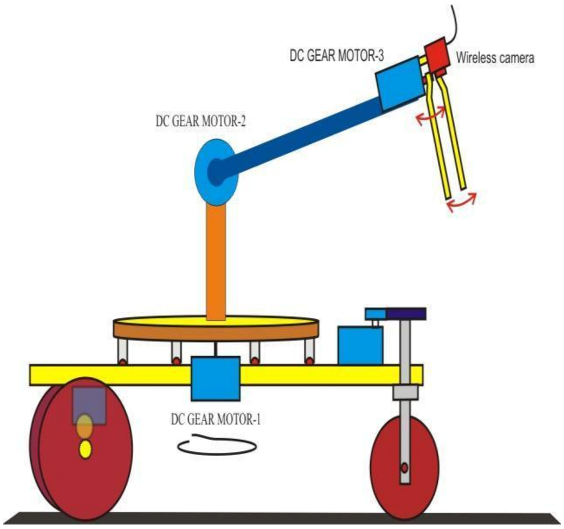


FIG2-arrangement of motors and grippers

STEP-3

We fix one wireless camera and one dummy gun over the arm to transmission video and fight against terrorist. All function of commando is control by microcontroller with help of relay.

IV. IMPLEMENTATION

The accelerometers are connected to the ATmega32 development board which is then connected to the Computer via serial communication. Now the data received by the computer is processed to remove as much noise as possible. Again the ATmega640 development board is connected with the computer through another serial communication channel. we have implemented two motors at the shoulder joint, M1 is to move the arm in Y-Z plane and M2 is for the movement along the X-Z plane. In this way the two motors provide the shoulder joint to be moved in any direction in space. we have implemented three motors at this joint. The Motor M3 is for the movement of the arm along the Z-axis in the X-Y plane. The Motor M4 is used for the bending motion of the elbow and the Motor M5 is for the rotation/twisting of the elbow to wrist portion.[3] [4] [5]

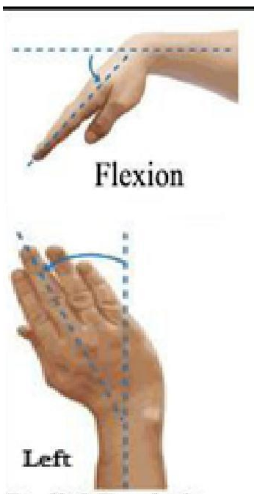
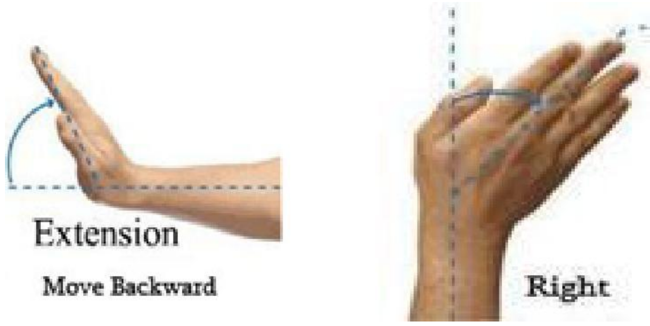


FIG3-Hand gestures

4.1 Accelerometer

An accelerometer measures gravitational force or acceleration. By tilting an accelerometer along its measured axis, one can read the gravitational force relative to the amount of tilt. Most accelerometers available today are small surface mount components, so you can easily interface them to a microcontroller. There are three axes that can be measured by an accelerometer and they are labelled as X, Y and Z. Each measured axis represents a separate Degree of Freedom (DOF) from the sensor—thus a triple axis accelerometer might be labelled as 3 DOF. In this project, only 2 axes namely X and Y are used. The accelerometer used in this paper is ADXL3xx .



4.2 Block Diagram

a)TRANSMITTER-

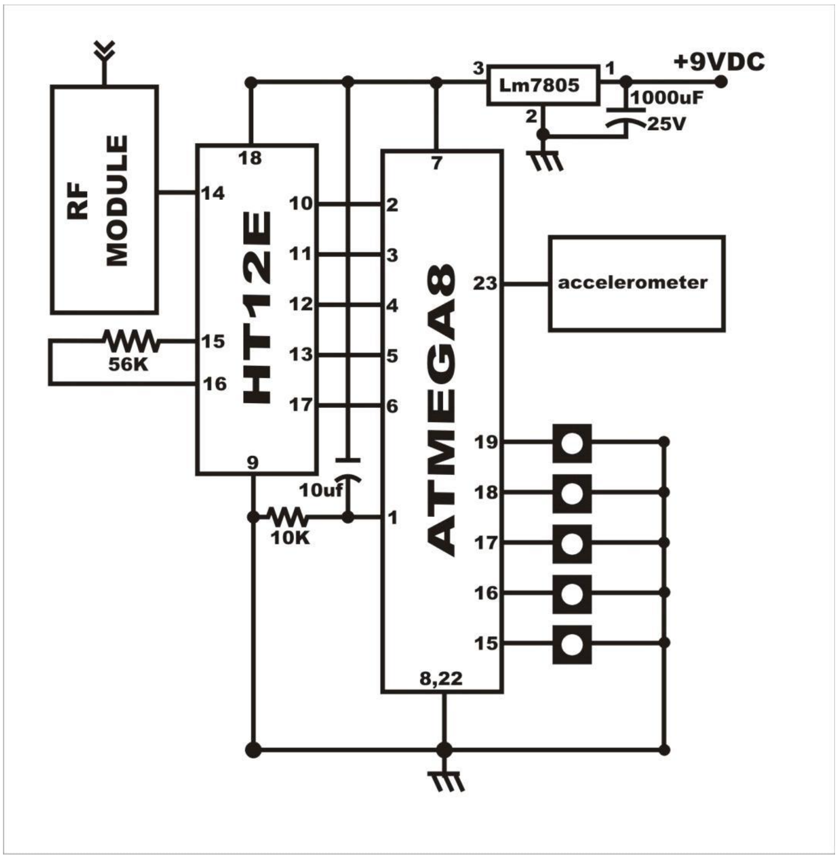


FIG4- Block diagram of transmitter

b)RECEIVER-

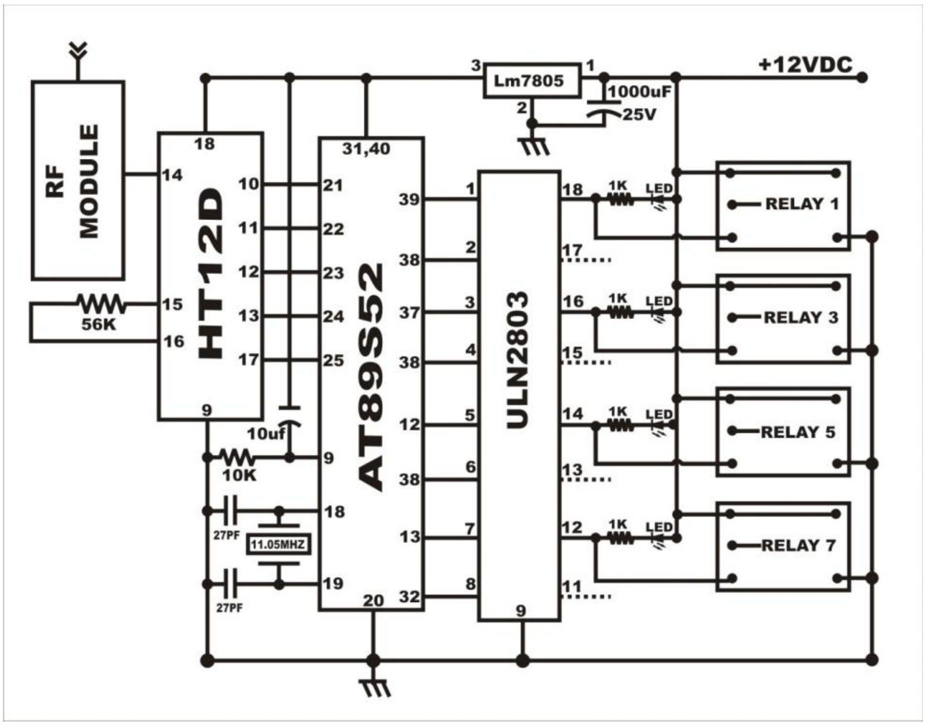


FIG5- Block diagram of receiver

V. CONCLUSION

The objectives of this project has been achieved which was developing the hardware and software for an accelerometer controlled robotic arm. From observation that has been made, it clearly shows that its movement is precise, accurate, and is easy to control and user friendly to use. The robotic arm has been developed successfully as the movement of the robot can be controlled precisely. This robotic arm control method is expected to overcome the problem such as placing or picking object that away from the user, pick and place hazardous object in a very fast and easy manner. The primary objective is to make the Robotic arm, which comprises of three stepper motors, to interface with the Intel 8051-based micro-controller. It provides more interfaces to the outside world and has larger memory to store many project is to design the robotic arms that able to carry out certain task. The revolute robotic arm is able to move similar to human arm. The arm is designed so it is able to rotate clockwise and counter clockwise (180 degrees) and ableprograms. The main objective of this to pick and place objects. The arm needs to be as light as possible in order to maximize payload. The second main objective is to design and fabricate the serial servo controller circuit board that will be used to control the robot arm servo via a serial connection to a Personal Computer (PC)/joystick. This system would make it easier for man to unrivalled the risk of handling suspicious objects which could be hazardous in its present environment and workplace. Complex and complicated duties would be achieved faster and more accurately with this design. It is used in many applications ranging from industrial equipment to office automation. There may be some limitations High cost, When stopped the motor"s rotor continues to move back and forth one pulse, so that it is not suitable for prevent vibration since the servomotor tries to rotate according to the command pulses, but lags behind, it is not suitable for precision control of rotation.[7]

VI. FUTURE SCOPE

We can theorize a likely profile of the future robotic arm based on the various research activities that are currently being performed.[6] The features and capabilities of the future robotic arm will include the following (it is unlikely that all future robotic arms will possess all of the features listed).

•Sensor capabilities: the robotic arm will have based a wide array of sensor capabilities including vision, tactile sensing, and others. Progress is being made in the field of feedback and tactile sensors, which allow a robotic arm to sense their actions and adjust their behaviour accordingly. This is vital to enable robotic arms to perform complex physical tasks that require some active control in response to the situation. Robotic manipulators can be very precise, but only when a task can be fully described.

•Intelligence: The future robotic arm will be an intelligent robot, capable of making decisions about the task it performs on high-level programming commands and feed back data from its environment.

•Mobility and navigation: future robotic arm will be mobile, able to move under their own power and navigation systems.

•Universal gripper: robot gripper design will be more sophisticated, and universal hands capable of multiple tasks will be available.

•Systems integration and networking: robotic arm of the future will be "user friendly" and capable of being interfaced and networked with other systems in the factory to achieve a very high level of integration.

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