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HAND MOVEMENT RECOGNITION BY ROBOTIC ARM

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ABSTRACT:
A humanoid robotics is a new challenging field. To co-operate with human beings, humanoid robots not only have to feature human like form and structure, but more importantly, they must prepared human like behavior regarding the motion, communication and intelligence. In today's world there is an increasing need to create artificial arms for different inhuman situations where human interaction is difficult or impossible. We have highlighted the importance and use of robotics applications in developing countries. Our Robotic arm that has five separate movements to grab or release, lift or lower, rotate wrist and pivot sideways controlled servo motors.

KEY WORDS:—Servo Motors, ATMEGA 328, Micro controller, Arduino, Potentiometer.

INTRODUCTION:

Nowadays, robots are increasingly being integrated into working tasks to replace humans specially 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. 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.

This paper deals with a robotic arm whose objective is to imitate the movements of a human arm usingaccelerometers as sensors for the data acquisition of the natural arm movements. This method of control allows greater flexibility in controlling the robotic arm rather than using a controller where each actuator is controlled separately. The processing unit takes care of each actuator's control signal according to the inputs from accelerometer, in order to replicate the movements of the human arm.

A robotic arm is a robot manipulator, usually programmable, with similar functions to a human arm. Thelinks of such a manipulator are connected by joints allowing either rotational motion (such as in an articulated robot) or translational (linear) displacement. The links of the manipulator can be considered to form a kinematic chain. The business end of the kinematic chain of the manipulator is called the end effectors and it is analogous to the human hand. The end effectors can be designed to perform any desired task such as welding, gripping, spinning etc., depending on the application. 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.

Fig: 1: Audrino based Robotic Arm

Designing of Robotic Arm:

It consists of following parts:

- ATMEGA-328
- Arduino Micro controller
- Potentiometer
- Servo motor

a) ATMEGA 328

The ATMEGA-328 has 32KB of flash memory for storing code. It has also 2KB of SRAM and 1KB of EEPROM. The ATMEGA on the Arduino comes preburned with boot loader that allows you to upload new code to it without the use of an external hardware programmer.

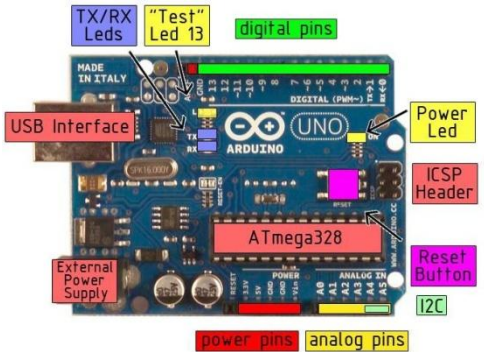


Fig: 2.1: Atmega 328

b) AUDRINO MOTOR CONTROLLER

The ARDUINO is a open source, which means Hardware is reasonably priced and development software is free. The ARDUINO programming language is a specified version of C/C++. The ARDUINO is a micro controller board based on the ATMEGA-328. It has 14 input / output pins. 6 analog pins, 16 Hz crystal oscillator, a USB connection a power jack, an ICSP header and reset button. It contains everything needed to support the micro controller, simply connect its to a computer with a USB cable or power it with aAC to DC adapter or battery to get a started. An important feature of the ARDUINO is that you can create a control program on the host PC, download it to the ARDUINO and it will runautomatically.

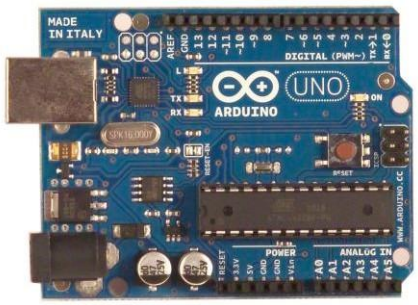


Fig.2.2: Arduino microcontroller

c) POTENTIOMETER

A potentiometer is a simple knob that provides a variable resistance, which we can read into the Arduino board as an analog value. In this example that value controls the rate at which an LED blinks, the potentiometer is a perfect demonstration of a variable voltage divider circuit. The voltage is divided proportionate to the resistance between the middle pin and the ground pin.

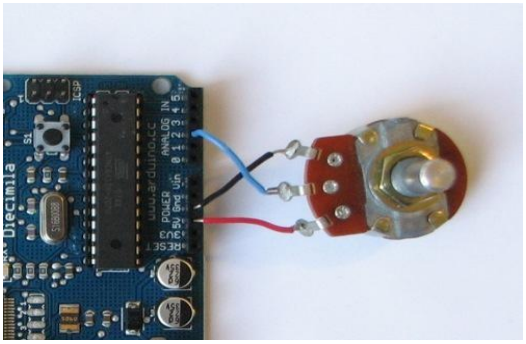


Fig: 2.3: Circuit diagram of potentiometer

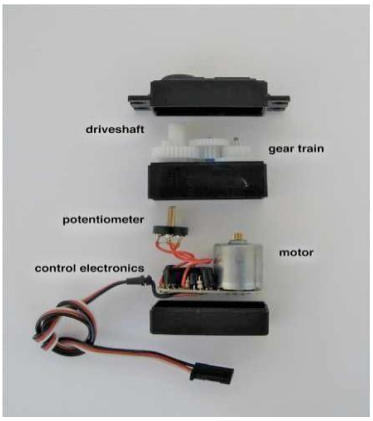
d) SERVO MOTOR

A servo motor has everything built in: a motor, a feedback circuit, and most important, a motor drive.
It just needs one power line, ground and one control pin.
Following are the step to connect a servo motor to the Arduino:

1. The servomotor has a female connector with three pins. The darkest or even black one is usually the ground. Connect this to the ArduinoGND.
2. Connect power cable that in all standards should be red to 5V on theArduino.
3. Connect the remaining lines on the servo connector to the digital pin on theArduino.

Fig: 2.4: A Servo motor

A Servo motor was a taken as a part to show the internal parts. We can see regular DC motor connect to a gear box and a potentiometer that gives the feedback for angle position.



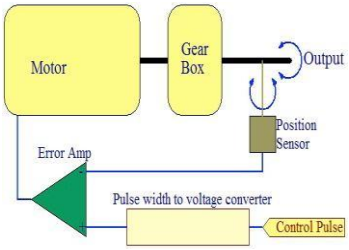


Fig: 2.5: internal part

APPLICATIONS

Therobotic armis used for multiple industrialapplications, from welding, material handling, and thermal spraying, to painting and drilling. Therobotictechnology also provides human-like dexterity in a variety of environments. These may include servicing Nuclear Power Stations, Welding and repairing pipeline on the Ocean floor, remote servicing of Utility power lines or cleaning up Radioactive and other Hazardous waste. Most industrial robots work in auto assembly lines, putting cars together.

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.

REFERENCES

1. Design Analysis of a Remote Controlled “Pick and Place” Robotic Vehicleby B.O. Omijeh (International Journal of Engineering Research and Development e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com Volume 10, Issue 5 (May 2014), PP.57-68)
2. Design of a Robotic Arm with Gripper & End Effector for Spot WeldingbyPuran Singh (Universal Journal of Mechanical Engineering 1(3): 92-97, 2013).
3. Design and Development of Search and Rescue Robotby Khalil AzhaMohdAnnuar, Muhammad HaikalMdZi.(International Journal of Mechanical & Mechatronics Engineering IJMME-IJENS Vol:16 No:02)
4. Survey of Robotic Arm and ParametersbyRitu Tiwari (International Conference on Computer Communication and Informatics (ICCCI -2016), Jan. 07 – 09, 2016, Coimbatore, INDIA

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