IOT BASED MICRO-SERVO ROBOTIC ARM.

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ABSTRACT

Robotics nowadays is becoming more popular due to various applications. The system implements Inverse Kinematics of a Robotic Arm and increase its working using Artificial Intelligence, by means of object trace. It will help to reach the goal of picking and placing the desired object. Real-Time system is used to reach complex hardware functionality. The aim is to design an algorithm and implement it on a robotic arm having an embedded processor. The detected image is then organized to trace the object in real time. Manipulation is a very important feature of robotics, which is necessary for fulfil simple and difficult tasks from painting cars in a factory to lifting casualty out of rubble. No ideal solution to manipulation has been identified yet that maximizes robustness and minimizes cost. Some particularly important considerations in manipulation are obedience and high fidelity force control. Force sensing and obedience at each robot joint can allow a robot to safely interact in emorphous and unknown environments.

INTRODUCTION

The term robot is coming from the Czech word robot, which means, "Forced labor". Most common fabricating robot is the Robotic Arm, which is a mechanical arm, usually programmable which perform the same function or similar to the human The application of robotics field is predominantly used in the field of research, laboratory based work, industrial work to computerized process and reduce the human errors. This paper is narrate the design of mechanical structure of a robotic arm. This robotic arm is often specify to move an object from one place to another place. One kind of example of this application is in an industrial area where need to move a significant object like tank or container or other object. The advantage of computerized process results is faster completion time with lowest errors. This paper also describes the execution of a robotic arm with switching controlled. The application of the force controlled function can be seen in the industrial/manufacturing environments.

LITERATURE SURVEY

In described to developed a human-machine communication gathering between the Leap Motion controller and the 6-DOF Jaco robotic arm. An algorithm was developed to allow an perfect mapping between the user hand movement, followed by the Leap Motion controller. The system should allow for a more natural human-computer interconnection and a plane manipulation of the robotic arm. The applications of this human-robot interconnection discussed in relation with contexture Assisted Living, where some use case scheme was introduced.

To build a robotic arm controlled by natural human arm movements whose data is obtained through the use of accelerometers has been proposed. The development of this arm was based on ATmega32 and ATmega640 platform along with a personal computer for signal processing. Ultimately, this pattern of the arm may be awaited to overcome the problem such as placing or picking dangerous objects or non-hazardous objects that were far away from the user.

PROPOSED SYSTEM

The pick and place robot being executed to ease the process of sorting, process of moving heavy materials etc. Normally the transfer process of the heavy materials is being carried out, using man power and if the transfer process is repeated for a period of time, it can cause abrasion to the operator. By using the specific robot the operator, will no longer have to flex and lift up heavy loads thus stopping injuries and increasing the organization of the work. Operator will make faults whether small or big in a while. In the industrial world, the industry cannot provide to take any kind of faults. As every mistake is costly whether learner of time, money and material.

PROBLEM DEFINITION

The pick and place robot being execute to moderate the process of sorting, process of moving heavy materials etc. Usually the convey process of the heavy materials is being execute, using man power and if the transfer process is repeated for a period of time, it can cause wounds to the operator. By using the specific robot the operator, will no longer have to curve and lift up heavy loads thus preventing wound and increasing the organization of the work. Operator will make mistakes whether small or big in a while. In the industrial world, the industry cannot afford to take any kind of mistakes. As every mistake is costly whether interns of time, money and material.

BLOCK DIAGRAM

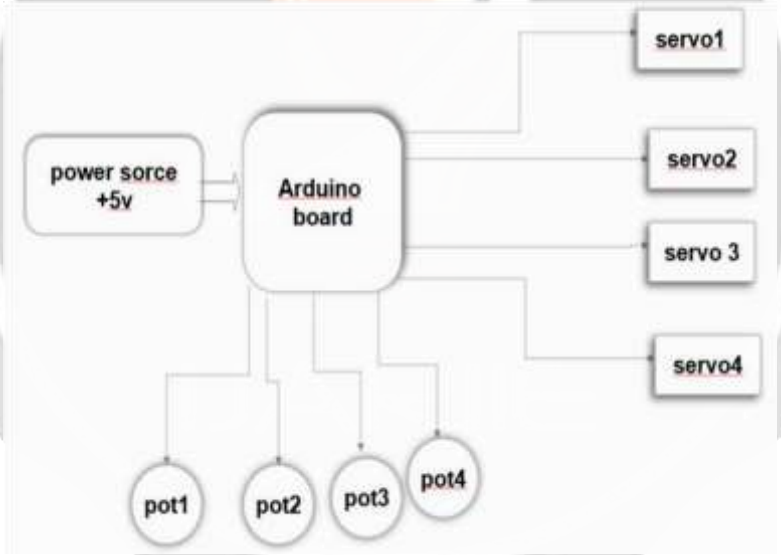

Fig show the Block diagram representing the robotic arm , The components here used are arduino uno board, capacitors, servo SG90,10k pot variable resistor. Now talking about servo motors they are unnecessarily used when there is a need for a exactly stick movement or position. These are not suggested for a high sped applications. Servo motors are suggested for low speed, medium torque and exactly position application. So they are perfect for designing robotic arm. Servo motor are present at different shapes and sizes. We are going to use small servo motors (four) a servo motor will have mostly three wires positive voltage another is for ground and the last one is for position setting. The RED wire is connected to power, the brown wire is grounded and the orange wire is for signal.

1. The arm has been built with cardboards and the individual parts have been locked to servo motors. Arduino Uno is programmed to control servo motors. Servos motors are acting as joints of Robotic arm here. This setup looks a like aRobotic Crane or we can convert it into a Crane by easy ways
2. This Robotic Arm is controlled by four Potentiometer with which we attach each with potentiometer that is used to control each servo. We can move these servos by rotating the potentiometer to pick some object, with some practice we can easily pick and move the object from one place to another. Here we use low torque servos here but we can use more powerful servos to pick heavy object.

3. Program done using Arduino 1.6.10.
4. We connect the circuit according to circuit diagram.
5. Now the voltage provided by these variable resistor voltage which represents position control into ADC channels of Arduino.
6. We are going to use four ADC channels of UNO from A0 to A3. After the ADC initialization, we will have digital value of pots representing the position needed by user.
7. We will take this value and match it with servo position.
8. The robotic arms takes a perfect scaling that is cardboard, foam board is cut using measuring a servo are fitted according so that position of one servo motor does not affect the position of other servo motor.
9. As we rotate the 10K pot the value changes accordingly and we get rotation in the output of servo motor.
10. The voltage across variable resistors is not completely linear; it will be a noisy one. So to filter out this noise, capacitors are placed across each resistor.

WORKING

Arduino has six ADC channels. Here four are used for the robotic arm. The UNO ADC is of 10 bit resolution so the integer values ranging from 0-1023(2^10=1024). This means that the input will map voltages from 0 and 5 volts into integer values between 0 and 1023. So for every (5/1024=4.9mv) per unit. As all the UNO ADC channels has a default reference of 5V for ADC conversion at any input channel. Since some sensors provide voltages from 02.5V, with a 5V reference we get lesser accuracy, so we have a instruction that enables us to change this reference value. So for changing the reference value we have ("analogReference();").

As default we get the maximum board ADC resolution which is 10 bits, this resolution can be changed by using instruction (”analogReadResolution(bits);"). This resolution change can come in some cases.Now if the above condition are set default, then we can read value from ADC of channel '0' by directly calling function "analogRead(pin);", here pin represents pin where we connect analog signal. The value from ADC can be taken into an integer as float voltage value=analogRead(A0); by this instruction the value after ADC gets stored in the integer "Voltage value".

We will have to use ADC channel of Arduino UNO with the help of above function:

a. analogRead(pin);
b. analogReference();
c. analogReadResolution(bits);

Now talking about servo, the arduino Uno has a feature which enables us to control the servo position by just giving the degree value. Say if we want the servo to be at 60, we can directly represent the value in the program. The Servo header(Servo.h) file takes care of all the duty ratio calculations internally.

ADVANTAGES

- Grasping and holding objects and then move them to a new location, or mixing with other fluids. (used in laboratories that trust such arms to work within a poisonous environment and so do not imperil the analyzer. Building cars.
    - Recovering doubtful objects without imperilling humans.
- Dig trenches.
- A source of entertainment and education.
- An me of an anthropocentric robot.
- Used in surgery.
- Used in farming.

show the arm are using for the architecture drawing part and agricultural motive also we can use ad pick and place .

DISADVANTAGES

- This project is a small scale manufacturization
- it can pick up only small and light objects.
- On large scale this project may become expensive and its circuit difficulty increases.
- On large scale may become dangerous due to uncontrolable robotic arm it can harm physically.

FUTURE SCOPE

- Future improvement can include further improvement that is by adding 360 degree rotary servo motor and making it more stable. Setup can be improved that will pick more weight compared to present model.
- Ultrasonic sensor can even be placed on the arm so that it can identify and at the same time pick the object and keep it on other place.
    - The robot so programmed for pick and place operation can be made flexible and more organized by giving the response and making it to work on own than any human involvement. It can be made possible by image processing tool collaborated with this Arduino. The features that can be added on to improve its efficiency, make it operate on its own thought without any human involvement are line follower, wall hugger, barrier avoider, metal detector, bomb diffuser etc.

CONCLUSION

The main focus of this work was to design, and programme robotic arm the robot arm was designed with five degrees of freedom and expert to accomplish accurately simple tasks, such as light material handling the robot arm is provided with several servo 40 motors which do links between arms and perform arm movements. A microcontroller that drives the servo motors with the potential of modifying position The programming is done on ATMEGA-328p Microcontroller using Arduino programming. The potentiometers are also used to detect the angle of rotation and the signals are then sent to the microcontroller. And you can control the robotic arm also using android device, in today's world, this Robotic arm has turned out very kindly. Expect Robotics and Automation, these kinds of arms have applications in other fields