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Fabrication of Painting Robot based on automated Technology

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Abstract: The project is based on wall painting robot, controlled through wireless technology. Here we are going to develop a mechanism, which will run through the rope and using Pnumetic mechanism, we can start our painting automatically by robot. One of the major part is the automation for providing good feedback and control of the mechanism consisting of actuators and other mechanical devices.

Introduction

This is an era of automation where it is broadly defined as replacement of manual effort by mechanical power in all degrees of automation. The operation remains an essential part of the system although with changing demands on physical input as the degree of mechanization is increased.

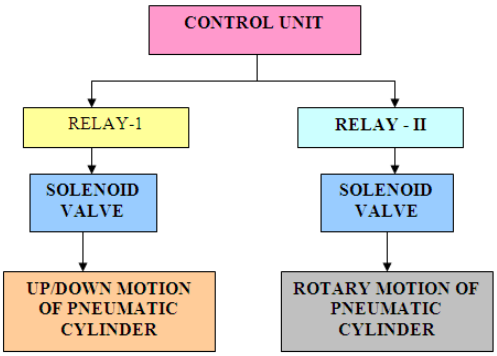
Degrees of automation are of two types, viz.

- Full automation.
- Semi automation.

In semi automation a combination of manual effort and mechanical power is required whereas in full automation human participation is very negligible.

Block Diagram

We use this concept for project '**SPRAY PAINTING ROBOT**', with electronic control unit.



Literature Review

In this project, the discussions are more about the previous researched that have been done. In 'the never-ending effort of the humanity to simplify their daily work, came the birth of the automatic manufacturing. Automatic manufacturing has become an important motivation to develop more flexible automated manufacturing techniques, where the original idea to gain more production rate for an industry (Olsson, 2002).The discussion on how a robotic spraying automatic would boost up a production rate and how simulation can help overcome the paint constrains

Robotics technology embraces multiple disciplines such as structural mechanics, material physics, power electronics, computer science, software engineering, etc. The continuous progress and discrete breakthroughs in respective discipline have altogether contributed to a remarkable improvement in performance of industrial robots (Olsson, 2002) .A robot is cheaper, can move faster and more accurate, with higher payload and is more reliable than ever before. The transition time has been reduced through the use of robot simulation systems, often referred as CAR (Olsson, (2002). The robot task can in this way be simulated using a virtual model of the work cell at a time where only digital prototypes of the work piece exist. The risk of technical failure for a transition can be reduced. The robot task description can even be transferred to the robot system to reduce the very time-consuming robot programming phase (referred as off-line Programming).

Introduction about Robotics:-

A robot manipulator can be divided into two sections a body and arm assembly and wrist assembly there are usually three degree of freedom associated with the wrist.

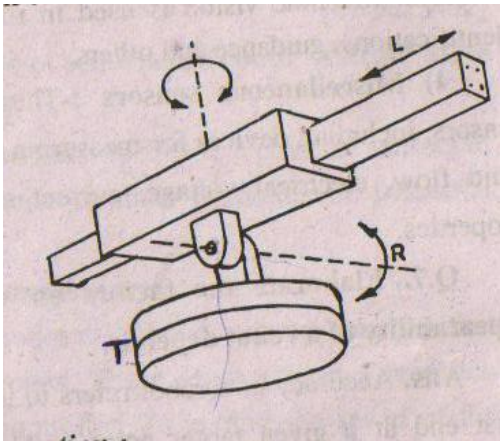
At the end of manipulator wrist is a device related to the task that must be accomplished by the robot. The device called end effectors is usually either

1) A gripper for holding a work peace or

2) A tool performing some process is used to position the end effecter and the robot wrist is used to orient the end effecter.

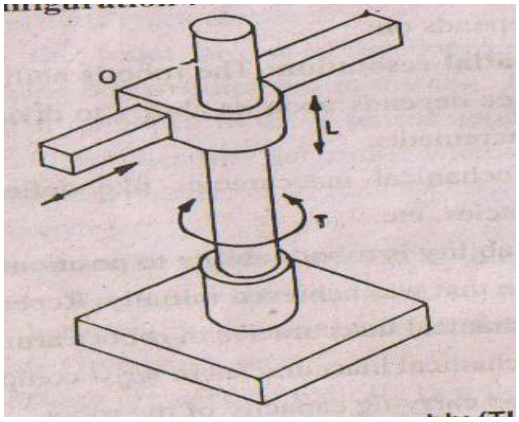
Five Configurations are:-

1) POLAR CONFIGURATION;'-



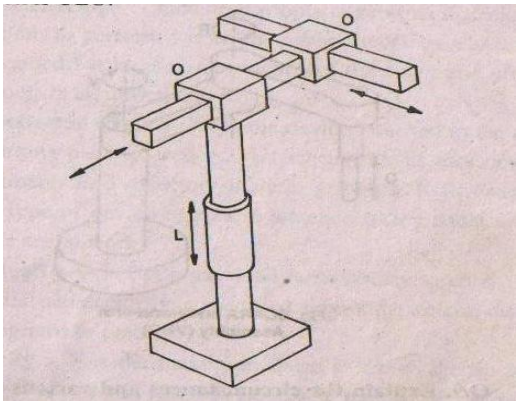
This configuration consist of sliding arm actuated relative to the body that can rotates about both a vertical axis (t joint) a horizontal axes (r joint)

2) CYLINDRICAL CONFIGURATION:-



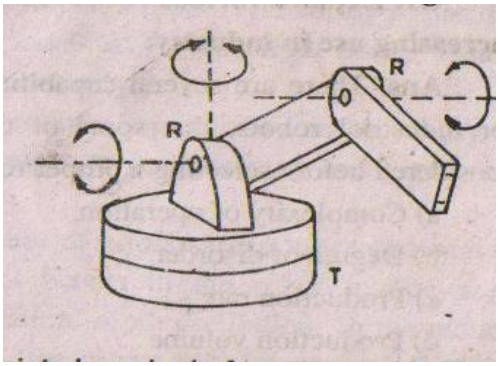
This configuration consists of a vertical cilium relative to which an arm assembly is moved up or down. The arm of the column our figure were a possible way in which this configuration can be constructed, using t joint to rotate Colum about its axis.

3) CARTESIAN CO-ORDINATE ROBOT:-



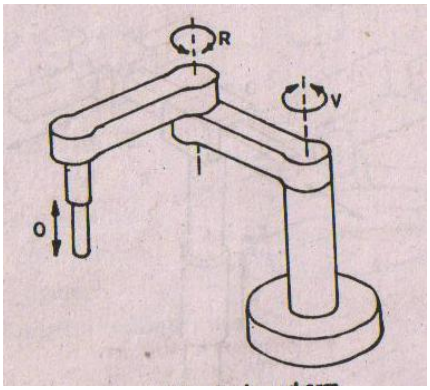
Other names for this configuration include rectilinear robot and xyz robot. As shown in fig. it is composed of three sliding joint two of which are orthogonal.

3) JOINT ARM ROBOT:-



This robot manipulator has the general configuration of human arm consist of a vertical column that swivels about the base using T joint. At the top of the column is a shoulder joint his output link connect to an elbow joint.

4) SCARA:-



SCARA is a selective comp liana assembly robot arm. This configuration is similar to the jointed arm

robot accept that the shoulder and elbow rotational axis are vertical which means that the arms is very rigid in the vertical direction, but compliant in the horizontal direction. This permit the robot to perform insertion task in vertical direction, where some side to side alignment may be needed to mate the two part properly.

SCARA robo mainly performs the function of loading and unloading the material into the machine, it is also used for lifting and putting down material. For these functional reasons SCARA robo are used

Problem Statement

In general, the use of applying a layer coat of paint or any other kind of substance, which, covers up partial or entire product, are to extend the life of the good or product, to give an extra credit on the product's looks or finishing. As we know, the consumers will be attracted to the product if the products are well fashioned or in other word color fill and bright. In order to produce a skillful panting job continuously without compensate more time, a design of a robotic automation system should be placed in the production line. The result of robotic paint automation would not downgraded the finished good, in fact, the use of a robotic spraying automation would give a similar finish to all products and the output of the productivity can be increased enormously. In this case, the consistency and the repeatability of the robot motion itself are placed in a good benefit, where the use of robotic spraying automation on finish goods can be done faster and with a lower cost without losing the quality of the finish goods. The facts that robot spraying automation keeps a lower cost is supported by the & acts that, amount of paint that are used in a single product is fixed without any lost of paint. As we know, a robotic automation system would be a high capital expenditure but, the products that are produced with a great quantity and quality would return back the cost of the robotic automation itself. (Shanon, 1999)

Objective:

The objectives of this project are to design and develop a spraying robot that will be applied wall painting. The understanding of the system should be sufficient during this project. The objective is carried out through a fabrication with the reason that the cost might be too expensive for a student to carry out. A robot system fabrication is a lot more portable and would help ease the student to comply. The objectives o this project conduction is stated below:

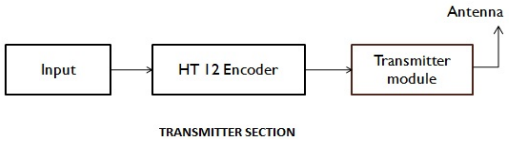
i. To develop a suitable spraying robot to adapt in a certain workplace for wall painting

ii. To propose a suitable robot work cell for the spraying.

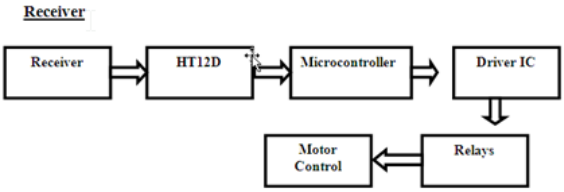
Block Diagram

Controlling unit:

Transmitter



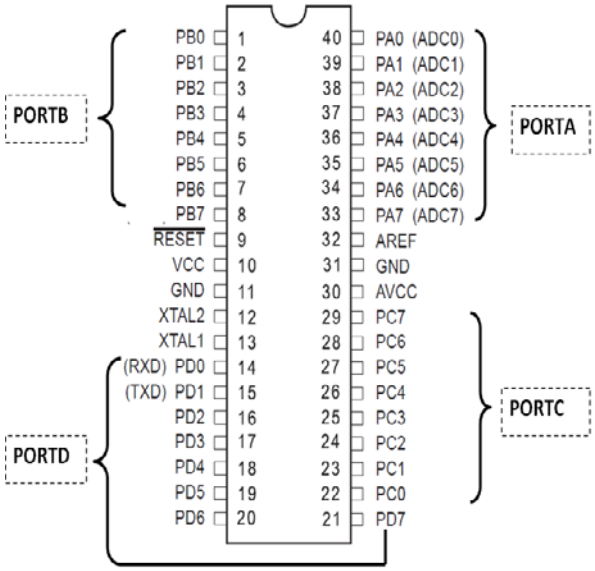
TRANSMITTER SECTION

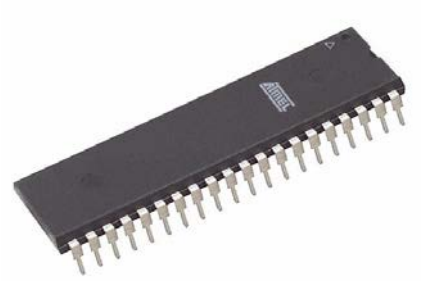


Hardware

- ATmega16 microcontroller
- L293D Motor Driver IC
- 7805 Voltage Regulator IC
- Relays
- DC Motors

Microcontroller ATMega16





The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega16 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed.

Pin Descriptions

VCC Digital supply voltage.

GND Ground.

Port A (PA7..PA0): Port A serves as the analog inputs to the A/D Converter. Port A also serves as an 8-bit bi-directional I/O port, if the A/D Converter is not used. Port pins can provide internal pull-up resistors (selected for each bit). The Port A output buffers have symmetrical drive characteristics with both high sink and source capability. When pins PA0 to PA7 are used as inputs and are externally pulled low, they will source current if the internal pull-up resistors are activated. The Port A pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Port B (PB7..PB0): Port B is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port B output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port B pins that are externally pulled low will source current if the pull-up resistors are activated. The Port B pins are tri-stated when a reset condition becomes active, even if the clock is not running.

Port C (PC7..PC0): Port C is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port C output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port C pins that are externally pulled low will source current if the pull-up resistors are activated. The Port C pins are tri-stated when a reset condition becomes active, even if the clock is not running. If the JTAG interface is enabled, the pull-up resistors on pins PC5(TDI), PC3(TMS) and PC2(TCK) will be activated even if a reset occurs. Port C also serves the functions of the JTAG interface and other special features of the

Port D (PD7..PD0) Port D is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port D output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port D pins that are externally pulled low will source current if the pull-up resistors are activated. The Port D pins are tri-stated when a reset condition becomes active, even if the clock is not running.

RESET Reset Input. A low level on this pin for longer than the minimum pulse length will generate a reset, even if the clock is not running. Shorter pulses are not guaranteed to generate a reset.

XTAL1 Input to the inverting Oscillator amplifier and input to the internal clock operating circuit.

XTAL2 Output from the inverting Oscillator amplifier.

AVCC AVCC is the supply voltage pin for Port A and the A/D Converter. It should be externally connected to VCC, even if the ADC is not used. If the ADC is used, it should be connected to VCC through a low-pass filter.

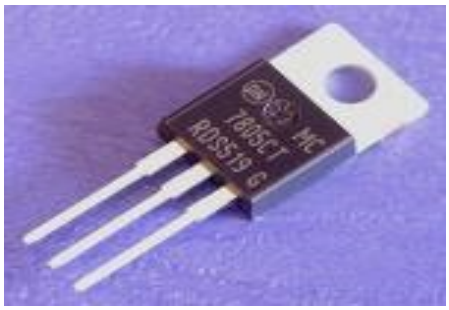
AREF AREF is the analog reference pin for the A/D Converter.

L293D Motor Driver IC:

L293D IC is basically used for driving the inductive loads like DC motors, stepper motors, and relays. It is a 16 pin DIP IC .It will simply amplify the logical input combinations from the microcontroller IC to drive the inductive loads like DC motor in our case.
With the help of L293D IC we can drive two motors simultaneously at a time. It has four I/P pins and four O/P pins for controlling the devices by using microcontroller. For a single motor the combinations of two I/P are used for taking the I/P from the microcontroller and after amplification the corresponding two O/P combinations are connected **with motor.**

7805 Voltage Regulator IC:

It is a three pin IC used as a voltage regulator. It converts unregulated DC current into regulated DC current.



Scope of Study:

The scope of study is based on the objective of the project. Simulation of the spraying robot automation is carried out based on the specific task of the project. In this project, the specific task is defined as the spray paint of the hiture door .The designs of the simulation are depending on the work piece and the work environment. The method is to handle an offline programming simulation.

Need For Automation

Automation can be achieved through computers, hydraulics, pneumatics, robotics, etc., of these sources, pneumatics form an attractive medium for low cost automation. The main advantages of all pneumatic systems are economy and simplicity. Automation plays an important role in mass production.

Advantages

- Low cost intelligent robot
- Portable in size and Easy transportable
- Since the project is based on the sensor, it is compact and swift and response.
- No external devices are used here to control it.
- The medium is air; the operation of the arm movement is fast.

Disadvantages

- Nozzle adjustment is done by manually
- This system operated in pneumatics, so we need air tank or compressor

Applications

- Industrial Application
- Medium scale painting industries

Conclusion

On the end of the introduction chapter, a brief understanding of robot definition, benefits, advantages and the purpose of the project is properly introduced.

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