

DESIGN AND FABRICATION OF PRISMATIC PAINTING ROBOT

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Abstract:- We have design the prismatic robot wall painting machine. In this project the cuboidal frame is made of Aluminum and spray gun is mounted on one of the face of the frame. The compressor and the battery is mounted on the base of the frame. Arduino and motor drive is also mounted on the base of the frame and motor pulley mounted on the top of the frame. We have performed this project so that we can satisfy the criteria of simplicity, low weight, low cost and fast painting time. The Arduino and motor drive is used to guide the motion and control the spray gun and motion of the mobile base.

Keywords: Automation, Robotics, Arduino, Design, Prismatic

1. Introduction

The advent of new high-speed technology and the growing computer Capacity provided realistic opportunity for new robot controls and realization of new methods of control theory. This technical improvement together with the need for high performance robots created faster, more accurate and more intelligent robots using new robots control devices, new drives and advanced control algorithms. This project describes a new economical solution of robot control systems. The presented robot control system can be used for different sophisticated robot applications. Such as prismatic-prismatic wall painting robot. In his project we show that how we control the movement of the any ROBO with the help of wireless RF control logic. In this project we control the base for all the direction. And rotate the robot for all direction. In this project we use two circuit, one as a transmitter and second as a receiver. In the transmitter circuit we use ten switches as a transmitter and in the receiver we use three DC motors to drive a robotic arm with all movement. The terms robot and robotics are only recently used. The term robot was first introduced by a Czech dramatist, karelcapek in his 1921 play "rossum's universal robots". He was referring to a perfect and tireless worker performing manual labour jobs for human beings. Isaac Asimov, coined the word robotics as the science of the study of robots, in his science fiction stories about robots in 1940s. Webster's New World Dictionary, 1988, defines robotics as 'the science or technology of robots, their design, manufacture, application, use etc.

2. Design Analysis

Systems design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development.

| S.No. | Parameters | Values |
|-------|----------------------------------|---------------------------------------|
| 1 | Density | 7850 kg/m ³ |
| 2 | Coefficient of thermal expansion | 1.2e-005 c-1 |
| 3 | Specific heat | 434 JKg ⁻¹ c ⁻¹ |
| 4 | Thermal conductivity | 60.5W m ⁻¹ c ⁻¹ |
| 5 | Resistivity | 1.7e-007 ohm m |
| 6 | Compressive yield strength(Pa) | 2.50E+08 |
| 7 | Tensile yield strength | 2.50E+08 |
| 8 | Tensile ultimate sterength | 4.60E+08 |
| 9 | Strength coefficient(Pa) | 9.20E+08 |
| 10 | Strength exponent | -0.106 |
| 11 | Ductility cofficient | 0.213 |
| 12 | Ductility exponent | -0.47 |
| 13 | Young modulus(Pa) | 2.00E+11 |
| 14 | Poission's ratio | 0.3 |
| 15 | Bulk modulus(Pa) | 1.67E+11 |
| 16 | Shear modulus(Pa) | 7.69E+10 |
| 17 | Environment temperature | 22°C |

3. Required Component- Robots are used to do work very precise and complete the task in specified time. The following components are required to make a prismatic robot for painting purpose.

3.1 Spray Gun

The air brush led to the development of the spray gun; a similar device, that typically delivers a higher volume of paint and for painting larger areas



Figure 1. Spray Gun

3.2 Compressor

An air compressor is a device that converts power (usually from an electric motor, a diesel engine or a gasoline engine) into potential energy by forcing air into a smaller volume and thus increasing its pressure.



Figure 2. Compressor

3.3 DC Motor

A DC motor uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic fields and current-carrying conductors.



Figure 3. (DC Motor)

3.4 Battery

A battery is a type of linear power supply that offers benefits that traditional line-operated power supplies lack: mobility, portability and reliability.

3.5 Arduino

We have used arduino because it is a open source device which can be programmed through any operating system like Window, Mac, linux etc.

3.6 Motor Drive

L298 is a high current and high voltage IC. Its receives TTL logic signals and operates different loads like motors, solenoid, relays etc. It is mostly used in motor driver's designing

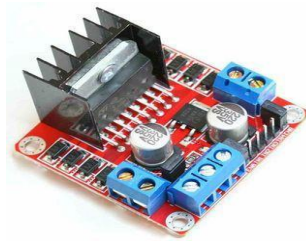


Figure 4. MOTOR DRIVE

4. Comparative Study

We have compared our painting robot with manual painting process with the following parameters such as time, cost, amount of paint, safety, efficiency, apparatus used.

| | Painting by robot | Manually Painting |
|------------------------|-----------------------|-------------------|
| Time | Less | More |
| Cost | Higher | Lower |
| Amount of paint | Minimum | Maximum |
| Safety | More | Less |
| Efficiency | High | Low |
| Apparatus Used | Spray Gun, Compressor | Roller Or Brush |

5. RESULTS

A systematic procedure which is followed in our project would help to develop similar Robot of higher capacity & paint large area walls To paint the large wall area we can program the Arduino according to need. For different type painting purpose the nozzle can be changed either automatically or manually. We can use different powers of compressor according to the need.

Discharge of the painting robot is $Q = .072 \text{ m}^3/\text{s}$

6. CONCLUSIONS

IMPROVED PERFORMANCE AND REDUCED COMPLEXITY

It is becoming increasingly clear that a process which is technically feasible may not necessarily always represent the best solution. Reducing the complexity of painting systems is an important aspect of product development.

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