Pneumatically Operated Automatic Spray Painting Robot

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***Abstract*- The primary aim of the project is to design, develop and implement Automatic Wall Painting Robot which helps to achieve low cost painting equipment. Despite the advances in robotics and its wide spreading applications, interior wall painting has shared little in research activities. The painting chemicals can cause hazards to the human painters such as eye and respiratory system problems. Also the nature of painting procedure that requires repeated work and hand rising makes it boring, time and effort consuming. When construction workers and robots are properly integrated in building tasks, the whole construction process can be better managed and savings in human labor and timing are obtained as a consequence. In addition, it would offer the opportunity to reduce or eliminate human exposure to difficult and hazardous environments, which would solve most of the problems connected with safety when many activities occur at the same time. These factors motivate the development of an automated robotic painting system.**

INTRODUCTION

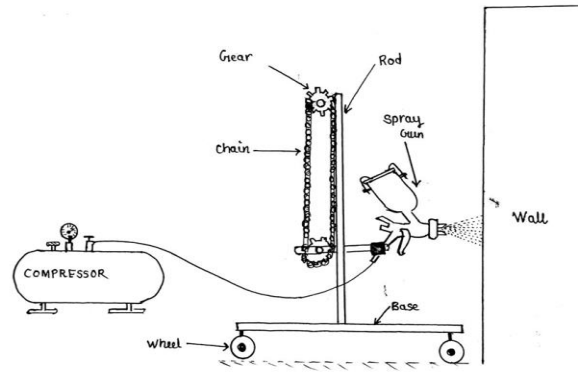
Building and construction is one of the major industries around the world. In this fast moving life construction industry is also growing rapidly. But the labors in the construction industry are not sufficient. This insufficient labors in the construction industry is because of the difficulty in the work. In construction industry, during the work in tall buildings or in the sites where there is more risky situation like interior area in the city. There are some other reasons for the insufficient labor which may be because of the improvement the education level which cause the people to think that these types of work is not as prestigious as the other jobs. The construction industry is labor-intensive and conducted in dangerous situations; therefore the importance of construction robotics has been realized and is grown rapidly. Applications and activities of robotics and automation in this construction industry started in the early 90‟s aiming to optimize equipment operations, improve safety, enhance perception of workspace and furthermore, ensure quality environment for building occupant. After this, the advances in the robotics and automation in the construction industry has grown rapidly.

Despite the advances in the robotics and its wide spreading applications, painting is also considered to be the difficult process as it also has to paint the whole building. To make this work easier and safer and also to reduce the number of labor automation in painting was introduced. The automation for painting the exterior wall in buildings has been proposed. Above all these the interior wall painting has shared little in research activities. The painting chemicals can cause hazards to the painters such as eye and respiratory system problems. Also the nature of painting procedure that requires repeated work and hand rising makes it boring, time and effort consuming. These factors motivate the development of an automated robotic painting system. This project aims to develop the interior wall painting robot. This automatic wall painting robot is not designed using complicated components

This robot is simple and portable. The robot is designed using few steels, conveyor shaft, spray gun and a controller unit to control the entire operation of the robot. This robot is compact because of high speed and pressure capabilities they have. They also have a very small weight to power output ratio and predictable performance ie., losses are minimum due

to less number of moving parts and so gives expected performance. Due to elegant and simple control systems it can control noise vibration and does silent operation and no vibration is produced. It has longer life, flexibility and it is efficient and dependable, and the installation is simple and the maintenance is also easy. Some of the conditions that have to be considered while using this robot is that the system is operates in pneumatics, so it needs air tank or compressor to them. The life of the parts like seals, packing and gaskets etc., are very short but, they are essential to prevent leakage so that the system becomes costlier.

LINE DIAGRAM



Component use in machine:

- Frame stand And Wheel
- DC motor
- Battery
- Control unit
- Spray gun
- Solenoid valve
- Chain
- Compressor

Frame Stand and Wheel: - The frame stand is the steel welded in such a way that it can carry the whole equipment. The steels are welded strongly in welding laboratory with an idea to carry the entire robot with the control unit, battery and DC motor in the mobile platform and the IR sensor, solenoid valve and spray gun in the roller shaft .Four wheels are attached to the frame stand in order to move the robot in the direction specified. The movement of these wheels are controlled by the DC motor rotation which is controlled by the microcontroller. Since it is obvious that if either the movement of front or back wheels are controlled automatically the movement of the other one will be controlled. Therefore, in this robot the movement of the back wheels are controlled using the DC motor such that the movement of entire robot is controlled.

DC MOTOR

DC motors are part of the electric motors using DC power as energy source. These devices transform electrical energy into mechanical energy. The basic principle of DC motors is same as electric motors in general, the magnetic interaction between the rotor and the stator that will generate spin. DC motors are widely used in speed and direction control because control of these motors are easier than other motors. The motion of a DC motor is controlled using a DC drive. DC drive changes the speed and direction of motion of the motor.

Specification of DC motor: The specification the DC motor used in this project is mentioned as follows:

- Voltage -12V
- Speed -10 rpm
- Load current -1A

Spray Painting Gun is a painting technique where a device sprays a coating (paint, ink, varnish, etc.) through the air onto a surface. The most common types employ compressed gas—usually air—to atomize and direct the paint particles. Spray guns evolved from airbrushes, and the two are usually distinguished by their size and the size of the spray pattern they produce. Airbrushes are hand-held and used instead of a brush for detailed work such as photo retouching, painting nails or fine art. Air gun spraying uses equipment that is generally larger. It is typically used for covering large surfaces with an even coating of liquid. Spray guns can be either automated or hand-held and have interchangeable

heads to allow for different spray patterns. Single color aerosol paint cans are portable and easy to store.

OBJECTIVES

The actual targets for development of the wall painting machine, in order to solve the aforementioned situation were set as follows:

1) To make machine structure simple to enable easy mounting as well as for safety.
2) To perform only painting in a single color.
3) To be usable only on external walls of structures but also in various other places such as on walls of civil structure.
4) To Avoid Hazard Effect Of Paint On Human Body.
5) The Automated Painting Robot Was To Be Designed With The Vision To Facilitate Easy.
6) Being A Prototype Design, The Painting Section Is Limited In Height.
7) Accurate and Smooth Painting.

REFFERANCES

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