

Automatic Wall 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 labour 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.

Keywords:- Frame stand, ARM, DC motor, Battery, Control unit .

1.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 90s 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 labors 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 i.e., 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 and the electric shock is always there, which makes the machines ugly and dust and dirt are adhering 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.

2.Principle



We have already discussed how a light sensor works. IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity, which we already know can be detected using a threshold. Since the sensor works by looking for reflected light, it is possible to have a sensor that can return the value of the reflected light. This type of sensor can then be used to measure how "bright" the object is. This is useful for tasks like line tracking.

Objective:

- The actual targets for development of the wall painting machine, in order to solve the aforementioned situation, were set as follows:
- To make machine structure simple to enable easy mounting as well as for safety.
- To perform only painting in a single color.

- To be usable only on external walls of structures but also in various other places such as on walls of civil structure.
- To Avoid Hazard Effect Of Paint On Human Body.
- The Automated Painting Robot Was To Be Designed With The Vision To Facilitate Easy.
- Being A Prototype Design, The Painting Section Is Limited In Height.
- Accurate And Smooth Painting .

Component:

- ARM
- Frame stand
- DC Motor
- Battery
- Control Unit
- UltraSonic Sensor
- Nozzle
- Pump
- Solenoid valve

3.Advantage :

- Save Floor Space
- Access And Paint More Parts
- Protect Human Workers
- Customize Automation

4.Application :

- Industrial robots are able to recognize what areas to paint by using software, algorithms, sensors, and cameras.
- By recognizing patterns, your robotic

painting systems are able to paint with high accuracy and comply with your specifications.

5.Future Scope :

- With the higher supporting column, robot can be used for painting an even larger section of wall.
- Adjustment of color density can be done
- Arm can be provided for more flexibility.
- Voice indication or display can be interfaced for the level of paint in the container.

6.Conclusion :

Automatically paint the wall of given dimension has been designed and implemented. The approach uses Ultrasonic sensor to detect the presence of wall. The microcontroller unit to control the movement of the DC motor. The robot eliminates the hazards caused due to the painting chemicals to the human painters such as eye and respiratory system problems and also the nature of painting procedure that requires repeated work and hand rising makes it boring, time and effort consuming. The robot is cost effective, reduces work force for human workers, and reduces time consumption. The pitfall of the project is that the robot continues painting even after the end of the wall hence it can be overcome by adding some indicating objects such as buzzers. In the future the painting robot can be enhanced by using image processing in order to scan the objects and obstacles that are present in the wall so that those objects can be automatically omitted while painting.

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