

# FABRICATION OF AUTOMATIC WALL PAINTING MACHINE

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## ABSTRACT

*Primary aim of our project is to design, develop and implement Automatic Wall Painting m which machine helps to achieve low cost painting components. The advances in robotics and its wide spreading applications, interior wall painting has shared in research activities. The chemicals used in painting can cause hazards to the human painters such as eye and respiratory system problems. Also, the 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 overall construction process can be better managed and savings in human labor and timing are obtained as a consequence. It would offer the opportunity to reduce/eliminate human exposure to difficult and hazardous environments, which would solve most of the problems connected to safety when many activities occur at the same time. These factors motivate the development of an automated robotic painting system.*

*Index Terms – Addictive, Construction robot, Liquid, Paint, Painting roller, Painting storage tank.*

## 1. INTRODUCTION

In this fast moving life construction industry is also growing rapidly. But the labors works under construction industry are not sufficient. That insufficient labor in the construction industry is because of the difficulty in the work. In construction industry, during the work in tall buildings or in construction site where there is more risky situation like interior area in the city or mostly heighted buildings.

The construction industry is labor intensive and conducted in dangerous situations; therefore the importance of construction robotics has been realized and it 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, en furthermore, ensure quality environment for building occupant.

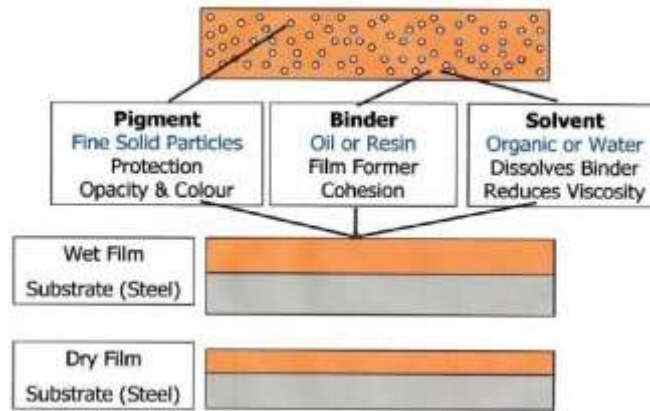


Fig.1 Ingredients of Paint

The automation for painting the exterior wall in buildings has been proposed. Above all these the interior wall painting has shared 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 painting system. This project aims to develop the interior wall painting robot. This automatic wall painting robot is not designed using complicated components. That robot is simple and portable. The robot is designed using iron and steel material, conveyor shaft, adjustable spray nozzle and a controller unit to control the entire operation of that entire system. This system is compact because of high speed and pressure capabilities they have. That system is also have a very small weight to power output ratio and predictable performance i.e., losses are minimum due to a smaller number of moving parts and it gives expected performance. Due to simple control systems it can control noise vibration and does silent operation and vibration are not produced. It has longer life, flexibility and it is efficient and dependable, the installation is simple and the maintenance is less and easy.

### 1.1 Problem Statement:

- The problem I worked to solve this year was insufficient industrial and home painting techniques.

Hand painting of wall having low accuracy and it hazards to humans because of that the chemical used in paints are dangerous for humans.

### 1.2 Objectives

The main goal to design painting machine

- To make painting friendly and simple
- Wall painting machine helps to low cost painting machine.
- In paint chemical hazards to human health.
- Painting procedure required the painting work which is irritate to the human being and make it boring procedure and consume time.

### 1.3 Scope

This system has motivated for improve the painting accuracy and minimizing the man power.

## 2. LITERATURE REVIEW

- Politeknik Sultan Salahuddin Abdul Aziz Shah, Shah Alam Selangor, 2020

Alhamdulillah, in the name of Allah the most gracious and the most precious, first and foremost, I would like extend our deepest praise to Allah SWT who given us patient strength, determination, obstacle that helping us to think wisely

in making a decision and courage to completed this project. Many thanks and highest gratitude to, our supervisor, which help, lead and guides us with our project “painting machine”.

2.Mohamed Abdellat [1] In this paper author introduced wall painting robot to avoid the repetitive work of painting the process which makes exhausting and hazards to human they introduce the conceptual design of robot. Which contain arm that work vertically. The arm is fitted on the mobile for give the motion to arm to paint the wall area. This robot is fast painting or working using ultrasonic sensors. For adjusting the motion of the limit the control system is used for guide the arm motion. It is only used for interior walls of building. In this robot the roller contains painting liquid and paint the area. The robot can adjust man over itself in front of the wall.

3.Dhaval Thakaret. al. [2] this paper gives basic information about small and medium scale industries manufacturing components have to paint for protecting from rusting so the spray application consumes maximum time and paint which required the skilled worker emerged with the application. They cannot manage robotic arrangement for higher efficiency so the rise of the such process have to be made which is affordable, gives better accuracy, consumes minimum time for coating so objective has to developed such mechanism which coat the object with the dipping technique having semi-automatic arrangement which is suitable for our requirement and which can be valuable for small and medium scale industries.

4.Takuya Gokuyet. al. [4] they have shared that construction of Wall-Surface Operation Robot plan to automate and increase the efficiency a series of restoration works by adding, changing of an attachment, new task for cleaning. Tile separation sensing and repair work to the initial functions of picture painting in a single and multiple colors is also done. The analysis of this example was introduced as aperiodic inspection of the 10th year for the office building concerned. And, high profitability is expected because of presence of many similar structures.

5. Berardo Naticchiaet. al. [3] in this paper, they shown that automated painting can be not only aimed at correcting productivity, but also quality checking. A robot arm with high precision is required. An automated system to convert the normalized coordinates of the liquid colors to be reproduced into the movement speed of the robot end tool and valve opening end of the mixing board. Most of the work will be probably necessary to achieve high resolution. Because of the shape of full-scale robots, probably also the resolution of the human scale robot will be lower. Another particularity of the small-scale arrangement is of course the ability to access some hard places of buildings under construction, where human range robots could not be allowed.

### 3. METHODOLOGY

The working principles of the automatic spray painter is as follows, the object sensor is used to identify the position of the object or the specimen we wants to spray. After identify the position, conveyor belt stop and the controller identify solenoid valve to adjust the position of the valve of the sprayer. After identify the solenoid valve position the controller control the DC Motor and the motor helps to spray the specimen.

The controller in the device is Relay . A relay is an electrically operated switch used to isolate one electrical circuit from another. In its simplest form, a relay consists of a coil used as an electromagnet to open and close switches contacts. Since the two circuits are isolated from one.

After the spraying operation, the dryer get a signal from control unit to dry the specimen. After the drying operation, the belt conveyor rotates and next specimen reaches the position. The process continues when we switch off the relay circuits. Based on the speed of the operation, the process to be continued and the based on the number of specimens the process stops the operations.



Fig. Machine Setup

#### Frame Stand and Wheel

Frame stand is the steel welded in such a way that it can carry the all equipment. The steels are welded strongly in welding laboratory with an idea to carry the overall machine with the control unit, battery and DC motor in the mobile platform and the IR sensor, solenoid valve and spray nozzle in the roller shaft .Four wheels are attached to the frame stand in order to move the machine in the direction specified.

#### DC Motor:

DC motors is part of the electric motors using DC power as energy source. The 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.

#### Battery

In order to provide supply to the controller unit battery is used that is Lead acid battery is used in that system. The lead-acid battery is a rechargeable battery. It having a very low energy-to-weight ratio and a low energy-to volume ratio, their ability to supply high surge currents means that the cells maintain the relatively large power-to-weight ratio. These features, along with their low cost, make them attractive for use in motor vehicles to provide the high current required by automobile starter motors.

#### 4. PURPOSED MODELLING:

Wall painting robot is a simple device which carries the entire paint application set up from one end to another end of pipe and simultaneously applies a uniform spray coat of paint on the wall pipe. Machine easily solves above problem which otherwise is really difficult without such Setup. The machine needs highly compressed air supply for movement of painting operation.

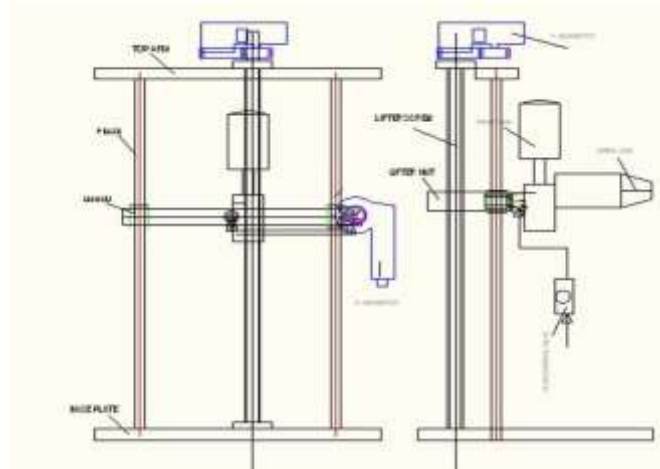


Fig: Assembly of Automatic Spray Painting Machine

**Components :**

Relay: The basics for all the relays are the same. Take a look at a 4 – pin relay shown below. There are two colors shown. The green color represents the control circuit and the red color represents the load circuit. A small control coil is connected onto the control circuit. A switch is connected to the load. This switch is controlled by the coil in the control circuit. Now let us take the different steps that occur in a relay.

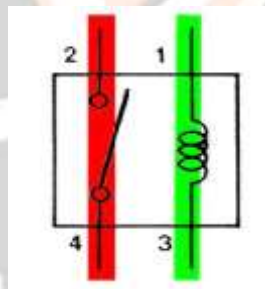


Fig. Relay



## 5. CONSTRUCTION AND WORKING

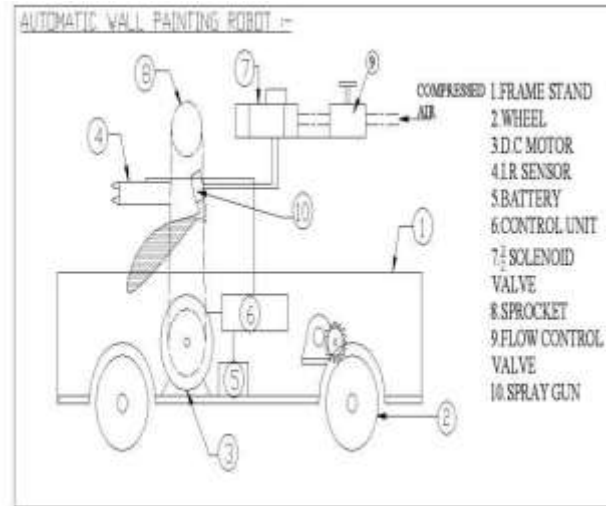


Fig. Construction of automatic Wall Painting Machine

The construction of paint paths is apart into the following steps: outlining of painting process, planning of encounter free spray gun motions. Specifies a trajectory of the spray gun, which satisfies the desired paint quality. In this module only spray gun motions are considered in relation to process quality. No restrain of Vol-4 Issue-2 2018 IJARIE-ISSN(O)-2395-4396 7676 www.ijarie.com 1391 machine are made and collisions between the spray gun and its background are not considered. The system uses the "Geometry Library" and the "Procedure Library" in order to plan this trajectory. The arithmetic library specifies for each arithmetic primary or more painting scheme, which may be applied for painting that particular type of geometric primitive. The painting procedure specifies how to apply spray gun motions to the surfaces in order to achieve a satisfactory process quality. The procedure library is established through experimental work. The basic idea is to enable outlining of paint strokes that continue everywhere the parts even though different geometric primitives must be covered along the surface and even though continuous robot motions cannot follow the surface. The system will attempt to approximate the triangular patches of the surface model by larger plane regions (virtual surfaces), which are oriented in a few main directions. DP/DT switch has an central OFF position, when operated to one of the ON position, the motor will rotate in clockwise direction, operating the worm gear box and thereby the pinion shaft. The pinion rotates to rotate the gear and thereby the main shaft and stand in clockwise direction taking the stand to close position. When other ON position is operated the motor will rotate in counter clockwise direction, operating the worm gear box and thereby the pinion shaft. The pinion rotates to rotate the gear and thereby the main shaft and stand in counter clockwise direction taking the stand to open position.

## 6. ADVANTAGES

1. The machine has very low error.
2. The size of project made by is more suitable for wall painting system.
3. It is easy to make.
4. It has low maintenance.
5. The system has worked fully switched operated.
6. Size of machine is small therefore easy to operated.
7. Construction is very simple and Suitable for Operating.

## 7. LIMITATIONS

1. Being semiautomatic we cannot neglect at least one operator.
2. Power supply system is required to operate the machine control circuit & motor operate.
3. Power supply is regularly required.

## 8. APPLICATIONS

1. Use in big all type painting mfd purpose.
2. Used industrial job painting purpose.
3. In industries purpose.
4. Can be used in engineering Workshop.
5. Use in domestic purpose for all painting purpose.

## 9. CONCLUSION

We have designed and fabricated the prototype model for testing purpose which is limited to a certain height, but it can be developed and the limit can be increased. Also, our model requires an external compressor for the compressed air this can be eliminated by using an in-built compressor.

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