

Design and Development of Automatic Multicolor Wall Painting Machine

Lokesh Gorakhnath Bagul¹

¹Student. Department of Mechanical Engineering G.H Raison College Of Engineering And Management, Wagholi, Pune-412 207, MH, India

Abstract – The underlying point of the task is to configuration, create and utensil Programmed Divider Painting machine which assists with settling minimal expense painting attachment. The inconveniences as like the canvas synthetic substances can make dangers the human painters like eye and respiratory framework issues. Additionally the idea of painting methodology that requires rehashed works and hand rising makes it's exhausting, additional time and furthermore the more exertion burning-through. At the point when the developments laborers and furthermore the machines are appropriately coordinated in building assignments. The entire developments interaction can be better overseen and reserve funds in human work and timing are acquired as an outcome. It saves work, cost and saving human work. In this expansion, it would get the chance to decrease or dispense with human contamination. It tackles a large portion of the issue with security when heaps of exercises happen simultaneously. This task propels the improvement of prograded divider painting machine.

Key Words: respiratory, human contamination, exhausting, heaps.

1. INTRODUCTION

Paint is characterized as the shaded substance which is spread over a surface and dries to leave a slight enhancing and defensive covering on divider. In India numerous mishaps are occurred while painting of huge structures. It is hard to paint at high elevation some of the time numerous casualty happens in view of releasing of rope or misbalancing. To stay away from this sort of casualty, we moved our concentration towards the exploration for supplanting people with robot in a work of art framework. The development enterprises are work packed and led in basic point in this way significance of development automated has been seen and is developed rapidly. There has been predictable endeavors that could prompt the advancement of a robot that is equipped for playing out the paint activity of the inside dividers of homes and different applications too. This thought is the blend of blending mechanical technology in painting industry is generally known where the plan is intricate

and the painting ought to be time effective and simple to deal with to accomplish supreme outcomes.

PROBLEM STATEMENT

At the point when development laborers and robots are appropriately incorporated in building errands, the entire development cycle can be better overseen and reserve funds in human work and timing are acquired as an outcome. Also, it would offer the chance to decrease or dispose of human openness to troublesome and risky conditions, which would tackle the majority of the issues associated with security when numerous exercises happen simultaneously. At long last, computerized machines can create greater items, as they would advance the section from make creation to modern creation, with resulting higher precision and lower levels of imperfections.

OBJECTIVES

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 multi colouring on wall by the machine.

To be usable only on external walls of structures but also in various other places such as on walls of civil structures.

2. LITERATURE REVIEW

In this paper the researchers BerardoNaticchia, Alberto Giretti And Alessandro Carbonari first the issue of a new miniature laboratory for developing lightweight and well-coordinated robotized systems is pursued [1]. Then a novel robot device for high quality multi-colour interior wall painting carried by a robot arm is developed and successfully tested [2].

Their new multi-colour spraying end-tool was developed and fixed on the robot arm, in order to be able to reproduce coloured artworks [3].

Finally, a methodology to reproduce colours from digital format of artworks is presented; showing how accurate and efficient is this new robotized spraying device [4].

Young S. Kim & et al. Have done survey on approximately 6,677,000 apartment housing units in South Korea [1].

Exterior wall painting for such Multi-dwelling apartment housings in South Korea represents a typical area to which construction automation technology can be applied for improvement in safety, productivity, quality, and cost over the conventional method [2].

The primary objective of this study is to design a conceptual model of an exterior wall painting robot which is applicable to apartment housing construction and maintenance and to conduct its technical economic feasibility analyses [3].

Conclusions made in this study show that the proposed exterior wall painting robot is technically and economically feasible, and can greatly enhance safety, productivity, and quality compared to the conventional method [4].

Finally, it is expected that the conceptual model of the exterior wall painting robot would be efficiently used in various applications in exterior wall finishing and maintenance of other architectural and civil structures such as commercial buildings, towers, and high-rise storage tanks [5].

In this paper researcher Selvamamilakshmi D et al. made a robot to facilitate wall painting, which is a time-consuming and cumbersome activity [1].

The robot comprises of a set of heavy load capacity wheels moving along a railing and a pulley mechanism [2].

The design involves using a spray gun painting mechanism that moves vertically with the help of a lead screw from a platform mounted on a horizontal railing [3].

Painting is achieved by the horizontal movement of the platform coordinated with the vertical movement of the lead screw attached with the spray gun, thus covering the plane of the wall in a zigzag manner [4].

The robot also employs IR sensing to differentiate between the surface of the wall and other furniture to preclude painting undesirable areas [5].

In this paper author describe the design and working of an autonomous wall painting robot. The conceptual design of a movable painting robot to be used for painting interior walls of residential building had been described. The robot uses roller fed with liquid paint and keeps contact with the wall surface [1].

The robot enables the roller to scan vertically as well as horizontally to the painted walls [2].

The robot can manoeuvre to adjust itself in front of the wall. In this paper, they present a technique for increasing the speed at which a standard industrial manipulator can paint a wall surface [3].

The approach is based on the perception that a small error in the direction of the end effectors does not influence the quality of the paint job. It is far more important to maintain constant velocity throughout the orbit [4].

Dr ahmed abdallah mohammad ali In this paper spray painting is painting technique a device spray a coating through air on the surface spray guns evolved from airbrushes the two are usually distinguish by their size and size of spray pattern by they produce air gun spraying uses equipment that generally large [1].

In manual work, air gun held by skilled worker at 10 inches from object and moved back and forth over surface [2].

Joel john and Shubin paul Thomas In this paper, the author construct the machine consist of frame which is used to mount the components DC motor, battery, solenoid valves, and spur gears [1].

The machine is run with help of spur gear mechanism this arrangement is to paint wall continuously along length and height [2].

In this paper they said workers cannot manage robotic arrangements for higher efficiency so provides the air supply which support spray printing [3].

A battery provided for DC supply to relay unit for working arduino board machine switched ON compressor provides the pump acting and ultrasonic sensor detect the wall for starting point [4].

METHODOLOGY

RIGHT: A user defined function in Arduino1 that signals the 4 DC motors driving the wheels to rotate clockwise, moving the robot to the right, all the while continuously reading the value of SensorB. When the reading of Sensor B drops below 10cm Arduino1 signals the motors to halt.

LEFT: A user defined function in Arduino1 that signals the 4 DC motors driving the wheels to rotate counter-clockwise, moving the robot to the left, all the while continuously reading the value of Sensor B. When the reading of Sensor B rises above 260cm Arduino1 signals the motors to halt.

ONE-STEP-UP: A user defined function in Arduino2, signals the actuator to move forward a horizontal distance of 5cm, which translate to an approximate vertical distance of 17cm. this depends on the reading of Sensor A. The function calculates the difference between the sensor's previous reading and the current reading, when this difference reaches 17cm, the Arduino signals the actuator to halt. In case the lift has reached its highest level then Arduino2 send the signal MAX to Arduino1.

ALL-THE-WAY-DOWN: A user defined function in Arduino2, turn the spray gun off first then signals the actuator to move backward a horizontal distance of 30cm, which translate to an approximate vertical distance of 103cm, returning the scissor lift to its original state. this depends on the reading of Sensor A.

The function continuously reads the value of Sensor A, when this value reaches 103cm, the Arduino signals the actuator to halt. ON, UP, DOWN, MAX, are all assigned to numbers 1,2,3,4 respectively, in both Arduino boards to make the process easier to follow.

The painting process begins by calibrating the robot either to the left side or to the right side, whichever is closer, after which, turns the spray gun on and moves horizontally to the end of the wall, then moving a step up. Repeating the same pattern (left/right, up a step, left/right) until the a rectangular is painted. Then the painting process finishes with turning the spray gun off and bringing the lift down to its original position



Fig -1: Project model

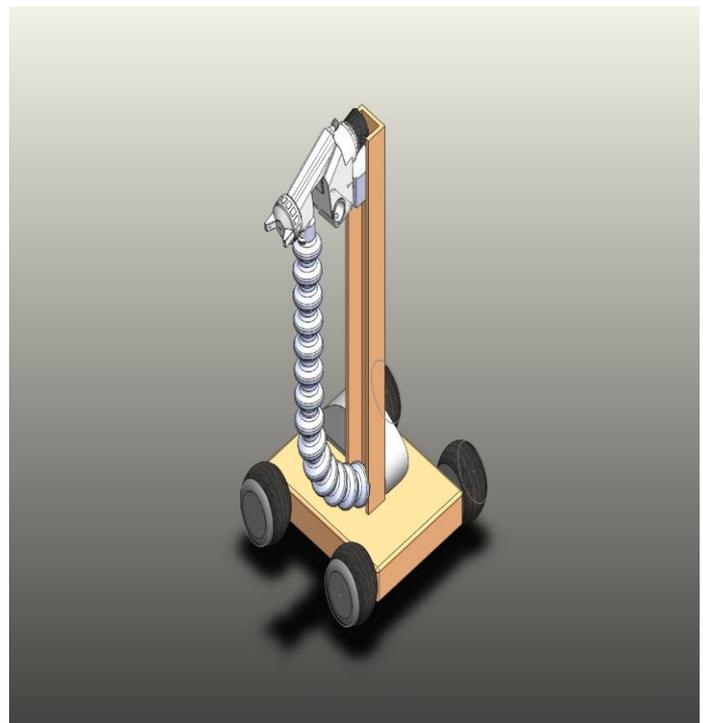


Fig – 1: Design Model

3. CONCLUSIONS

The robot is cost effective, reduces work force of human workers, and reduces time consumption. The pitfall of project is that robot continues painting even after the end of wall hence it can be overcome by adding some indicating objects such as buzzers or sensors. This method is very useful for painting of any shape with very less time period. Closeness of this machine is more as compared to manual painting. Robot also saves the labour cost and total cost of painting in any jobs

REFERENCES

1. Naticchia, A. Giretti, A. Carbonari, "Set up of a robotized system for interior wall painting," In the 23rd International Symposium on Automation and Robotics in Construction, Tokyo, Japan, pp.194-199, 2006.
2. Terauchi ST, Miyajima T, Arai MK, Takizawa S. Development of an exterior wall painting robot capable of painting walls with indentations and protrusions. *Automation and Robotics in Construction*. 1993; 10:285–93.
3. Mohamed TS, Abdellatif MA, Ramadan AA, Abo-Ismaail AA. Development of roller-based interior wall painting robot. *World Academy of Science, Engineering and Technology* 2011; 5(11):2309–16 Kumar VRP, Balasubramanian M, Raj SJ. Robotics in construction industry. *Indian Journal of Science and Technology*. 2016; 9(23):1–12.
4. Kahane B, Rosenfel Y. Improved tools for robotic interior painting. *Proceedings of the 16th ISARC IEEE International symposium; Madrid, Spain*. 1999. p. 275–80.
5. Fu, K. S., Gonzalez, R. C., Lee, C. S. G., (1987) "Robotics – Control, Sensing, Vision and Intelligence", McGraw Hill International Editions, New York.
6. Mohamed T. Sorour, Mohamed A. Abdellatif, Ahmed A. Ramadan, and Ahmed A. Abo - Ismail, Development of Roller - Based Interior Wall Painting Robot, *World Academy of Science, Engineering and Technology* Vol 59 2011.
7. Jayshree sahu, S.K.Sahu, Jayendra Kumar, Microcontroller Based Dc Motor Control, *International Journal of Engineering Research & Technology (IJERT)*, Vol. 1 Issue 3, May–2012
8. Mohamed T. Sorour, Mohamed A. Abdellatif, Ahmed A. Ramadan, and Ahmed A. Abo-Ismaail, Development of RollerBased Interior Wall Painting Robot, *World Academy of Science, Engineering and Technology* Vol 59 2011.
9. S.m.s.Elattar, Automation and robotics in construction: Opportunities and challenges, *Emirates journal for engineering research*, Vol no 13 (2), Page no 21-26 2008
10. Dailey, C. M., Traver, A. E., Wesley, G. L., Hass, C. T., & O'Connor, J. T. (1993). Field Testing of an Automated Surface Finishing System for Large Diameter Storage Tanks, *Proceedings of the 10th International Symposium on Automation and Robotics in Construction (ISARC)*, Houston, TX., USA, Sept. pp.431-438, ISBN 0 444 81523 6.