

# Paintobot a Roller based Interior Wall Painting Robot

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**Abstract-** This paper describes the development of an autonomous robot for painting the interior walls of buildings. Wall painting is a repetitive, exhausting and hazardous process which makes it an ideal case for automation. As we know paint is a chemical which is very harmful to human being, so in order to eliminate the tedious labor work we have built Paintobot. Paintobot is an interior wall painting robot which will replace the human labor for interior wall painting. Paintobot uses both hardware and software to complete the painting process. It has four direction of movement and also carries proximity sensors to detect any obstructions during work. To imitate the painting action, it uses roller and a vertical column which moves vertically up and down with the help of a telescopic lift mechanism.

**Keywords:** Interior wall painting robot, Paintobot, Telescopic lift mechanism.

## I. INTRODUCTION

As we all know, till date we have seen many advancements in all major fields of work. But interior wall painting hasn't seen much advancement in its procedure. Though we know that paint is a harmful chemical still we rely on human labor to paint our interior walls. Painting is a repetitive and exhaustive work which takes days together to complete a project. In a general survey we learnt that for painting a 12x12 ft wall a manual labor takes in about 2-3 hours without taking any miscellaneous time into consideration. So, in order to eliminate the danger on the labors and to reduce the time taken to finish the job, we are creating a robot called PAINTOBOT.

Paintobot is a 3-DOF robotic model which can be used to paint an interior wall of a house or a office workspace. We have seen many researches regarding robotizing wall painting, all these models consist spray paint which is proven for automobiles but not for interior walls. We are aiming to create a robot which will use the conventional roller for the painting purpose. This is because it can be more convenient for the owner to replace the used one to a new one. Paintobot will complete the whole project in way less time than a manual labor. Paintobot will have a very simple design structure, as we intend not to complicate this work. It will consist of a base which will act as a housing for SMPS, pump, wheels, motor and an Arduino board. Then comes the vertical column which acts as a support and a mechanism for the roller. Roller housing will be placed on the column which will have a spray, roller and a return line to the source. The vertical motion will be achieved by a vertical lift mechanism which will be smooth and quick. As per study and calculation for painting two 12x12

walls, 1ltr of paint is required. This tells that our robot carrying the paint box can be agile.

Now to the design part, Paintobot which we are creating will be a prototype. This robot will be made in a 1:1 scale. The total height of the model will be approx. 4.5ft and dimension of the base is decided as 1x2ft.

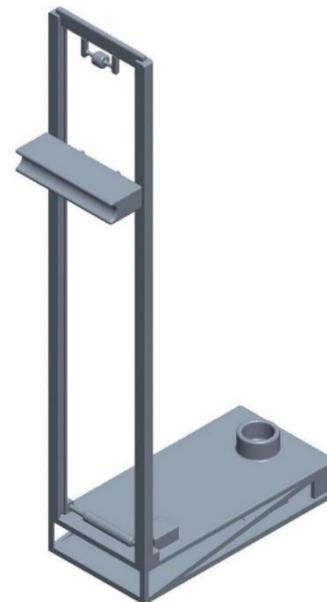
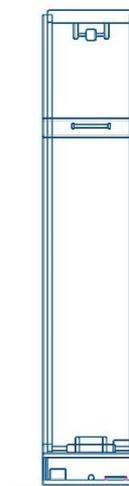
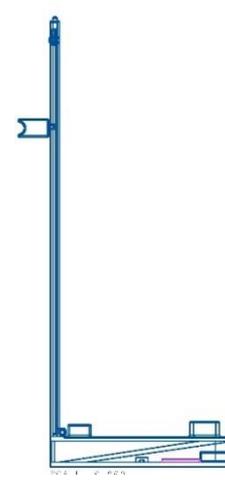


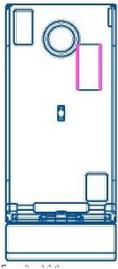
Fig.1: Isometric view of CAD Model

Front View



Side view





Top view

Fig.2. Orthographic View of CAD Model

Paintobot has 3 DOF as the vertical column moves up and down, the base moves in 4 directions. When the machine is turned on, the sprayers are turned on which will wet the roller in appropriate amount. If there is excess of paint inside the roller chamber, a return line is placed in it so that the excess paint will come back to the container. The vertical column starts moving up and down. This action will result in painting action. The sprayer is timed in such a way that when the roller returns to the base, the sprayer is turned off until the base adjusts itself to the next position. The base will be programmed to move to a distance equal to one roller length. When the base reaches to a new position, the process starts again until whole wall is painted. Now we know that all walls are not in a rectangle shape or there will be window frames which will be present in the wall. In order to overcome this, we will be using IR proximity sensors which will detect the obstacles and stop the machine from further actions. Once one wall is finished, we will have to manually shift the robot to the next wall. When all the paint work is done, paint from the system has to be removed. So in order to do that, we can place a can of turpentine and run the system. This will clean out the whole system. Of course, this has to be done right after finishing painting because once the paint dries, it will be very difficult.

## II. LITERATURE SURVEY

- 1) **Mohamed T. Sorour et.al**, In this paper, A two link planar robotic arm with new actuating mechanism and a mobile platform were designed and implemented. They have managed to achieve 0.101 hour/m<sup>2</sup> which was desired for domestic use.  
**Mohamed Abdellatif**, In this journal, the conceptual design of a mobile painting robot to be used for painting interior walls of building has been described. The robot enables the roller to scan both vertically and horizontally the painted walls. This robot seeks simpler design and major improvements in future.
- 2) **Mohamed Sorour**, This paper presents the detailed computer aided design (CAD) model of a fully functional wall painting robot for interior finishes. The RoboPainter is said to be capable of performing full scale wall-ceiling painting in addition to decorative wall drawings. But just being a CAD model or prototype cannot justify the objectives. So, the author seeks future improvements.

- 3) **ARIS et.al**, In this paper, the authors concludes that The painter robotic system has achieved optimum benefits with regard to reliability, safety appearance, and ease of use. The author had written a control program for the painter robot. It can be reprogrammed easily to cope with any changes in the process. This robot painter was a fully AC model.
- 4) **B. Naticchia et.al**, In this paper it was shown that an empirical procedure is available to build mathematical models for painting quality when analytical relations are not available, and its accuracy is demonstrated by the good matching with experimental results. Future research will be devoted mainly to check other models for different kinds of application relative to both different spraying techniques and to more complex construction sites.
- 5) **Yehiel Rosenfeld et.al**, This paper describes the interior wall finishing task. The author seeks improvements and enhancements in future for painting and plastering the built wall. Experiments are being done on with various fiber-reinforced plasters, which may simultaneously fulfill two objectives, namely as a decorative coating and as a stabilizing agent in lieu of mortar.
- 6) **Alberto Giretti et.al**, Mixing equipment developed throughout the research step described in this paper, the authors have shown that automated painting can be not only aimed at improving productivity, but also quality. In addition, two kinds of complementing ergonomics can be thought, one at reduced scale and the other one at human scale.
- 7) **Randy A. Graca et.al**, In this patent, the authors have concentrated in creating a multi- arm robot which will do multiple tasks at once. This is intended to be used in either automobile industry or domestic wall paint use.
- 8) **P.Keerthanaa et.al**, This paper describes automatically paint the wall of given dimension has been designed and implemented. The approach uses IR transmitter and IR receiver to detect the presence of wall. The authors found that the only disadvantage of the project is that the robot continues painting even after the end of the wall.
- 9) **Ehsan Asadi et.al**, A cooperative interior paint robot is presented in this work that provides a way to combine the benefits of automation in construction with those of human ingenuity. The robot is successfully tested in actual industrial development, that confirms the advantages of collaboration in leveraging the quality of finishing due to the precise control of paint distribution.

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