

DEVELOPMENT OF AUTOMATIC PAINT SPRINKLER SYSTEM

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Abstract- In today's world there is a growing urge to provide automation in every field and every day to day task, but in the field of wall painting only a limited research are contributed, our current painting techniques are very difficult and the painting chemicals can cause hazards painters by affecting respiratory system, eyes etc. There is in need of some automation in painting process. The main aim of this project is to develop a portable automatic paint sprinkler system which is highly efficient with low cost. The proposed system is fully automated. Ultrasonic sensors are used to measure the area to be covered. It is very effective on time management by completing the work without any error. It also reduce the human risk.

I. INTRODUCTION

Painting is a repetitive and exhausting process which makes it an ideal case for automation. Our ordinary painting technique has too much disadvantage. Now we are using brushes and rollers for painting but painting by these equipment are time consuming, it is very difficult to paint on edges and these tools cannot reused we have to replace it periodically and this become waste. There is too much wastage of paint during each time dipping and painting these tools are also costly. Alternative method of painting is sprayer, it make the painting easier but these can't use continually, It can be used only to paint a small portion until paint in the tank used up. To make the product compact the size of the tank must be very small so that it is not possible to fill a large quantity of paint. If we increase the tank size it become heavy and cannot be used easily. One of the major problems is difficult in painting tall building. It takes too much time for finishing and too dangerous.

The chemicals in paint can cause hazards to painters such as eye and respiratory system. The overall finishing of ordinary painting is very poor. Nowadays the labour charge is increasing. There are some robots for painting purpose which is mainly

used in automobile industries but they are too costly and big as a room size so that type cannot be used in the ordinary wall painting and small scale industries for painting their product.

Now we are living in a world of automation and we depend on automation. So in order to revolutionize the field of painting we decided to develop a portable automatic paint sprinkler system by implementing the project, human effort and labour time is reduced and health problem can be avoided and cost is reduced. The proposed system provides automatic painting and uses sprayer gun for painting. The sprayer gun is fully controlled and motor are provided for forward and backward move and the motors are controlled by microcontroller.

II. LITERATURE REVIEW

(1) This introduce a sensor based automatic wall painting robot which can move up down and left right by applying an air pressure to clean the wall. Here they use an IR sensor for line tracking, but sensor can affected by humidity, dust but the power consumption rate is very low and provides better productivity. (2) This painting technology is developed using the automatic programming technology and image processing so we can paint any structure using this programmed technology but the operation is very difficult and also it is a very expensive design

(3) Semi automated colour painting machine provide a flexible painting but it has a complex operation and it is mainly focusing on the industrial applications for painting small products machine part etc. (4) This automatic machine can guided by a mobile application. This machine is guided by wall dimensions and colour which is sent through a camera attached in raspberry Pi module. It includes a metallic structure but the circuit and operating is very complex

(5) This technique is adopted for inner hull blocks because painting in these areas is very difficult and dangerous because the work space is very narrow and isolated. By applying this system the

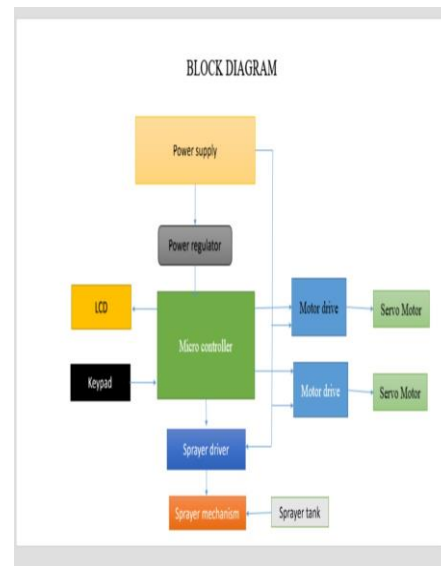
productivity and painting quality increased and accidents and injuries reduced.(6) This low cost automatic wall painting robot use Arduino for system controller, the overall operations of this automatic is very simple and easy to handle this project use cheap component but it has only one side movement and can't be used efficiently

(7) This is a wall climbing robot which use vacuum pump for climbing. The three modes of operations of this wall climbing robot are suction, motion and painting. But this process is very time consuming and there will not any perfection and painting overlap may happen. We can paint very tall buildings but the motion of the robot is very slow so it takes too much time for completing. (8) This automatic wall painting robot has a heavy metallic structure, battery, control unit, solenoid valve, and sprocket. The operation is simple but the overall structure has a big size so we can't use it on every area and it is very difficult to handle

(9) in this project where all the steps are fully automatic and no intervention of an operator is needed. This robot has features like laser triangulation sensor, geometric feature detection, tool path planning. This method is mainly used for painting unknown parts. The circuit is very complex and big in size. So it can't ally for common use. It mainly focusing on industrial application (10) The autonomous robot have arms which contain sensor. The sensor scans the wall vertically and covers the area to be painted in laterally. The robot use ultrasonic sensor to adjust the motion limits. The robot is less weighted and low cost. The robot use rollers for painting so there may be wastage of paint and frequent removing of rollers are needed.

III. BLOCK DIAGRAM

The block diagram gives detailed idea about the project, important parts and how it work. The main component used here is microcontroller, motor, battery, sprayer, ultrasonic sensor, and keypad. Here we are use three motor drive and six servo motor for the movement and ultrasonic sensor for measuring wall area to be painted and a current sensor for resting to the initial stage.



IV. COMPONENT DISCREPTION MICROCONTROLLER

The microcontroller used here is Arduino UNO which is similar to Atmega328. The Arduino UNO has 14 digital input and output pin. The UNO can be powered using a USB connection with an external power supply. The operating voltage of UNO is 5v. The Arduino has 6 analog input, a 16MHz ceramic resonator, USB connection, a power jack, an ICSP header and reset button, the pin 3,4,5,6,9,10 and 11 provided 8 bit PWM output



V. ULTRASONIC SENSOR

The sensor used in this project is HC-SR04 ultrasonic sensor. It uses Sonar for measuring the distance. It provides accurate measurements. The operating voltage of this ultrasonic sensor is 5



VI. RELAY

These are switches used for controlling both the AC and DC appliances. Relay are used when we want to control high current AC/DC using sensor output or in the driver circuit. Here we are using a 5v Or 6v sugar cube relay



VII. LIQUID CRYSTAL DISPLAY

(LCD)

LCD is used in this project because it consumes only less power than the light emitting diode and glass display. The LCD can be either passive matrix or active matrix .at each pixel intersection of the active matrix a transistor is located and it is also known as thin film transistor display. The active matrix has an improved screen refreshing time. They align into block when the electric charge is applied and light enter through them.



VIII. MOTOR DRIVE

Motor drive act as interface between the microcontroller and motor of the robot. The commonly used IC is L293D. It is a 16 pin IC

IX. SERVO MOTOR

Servo motor is a dc motor with built in gearing and feedback control loop circuitry .Most of the servo motors can rotate about 90° to 180° . The servo motor are idle for robot leg and arm, rack and pinion steering. Since servos are fully self-contained, the velocity and angle control loops are very easy to implement, prices remain very affordable.

X. SPRAYING MECHANISM

Sprayer is an arrangement which is used to sprinkle paint on surface that we want to paint. The process

of applying paint on the surface through a nozzle by giving certain pressure is spraying. The spraying mechanism includes spray gun, sprayer tank and compressor. The spray gun is evolved from the air brushes. Airbrushes are handheld and are used instead of brushes for detailed work.

In a spray gun the paint is applied to an object by using pressurized air. Another important thing is the selection of nozzle, the nozzle is selected on the basis of shape of the work piece. Normally 6 to 10 inches can painted by a skilled operator using the spray gun.

XI. WORKING

The proposed design of robot is very simple and easy to handle. In this project we are using simple electronic circuit so cost is also less. We are giving input through a keypad like measurement of the area to be painted and similar data. The microcontroller Arduino Uno is used therefore overall system control.

The proposed design has six servomotors for top down, left right, forward backwards movement. The servomotor moves according to the distance measured by the ultrasonic sensor. Electric sprayer is used for painting purpose so there will not be any wastage of paint. The robot needs less painting time and small in size so it is easy to handle

XII. ADVANTAGE

The proposed system has high consistency and high efficiency.

It has a better productivity and power consumption is low.

Human effort and risk is reduced.

Wastage of paint is minimized.

Overall cost of painting is reduced.

XIII. CONCLUSION

Wall painting is a repetitive and exhausting process which makes it an ideal case for automation so we well studied about the project Development of automatic paint sprinkler system which is very much useful mainly in construction field. The main aim of the project is to replace the conventional painting methods and bring a revolution in the field of painting.

This will improve condition of image processing with needed changes .There may be the probability of sensing an object on wall and

avoid painting on that particular space .It also gives the path to draw pictures or portraits

XIV. REFERENCE

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