Wall Painting with Wall Climbing Robo

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ABSTACT: The proposed system narrows the risk for humans while painting tall buildings. An automatic painting function is implemented on the wall climbing robot. It evaluates the perfection of painting by itself and correction is done automatically.

KEYWORDS: BO-Motor, Bluetooth, spur gear, worm gear, strip gear

I.   INTRODUCTION

The main objective of this project is to nullify the risk factors for painters when they are painting flat buildings and to ease the painting. An automatic painting function along with the perfection evaluation is implemented on this wall climbing robot. Robotic body is attached to the wall by using a frame which consists of 4 vacuum cups, and the movement through the wall is made by 2of this vacuum cups at a time. The principle of air sucking is applied in this project. Control of the robot can be made by utilizing an android application and it can be done from the ground itself.

II.   WORKING

- **Suction**

Robotic body climbs the wall using four suction cups and the vacuum is created by a vacuum pump (collected from vacuum cleaner) .Two valves are given to vary the air flow, which can be controlled through Bluetooth . The shortcoming of vacuum disappearance due to the leakage of air is overcome by vacuum pump, which aids the suction cups.

- **Motion**

Four cups are at the tips of the strip gears, and the cup should be pressed to the wall before applying vacuum. This is done by four BO-Motors. Movement through the wall is made by the rotation of spur, worm and strip gears attached to dc gear motors and is controlled as per the instruction from the arduino board . This method allows the entire setup to move through a vertical surface. The movement can be controlled form a Smartphone via Bluetooth.

- **Painting**

A robotic arm is implemented for the painting function which contain a sprayer at the tip . The paint is pumped from the bottom level passed through a solenoidal valve and finally to the sprayer and the movement of the arm is programmable. After painting a portion of a surface, the entire body can be displaced to another area.
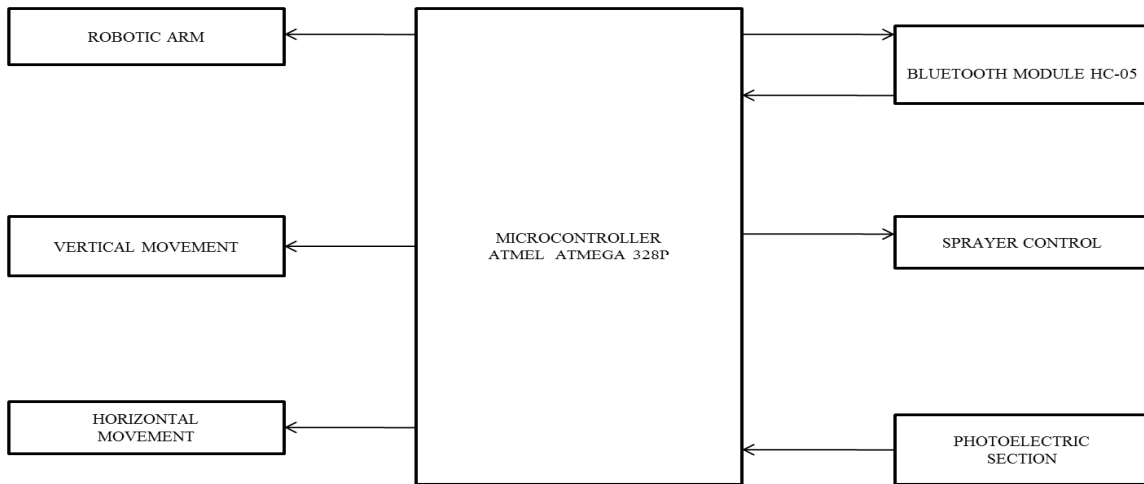
III. BLOCK DIAGRAM

Fig.1: Robot Section

Robot section:

• Bluetooth module hc 05: It is a low power bluetooth transceiver with CSR blue core chip. Here bluetooth module receives the control commands from the smart phone. The received control signals are fed to the microcontroller and as per the commands the movement of the robot and robotic arm can be controlled.

• Photoelectric section: This section consists of an array of photo diodes which detects the colour variations on the painted wall and corrections. By this we can monitor the perfection of painting.

• Vertical motor: This motor is in contact with a vertical gear strip connected through a spur gear. When the motor rotates, the robot moves in vertical direction. It can be controlled by the signals from the smart phone.

• Horizontal motor: Similar to the vertical movement, the horizontal motor is in contact with the horizontal gear strip for the horizontal motion.

• Robotic arm: This is a mechanical arm with 3 degree of freedom. It is used to hold the paint sprayer.

• Microcontroller: Microcontroller decodes the signals from control section and controls the movements. It also generates some signals to control the vacuum and pressure of paint and transfers to control section.
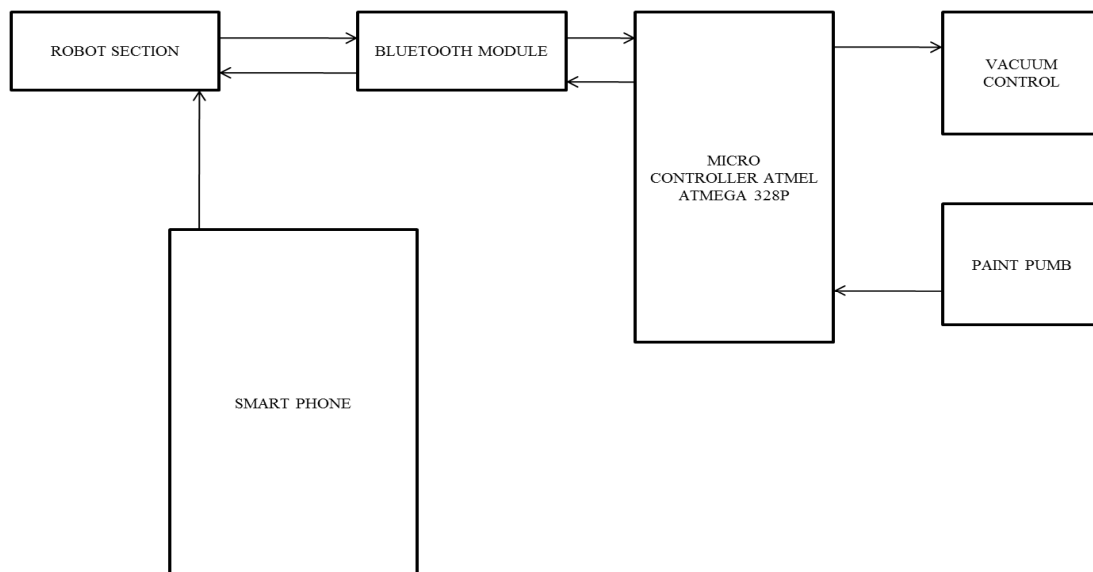

Fig. 2: Control section

Control section:

- Bluetooth module hc 05 :It receives the control signals from the robot section for operate the vacuum and the paint pump.
- Microcontroller (atmel atmega 328) : It checks and decodes the signals from robot section and operates the vacuum pump and paint pump.
- Smart phone: It consists of a Bluetooth application that pairs with the Bluetooth module at the robot section. Characters and numbers can be sent, and each character represents different actions at the robotic section.
- Vacuum pumb: This creates a pressure drop inside it by the rotation of a propeller, and then transfers the pressure to the suction cups at robotic section through a solinoidal valve.
- Paint pump: The pumping of paint from ground level to an elevated level is performed by this setup. This section includes a relay drive to switch the pump as per the requirements.
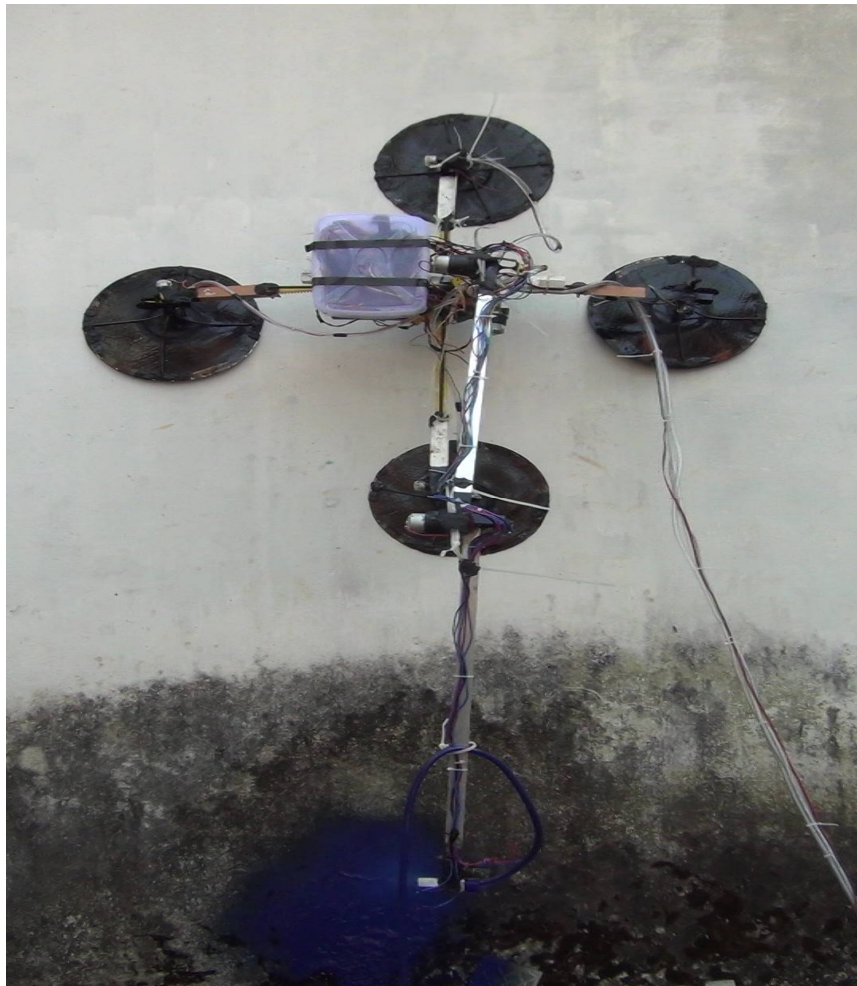

Fig. 3: Working model of wall painting robo

IV. ADVANTAGES AND APPLICATIONS

This project narrows the hardships while painting. The control of the robot can be done from the ground by using android mobile application. The over use of paint can also be reduced in this technique. This technique can be easily utilised in places where humans face difficulty in painting, such as multi-stored buildings. This can be utilised very effectively now a days, since the availability of labourers are low.

V. CONCLUSION

In this paper presentation we are introducing a wall painting robot equipped with air suction cups attached to the walls .This prototype is very helpful for the painting companies to do their contracts at very short time.

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