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ROOF CLEANING AND PAINTING ROBOT

Ms. Neethu John[1], Jefin Varghese[2], Nidhin Jose[3], Anjos Babu M, Vinu. M.M[4]

[2,3,4]*Department of Electrical & Electronics Sahrdaya College of Engineering and Technology, Thrissur, India*
[1]*Ms. Neethu John Asst professor Department of Electrical & Electronics Sahrdaya College of Engineering and Technology, Thrissur, India*

Abstract - *Today the world get fully atomized day by day and the man power is fully reducing because of the substitution of robots. Robotics are used to develop machines that can substitute for humans and replicate human actions. Robots can be used in many situations and for lots of purposes, but today many are used in dangerous environments manufacturing processes, or where humans cannot survive Robots can take on any form but some are made to resemble humans in appearance.*

Many robots are built to do jobs that are hazardous to people such as defusing bombs, finding survivors in unstable ruins, and exploring mines and shipwrecks. We are mainly using the robotics technique to clean the roof and roof gutters and also to paint the roof. RF remote controllers are used to control the robot and a robotic arm is used to clean the roof. Now a days roof is connected to the well recharging plants so the water must be clean , for that roofing will be clean and roof gutters must be clean .the corrosion the sheet the affect the purity of water so it should be clean for that sheet must be painted and roof gutters must be clean. We are using high pressure water jet for cleaning and spray paint by compressor is used for painting the roof. The primary project aim is to decreasing the maintenance cost on roofing and protect the workers life, decreasing the risk of work. .

Key Words: **RF remote controller, Water jet, Rapid Prototyping, Robotic Arm**

1. INTRODUCTION

Robots can be used in many situations and for lots of purposes, but today many are used in dangerous environments manufacturing processes, or where humans cannot survive Robots can take on any form but some are made to resemble humans in appearance. The mechanical aspect is mostly the creator's solution to completing the assigned task and dealing with the physics of the environment around it. Form follows function. Robots have electrical components which power and control the machinery .For example, the robot with caterpillar tracks would need some kind of power to move the tracker treads. Here we use belt drive mechanism to move the robot all directions and power window motor for the wheel system. Four wheel drive system enables movement of the robot all the for directions easy. The electrical aspect of robots is used for movement (through motors), sensing (where electrical signals are used to measure things like heat, sound, position, and energy status) and operation (robots need some level of electrical energy supplied to their motors and sensors in order to activate and perform basic operations). Taking this into consideration we designed the new robot for cleaning the roof and painting purpose. Now a days most of the roofs are covered with sheet. So the maximum life of roofing is about 10 years , and renovation of the sheet cost increase than older times so by maintenance we can increase the life expectancy of the roof. Now a days roof is connected to the well recharging sheet the affect the purity of water so it should be clean plants so the water must be clean . For that roofing will be clean and roof gutters must be clean. The corrosion the for that sheet must be painted and roof gutters must be clean. We are using high pressure water jet for cleaning and spray paint by compressor is used for painting so painting and cleaning must be perfect. The primary project aim is to decreasing the maintenance cost on roofing and protect the workers life, decreasing the risk of work. The roof cleaning robot contain cleaning of robot and painting .the full controlled robot is by RF transmitter grinding can be done before painting for getting better finishing on the sheet the sheet camera is used for looking the roof if the roof is painted by better finishing or not and how much clean the sensors we used for detecting the vehicles movement. A vehicle is run by caterpillar tyres for best movement above the sloped surfaces. And gripped teeth will apply grip towards sloped surfaces. Robot handing provide top of the robot give x axis and y axis of the sprayer handle. Highly pressured water jet provides better cleaning towards the dust and other things on the sheet so cleaning will be better.

The traditional system need to be operated by a operated above the roof and also only cleaning function is provided this type of system design make it easy to operate by the house owner or operator itself and also the 360 degree rotation and the movement of the actuator make it possible to reach every edges and corners of the roof .robotic arm and sprayer is controlled using arduino for that arduino is programmed for the motion of the both.

2. MECHANICAL STRUCTURE

Design of mechanical structure is an important area in the whole process. The entire system stability depends upon the base mechanical structure. The roof of the houses or other buildings have different structures some are slanted some tilted so the robot should not fall upon from side

4 wheel drive system is used which enables the movement of the vehicle all the four directions and also the 360 degree rotation. Also the breaking capability also increases. Each wheel is connected to a power window motor which provides high torque low speed movement which is essential for the robot. . The power window's automated feature comes from the window motor. Electrically generated, it triggers the mechanism to activate the gears or spurs to raise or lower the window glass. The mechanical structure is made using steel which provide high stability against accidents and also it can withstand high weight of the compressor and paint storage. Also it is provided with a length adjusting mechanism for the future expansion.

(a) (b)

Fig 1:(a) Power window motor, (b)Wheel design

Belt drive system is added in the 4 wheel drive system so as to increase the surface contact between the roof and the wheel and also to reduce the impact of the machine movement on the roof. The grip in the belt increases the friction which is highly necessary because the weight of the whole machine is not concentrated uniformly on all sides. The movement of the robot is controlled using RF transmitter and receiver. RFrecever is connected to the robotic wheels. So according to the signals from the transmitter the robot moves.

3. ARDUINO UNO

Arduino board designs use a variety of microprocessors and controllers. We are using two arduino in the transmitter and receiver part.in the transmitter part we are using the arduino as the mediator between controlling switches and nrf24lo1. In the receiver part it act as a mediator between nrf24l01 and actuators.

4. BLOCK DIAGRAM

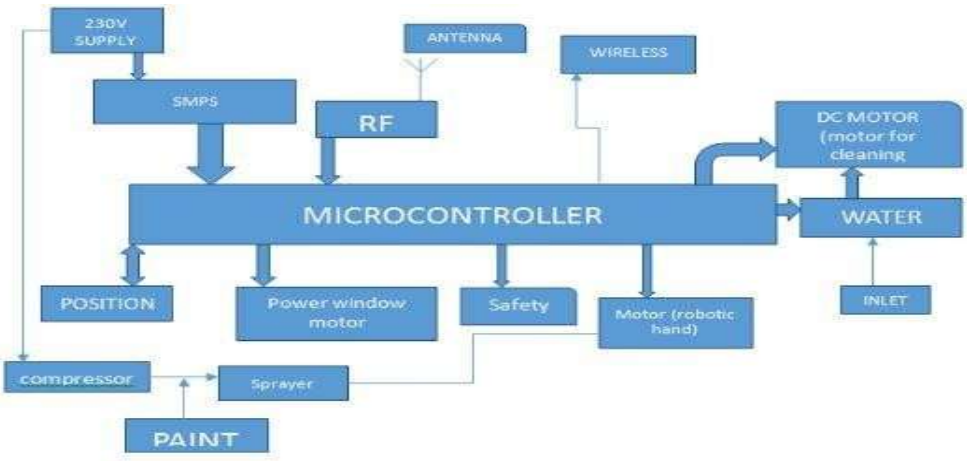

Fig .2 Block diagram

Microcontroller unit consist of multiple number of microcontrollers, mainly about 3 microcontrollers. In every IC specific programs will be saved for different modes of working such as cleaning, painting etc. then one IC is for working in accordance with the RF signal received. the microcontroller we are using is atmega328 ppu it act as the brain of the robot .Different sensors such as position sensor, braking sensor are connected to the microcontroller if anything wrong happens the microcontroller will take immediate measures and also alert the machine controller. We are using IR modules as end limiters which will sense whether the machine is close to the end of an edge or whether machine is unstable and send signals to microcontroller and it acts upon it. All control is done by arduino board and main control is done by wireless RF remote. By the signal from RF control it is processed by the receiver and give the signal to arduino according to that the vehicle movement can be done. Web camera placed on the top of the vehicle is to observe the sheet clean and painting. Components such as compressor, end switches, safety sensors, water pump are connected to the microcontroller.

An air compressor is a device that converts power (using an electric motor, diesel or gasoline engine, etc.) into potential energy stored in pressurized air (i.e., compressed air). By one of several methods, an air compressor forces more and more air into a storage tank, increasing the pressure. When tank pressure reaches its engineered upper limit, the air compressor shuts off. The compressed air, then, is held in the tank until called into use. When high pressure air is passed through the sprayer a vacuum is created which pushes the paint from the paint storage and this is mixed with air and passed out side with air, also some air is inhaled into the compressor.

Sensors are used to detect the movement of vehicle at the roof top, if the roof top is so high so the vehicle we can't see so the position and anti-falling system and braking system have to be installed at the wheel so we get the information and all details of the position of the wheel. When at falling time it will be detect and give the details of the position and the signal from the sensor will be processed by the arduino and braking system will be active and brake applied on the power window motor so the braking system will provide ant –falling system Another sensor which is placed at robotic hand to detect the position of the hand and provide x axis and y axis of the robotic hand movement.

Water pumping is mainly used for cleaning purpose. In this we are using direct high pressure water to clean the roofing sheet. We are using double nozzle and slit to increase the water speed. After cleaning we can do sanding if necessary otherwise can paint after the sheet is dry after cleaning.

5. ROBOTIC ARM

Fig.3 robotic arm

Robotic arm is used to cleaning, sanding, and painting of the roof. high pressured water cleaning is used for the roof. high pressure water jet pump nozzle is placed at the bottom of the vehicle and is used for cleaning. robotic hand is controlled by linear actuator with help of power window motor. the arm is mainly used for the linear movement mainly forward and backward and it can cover up to 50 cm which allows the water jet to reach every corner. x-axis and y-axis of the robotic hand with the movement of the linear actuator and motor for the to and fro motion. Robot hand is fixed with spray painter nozzle so the compressor give compressed paint through nozzle from storage tank and it will paint on the sheet the painting is done very neatly. But before painting we have to use sanding at the portion of corrosion. For better result of painting sanding can be done so the sanding bit we can also place at robotic hand.

6.WIFI CAMERA

Fig 4 Wifi Camera

Wireless cameras are proving very popular among modern security consumers due to their low installation costs (there is no need to run expensive video extension cables) and flexible mounting options; wireless cameras can be mounted/installed in locations previously unavailable to standard wired cameras. 360 degree rotation is provided so that there will be a full view of the robot and also the roof which will help in the control

7. CONCLUSION

Now days big places are truss worked so after 10 years it is not possible to maintenance by the man so the option in front of the company is to renew. At that time our project became big success. By our project we can save lot of money for maintenance and save the unwanted pollution happened by corrosions to atmosphere, and also we can save the workers time and their hard working energy and their life from the dangerous maintenance work .now a days in the roof tiles are cleaned by two person and at the time of painting all the tiles get reinstalled. So the time is wasting and lot of work and also dangerous work by our project we can save our precious time and life of the workers

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REFERENCES

1.Brook, Alan J. (1968). "The Discoloration of Roofs in the United States and Canada by Algae". Journal of Phycology. 4 (3): 250. doi:10.1111/j.1529- 8817.1968.tb04722.x. PMID 27068083.

2.Asefaw Berheb; Hashem Akbaria (December 2005). "Effects of soiling and cleaning on the reflectance and solar heat gain of a light-colored roofing membrane". Atmospheric Environment. 39 (40): 7807–7824. doi:10.1016/j.atmosenv.2005.08.037. Retrieved 18 April 2013

3."Sodium Hypochlorite, Sodium Percarbonate or Sodium Hydroxide for Roof Cleaning?". eClean Magazine. Retrieved 2017-06-29.

4."ARMA - Asphalt Roofing Manufacturers Association | Algae & Moss Prevention and Cleaning for Asphalt