Wall Climbing Robot

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***Abstract*—This paper presents a wall climbing robot utilizing the semi static movement. The climbing robot is a planned wheeled Robot to work in vertical normal landscape. The arranging issue is one of the three key difficulties to the improvement of genuine mechanical framework ready to climb genuine regular territory. Every of the two different regions – equipment plans and control – is moreover talked about.**

The robot will actually want to adhere itself to the divider anytime. Simultaneously endeavors have been made to make the plan of the robot light and effective by utilizing exceptionally less weighted materials. In this cycle the plan has been tried at various areas and tentatively determined the conceivable speed of the propeller to make pull to stick to the divider. Next in this planning the vertical and descending development of the robot is tried and carried out utilizing motors, propellers and so on.

***Keywords*—Suction, climbing, robot, DC motor, Aurdino**

I. INTRODUCTION

Wall climbing robots are versatile robots that can be utilized in an assortment of utilizations like security devices, cleaning supplies, review and support of surfaces of ocean vessels; oil tanks, glass pieces of tall structure building and so forth. To safeguard human wellbeing and security in unsafe undertakings to make the wall climbing robot a valuable gadget. Specialists have created different wall climbing robot models. Adhesion and motion components are the two fundamental components of wall climbing robots. Every bond or headway component has its own assets and shortcomings. Attachment system can create strain to get the robot on walls. The bond instruments of wall climbing robots can be classified into:

a) Negative strain attractions;
b) Magnetic attachments;
c) Dry grip or Van Der Waals force grip;
d) Electrostatic attachment.

Headway instrument decides the movement capacity of the robot. The ongoing movement instruments of the wall climbing robot can chiefly be classified into crawler, haggled type. In the robot planned, we are utilizing the strategy of vacuum bond and wheel movement.

Vacuum grip or negative tension bond, is generally utilized in wall climbing robots, as it has a few famous benefits, for example, state forward construction, broadly useful grip to different sorts of surfaces, which in corporate day to day existence wall and surfaces. Wheeled robots typically have straight forward mechanical construction and need simple control.

II.METHODS AND MATERIALS

There are three points involved in making of wall climbing robot: equipment configuration, control and arranging. A significant measure of work should be finished in every of these areas to foster a genuine climbing robot. The segment beneath portrays the difficulties engaged with these areas.

2.1 Hardware Design.

The equipment can expand the presentation of the robot, and frequently can make each of the other basic issues simpler to bargain with wheeled automated frame works have been utilized to traverse natural and plane slants. in this equipment configuration, wheels are being utilized to go on the walls. The engines of high-power supply have been used for the development. The propeller is joined a cylindrical shut design to make vacuum and empower the robot to adhere to the surface .to have the option to stick, the heaviness of the robot must keep in the

brain and in this way the body of the robot is made utilizing light weight material.

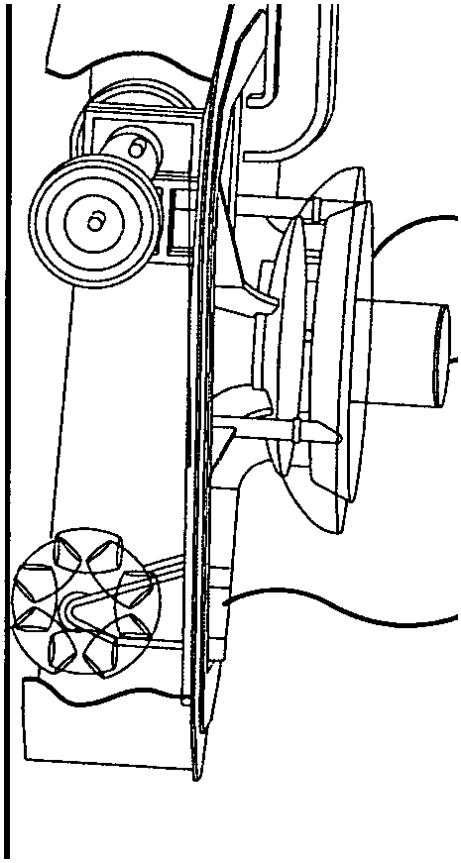

Fig 2.1 Robot Design

2.2 Control

There are three essential parts of the control issue for a climbing robot: X component, Y part furthermore Z part. To keep up with balance, both the area of the focal point of mass of the robot and the powers from contacts with normal highlights should be controlled. Forces involved:

Fr: Frictional Force due to the wall

N: Normal Force

V: Force created due to Propeller W: Gravitational Force of the robot μ: Coefficient of friction

In X direction, balancing the forces

N-V=0 ------(1)

In Y direction, balancing the forces μN-W=0 -----(2)

In Z direction, balancing the moment

Torque (Normal force) + Torque (Gravitational Force) -Torque (Vacuum Force) =0 ------(3)

2.3 PLANNING

The arranging issue is the third essential test for making a climbing robot

2.3.1 Planning Challenge

The planning issue for climbing robot comprises of creating direction that moves the robot through a multiple environment while keeping up with balance the issue proclamation was managed by making pressure important to maintain the robot upstanding against the power.

2.3.2 Planning Framework

In this section, the planning framework in the context of a specific climbing robot have been described. This robot consists of four wheels. All the wheels are connected to BO Motors to enable locomotion of the Robot. The low complexity of this robot's kinematics makes it suitable for studying the planning of climbing motions.

This robot consists of LIPO battery – 2200mAh, the Bluetooth range of – 2meters ,the duck body has BLDC motor of 1000kV which has 120gms,aurdino nano connection, Bluetooth module – HC05 is used.

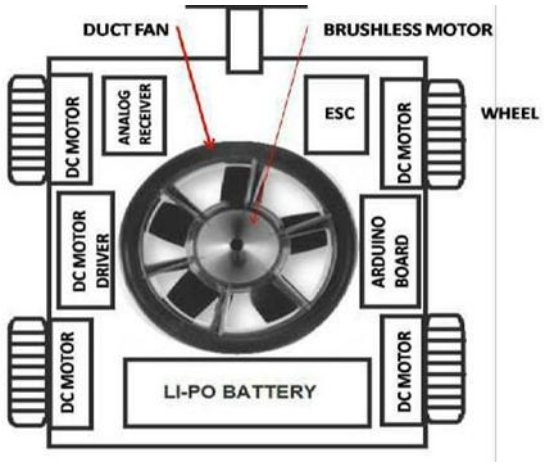

Fig 2.2 Pin Diagram

There are two mechanisms involved in the robot:

• Locomotion Mechanism – There are four wheels in each of the corner of the robot. These wheels are connected to DC motors. The movement of the robot in upward and Downward directions is controlled using a remote controller.

• Adhesion Mechanism - The components involved in the adhesion process are brushless DC motor, propeller. The operation of the motor and the propeller is to produce air free region. The propeller converts rotational motion into thrust. Propeller dynamics can be modelled by either or both Bernoulli's principle and Newton's third law. A pressure difference is produced between the forward and rear surfaces of the blade. It creates suction that will enable the robot to stick to the wall.

2.3.3Planning Implementation

The process of planning was led forward by its implementation process.

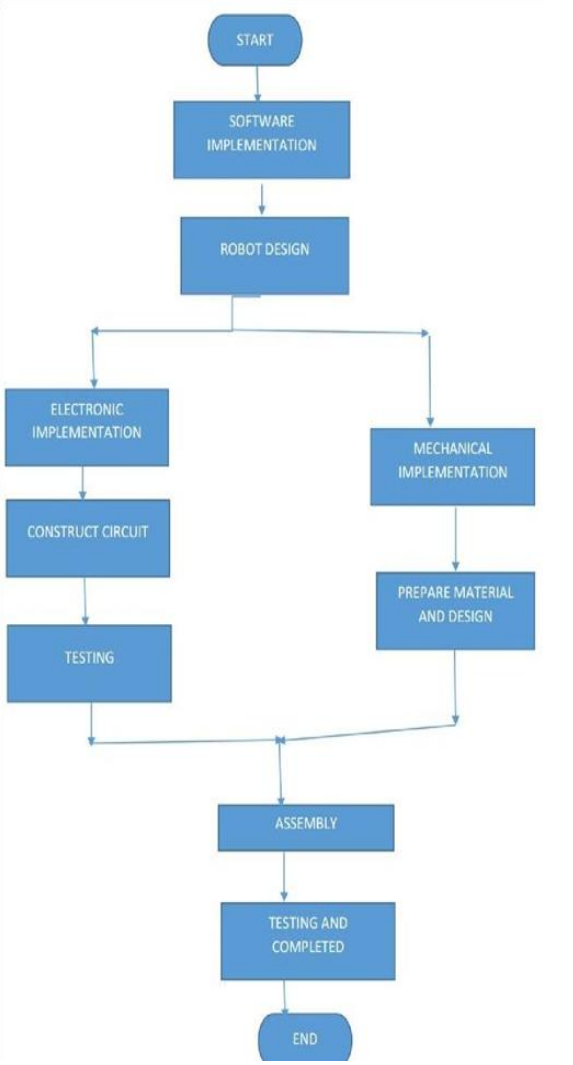

Fig 2.3: Planning Implementation Flow Chart

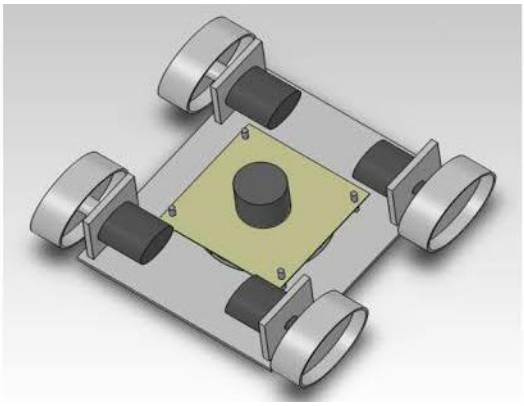

Fig 2.4: Work Implementation side view

III. ROBOT USAGE IMPLEMENTATION

i) The robot is first switched on. ii) As the power supply reaches the propeller of the robot, it starts to create vacuum by sucking the air below the surface of the robot just like the vacuum cleaner. This makes the robot stick to the wall.

iii) The locomotion controls make the robot to make movement on the wall. The wireless controller is available with controls for upward and downward movement of the robot.

IV.CONCLUSION

This paper described the challenges to developing an autonomous climbing robot and presented a method to address the planning problem. The current work deals with the robot able to address challenge of climbing the wall.

The future work will address the issues of security using the wall climbing robot.

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