

DEPARTMENT OF MECHATRONICS

MRD 416 - PROJECT PHASE II

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SUCTION POWERED WALL CLIMBING ROBOT

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INTRODUCTION

- ❖ In the modern scientific era, robots are one of the most exclusive inventions by which our life became easier and comfortable.
- ❖ One such robot is the “WALL CLIMBING ROBOT” which can be used for climbing vertical walls and perform tasks such as to clean, weld or inspect surfaces of high buildings, large oil tanks etc., replacing the workers in hazardous environments.

- ❖ Wall climbing robots, which are capable of climbing up vertical surfaces, ceilings and roofs, are expected to replace the manual workforce in facade cleaning works, which is both hazardous and laborious work.
- ❖ Wall climbing robots uses different mechanism to climb the surface, such as suction or vacuum, magnetic adhesion or specialised feet.

- ❖ The targeted capability to stick with surface can be achieved by duct fan.
- ❖ We are required to ensure safety of the workers needs to be considered.
- ❖ The robot has to identify the objects on the wall.

OBJECTIVES

- ❑ Develop a modular, re-configurable, wall climbing robotic system .
- ❑ Simple Design for the robotic platform.
- ❑ Circuit design with limited components.
- ❑ Vacuum production for climbing.
- ❑ Identifying the doors and windows by image processing or machine learning.

LITERATURE REVIEW

1. “A Novel Mechanism Design Technique To Develop A Vertical Climbing Robot With High Mobility For Flat And Spherical Surfaces” 2021 2nd International Conference on Robotics, Electrical and Signal Processing Techniques (ICREST)

- ❑ Demonstrates capability and effectiveness of wall climbing robot .
- ❑ Provides the basic requirements in the design wall climbing robot.
- ❑ This paper make use of reverse propulsion method for wall climbing.

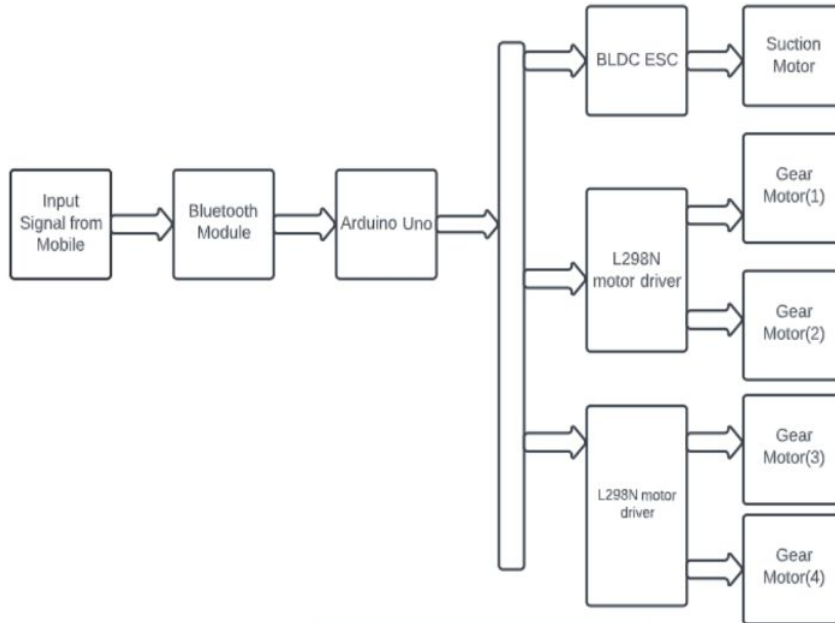
2. “Duct Fan Based wall climbing robot for concrete surface inspection” Annual IEEE Indian Conference

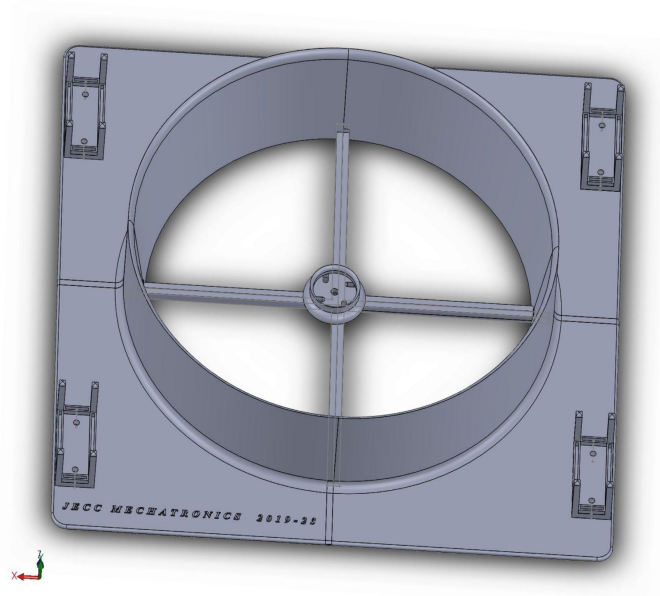
- ❑ Proposes the 3 main mechanism of wall climbing robot technology
- ❑ Suction, adhesion, magnetism
- ❑ In this paper a robot with duct fan based wall climbing mechanism is proposed.
- ❑ Make use of image processing
- ❑ Simple structure and fast response model.

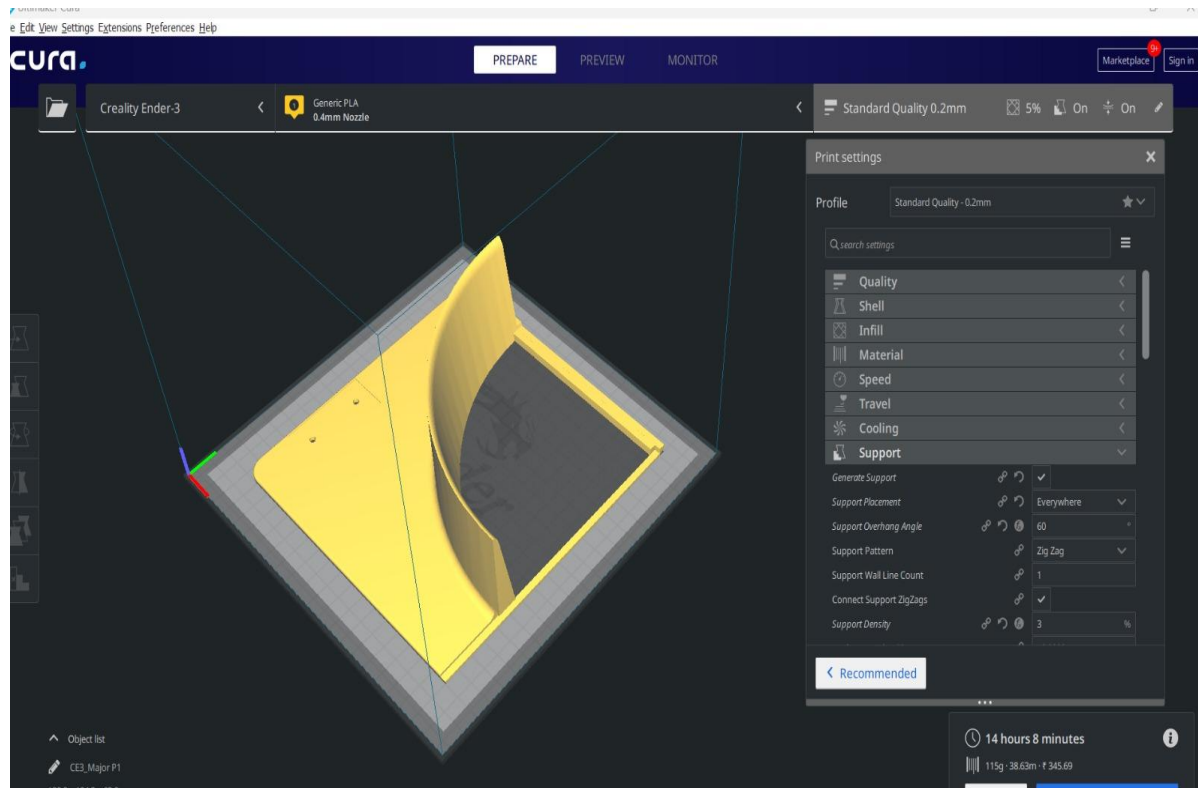
3.”Application of the ZED Depth Sensor for Painting Robot Vision System Development” August 2021 IEEE Publication

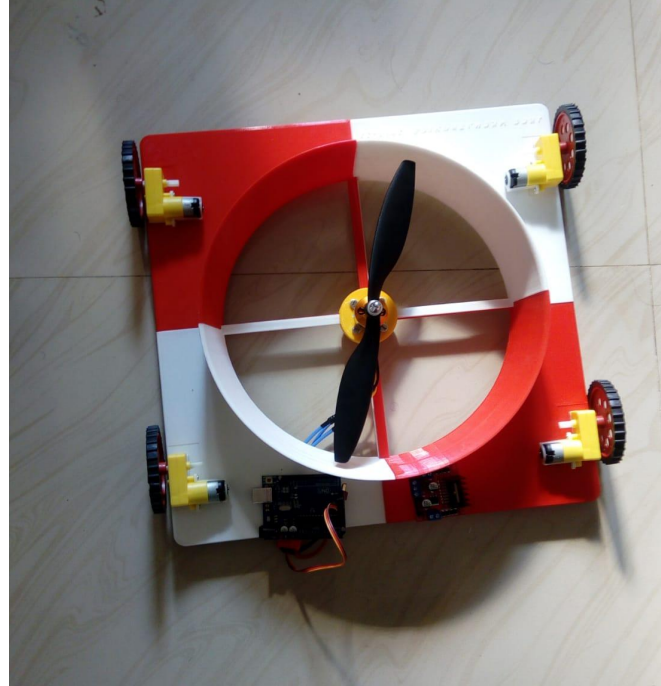
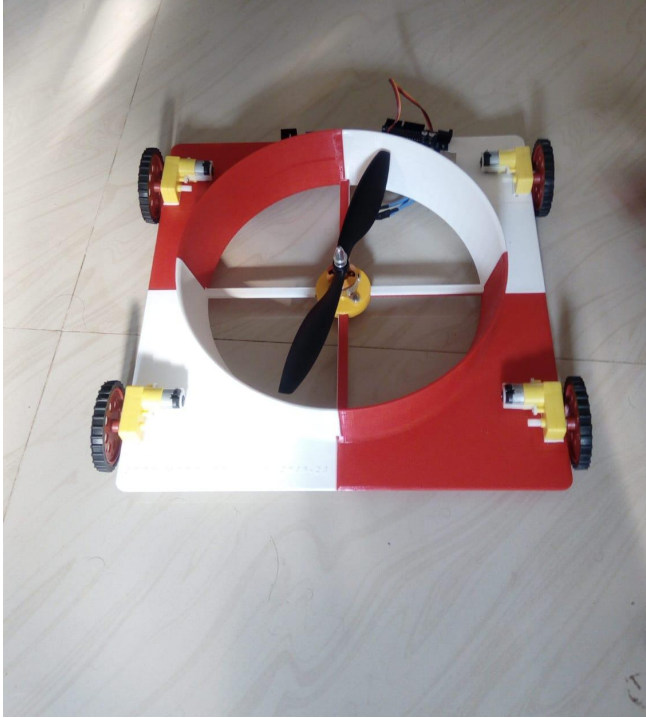
- ❑ Wall extraction was performed using simple image processing and morphological operations in a surface extraction algorithm.
- ❑ This introduces a procedure for window and obstacle detection from a depth image captured by a ZED depth sensor.
- ❑ Erosion.
- ❑ dilation.
- ❑ opening.
- ❑ closing.

METHODOLOGY









COMPONENTS USED

- ❖ L298N Motor Driver
- ❖ Arduino uno version R3
- ❖ HC-05 Bluetooth module
- ❖ A2212 2200 KV BLDC motor
- ❖ 30A Electronic speed controller
- ❖ 12V Power supply
- ❖ DC Gear Motors
- ❖ Android application -Bluetooth RC Controller

CONCLUSION

- ❖ Robots have been created to assist or replace humans in various dangerous and difficult tasks.
- ❖ Objectives of our work is to design and fabricate a wall climbing robot for high rise buildings.
- ❖ The BLDC motor provide the suction to stick on the wall.
- ❖ The image sensor used in the project enables us to detect the obstacle.

REFERENCES

- ❖ “A Novel Mechanism Design Technique To Develop A Vertical Climbing Robot With High Mobility For Flat And Spherical Surfaces” 2021 2nd International Conference on Robotics,Electrical and Signal Processing Techniques (ICREST) [1]
- ❖ Duct Fan Based wall climbing robot for concrete surface inspection” Annual IEEE Indian Conference[2]
- ❖ Application of the ZED Depth Sensor for Painting Robot Vision System Development” August 2021 IEEE Publication[3]

- ❖ “A Modular Biped Wall-Climbing Robot With High Mobility and Manipulating Function,” IEEE/ASME Transactions on mechatronics [4].
- ❖ “Crack detection by a climbing robot using image analysis,” International conference on Electronics Communications [5].

THANKS!