

AUTONOMOUS ROBOT SWEEPER

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Declaration by Authors

This is to declare that this report has been written by us as part of our coursework. No part of the report is plagiarized from other sources. All information included from other sources have been duly acknowledged. We aver that if any part of the report is found to be plagiarized, we shall take full responsibility for it.

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ABSTRACT

In today's world, everyone in the family is preoccupied with their jobs and does not have enough time to clean the house. The cleaning robot assists in mopping and cleaning the floor. This is accomplished by just pressing a button, and the robot will complete the task. This also reduces the amount of work required in manufacturing to clean the floors. As a result of the foregoing, I was inspired to design and construct an autonomous cleaning and mopping robot that can accomplish all of the cleaning and mopping job with a single button click therefore, this robot may be operated manually. We implemented SLAM algorithm on the ROS turtlebot and checked its working on a simulated environment . For the actual design of the robot , we used tinkercad

The major goal of the robot is to create a robot that is capable of effective dust cleaning and mopping of a particular room's floor. Its goal is to make robots affordable and practical for people of all socioeconomic classes. The robot's target operation time is one hour. The designed robot will be beneficial in both domestic and industrial settings. This eliminates the need for physical labour to keep the workstation and home clean. In addition, the device will clean the room with a single button press.

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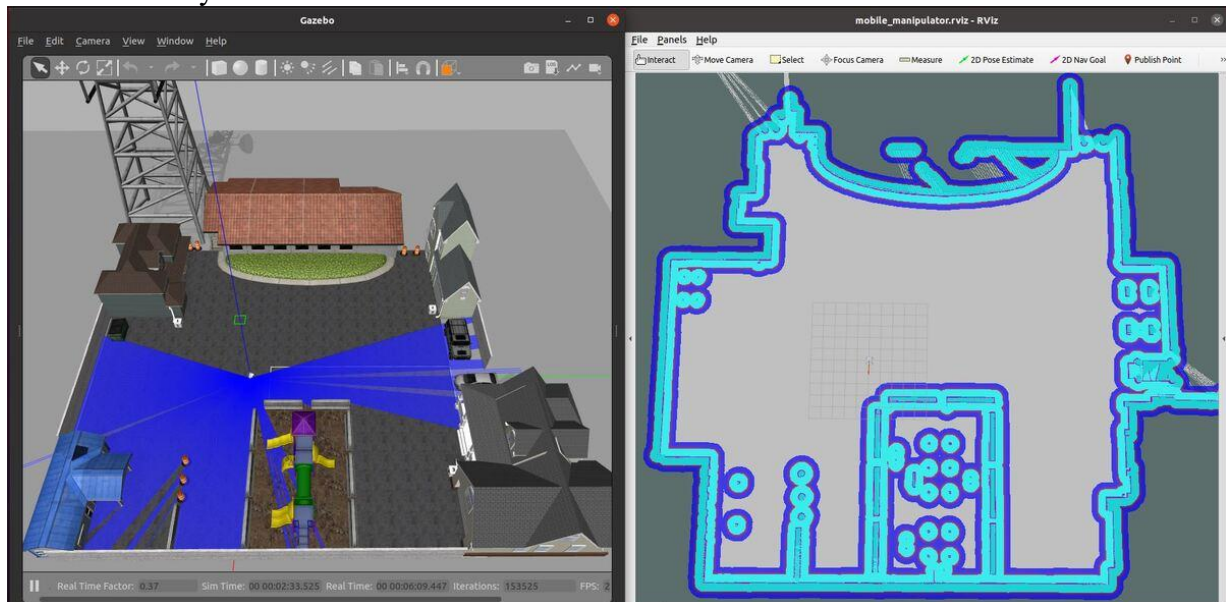
CHAPTER 1

INTRODUCTION

Problem Statement

Humans nowadays live a sophisticated existence. People in cities do not have regular schedules and work long hours. Someone will prefer time-saving tactics in such a case. As a result, robots have taken over the manual labour. It might be difficult for career-oriented and job-seeking women to balance home and work life.

Traditionally, a mop or wet mop is used to clean the floor, with the hand as a possible tool. They must clean the surface thoroughly. Cleaning also includes the cleaning of surfaces that are different Basically, there are cement floors and highly polished timber floors or perhaps marble floors. Rough surface flooring, such as cement floors, are mainly found in semi-urban regions and are covered by these floors. With so much dust, cleaning takes a long time. for the purpose of saving, there was a time when a House Cleaning Robot was required, an automated system that cleans and works on its own human intervention/control.



Importance of Solving

The use of an autonomous robot for floor cleaning applications saves a lot of time in people's lives. Service robots have lately gained popularity; these robots function in a semi- or fully automated manner to provide services that are beneficial to the well-being of humans and equipment. Medical robots, submersible robots, surveillance robots, demolition robots, and other sorts of robots that do numerous tasks are all examples of robots. They'll mow lawns, clean floors, and guard homes, as well as assist the elderly and disabled, perform some surgeries, inspect pipes and locations that are extremely dangerous to people.

With this project , we'll get a brief idea of how these automated systems work in terms of object detection and path planning , as well as we get a idea of how the design of these robots could be, keeping it precise and simple.

CHAPTER 2

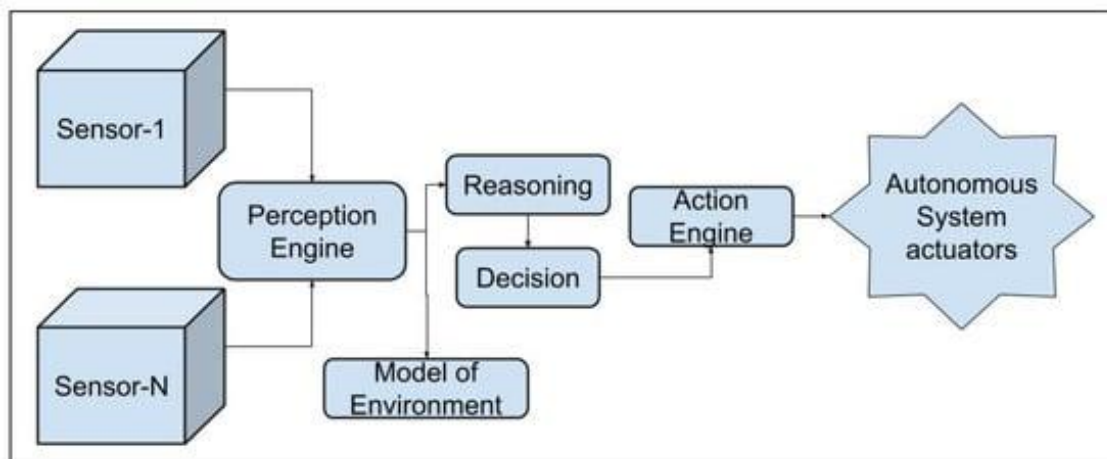
METHODOLOGY

ALGORITHM

For robots to work autonomously, it is required that it is able to navigate and map the environment in order to function. For this purpose we used SLAM algorithm.

SLAM Simultaneous Localization and Mapping involves two things: mapping and localization. SLAM is used instead of other techniques available like GPS because GPS can give us an accurate position of where we are in the world, but GPS by itself is unreliable, especially in urban areas with tall buildings.

GPS depends on a lot of factors, like the open sky, the number of satellites in line of sight, etc. Even at times when GPS can help provide coarse localization, SLAM can be used to provide a more accurate estimate of the vehicle's location.



METHOD

For our project, SLAM is used to map the environment for example a warehouse after which the robot plans the path for its movement. In order to mop the floor, the robot uses perception (detection of objects) and plans the path accordingly in order to clean the whole area.

In order to make a robot move around using SLAM you need to deal with four things:

- How to create a map of the environment: this helps the robot understand how is the environment where it will work
- How to localize the robot on that map: this means, the robot has to identify where it is in the environment and to which point in the map it corresponds
- How to compute a path from a point to another of the map
- How to move the robot following the path
- How to make the robot avoid obstacles in the path.

CHAPTER 3

WORKING

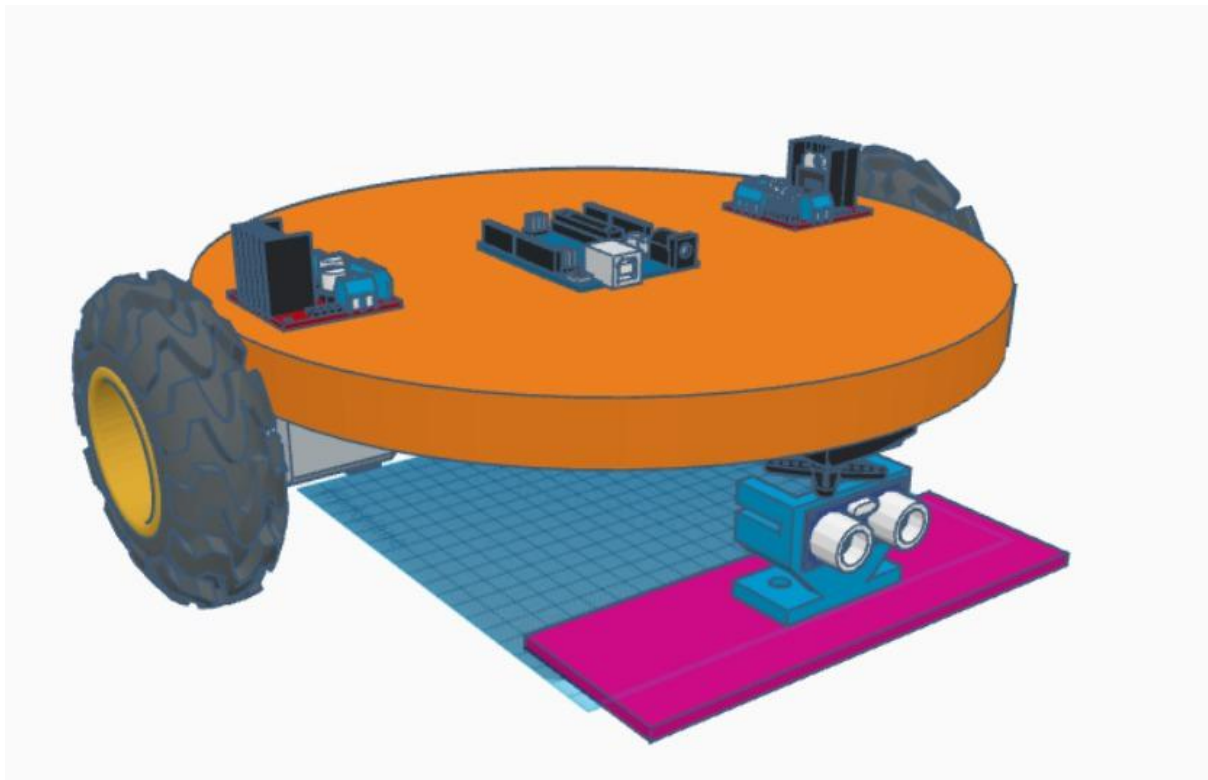
This is a proposed design.

Using a smartphone connection, the battery-operated cleaning robot cleans and mops at the same time.

The main controller for controlling the cleaning robot is Arduino. Ros serial is a ROS communication protocol that runs over the UART on your Arduino. It turns your Arduino into a full-fledged ROS node that can send and receive ROS messages, publish TF transformations, and obtain the ROS system time.

The Arduino is powered by a 12V DC battery. An android device operates a cleaning robot via a Bluetooth electronics app.

This app connects to the robot's HC-05 Bluetooth module via Bluetooth. For obstacle detection, an ultrasonic sensor is utilized, which transmits ultrasonic waves from its sensor head, receives the echo waves, and sends its output signal to the Arduino, which will immediately stop the robot and activate the buzzer.

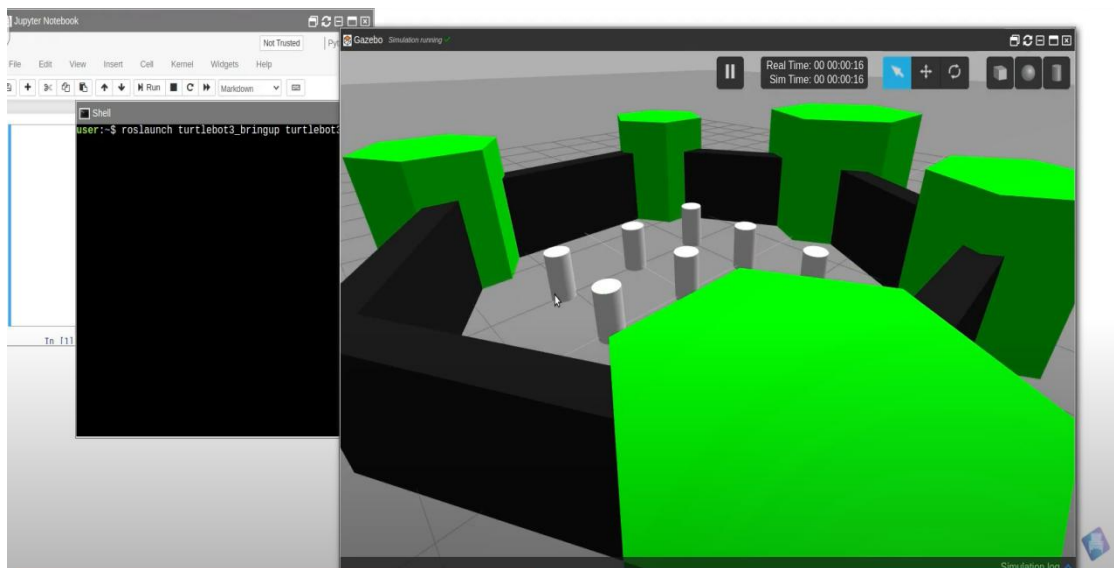


CHAPTER 4

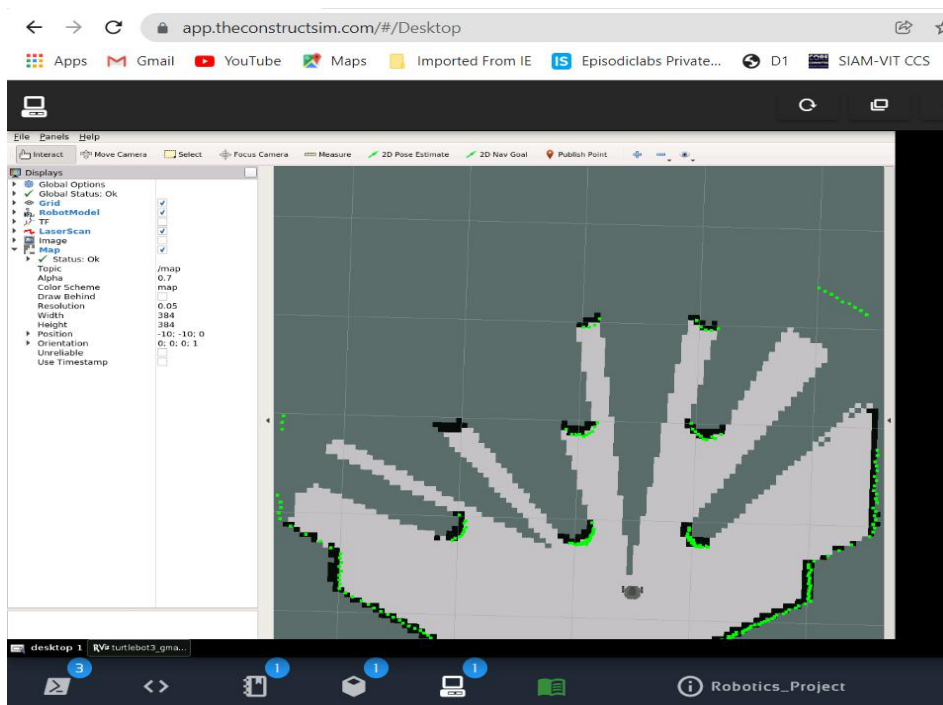
RESULTS

We were able to run simulations on theconstructsim site .The turtlebot was able to navigate and localize the environment that was actually a warehouse we were able to design.

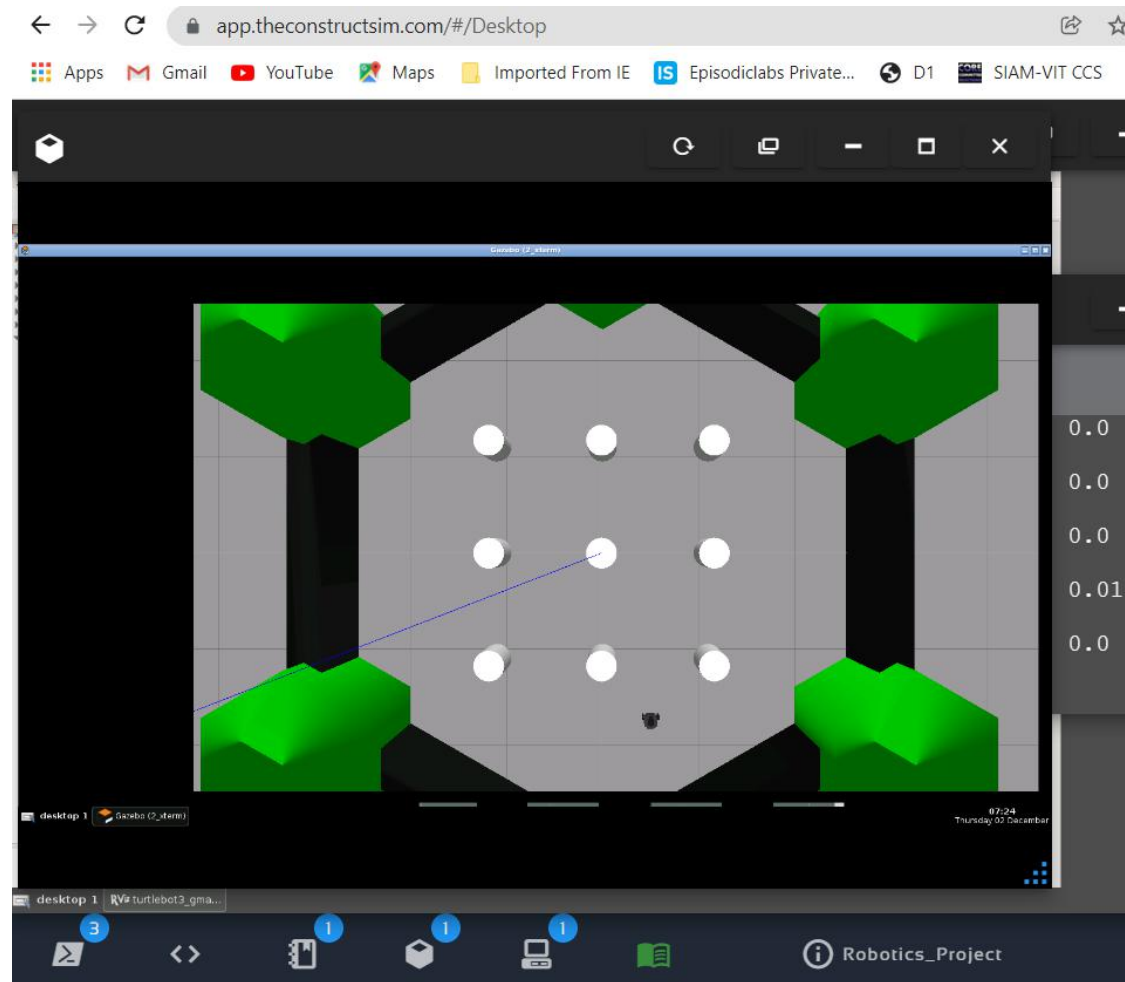
Simulations:



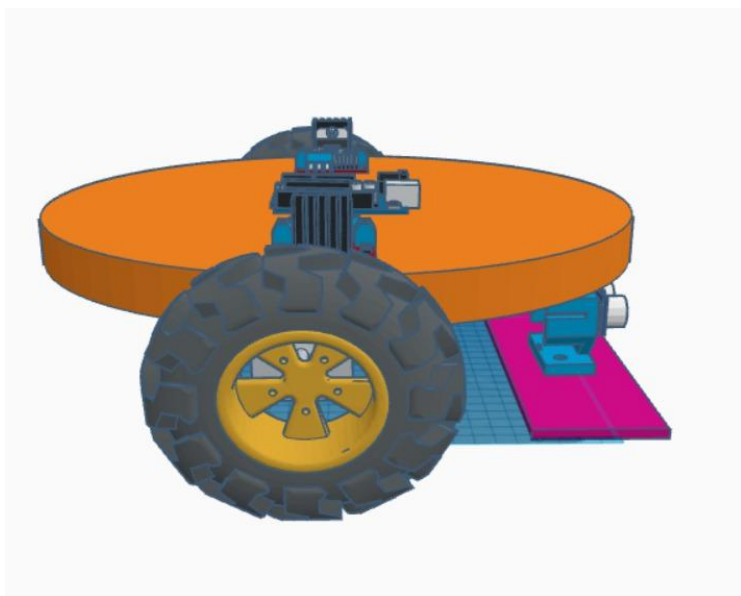
Gmapping:



Warehouse:



Design:



CHAPTER 5

CONCLUSION

There are so many cleaning and mopping robots present in the market but only some of them are affordable so we tend to economical in the actual hardware. There are very fewer robots that include both cleaning and mopping. With this work, we tried to reduce the cost of the robot and make it more compatible. Cleaner brushes can be added to the mechanism to increase the efficiency of dust collection and cleaning. Lead pouch cells can be used to reduce the weight of the robot which can further lead to the reduction of power consumption.

