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SMART HOME CLEANING AND CLEANSING ROBOT

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Abstract:

In today's world of convenience and automation, robots are widely employed in every industry, ranging from homes, hotels, to offices, etc. We are putting forth an automatic IoT-based vacuum cleaning and cleansing robot in response to the rising need for automation. There are many different robots on the market, but their high cost and limited variety are the main drawbacks that slow and dwindle sales. The goal of implementing this model into practice is to create a robot that can perform dry and water based vacuum cleaning while being economical, low maintenance, and user-friendly. This robotic vacuum cleaner is capable of collecting dust, detecting obstacles, and planning cleaning tasks using an Android application. With the aid of this robot, persons with disabilities will be able to clean their homes independently.

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I. INTRODUCTION

Any autonomously running device that takes the role of a person's labour, even if it doesn't look like a person or behave in a way that a person would. Furthermore robotics, is the branch of engineering that deals with the creation, maintenance, and use of robots.

II. NEED FOR AUTOMATION

Isn't it fascinating that with the aid of robotics, 60 percent of all job is capable of being automated since it is hazardous or repetitive? Although just 5 percent of our job is currently automated, this is a situation that needs to be addressed. "As machines become more and more efficient and perfect, so it will become clear that imperfection is the greatness of man." – Ernst Fischer. Robotics aims to create intelligent machines that can aid humans in their daily lives, keep everyone safe, and do the repetitive, dangerous, and tiresome chores that humans currently perform

III. CHALLENGES

• The difficulty was that the market required a less expensive option, one that could map and clean the area with ease. A robot with inexpensive sensors that are fully utilized was chosen.
• Low cost, so that all socioeconomic groups may afford it should be a feature of the robot.
• The robot's simple construction makes it mobile, enables it to clean every nook and cranny of the house, and makes it simple to fix.
• Lightweight the motors must provide greater torque to support the robot's weight, which acts as a payload on the motors and that could cause the motors to heat up or the coils to become damaged.
• Fewer sensors will be employed but the data will be analyzed using special sensor fusion methods in order to extract the crucial information from them all at once. This will increase sensor productivity output.
• A strong vacuum, which will fully clean the space while using less battery power

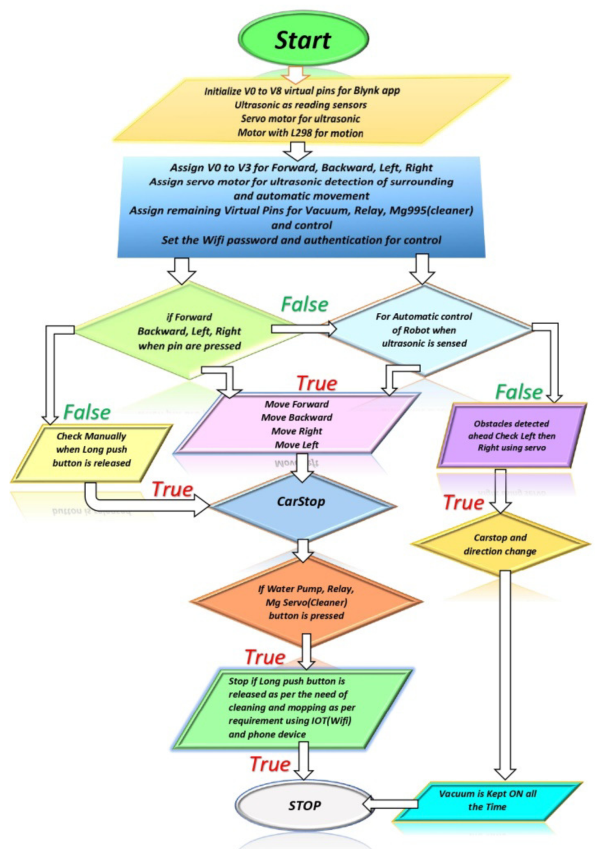
IV. LITERATURE REVIEW

When cleaning the floor in complicated environments, such as those containing thin-legged tables or chairs, traditional robotic hoovers or RVCs (robotic vacuum cleaner) featuring ultrasonic or infrared (IR) detectors struggle to detect boundaries. For RVCs working in varied household situations, a reliable obstacle detection (OD) approach that relies on the triangulation principle is given. The suggested technique projects a horizontal IR beam towards the floor using the IR emitter, and then utilises the RVC's wide-angle vision camera to take a picture that contains the IR line that was reflected by the surface or an obstruction. Using the consistently indicate of the pixels that correspond to the IR line in the acquired image, obstructions are recognised.Researchers are paying more attention to robots as a result of the advancement of technology in order to improve people's lives. With additional capabilities like planning for a certain period and a bag-less trash container with an automatic dirt disposal mechanism, the robot can operate in both autonomous and manual modes. This work has the potential to significantly improve human lifestyle. Cleaning a large area is generally recognised to be a labor-intensive, constantly repeating task. The cleaner robot can currently be separated into multiple jobs, such as vacuum cleaner, wiping robot, etc. The RVC was released before the rest of these robots. Electrolux introduced the first self-driving vacuum cleaner in 1996. The first robotic vacuum cleaners failed to remove clutter and sloppy cleanliness. As a result, it is impossible to properly launch this cleaner on the market. The UK tech company Dyson created the DC06 robotic vacuum in 2001. However, because to the expensive cost, it was never made available on the market. Since 2002, the majority of the cleaning robot's research has been devoted to lowering production costs and developing highly effective cleaning robots. Using various sensor and route planning algorithms, the target archiving process has undergone numerous adjustments. A multipurpose floor cleaner that can mop and vacuum the floor was advised. has created an autonomous cleaning robot to eliminate dust in. A novel method for using sonar data to generate a bitmap plan for a mobile robot. Results and assessments made in the home context show that the suggested approaches are valid. Comprehensive raster maps made in the manner advised by the research likely result in a decrease in development costs. Instead of a pricey laser sensor, sensor mapping might be done using an inexpensive ultrasonic sensor. The suggested robot was put to the test at a university lab, and it can be enhanced by showing actual information. In fact, because of the specular reflective indoor operation, sonar data could not always be precise. It illustrates how the mapping algorithm uses compass and ultrasonic sensors. The description of data fusion, which is the merging of information from numerous sensors and associated data to increase accuracy beyond what can be obtained with a single sensor itself. The optimum sensor fusion techniques were described in this work, together with the results of the most pertinent research. The majority of state estimation techniques use the laws of probability to create a vector state from either a vector measurement or stream of vector measurements. These techniques are based essentially on control theory.

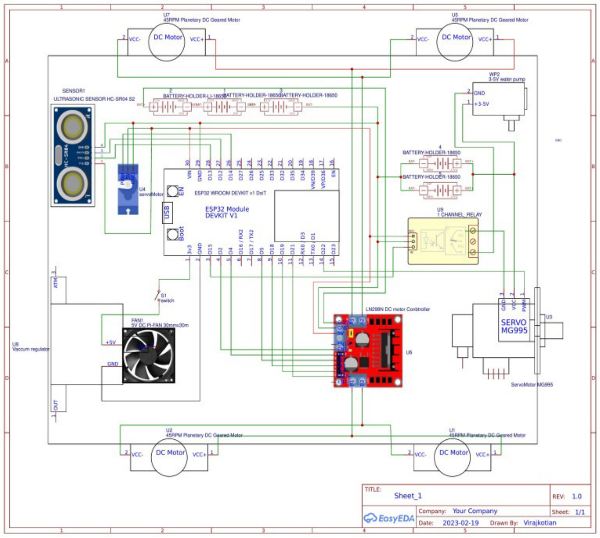
V. WORKING PRINCIPLE

A machine that can move is referred to as a mobile robot. It can travel about its environment on legs, wheels, rails, or any combination of those. It can also roll, crawl, swim, and fly. Mobile robots are employed in a variety of settings, including factories (automated guided vehicles), households (floor cleaning gadgets), hospitals (delivery of food and medications), agriculture (fruit and vegetable pickingfertilisation, planting), the military, and search and rescue missions. They answer the demand for adaptable handling of materials, the necessity for robots to just be able to work on huge buildings, and the requirement for quick work area reconfiguration.Navigation is the process or activity of planning and guiding a robot along a course or route so that it can go safely from one place to another without taking a wrong turn or bumping into other objects. Localization, path planning, and motion control are common components of the complicated process of navigation. The ability of a robot to determine its own location and orientation within a global environment is known as localization. Making a robot's path between start and destination places without colliding with any of the cluttered obstacles in the way is known as autonomous path planning.This involves interactions between units of mobile robots as well as interactions between mobile robots and humans. Motion control must ensure that movement is carried out following the intended path while also avoiding obstacles.

VI. FLOWCHART



VII. SCHEMATIC



VIII. HARDWARE

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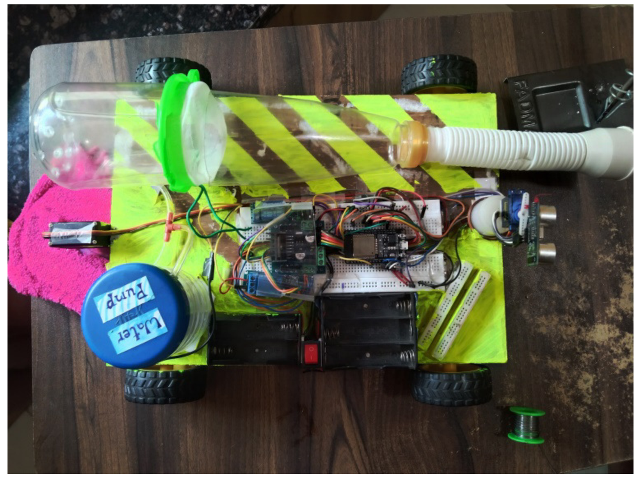

IX. ADVANTAGES

• It lessens human labour and power. City dwellers have irregular and protracted working time.
• In this type of situation, a person would constantly look for time-saving strategies.
• Assisting people who are physically challenged is another benefit of this endeavour.
• Physically challenged persons benefit from this robotic's autonomous mode.
• Simple installation and practical use which makes it userfriendly

X. APPLICATIONS

• Cleaning is the primary goal of this project.

• With this robot's assistance, we can save time.

• Possesses ability to manoeuvre around corners and under fittings.

XI. FUTURE SCOPE

• Feedback sensors like optical encoders may be incorporated to even further improve the robot's navigational capabilities.

• To improve the effectiveness of dust collection, cleaner brushes can be added to the vacuuming process.

• By using lithium polymer (Li-Po) batteries, the robot's bulk and weight can be decreased, which can also result in a decrease in power usage.

XII. CONCLUSION

• There exist a lot of cleaning and mopping robots on the market, but only a select few are cost-effective and practical.

• Robots that are capable of both cleaning and mopping are extremely rare.

• Through this project, we aimed to lower the robot's price and improve its suitability for Indian industries and consumers

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