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ENGINEERING AND PROTOTYPING OF A SMART MOPPING AND DUST COLLECTION MACHINE

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Abstract:

In the present day scenario all the members of family are busy with their work and are not getting proper time to clean inside and outdoor area of house. Our cleaning machine helps to clean and mop the floor inside and house and it can clean out some of the hard surface in parking areas and garden areas. This machine also cleans up the hard waste like Plastic cover, tree leaves and others with the help of Vacuum power. This is done by wireless drive control with Android mobile and the machine does the work. This also cuts down the labour used in factories for cleaning floor. Above being the case, motivated for the design and development of an automatic cleaning and mopping machine that does all the cleaning and mopping work. This machine can be controlled with the help of a mobile Bluetooth. The main motto of the project is to make this affordable and suitable for the Indian users and factories. The development of the machine starts with the design of a simple and most effective chassis for the machine which is a very important part as it has to carry all the weight on the machine. The electronics part where, the type of motor and its specification that should be used to run the bot, the sensors to be used, the Arduino controller, the motor drivers, the wheels and other electronic components to be used on the machine are decided. Further, the assembling of the components will be done and finally testing and calibrating the device. A machine which is capable of efficient dust cleaning and moping of the floor of a given room is the main aim of the machine. It is aimed to make the machine economic and feasible for the economic class society. The target time of operation of the machine is one hour. The developed machine will be useful for the household application and industries. This helps to keep the workspace and house clean without the physical labour.

Keywords — **Wireless drive control, Arduino, Sensors.**

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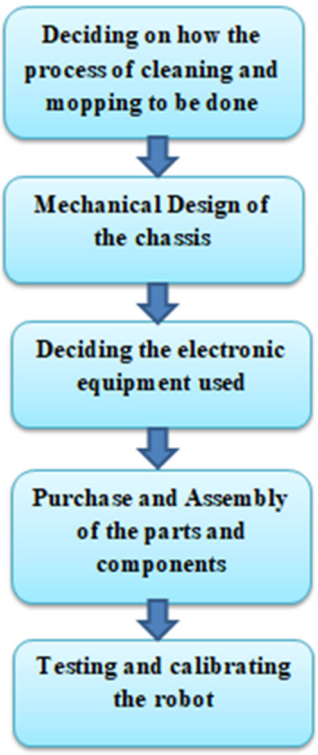
I. INTRODUCTION

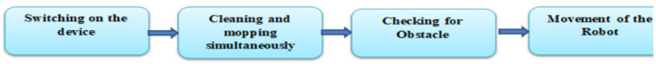
The integration of autonomous robots to human life is gaining rapid momentum. Cleaning has been one of the most important tasks in everyday human activity and it has always been a time-consuming process. It is not much of surprise that the demand for autonomous cleaning machine is increasingly been common in the modern digital world. The demand for household autonomous cleaning machine such as robotic vacuum cleaners, robotic lawn mowers is increasing exponentially.

II. DESIGN METHODOLOGY

Design of Automatic Cleaning and Mopping machine starts with the design of simple and most

effective chassis for the machine which is a very important part as it has to carry all the weight on the machine then electronics components which are to be used on the machine are decided which include the type of motor and its specification that are to be used to run the bot, the sensors to be used, the microcontroller (Arduino), the motor drivers, the wheels and other electronic components to be used on the machine. After all, parts are procured assembling the components and finally testing and calibrating the device are done.





III .COMPONENTS USED

The main components used in our project are listed below*:*

- 12V DC motor - 4 nos
- 12V 10amps lithium ion battery- 1no
- 12V DC pump -1 no
- 12V Vacuum pump – 1 no
- Brush Roller-1 no
- Mopping Roller-1 no
- Arduino controller – 1 no
- Relay board - 1 no
- Bluetooth module- 1 no
- Ultrasonic Sensor-1 no
- Motor Driver – 1 no
- Terrain Robotic Wheel – 4 nos

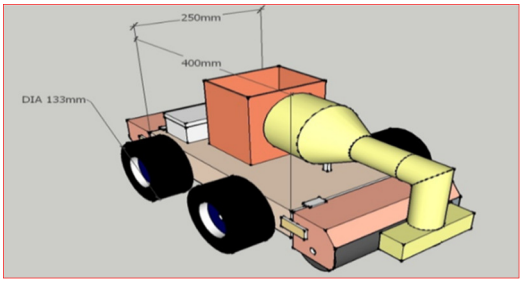
IV .OBJECTIVE

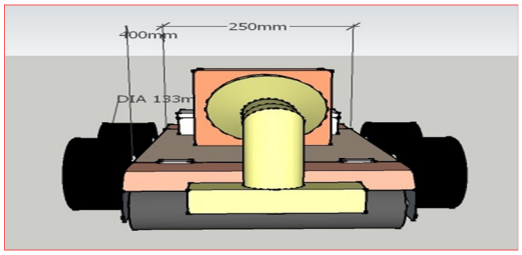
The primary objective of a mopping machine project is to design and develop an Bluetooth operated robotic system that can effectively clean floors by mopping, aiming to reduce manual labor, improve cleaning efficiency, and provide a convenient way to maintain floor hygiene, often incorporating features like Vacuum function

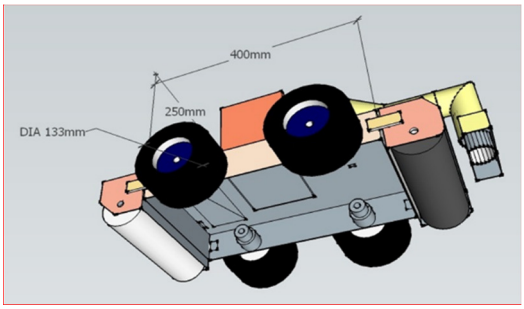
- Develop a machine that automates both mopping and dust collection, reducing human effort.
- Design an efficient dust collection system using vacuum suction or rotating brushes.

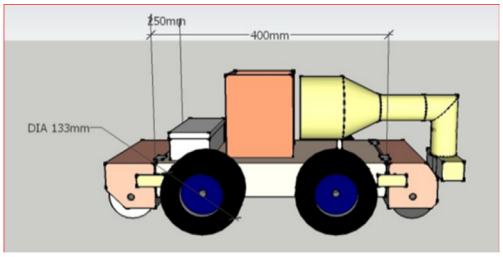
- Enable Bluetooth connectivity for remote operation via a mobile app. Provide user-friendly controls for start/ stop, speed adjustment, and cleaning modes
- Ensure easy maintenance with removable parts for cleaning and servicing.

V .DESIGN

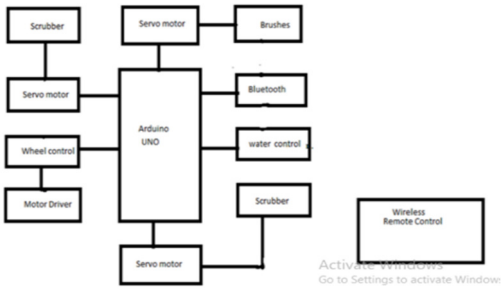






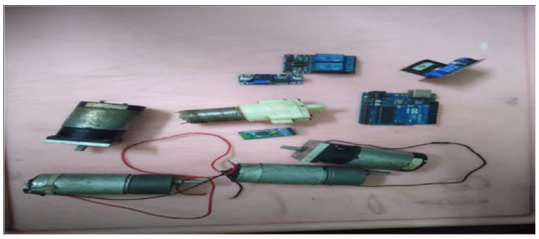


VII.BLOCK DIAGRAM



WORKING PRINCIPLE OF VACUUM CLEANING TECHNOLOGY

A vacuum cleaner is a cleaning apparatus consisting of a motor with an impeller, nozzle, hose, tube, and a filter. It is used for a general-purpose cleaning of the floor, carpet, and other surfaces. The motor and fan together create a partial vacuum within the system to suck dirt and dust from the surface through the nozzle that passes through a tube and hose until it reaches the dust collection unit. The dust collection unit is either a disposable dust bag (filter) or a cyclonic separator. Finally, the filtered air is let back to the environment (Leffler, Sörmark 2013). Figure represents the principal sketch of a canister vacuum cleaner.



V CONCLUSION

The engineering and prototyping of the Smart Mopping and Dust Collection Machine marks a significant step forward in the integration of automation and efficiency in household and industrial cleaning systems. Through the use of

advanced sensors, automation algorithms, and a carefully designed prototype, this machine demonstrates the potential to not only enhance cleaning effectiveness but also reduce manual labor and time consumption. The system's ability to autonomously detect and navigate different floor surfaces, coupled with its dust collection mechanism, offers a comprehensive solution to everyday cleaning challenges.

The prototype has successfully met key design goals, including energy efficiency, user-friendliness, and adaptability across various environments. However, further research and testing are necessary to refine the machine's performance, particularly in optimizing the integration of sensors for better obstacle detection and improving dust collection capacity for larger spaces. Future iterations can explore additional features such as smart connectivity for remote control, data collection for performance analysis, and improved battery life.

Ultimately, this project contributes to the growing trend of smart home technologies, providing valuable insights into the future of automated cleaning solutions. The successful prototyping of this machine lays the groundwork for the development of more advanced, cost-effective, and sustainable cleaning devices that can benefit both residential and commercial sectors.

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