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KEYWORDS:
Cleaning Robot, Rocker Bogie, Unmanned Autonomous System.

INTRODUCTION:
The development of robotics technology has taken over manual work. Here represents the technology that proposed the working of robot for cleaning. Vacuum cleaner is integrated with rocker bogie model. The robot basically works in both automatic and manual mode as per the need. The major functionality of the robot is to perform the picking and storing operation. It is programmed to accept inputs to sense obstacles around it and control the robot to avoid any collision. In the automatic mode robot control all the operations itself and change the lane in case of hurdle detection and moves back. In the manual mode, the keypad is used to perform the expected task and to operate the robot. This in turn benefits the society to keep the environment clean and eradicate the diseases.

In recent years, robotic cleaners have taken major attention in robotic research due to their effectiveness in assisting humans in cleaning applications. The normal cleaning methods by human effort is one among those methods which consumes more time. The aim is to build a robot with Rocker Bogie mechanism which can climb stairs and clean the surrounding with the help of vacuum while it’s moving around and stores the waste. Vacuum is used to collect unwanted waste from the surface and stores in internal container. The robot works in Automatic and Manual modes. In Automatic mode the robot moves by itself and changes its lane if any hurdle is detected.

Robot travelling on different kinds of terrains has become increasingly important therefore using Rocker Bogie system. The Rocker Bogie system consists of six wheels and a pair of passive joints. By using passive joints, the wheels can always contact the ground while traveling, so that the robot can
always be stable. IR sensors incorporated with Rocker Bogie for hurdle and height detection. Systematic cleaning process will impact on society to keep our surrounding clean.

OBJECTIVES:

- To understand the working principle of robotic cleaning system.
- To design and develop a hardware module to detect the unwanted waste on ground.
- To understand model making of Rocker Bogie.
- To design a system which can rotate 360 degree.
- To analyze and compare the performance of the system.

METHODOLOGY:

Many methodology or findings from this field mainly generated into journal for others to take advantages and improve as upcoming studies. The method is use to achieve the objective of the project that will accomplish a perfect result. Firstly, microcontroller checks data is initialized or not. If data is initialized then it checks for which mode is selected, automatic or manual.

Manual mode

It checks data given to the robot and then control the robot according to given data. If any data received it will decode that data and show that data on LCD. After that two conditions arrive, if any hurdle detected then robot will send the stop and hurdle detection signal to the remote and if there is no hurdle it will work according to the given data. The block diagram and architecture of robot is shown in figure 1 and 2.

![Figure 1: Block diagram of working robot.](image1)

![Figure 2: Architecture of robot.](image2)

Automatic mode: If automatic mode is selected, then the robot will start moving forward with cleaning action. After that if there is hurdle detected then it will stop and give alarm and moves back and start again, also check if there is wall then it turns and clean the further area.
RESULTS: These are the following results obtained for the proposed model shown in Figure 3:

1. Successfully vacuum cleaner is integrated with rocker bogie mechanism which can move in uneven surface and cleans the surrounding with the help of vacuum while it's moving around.
2. Vacuum cleaner sucks the waste for surface and stores in its internal storage.
3. Swachh robo can move front, back, right and left.
4. It also rotates 360 degree and climb stairs.
5. The robot can carry out cleaning process without human interference in automatic mode and even we can control the robot using remote.

<table>
<thead>
<tr>
<th>Table 1: Performance and analysis of robot.</th>
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<tbody>
<tr>
<td>Task</td>
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<tr>
<td>Area coverage</td>
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<tr>
<td>Upstairs movement</td>
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<td>Downstairs movement</td>
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<tr>
<td>Vacuum cleaning</td>
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<td>Storing waste</td>
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Figure 3: Proposed working model.

CONCLUSION:

The Swachh Robo is designed to minimize the human interference in cleaning and to increase the effectiveness of cleaning of a vast area. Thus, developed system using the rocker-bogie which is able to function in uneven surfaces, climb stairs and run over obstacles. It is also equipped with sensors which will help in the hurdle detection. Furthermore, the robot works in manual and automatic mode according to the user’s convenience. The performance of the robot is improved in comparison with the existing ones and found that the system works in a much efficient way.

SCOPE FOR FUTURE WORK:

The future work can be of the following areas in cleaning robots:

- There may be an effort put forward in increasing the efficiency in cleaning a given area.
- An additional feature to connect the robot with Smartphone’s to operate using Internet of Things can be added advantage.
- Increase in research work towards the robot to climb efficiently up to a height of 300 mm.
- To enhance the capacity of the storage bin for better disposal methods.

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