S.C.A.R.

STAIRCASE CLEANING AUTOMATED ROBOT

Aarushi Agarwal (2016216), Abhishek Maiti (2016005), Piyush Gupta (2016066), Rajat Bansal (2016260)

Mentor: Tejaswini K Rao Advisor: Dr. Alexander Fell

ABSTRACT

Technology is an essential part in our lives nowadays. It plays an important role as it is able to perform several tasks with precision and accuracy. Generally robots are well adapted to work on flat areas, however there may be a need to work on uneven surfaces like staircases. So we have come up with a staircase climbing robot.

It is economic and can efficiently climb stairs.

OBJECTIVE

To develop a staircase climbing robot that can move on both flat surfaces and climb stairs.

SOCIAL SIGNIFICANCE

The rising dirt levels in our environment have become a huge concern that needs to be addressed.

According to various surveys, dirt and dust are one of the most common causes of deaths. In rural areas, a lot of people have been found to be suffering from chronic asthma and backaches. We aim to curb these problems by reducing the number of hours spent on cleaning the stairs.

Some of the salient features of S.C.A.R. are :

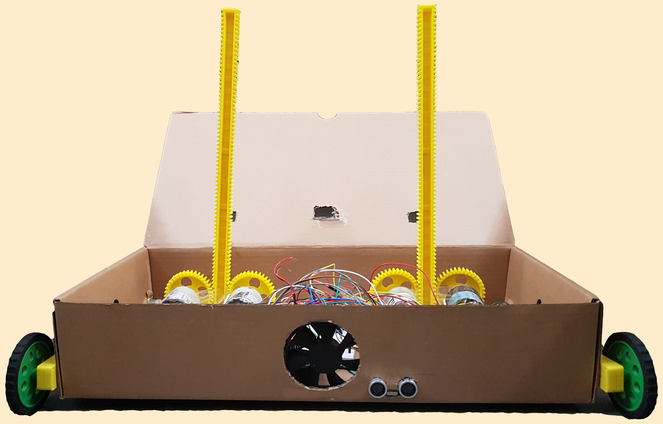
- Fan that sucks in the dust while climbing.
- Reduces illnesses caused by dust in the environment.
- Reduces backache s and other back related problems.
- Saves time otherwise spent in cleaning.

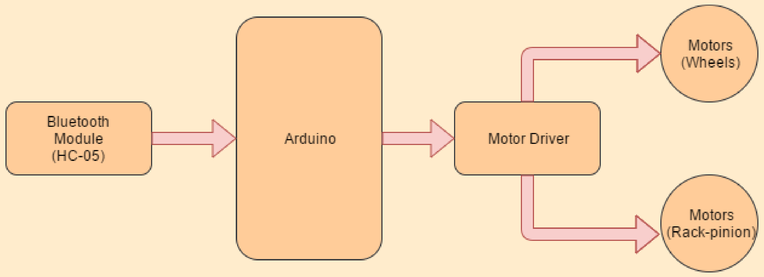
MECHANICS INVOLVED

The materials used in the project:-

- Arduino Uno x 1
- Motors x 8
- H-Bridge (L298N) x 2
- Bluetooth (HC-05) x 1
- Rack – pinion x 2
- Cogs x 4
- Computer Fan x 1
- Breadboard x 1
- Jumper Cables
- Cardboard Box, etc.

The Bluetooth module receives a signal from a handheld remote, and the robot starts moving forward. Upon detecting the edge of a stair, it stops and begins clean the area. As soon as it finishes, it begins to ascend. Upon reaching a sufficient height, it stops ascending and moves forward. The ascent mechanism (rack and pinion) is then pulled back up and the process repeats.





RESULTS

We successfully developed a working prototype of S.C.A.R.

Some statistics:-

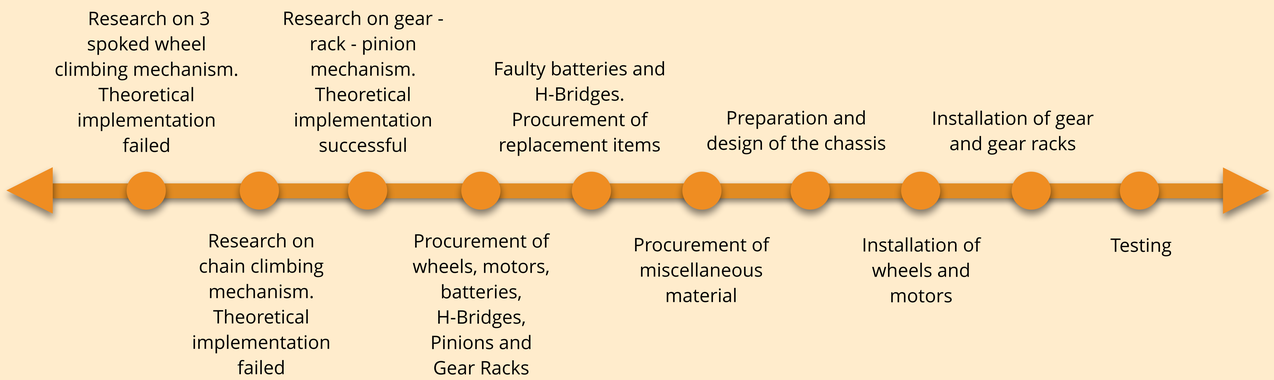
- Weight: 3kg (approx.)
- Speed (on flat surface): 0.5 m/s (approx.)
- Speed (on stairs): 0.25 m/minute (approx.)
- Blower capacity (dust): 3 g/s (approx.)

FUTURE PROSPECTS

The project can be expanded into multiple domains with minor changes. Some of the further applications include:

- This mechanism can be similarly applied in wheelchairs to help disabled people climb stairs.
- It can be modified to climb stairs of different heights.
- It can be made to climb down the stairs.
- It can be used as a means to transport objects between different floors of a building.

TIME LINE



REFERENCES

- www.randomnerdtutorials.com/complete-guide-for-ultrasonic-sensor-hc-sr04
- www.instructables.com/id/Control-DC-and-stepper-motors-with-L298N-Dual-Moto
- www.group8robot.magix.net/index.htm
- www.fablab.hylas.be/blog/stair-climbing-robot-group-4-nick-adriaens-lowie-lagrin-vince-muyshondt