



Automated Vacuum Cleaner
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Capstone Design Project ELE591



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Abstract

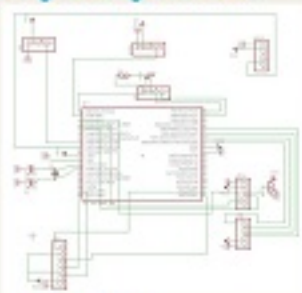
Our main objective is to design an automated vacuum cleaner that is capable of cleaning any targeted room. In addition to covering every possible "m" and avoiding all obstacles. As a start point the automated vacuum cleaner should be placed at any corner of the room and is expected to turn off whenever the room ends.



Design

Our automated vacuum cleaner is the combination of a Rover 5 and a PCB (printed circuit board) attached to an external hover. The materials used are a pic 18F4550 processor, which is used to control and send signals to all part of the board. There are 3 ultra-sonic sensors used for obstacle avoidance and room scanning. In addition to the motor regulator that is used to control the motors of the rover 5. Last of all we need to attach the external hover to the rover 5.

Design on Eagle software



Real Design

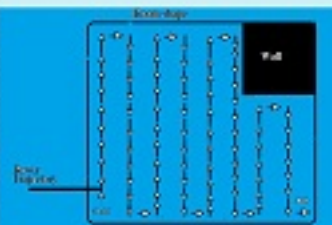


Algorithm

The algorithm that the automated vacuum cleaner follows to successfully cover all areas and avoid obstacles is divided into 2 parts.

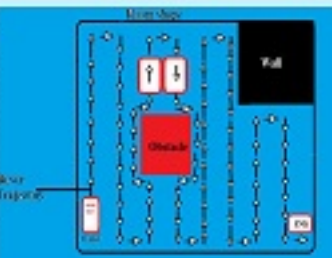
Room Scanning

Room scanning algorithm is the general algorithm followed by the robot. It orders the robot to go forward until it encounters a wall or a boundary of the room.



Obstacle Avoidance

The obstacle avoidance algorithm is called whenever the room scanning algorithm is interrupted by an obstacle.



Differentiate between obstacles and walls



In order for the automated vacuum cleaner to know which algorithm to follow, sensors should be able to identify obstacles from wall boundaries. Walls are high therefore we have chose to elevate the middle sensor. In a 45 degree angle so that it won't see the obstacle anymore assuming the obstacle is of medium height. However the right most sensor is used to check for an obstacle.

Vacuum cleaner Rover

The following is a picture of the external hover attached to the rover where the cleaning tube of the model is equal to the width of the rover. This would ensure that all the areas would be cleaned.



Major Components



Rover 5 used as the base for our design

Pic18F4550 used as our microprocessor

Ultra Sonic Sensor used to measure the distance



LCD used to display sensor measures

Motor Regulator used to control signals being sent to the motor

Vacuum cleaner used to clean the target space

Acknowledgements

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