Cover page

Project title: SweepUp Stairs …… Academic Year: 2024-2025……

Group Members: …Jood Hamdallah…… Department Name: Computer Engineering Department

…Saleh Sawalha……

Project Type Software or Hardware (Choose one)

Supervisor Name: Dr. Manar Qamhieh

Format:

- Single space, Times New Roman.
- 12 pt,
- Maximum 1 page.

Abstract Body:

Items must be provided in the Abstract:

- Why do you think this project is important? Please explain the significance of this Project in brief.
- In your point of view what are the important aspects that should be covered in the project?
- Objective(s): In your view, please explain the main objectives of the project.
- Methodology: Give a brief outline of the application development process.
- Had this project been done before? Are there any similar applications available today?
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- **Note:** Please deliver this abstract early to ensure that your Project has been approved by the department's projects committee. **Registration will not be done without this approval.**

Project's Abstract:

Cleaning tasks, such as sweeping or wiping can often be tiring and staircase cleaning is even more challenging and time consuming, especially that staircases are found in nearly every building, both indoors and outdoors. Unlike flat surfaces, stairs consist of multiple steps, each with edges and corners that are hard to reach. This requires manual effort to clean all the steps. The process is repetitive and time-consuming, particularly in multiple floor buildings, where cleaners must often carry equipment up and down.

Our project involves designing a robot that can autonomously detect and navigate staircases, climb and clean them smoothly and balanced. Safety is ensured by maintaining stability and preventing falls, while obstacles are avoided using navigation technology. As a result, the project will provide a practical solution to a common time-consuming and challenging duty, through improving efficiency, minimizing dependence on human labor, and delivering consistent cleaning outcomes in various environments.

The robot consists of three wooden cuboids: one large cuboid in the center and two other smaller ones on each side. The central cuboid is connected to the side cuboids (the first and third) through a lifting mechanism that allows raising and lowering the side cuboids as needed. Wheels will be used to drive the movement of the cuboids controlled by stepper motors. Since there's a staircase recognition system, the robot will use a camera to detect the staircase accurately and navigate to it for climbing and cleaning. In addition to the obstacle detection system that uses sensors to identify and avoid any obstacles present on steps.

There have been several projects about cleaning robots, but they are designed to clean only flat surfaces and not staircases. What makes this project different is that it can efficiently climb and clean stairs, and unlike other robots, this one is made specifically to deal with the challenges of stairs, such as preserving balance, avoiding obstacles, and cleaning the steps.