Smart Vacuum Cleaner

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Introduction

Robotic vacuum cleaners are a remarkable innovation in home automation and robotics, designed to reduce human labor and enhance cleaning efficiency. These autonomous devices, powered by advanced embedded technologies like the PIC16F877A microcontroller, can navigate various home layouts with precision. They continuously process environmental data in real time, adapting to different surfaces and obstacles to deliver superior cleaning performance. By integrating intelligent sensors and efficient motors, robotic vacuum cleaners have become essential tools in modern homes, offering both convenience and advanced technological benefits.

Design

In the following, the flowchart of this project that demonstrates how our vacuum cleaner works according to our code flow:

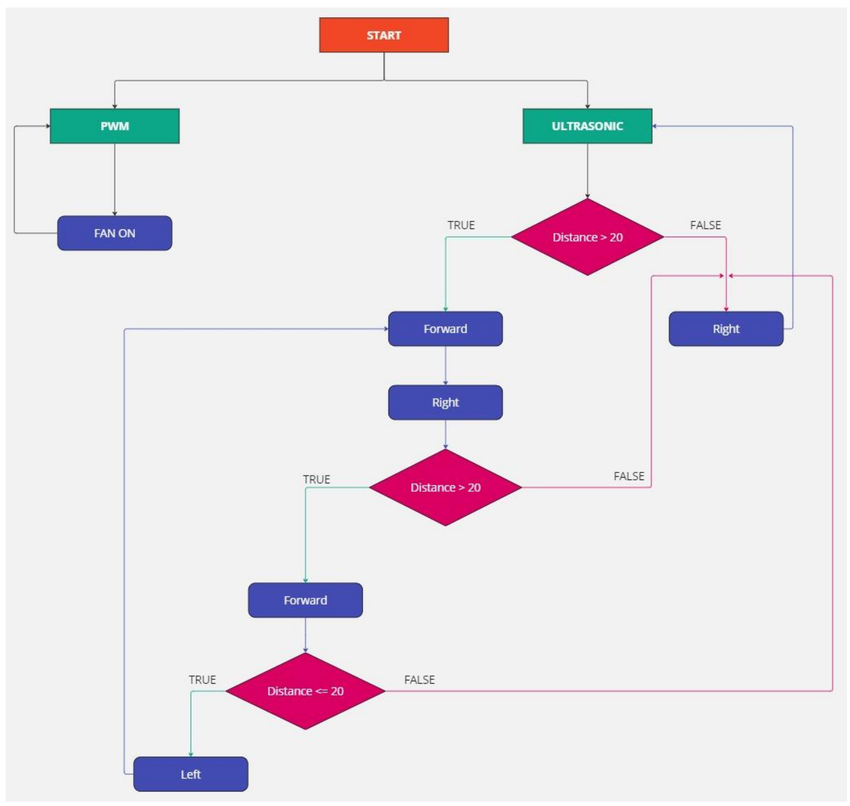

Figure 1: Flowchart

What follows, is the designed circuit of the system we are seeking to construct:

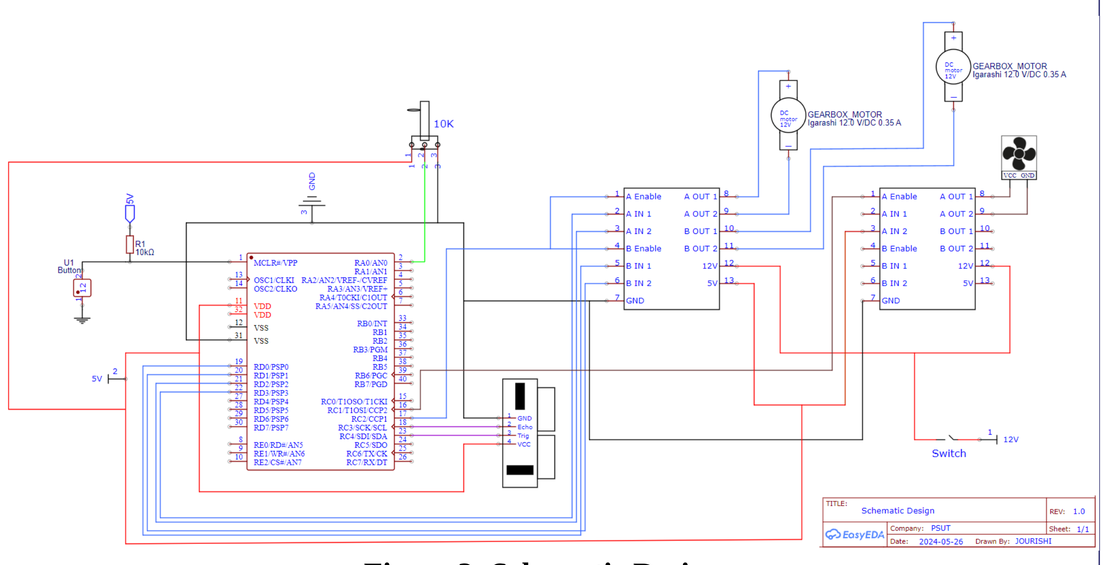

Figure 2: Schematic Design

Results

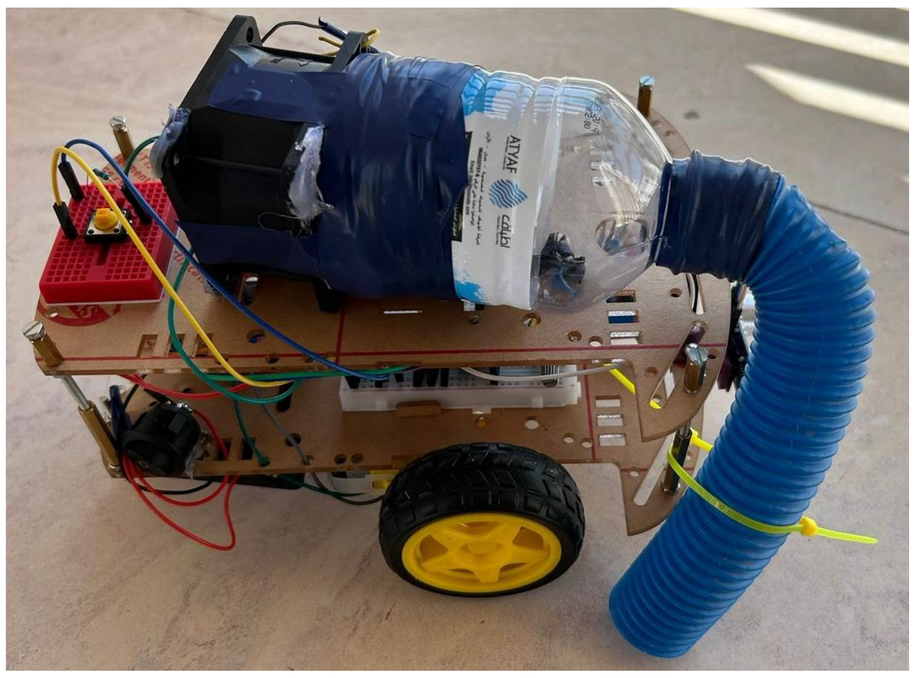

Figure 3: Vacuum Cleaner Side View

Figure 4: Vacuum Cleaner Front View

The layout of our automated vacuum cleaner is strategically designed to optimize both functionality and ease of maintenance. The following pictures show where the motors, ultrasonic sensors, microcontroller, fan, and power supply are located in relation to other crucial parts of the chassis. Every element is arranged to optimize both navigational and cleaning performance in terms of efficiency and effectiveness. The design guarantees that the vacuum cleaner is both lightweight and strong enough to tackle a range of cleaning conditions, with simple access to all parts for maintenance and repairs.

Conclusion

This project demonstrates the successful design and implementation of an automated vacuum cleaner using a PIC16F877A microcontroller, achieving autonomous navigation, obstacle avoidance, and effective cleaning. This innovation addresses the demand for smart home solutions that enhance convenience and efficiency in daily chores. The integration of ultrasonic sensors, motors, and a PWM-controlled fan ensures efficient operation and adaptability to various conditions.

The broader significance lies in showcasing how embedded technologies can revolutionize household tasks, improving quality of life by saving time and effort. This poster provides a clear and comprehensive overview of the project, serving both as an informative standalone piece and as an effective aid during presentations.