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Bachelor of Engineering Mini Project 2A Presentation



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A PRESENTATION ON

“SMART VACUUM CLEANER ROBOT”

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Abstract

A new home cleaning service robot has been introduced, featuring three subsystems: electrical, software, and mechanical. The electrical subsystem includes a microcontroller, sensors (opponent and light), and a motor. The mechanical subsystem comprises the motor and wheels, which are controlled by the microcontroller to avoid obstacles and collisions. The software subsystem functions as the robot's brain. The microcontroller detects obstacles using sensor inputs and adjusts the robot's direction to prevent collisions. In case of a potential collision, the microcontroller directs the motor to maneuver the wheels away from the obstacle. The robot's cleaning process is performed by a vacuum cleaner located at its bottom.

Problem Definition

Problem Statement

- There is a need for an affordable, compact, and efficient vacuum robot that can help people clean their homes without taking up much space or requiring a significant financial investment.

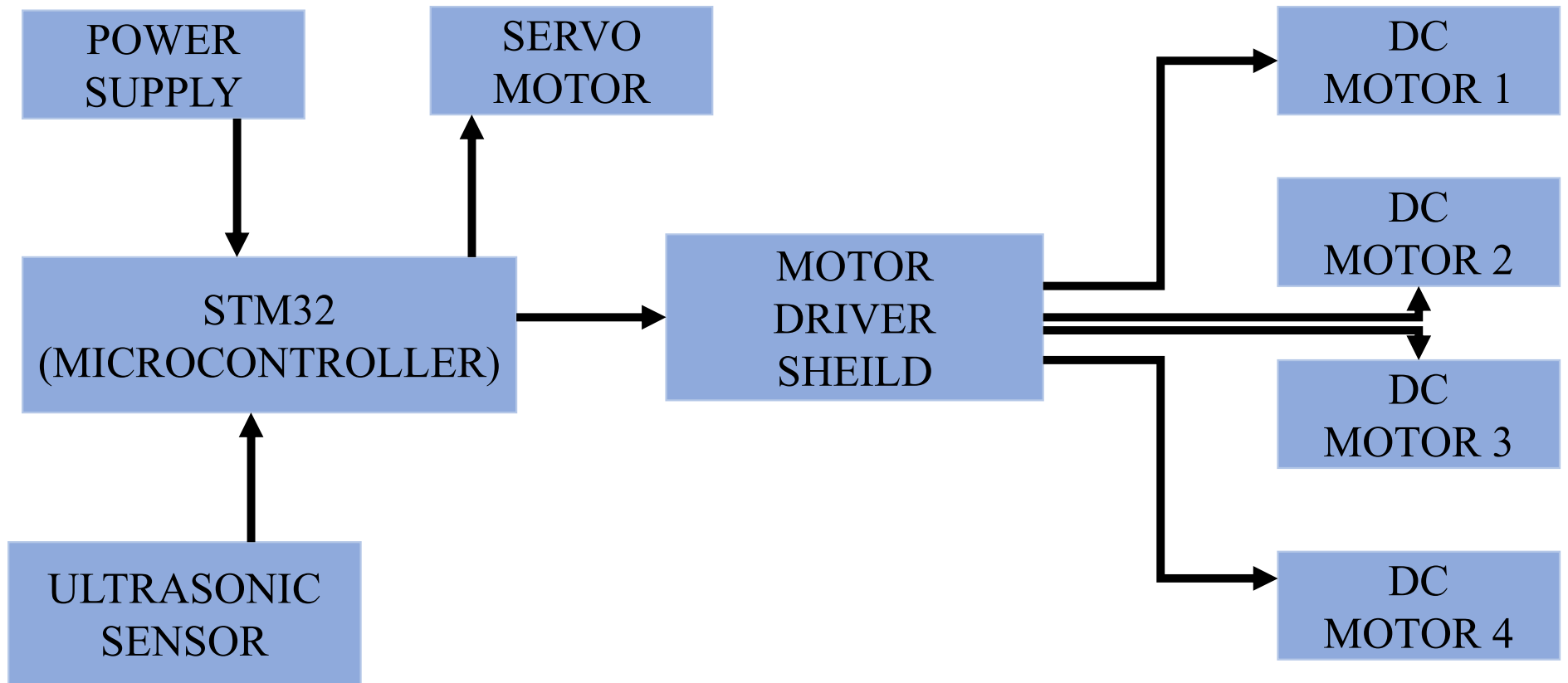
Problem Definition:

- Many people have busy schedules and do not have enough time to clean their homes.
- Technological advancements continue to emerge, offering opportunities to make human tasks easier.
- Most people use hand-controlled vacuums for cleaning, which can be time-consuming and labor-intensive.
- Additionally, many vacuum robots available in the market are expensive and can be large in size, making them less accessible for the average consumer.

Introduction

A robotic vacuum cleaner is an autonomous robotic vacuum cleaner that has intelligent programming and limited vacuum cleaning system. Some designs use spinning brushes to reach tight corners. Other combine a number of cleaning feature(mopping obstacle detector) simultaneous to vacuuming, thus rendering the machine into more than just a robot “vacuum” cleaner.

Block Diagram



Software & Hardware

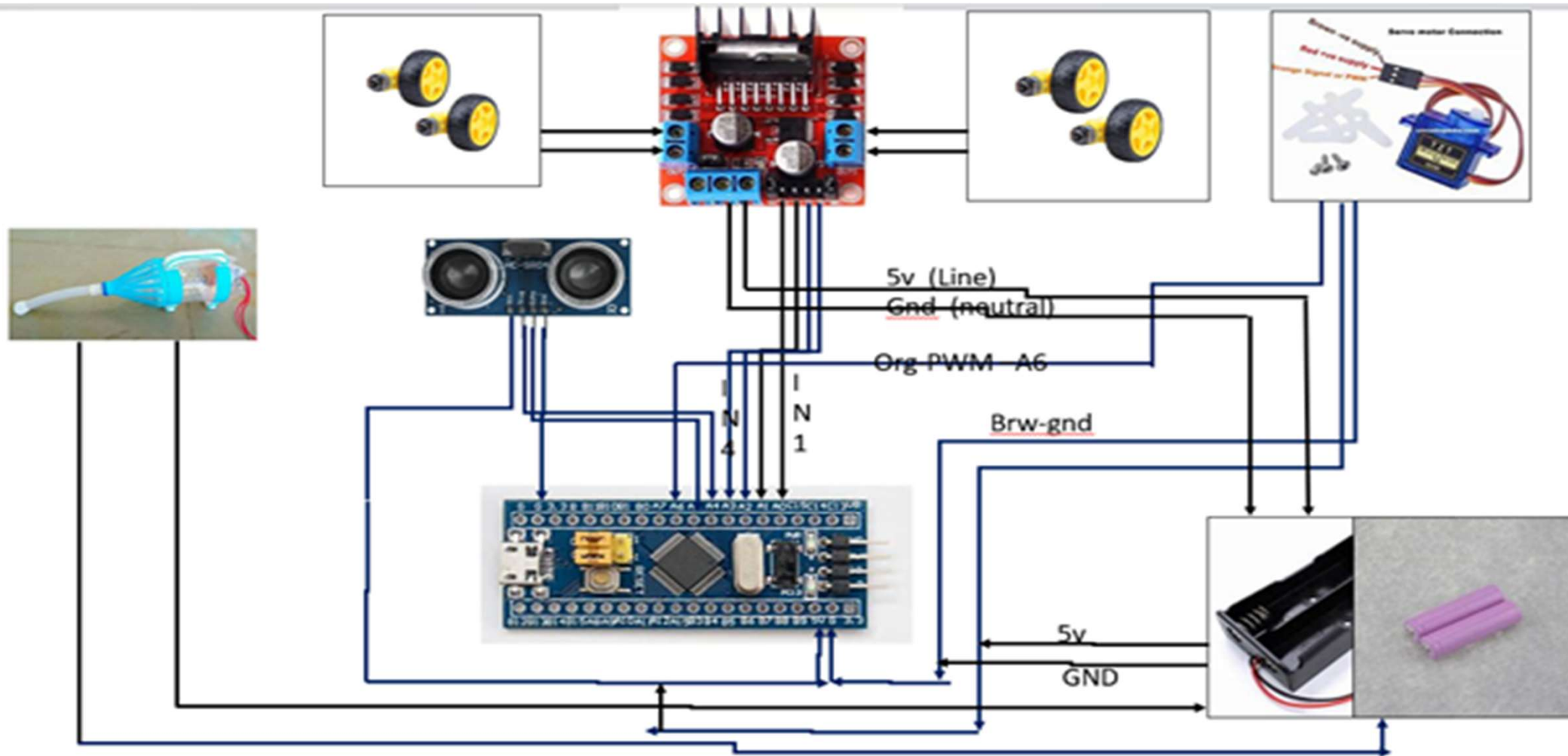
Hardware

- STM32 Microcontroller
- Motor Driver Shield
- DC Motor
- Servo Motor
- Ultrasonic Sensor (HC-SR04)
- Battery Pack

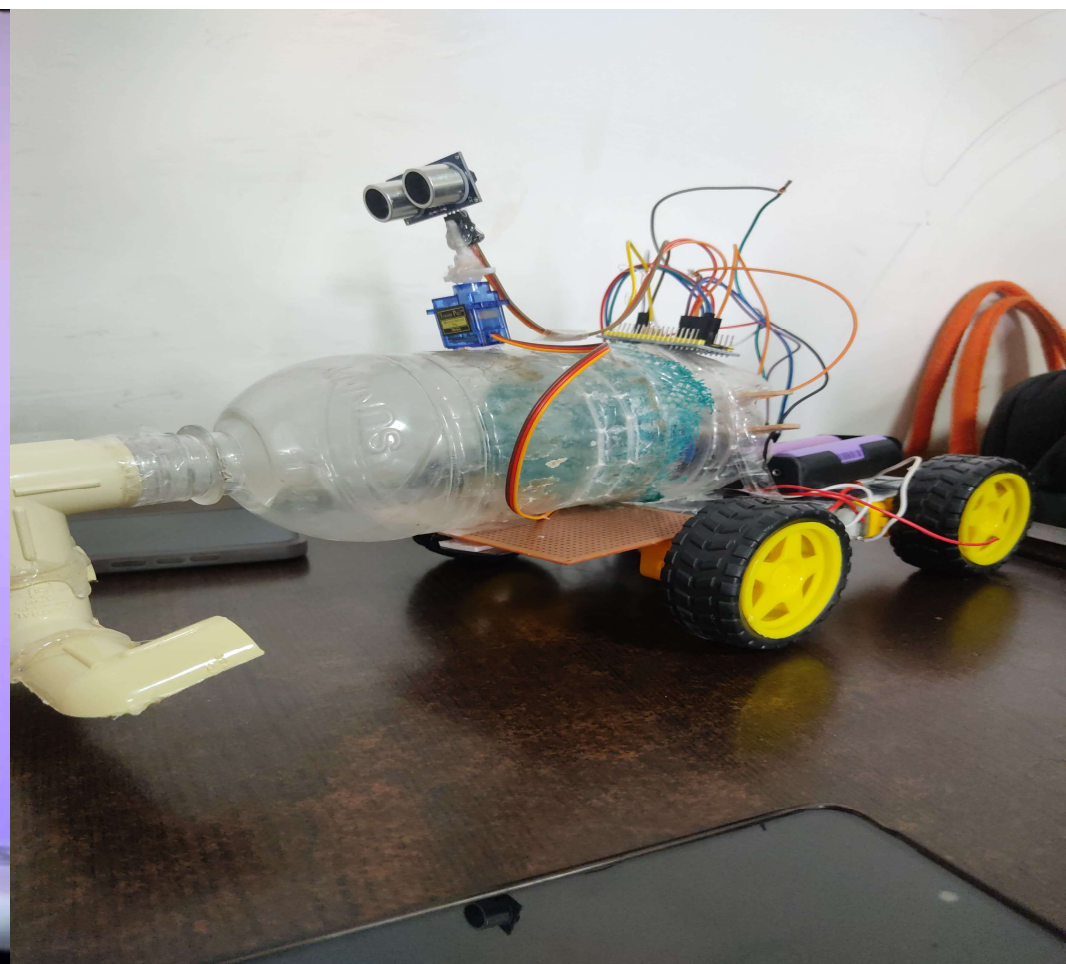
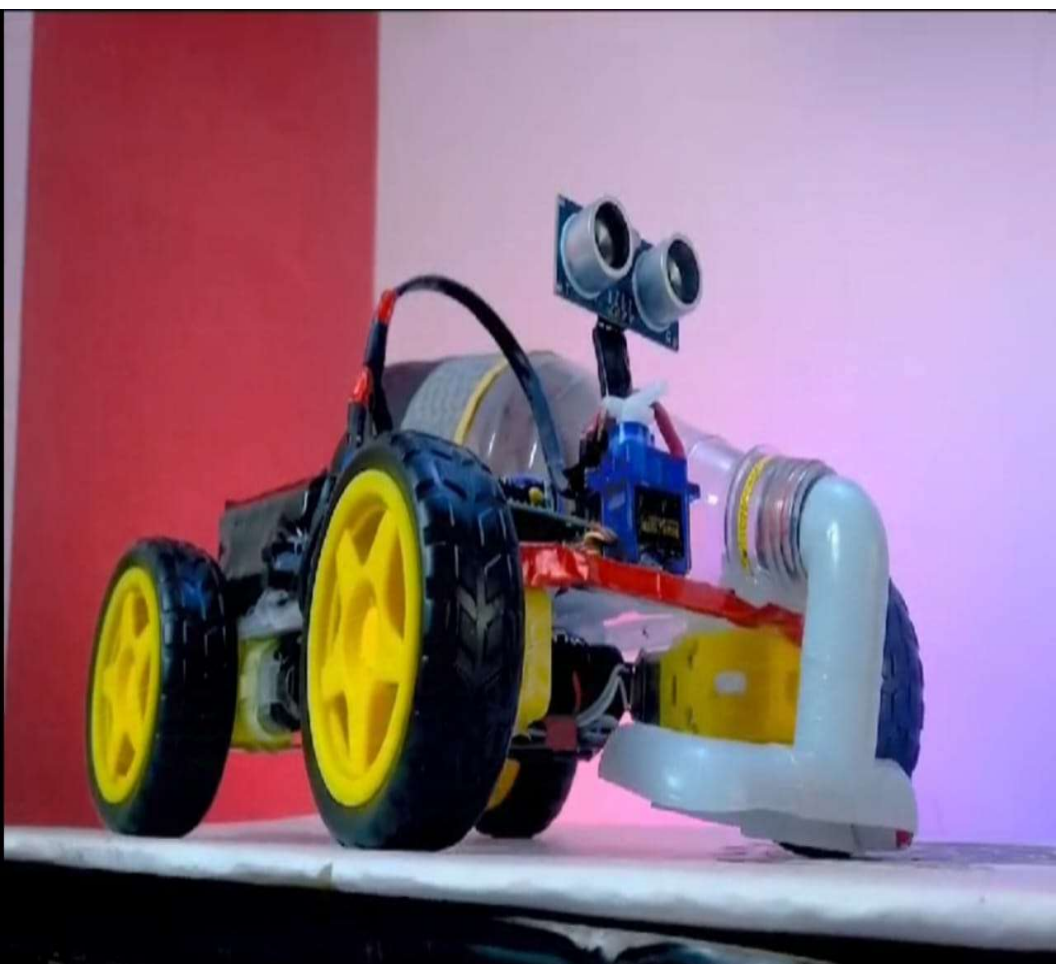
Software

- Keil uVision
- STM32CubeIDE
- Arduino IDE (STM32 Core)

Circuit Diagram



Results



Advantage and Disadvantage

Advantages	Disadvantages
1. Autonomous Operation	1. Limited Obstacle Detection
2. Efficient Cleaning	2. Battery Life Constraints:
3. Low Power Consumption	3. Lack of Real-Time Feedback
4. Compact and Cost-Effective	4. Simple Navigation Algorithms
5. Versatility	5. Maintenance

Application

1. Household Cleaning: The robot can autonomously clean floors in homes, particularly under furniture or in hard-to-reach places.
2. Office Spaces: Useful for cleaning large office areas, where manual cleaning is time-consuming.
3. Hospitals and Clinics: Can be used to keep hospital floors free from dust and small debris, ensuring cleanliness in sensitive environments.
4. Workshops: Suitable for removing dust and small debris in manufacturing or mechanical workshops.
5. Retail Spaces: Automated cleaning in retail environments, maintaining cleanliness without disrupting customers

Conclusion & Future Scope

- In future we hope to make the robot smarter such that when the robot clean any room, it will save the information about obstacle and its location and if the user want to clean a room it just will restore information and will clean faster
- The STM32-based smart vacuum cleaner effectively integrates real-time sensor data processing with autonomous navigation, offering efficient cleaning and intelligent obstacle avoidance. Its modular design also paves the way for future enhancements in smart home technology.

Reference

- SMART VACUUM ROBOT by Vijayalakshmi M, Bhargavi Baljoshi, G.Lavanya, Gouri Master, Gurav Sushil (May-20)- ResearchGate.net
- Design of a Small Sweeping Robot Based on STM32 by Xiaosheng Zhanga, Gaopeng Zhanb, Xin Xuc and Kai Fangd (January-22)- ResearchGate.net
- DESIGN OF AUTONOMOUS CLEANING ROBOT by Lakshmi Bangalore Gangadharaswamy (December-19) -Tampere University
- Designing and Optimization of An Autonomous Vacuum Floor Cleaning Robot by H.A Shakhawat Hossen Prayash,Saiful Islam,Shamik Datta (May-20) –IEEE Xplore