FYP

Luma-Bot : AI Integrated Robot

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Summary

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- Objective
- FYP Scope
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- Our Project Plan (Time lines)
- Budget / Costing (if any)
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Problem Statement

"Addressing Modern Domestic Challenges with AI"

In modern households and workplaces, maintaining cleanliness in small indoor spaces can be time-consuming and requires constant manual effort. With increasingly busy lifestyles and limited availability of help, there is a growing need for an autonomous solution that can navigate indoor environments, avoid obstacles, and perform cleaning tasks efficiently. Developing such a robot can help reduce manual workload and improve overall productivity in daily routines.

Objective

The objective of this project is to develop Luma-Bot, an AI-powered robot designed to assist in homes and workplaces. The robot will be capable of navigating indoor spaces independently, avoiding obstacles using ultrasonic sensors, and efficiently moving through different environments. It will feature automated cleaning functionality, operating autonomously. By integrating these smart features, Luma-Bot aims to improve daily efficiency and reduce manual effort in basic household and workplace cleaning tasks.

FYP Scope

This project aims to develop an AI-powered robot with autonomous navigation capabilities. The robot will be able to independently scan indoor spaces, detect and avoid obstacles using sensors, and perform cleaning tasks without human intervention. It is designed to operate efficiently in household and workplace environments, enhancing productivity and reducing the need for manual cleaning.

Our Methodology

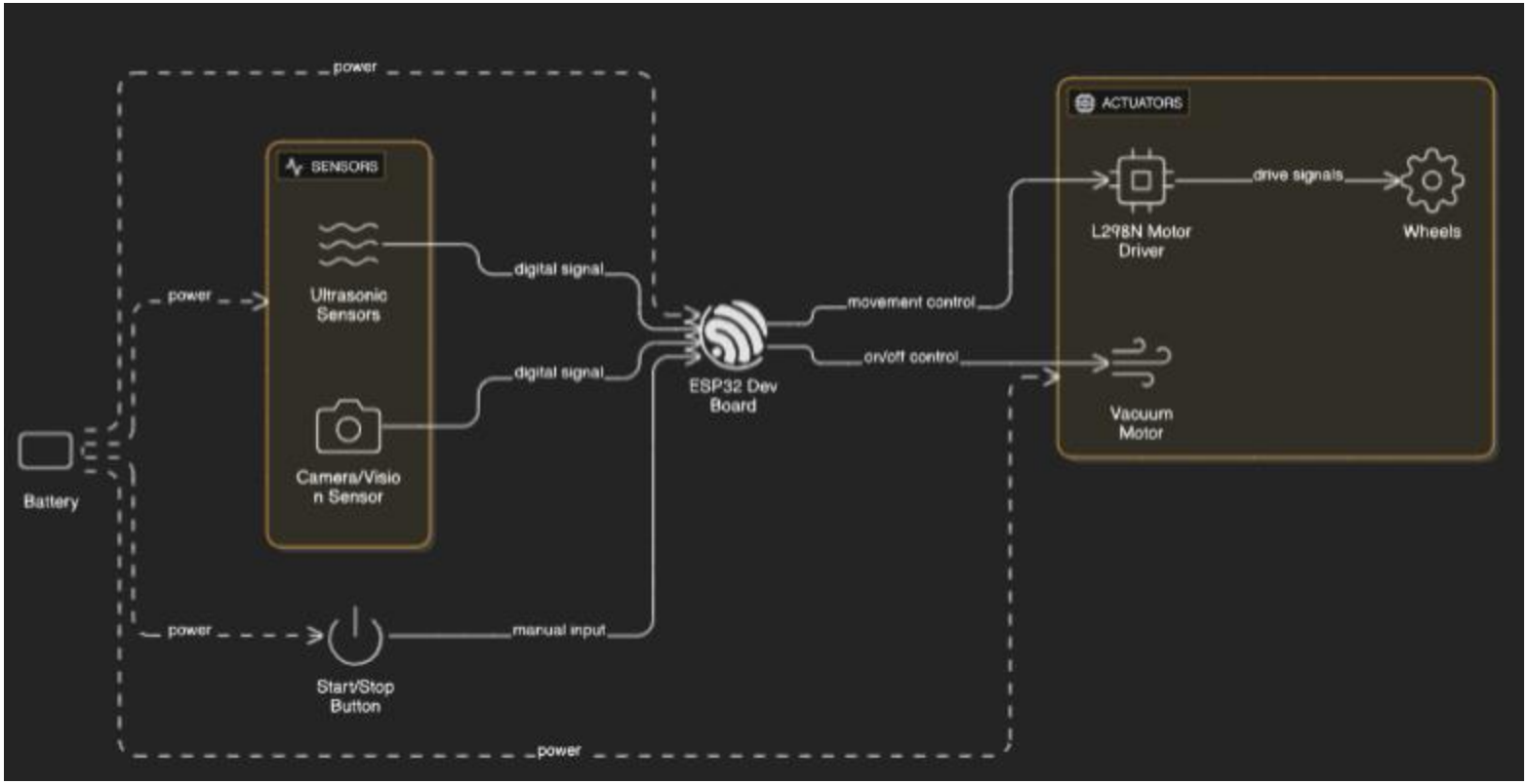
Agile Methodology is used for development.
Agile is chosen because it allows for flexibility, iterative development, and continuous feedback.

The project involves multiple parallel components, including:

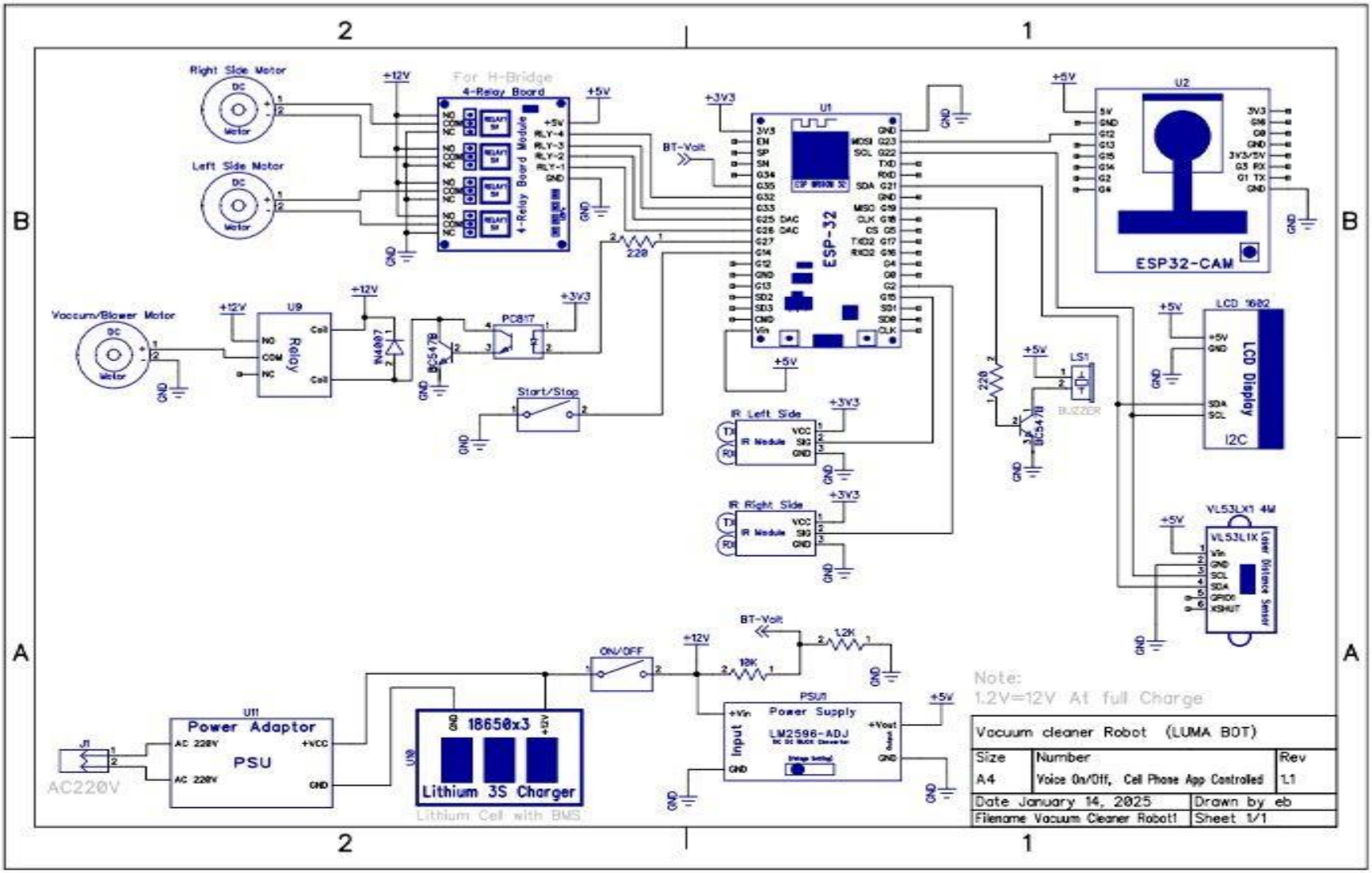
- Model development
- Real-time analysis
- System integration and testing

Robot Design

Block Diagram



Circuit Diagram



Our Project Plan

Task	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Project Planning and Research	XXXXXXXX					
Hardware Design and Prototyping		XXXXXXXX				
AI Integration			XXXXXXXX			
Tracking Algorithm Development				XXXXXXXX		
System Integration and Testing					XXXXXXXX	
Final Adjustments and Deployment						XXXXXXXX

Budget / Costing

Sensors (e.g., proximity sensors, dust sensors): **PKR 13,000**

Actuators and Motors: **PKR 5,000**

Microcontrollers (e.g., Arduino, Raspberry Pi): **PKR 10,000**

Vacuum System Components: **PKR 7,000**

Battery and Power Management System: **PKR 5,000**

Miscellaneous Hardware (cables, connectors, mounts): **PKR 5,000**

Development Tools and IDEs (e.g., Visual Studio Code, PyCharm): **PKR 5,000**

Machine Learning Libraries (e.g., TensorFlow, PyTorch): Free (Open Source)

Prototyping Costs: **PKR 7,000**

Testing and Debugging Equipment: **PKR 5,000**

Developer Stipends (3 developers for 6 months): **PKR 20,000**

Internet and Communication: **PKR 2,000**

Electricity and Utilities: **PKR 3,000**

Miscellaneous Operational Expenses: **PKR 5,000**

Unexpected Costs and Overruns: **PKR 5,000**

FYP Deliverables

- FYP II Presentation
- Software Requirements Specification (SRS)
- Software Design Specification (SDS)
- Preliminary Report including 7 chapters
- Software Design
- Standard Size Poster

Reference

- **Espressif Systems.** (2022). *ESP32 Technical Reference Manual*. Retrieved from: https://docs.espressif.com
- **Last Minute Engineers.** (2021). *L298N Motor Driver with Arduino*. Retrieved from: https://lastminuteengineers.com/l298n-dc-stepper-driver-arduino-tutorial/
- **Parallax Inc.** (n.d.). *Ultrasonic Sensor HC-SR04 Documentation*. Retrieved from: https://www.parallax.com/product/ultrasonic-sensor-hc-sr04/
- **Banzi, M., & Shiloh, M.** (2014). *Getting Started with Arduino* (3rd ed.). Maker Media, Inc.