Wall - E Robot

Project Description

This project brings to life a miniature version of the iconic Wall-E, a beloved character from the Pixar universe. This IoT-enabled robot is designed to interact with its environment, express emotions, and perform simple tasks, mirroring the original character's capabilities.

Key features of this project include:

- **Navigation:** Wall-E can navigate its surroundings using an ESP-NOW protocol-based remote control, allowing for precise and flexible movement.
- **Obstacle Detection:** Equipped with advanced sensors, Wall-E can detect obstacles in its view, such as somebody's hand, and respond accordingly through speaking + glowing LED + message on OLED Display
- **Emotional Expression:** Using lights and sounds, Wall-E can convey a range of emotions, adding a layer of personality and charm to its interactions (for example, a greeting sequence and a dance sequence)

Functionality + Components

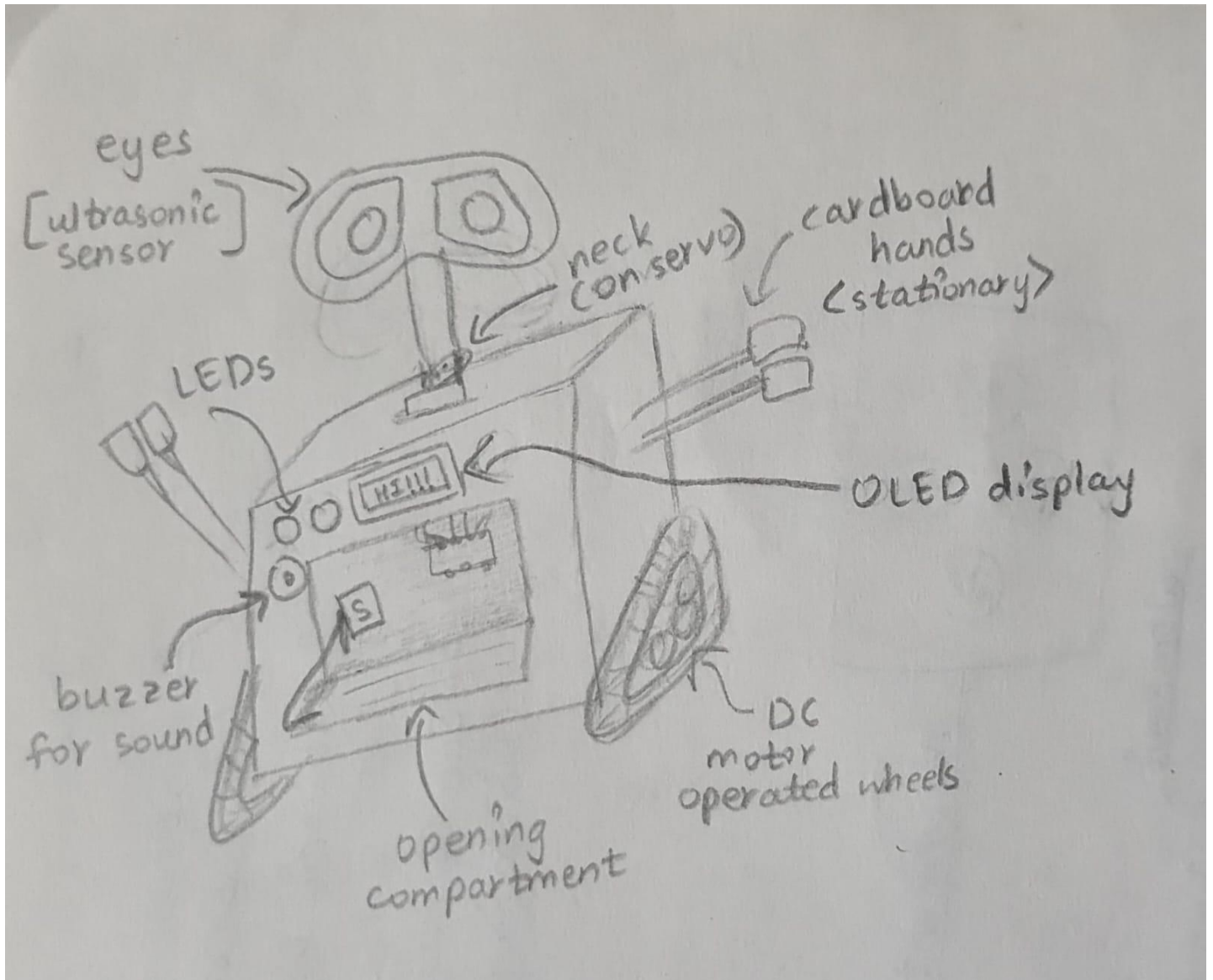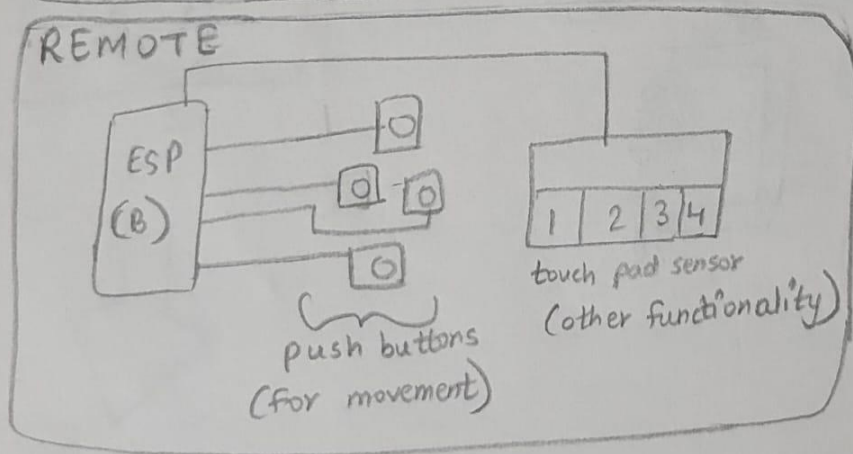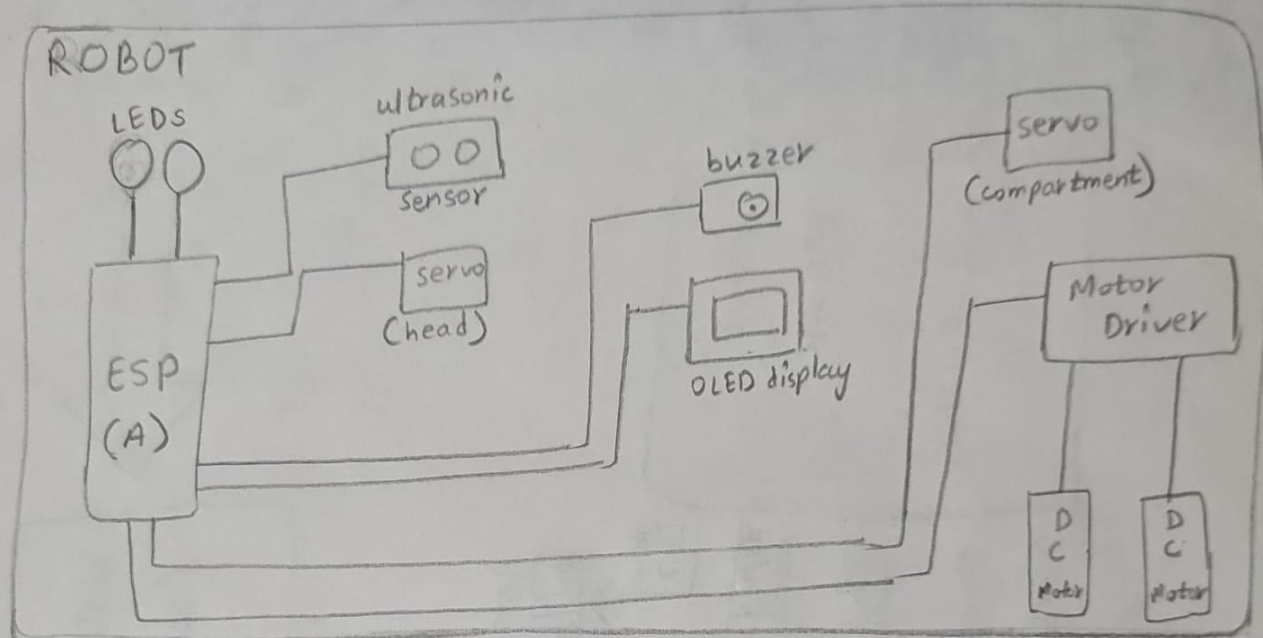| S.	Functionality	Components
1.	Head Movement (side-by-side movement)	Servo Motor
2.	Controlled via Remote (like RC Car) (Using ESP NOW Protocol)	DC Motors + Motor Driver
3.	Speaking "Wall-E" when object detected	Ultrasonic Sensor + Buzzer Module + Audio File (notes to be played)
4.	Opening Compartment (front-side)	Servo Motor + Metal Wire
5.	\<brain\> + remote	2 ESP32s
6.	Visual Output (message, etc.)	OLED Display
7.	Visual Output (along w/ speaking/message display/open compartment)	2-3 LEDs

Links

PLAYLIST -
[https://youtube.com/playlist?list=PLnBNn0PNyQeItAKslIze3VWhxnNMNcMum&si=3b0UBDRtgv7-p6Ot]

- **Main Project - [https://youtu.be/Cqv2w0qYf-s?si=RmJfrE-U5NNhcAri]**
- Inspiration [https://youtu.be/7oVSaUWeKt0?si=ZEMn69vPeaACM1kR]
- Buzzer [https://arduinointro.com/articles/projects/adding-sounds-to-arduino-using-the-mh-fmd-piezo-buzzer-module]
- Buzzer 2 [https://youtu.be/zl1o-t_17oQ]
- Chassis [https://youtu.be/958D1eE12u8]
- Chassis 2 - Cardboard [https://youtu.be/-7OVFjbQBAw]
- Cardboard Structure [https://youtu.be/4IP_eBGbSec]
- Object Avoidance [https://www.youtube.com/watch?v=CKRa1tMLPXg&pp=ygUQd2FsbC1lIHJvYm90IGRpeeQ%3D%3D]

Diagrams

ROBOT

LEDS

ultrasonic
O O
sensor

buzzer
O

servo
(compartment)

servo
(head)

ESP
(A)

OLED display

Motor
Driver

D C Motor

D C Motor

REMOTE

ESP
(B)

O

O O

O

push buttons
(for movement)
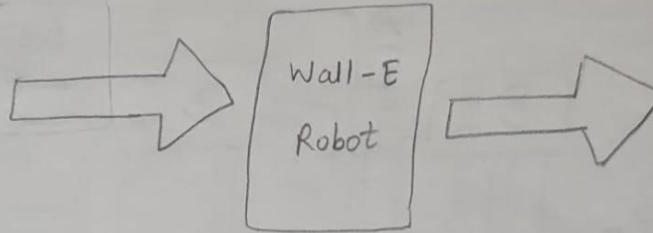
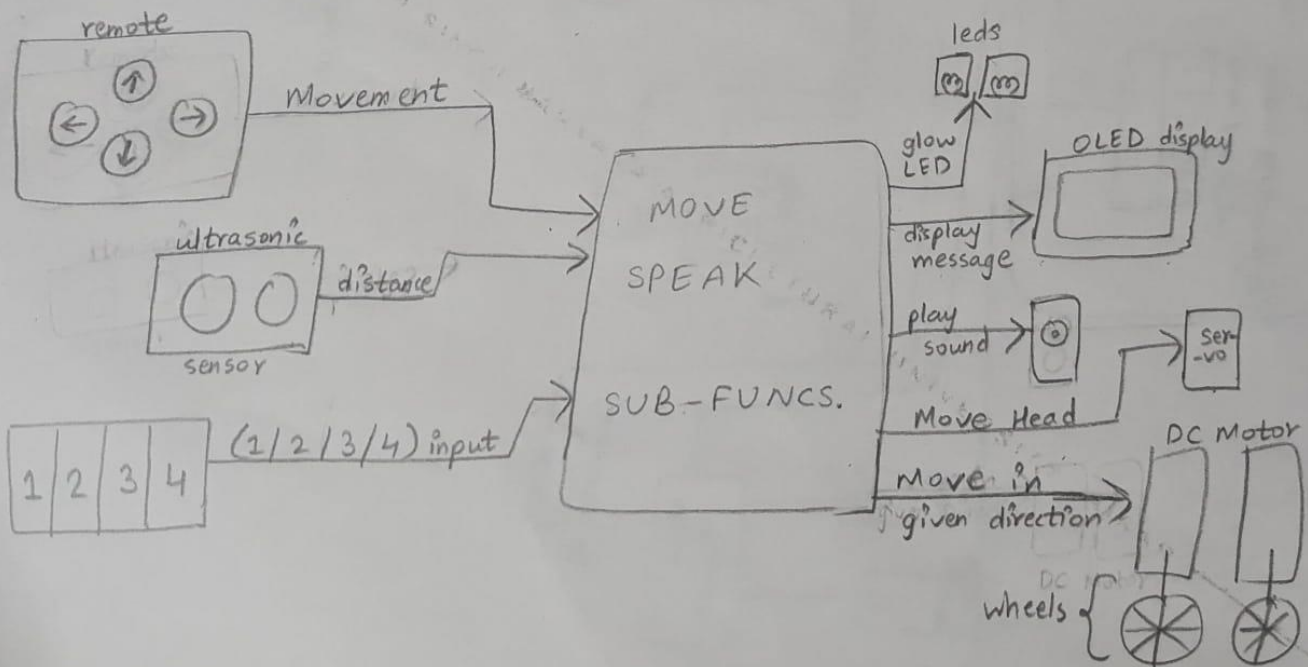**1 | 2 | 3 | 4**

touch pad sensor
(other functionality)

INPUTS

1. Movement Direction (via push btn)
2. Ultrasonic Distance Data
3. Sub Functionalities (via touch pad sensor)

OUTPUT

1. Move in desired direction (Dc motor)
2. Say "Wall-E" when obj. in some defined range + LED glow pattern
3. Perform desired func.
   ↳ Head Movement (predefined Sequence)
   ↳ Open/Close Front Compartment
   ↳ Greeting Routine (OLED + LEDs + Head Move)
   ↳ Dance Routine (any random movement)

Wall-E Robot

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remote

Movement

ultrasonic sensor

distance

1 2 3 4

(1/2/3/4) input

MOVE

SPEAK

SUB-FUNCS.

leds

glow LED

display message

play sound

Move Head

Move in given direction

OLED display

Ser -vo

DC Motor

wheels

Inspiration