ELECTRONIC WORKSHOP PROJECT

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Date:
12th November 2024

PROBLEM STATEMENT

- Object following rover

The goal is to create a system that allows a robot to detect objects in front of it and move towards them. The system will use sensors to identify if there is an object nearby and then decide how to move in the direction of the object. This will involve detecting the object, making decisions about how to approach it, and controlling the robot's movement to go towards it.

Our Approach: Object-Following Rover

- **Objective**: Design an autonomous rover that detects and follows objects using a combination of IR and ultrasonic sensors.
- **Sensor Integration**:
  - **IR Sensors**: Detect obstacles at short ranges.
  - **Ultrasonic Sensors**: Measure the distance to objects at longer ranges.
- **Navigation Logic**:
  - **Object Detection**: The IR sensors alert the rover to nearby obstacles, while ultrasonic sensors help identify objects at a distance.
  - **Movement Control**: Data from the sensors is processed by the **Arduino Uno** to determine direction (e.g., forward, turn left/right, stop) and guide the rover towards the object.

Solution

- **A few Components used are**:
  - 4 **Motors** for movement
  - **Arduino Uno R3** for control
  - **HC-SR04 Ultrasonic Sensor** for distance measurement
  - **IR Sensors** for close-range obstacle detection
  - **Servo Motors** for directional control
  - **Other**: MDF boards, motor driver shield, resistors, jumper wires, wheels, 12V battery.

Work Done

Hardware Setup:

- We have connected all the key components, including the Arduino Uno, motor driver, motors, and sensors (IR and ultrasonic).
- The Arduino Uno is now controlling the motors based on sensor readings, allowing the rover to move.

Functionality:

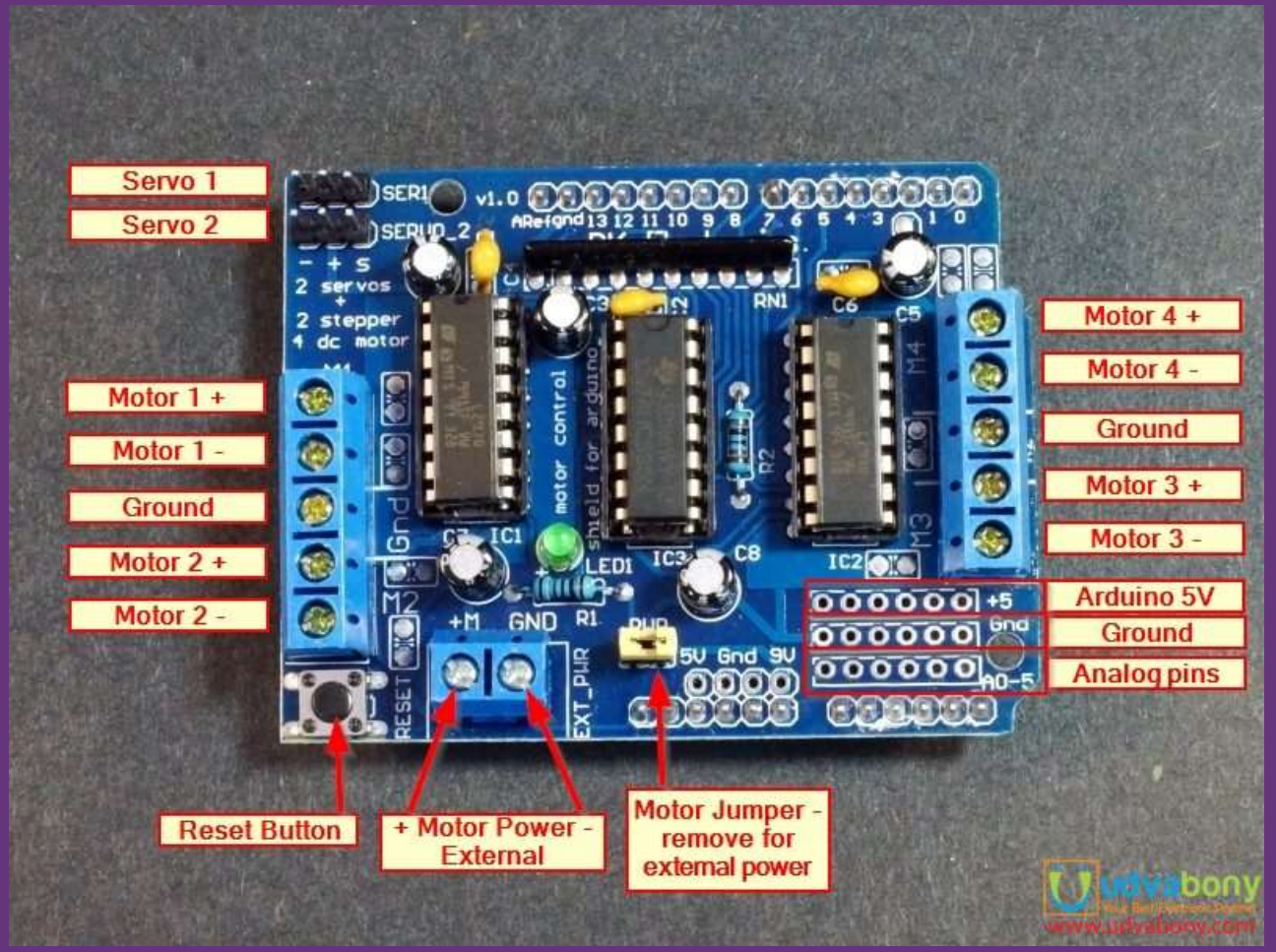
- Object Detection: The IR sensors detect nearby objects, while the ultrasonic sensor measures the distance to objects that are farther away.
- Movement: The rover moves towards detected objects, adjusting its path to avoid obstacles and follow the object.
- Control: The rover uses the sensor data to make decisions about which way to move, keeping a safe distance from objects.

Work Done

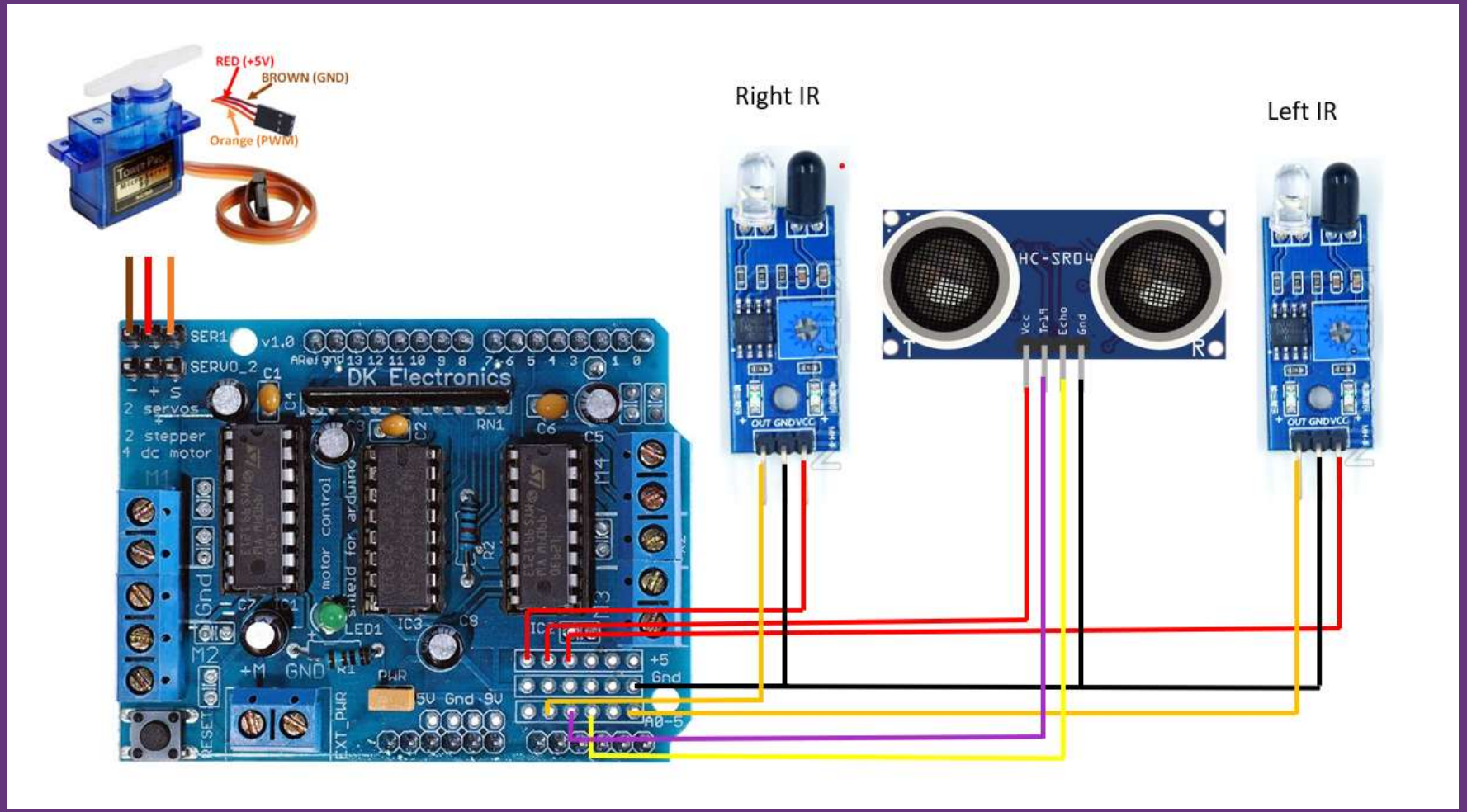
- **Testing:**
- We've tested the basic functions to make sure the sensors and motors work together. We are also fine-tuning the sensors for better accuracy and range.

- In the next slide, we'll show a short video of the prototype in action, demonstrating how it works.

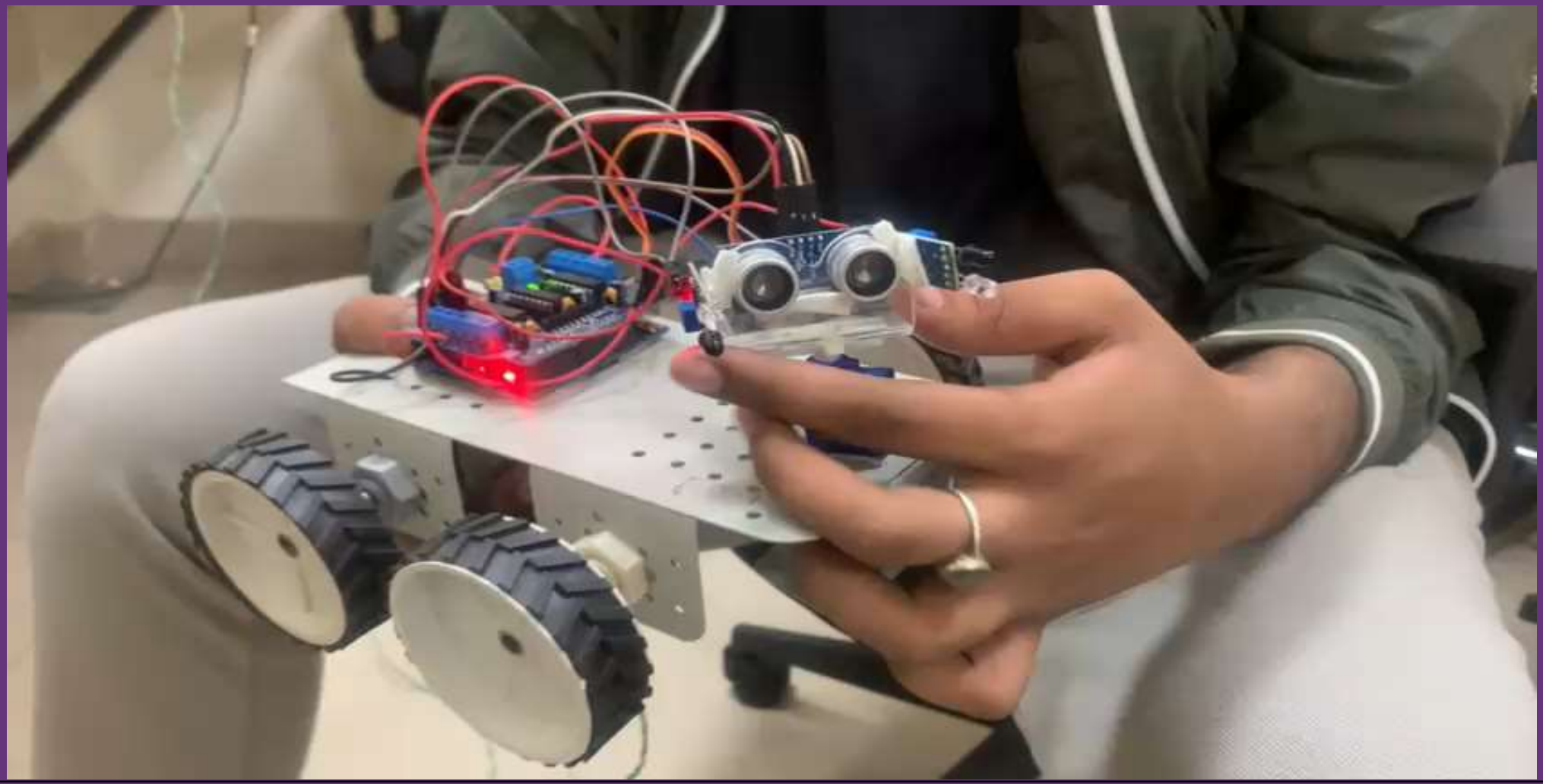
THE L293D Motor Driver



Connections we made as of now



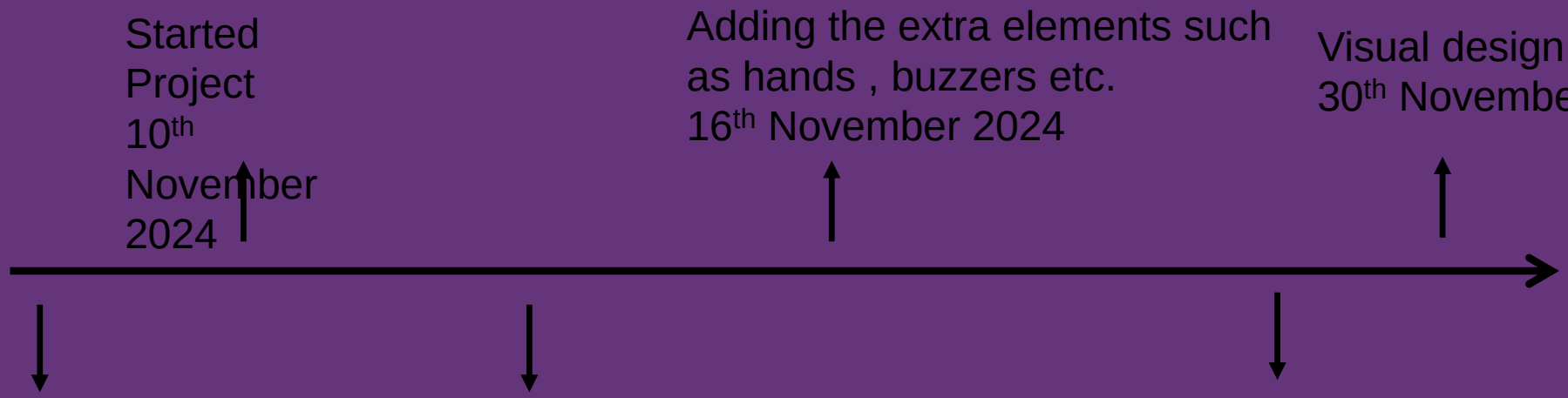
DEMONSTRATION



Future Planning

- To further improve both the functionality and aesthetics of the rover, we have planned several key upgrades:
- **Aesthetic Design**:
  We intend to enhance the visual appeal of the rover by incorporating additional design elements. This includes adding **articulating hands** that will move in coordination with the rover's movement, giving the model a more dynamic and engaging appearance.
- **Hardware Enhancements**:
  - **Servo Motors for Hands**: We plan to integrate **servo motors** to control the movement of the hands. These hands will move in sync with the rover's motion, adding a more interactive and realistic feature to the design.
  - **Buzzer or RGB LED Indicator**: To provide audible and visual feedback when the rover detects an object, we aim to add a **buzzer** that will sound upon detection. Alternatively, an **RGB LED** may be incorporated to provide a visual cue, signalling the rover's detection of nearby objects.
- These enhancements will not only improve the rover's user experience but also provide additional functional feedback, making the system more intuitive and engaging

TIMELINE


Started Project 10th November 2024
Adding the extra elements such as hands , buzzers etc. 16th November 2024
Visual design (looks) 30th November 2024
Planning project 7th November 2024
Made the basic prototype involving sensors and motors. 12th November 2024
Visual design (looks) Before 30th November 2024

THANK YOU!

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