Habib University

Dhanani School of Science and Engineering

Microcontrollers & Interfacing

EE 375L-T1/T2

Team: Circuit Cruiser

Group Members:	**Student ID:**
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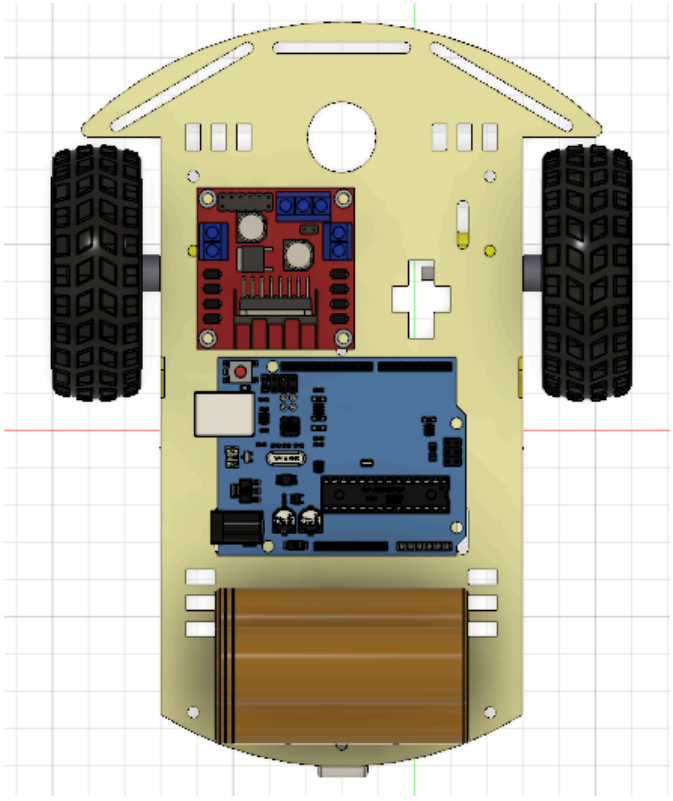
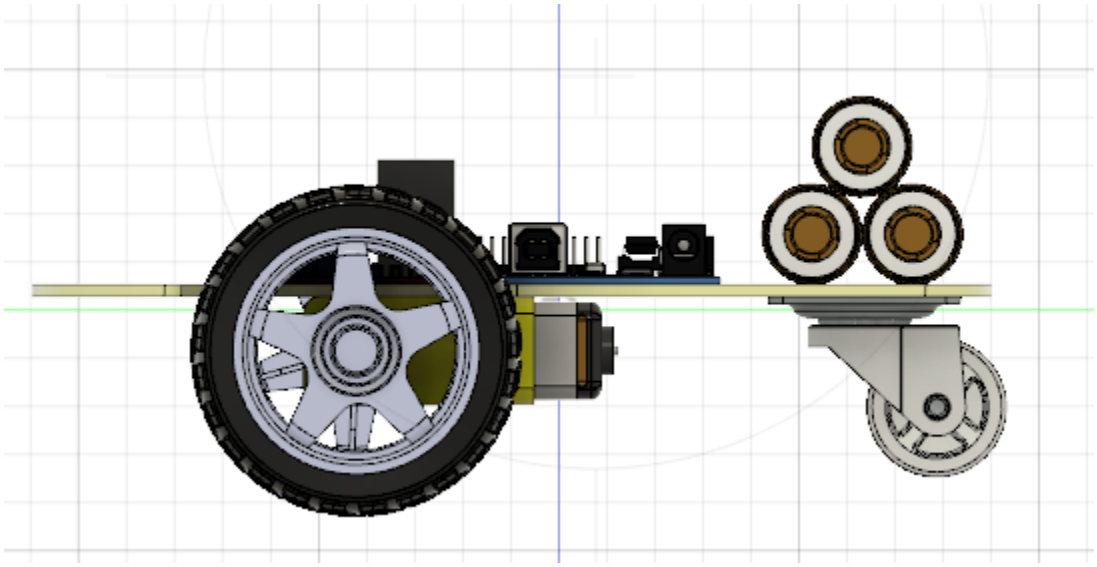
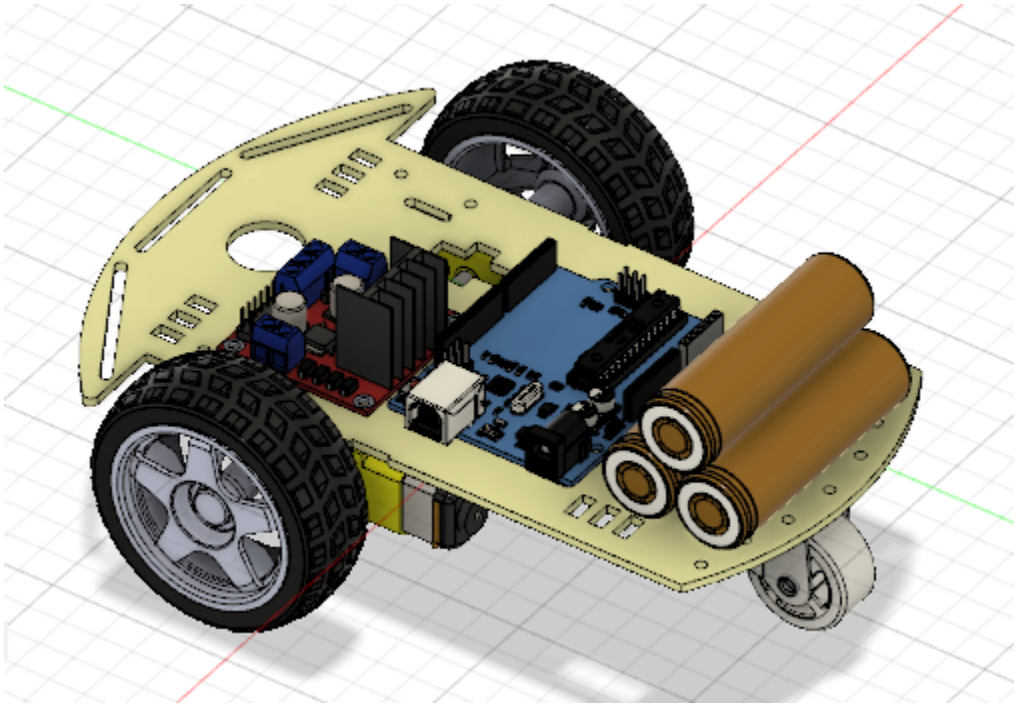
1.CAD Model of Robot with details

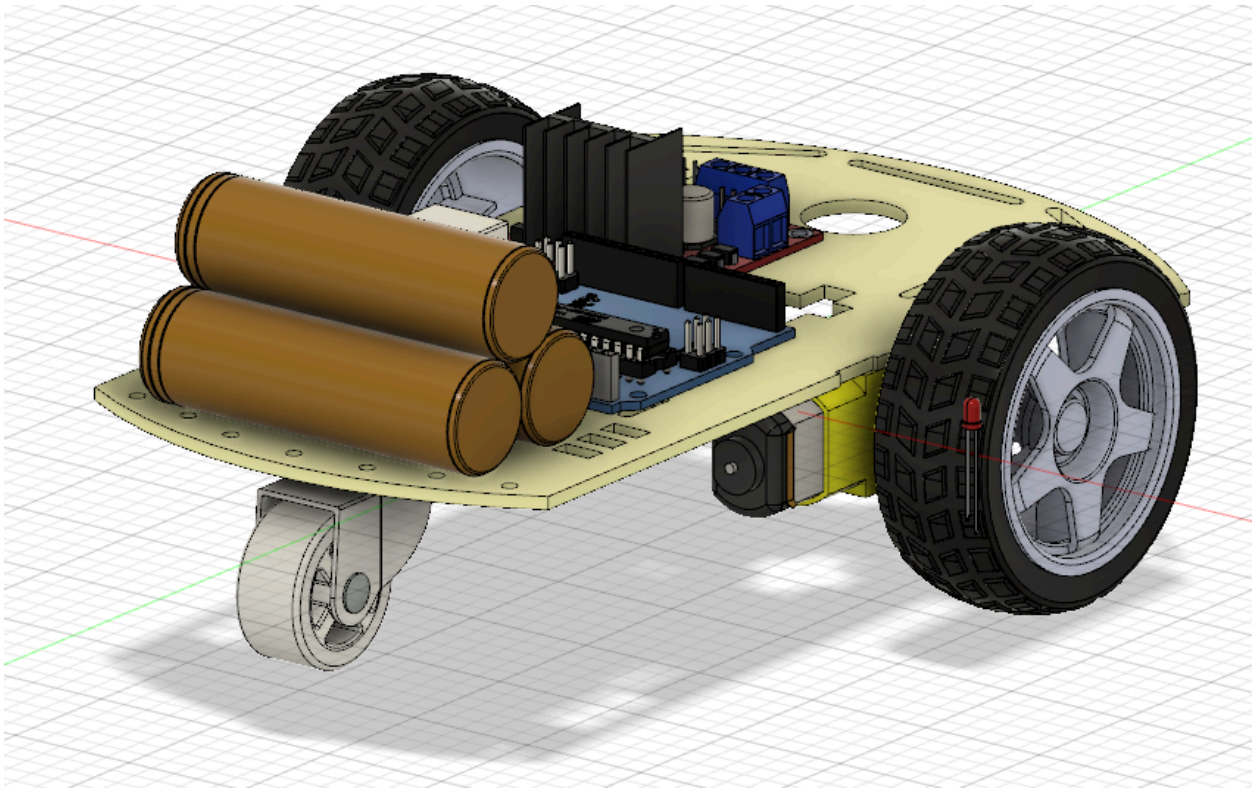
2D Schematics:

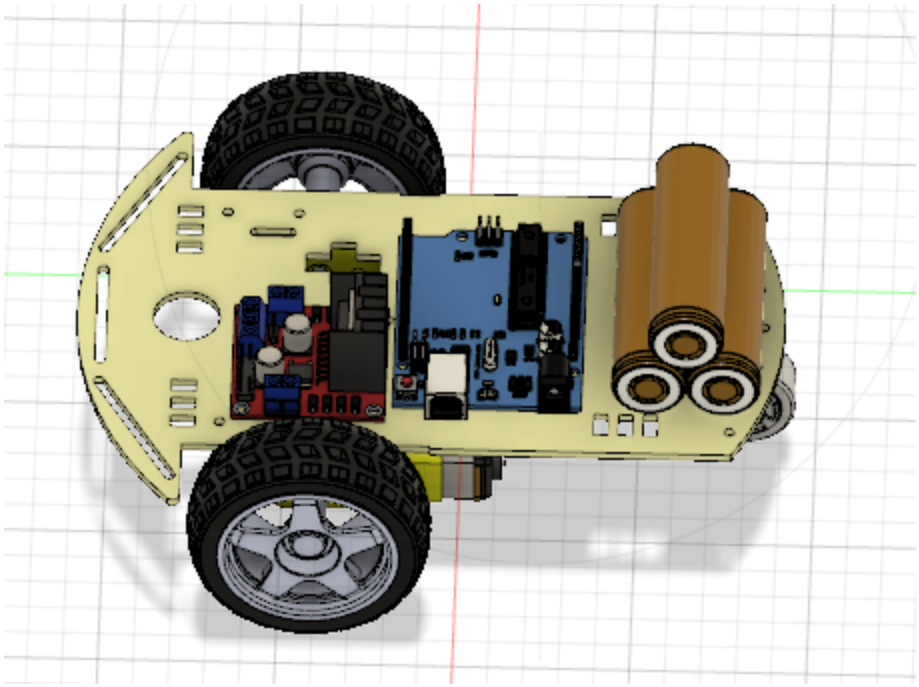




3D Design:







2.Task Division:

Aamaina :Documentation, Arena, Structure Design
2.Fatima :Sensors, Control Logic, Presentation
3.Abdullah:Actuation Mechanism,Structure Design, Hardware

3. Integration of Sensors

1. Infrared proximity sensors:

a. These sensors ascertain distances to obstacles through the emission of infrared light beams and subsequent detection of their reflections.

b. Quantity: 2

Each of the infrared (IR) sensors, meticulously placed on the bottom left and right sections of the robot's chassis, will be finely tuned to detect the presence and nuances

of the black line, facilitating precise navigation and control in varying environmental conditions.

2. Ultrasonic sensor:

Ultrasonic sensors use high-frequency sound waves to detect nearby obstacles. They emit and receive these waves using a transducer, ensuring accurate detection. Mounted on a servo motor, the sensor can scan in all directions, swiftly spotting and avoiding obstacles from any angle.

4.Sustainability aspect of our robot

The main materials that were provided to us from the university include arduino board, robot chassis, dc motors, and sensors. Those are issued one per group only. The arena that we will design, we will try to incorporate materials, even left-overs from the engineering workshop in our university. For obstacles, we'll try to use rough cardboard pieces that we have or are left from the engineering workshop. The sensors and other material provided to us is material that was used by students before us; and we will try our best to adhere to the safety guidelines in order to avoid accidents and wastage of materials. We'll try not to use more plastic in our project and instead use biodegradable substances. The power of the robot is provided from 3 lithium batteries, which are comparatively more efficient and are hence more environmentally sustainable.

5. Project Design and materials:

Materials required for the main construction of our robot design and for it to be able to load/unload and carry an object (size of Ping Pong Ball) using servo mechanism.

Chassis: Main body of the robot that all components will attach to

1.Geared DC motors and wheels

a. We will use available TT-Motor (yellow) assemblies with wheels from lab. These will be part of the main chassis that will drive the robot.
b. Price: Can be issued from Circuits lab.

2. Servo Motors

a. We will use two SG90S/MG90S servos, one to move the Ultrasonic sensor and the other to control the mechanical gripper.
b. Price: Issued with our MCI kits.

3. Battery Pack

a. We will use multiple (at least 3) rechargeable Li-Ion 18650 cells in series to get our desired voltage of 12V or higher to power the robot.
b. Price:

4. Microcontroller

a. We will use Arduino as issued to us per group as the main microcontroller that will drive our robot.
b. Price: N/A (Issued to us)

5. Motor Driver module

a. We will use two L298N motor driver modules provided in the kit. This will provide a separate high voltage power supply to the DC motors and control their speed.
b. Price: Included in MCI lab kit.

6. Mechanical gripper

a. We will manufacture our own gripper using the materials from Engineering Workshop(will externally be integrated so it is not currently present in the)

6. Arena Design

We will use cardboard for the floor of the arena to ensure a smooth surface. In case of unavailability of cardboard, we can use wood from the engineering workshop and add a poster on it to make the surface smooth. For the floor we will use white color, so for incorporating the black lines, we can use black tape; this will ensure more accuracy in the distinction between the ‘default’ floor and the lines.

For obstacles, we can use thermopole/cardboard/wood and make them stand (with wood glue/nails). Objects as obstacles can include random small toys or balls. To ensure safe unloading of objects, we can make a small basket.