Fire-Fighting Robot

Group-9

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Problem Statement

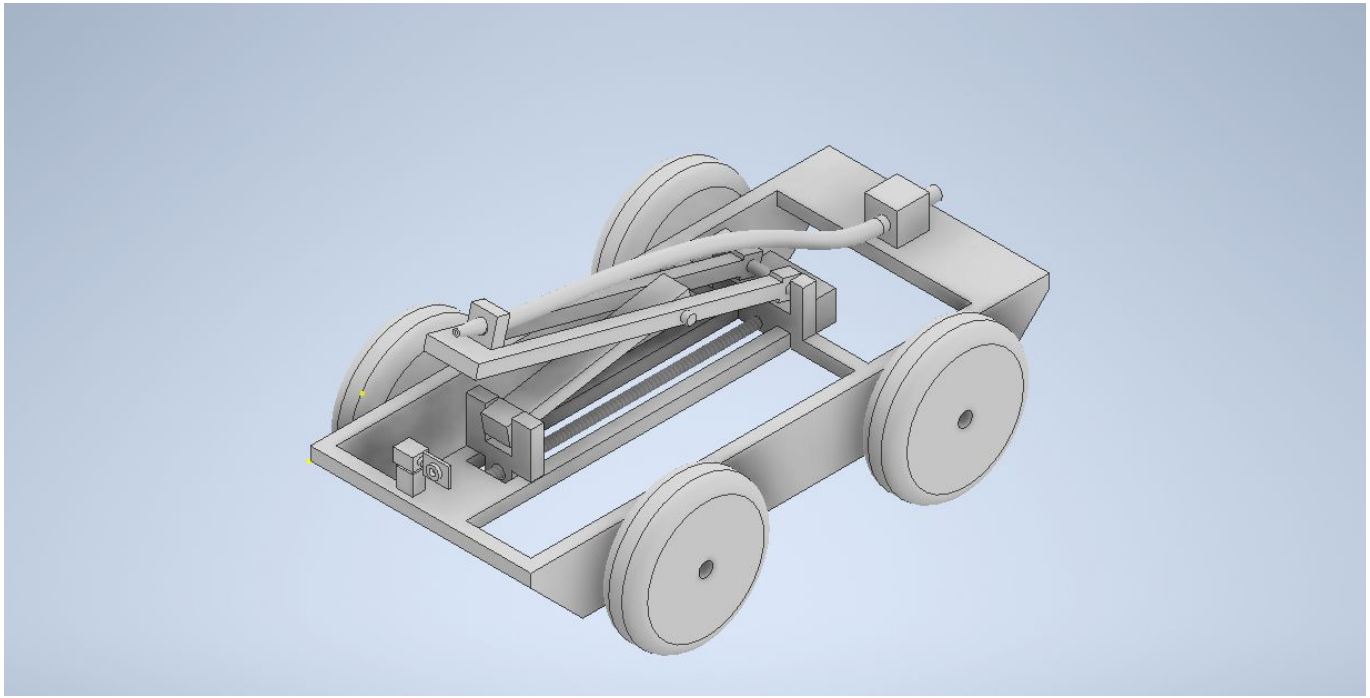
Firefighters face serious risks from heat, toxic smoke, and dangerous environments, leading to potential burns, long-term health issues, and physical injuries.

- Heat
- Smoke and Gases
- Dangerous Locations

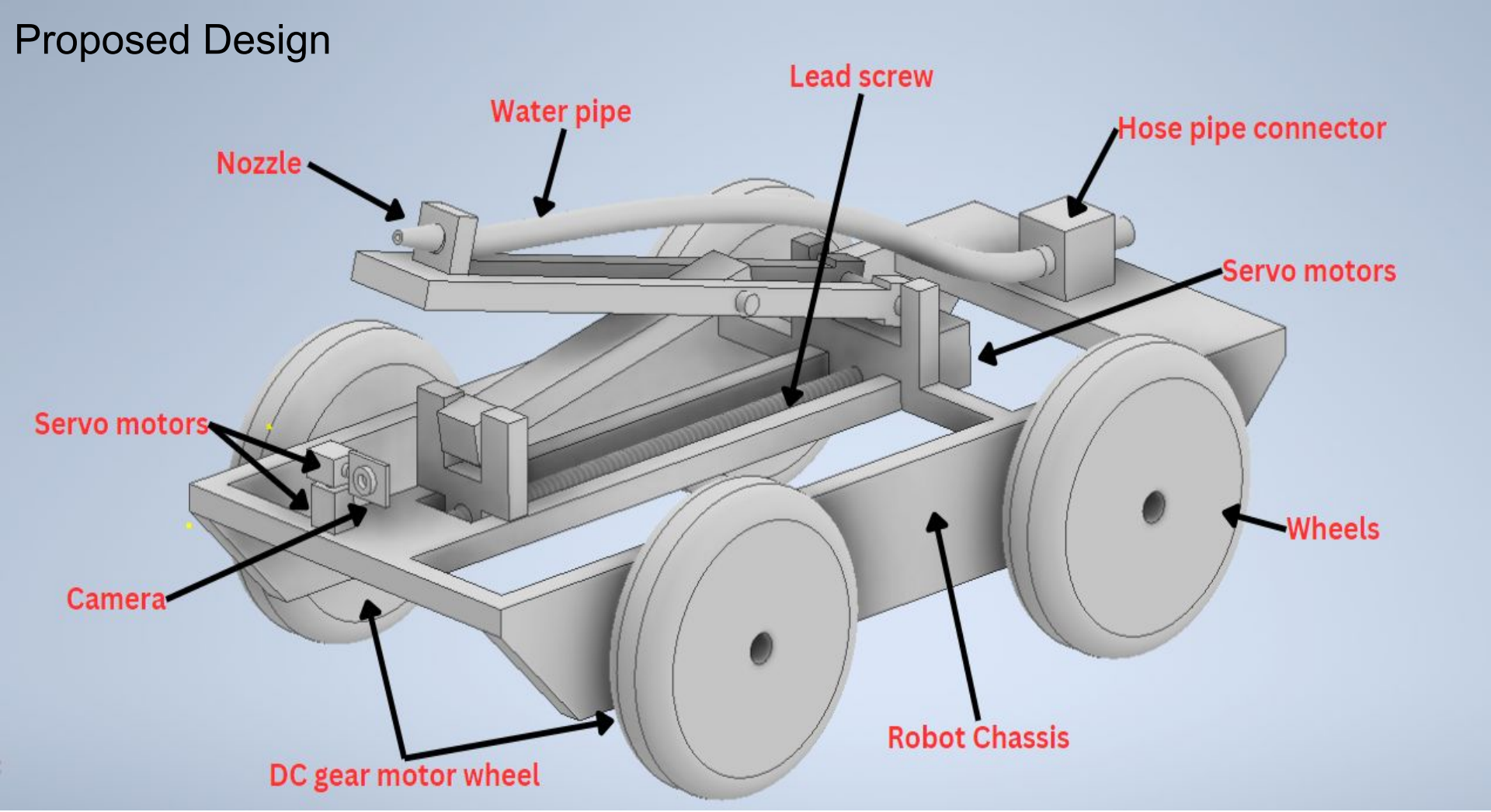
“why a problem”.

Proposed Solution

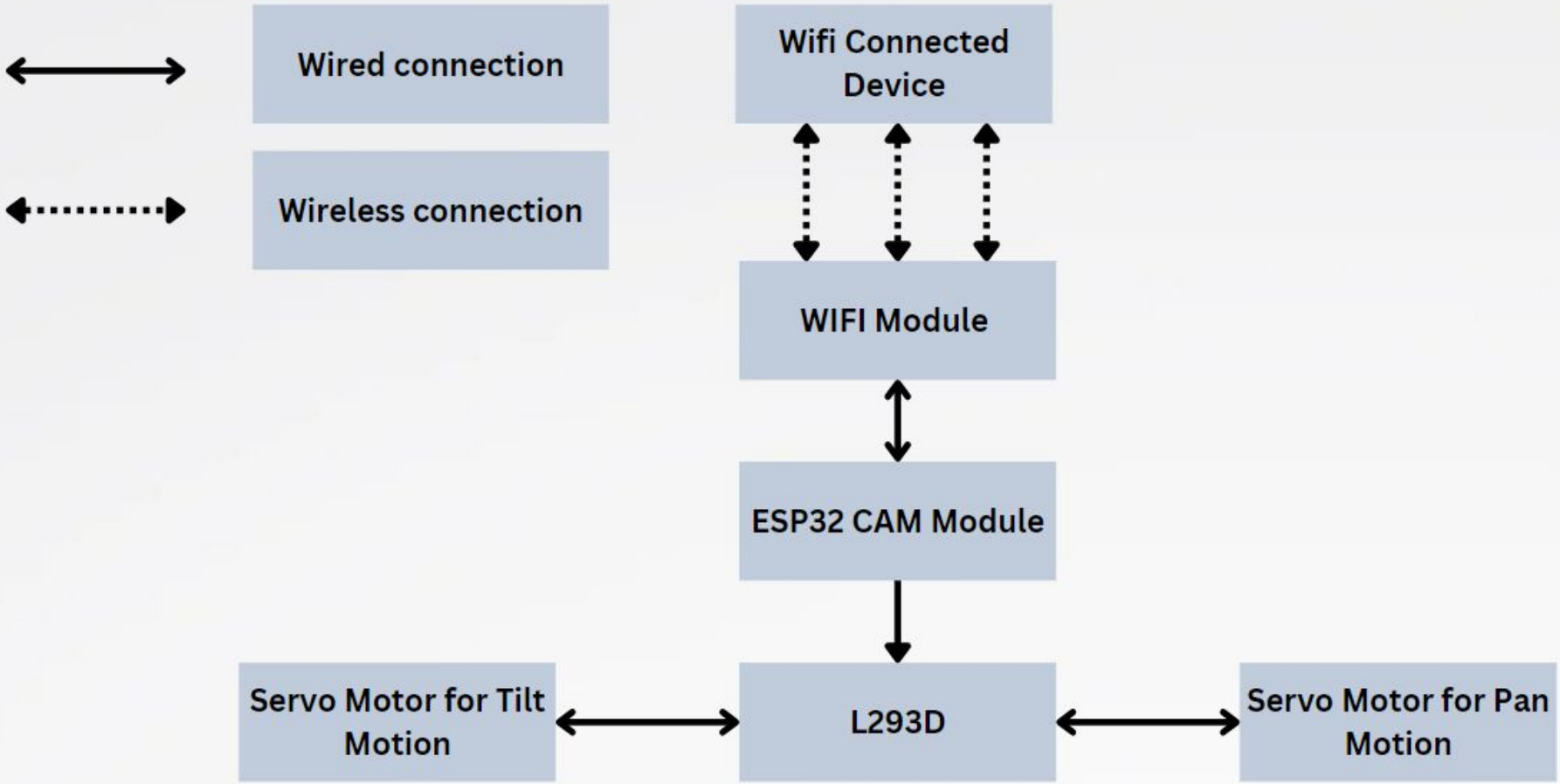
Developing the fire fighting robots to enhance the safety of the firefighters.



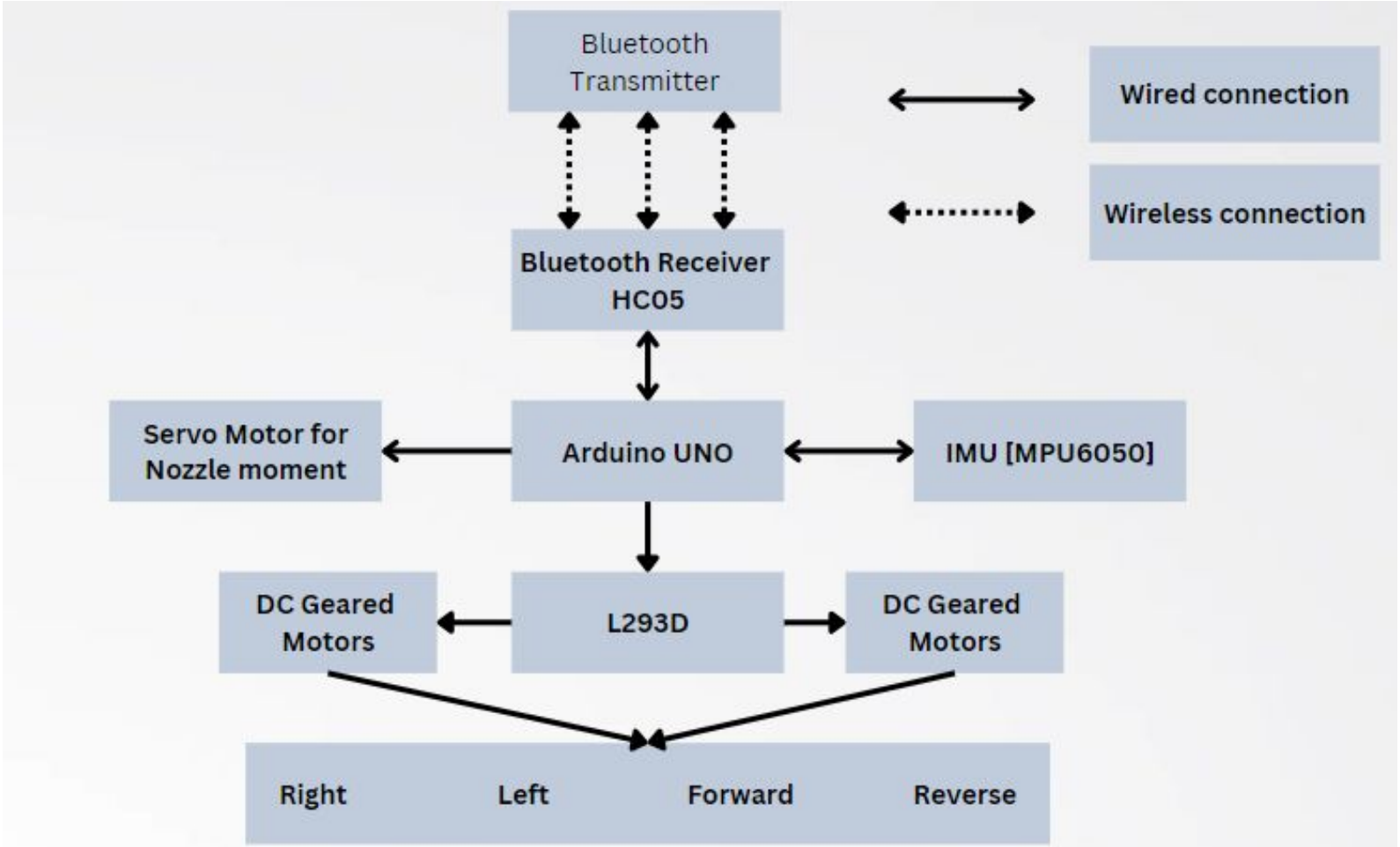
Proposed Design



Mechatronic Architecture for Vision



Mechatronic Architecture for Direction Control



Calculations for motor selection

M = 15kg, Slope Inc(θ) = 16°, Vel = 0.5m/s, Acc = 0.01m/s², Us = 0.8 Uk = 0.7 (Friction coeff)

Diameter of wheels = 11mm X 4, No of Motors = 2

Case: 1. Robot climbing the slope.

Torque required by single motor assuming 50% efficiency w.r.t to ratings = **7.7 kg cm [10 kg cm].**

Case: 2. Robot stationary on the slope and spray water.

Torque required by single motor assuming 50% efficiency w.r.t to ratings = **8.5 kg cm [10 kg cm].**

Range of water spray

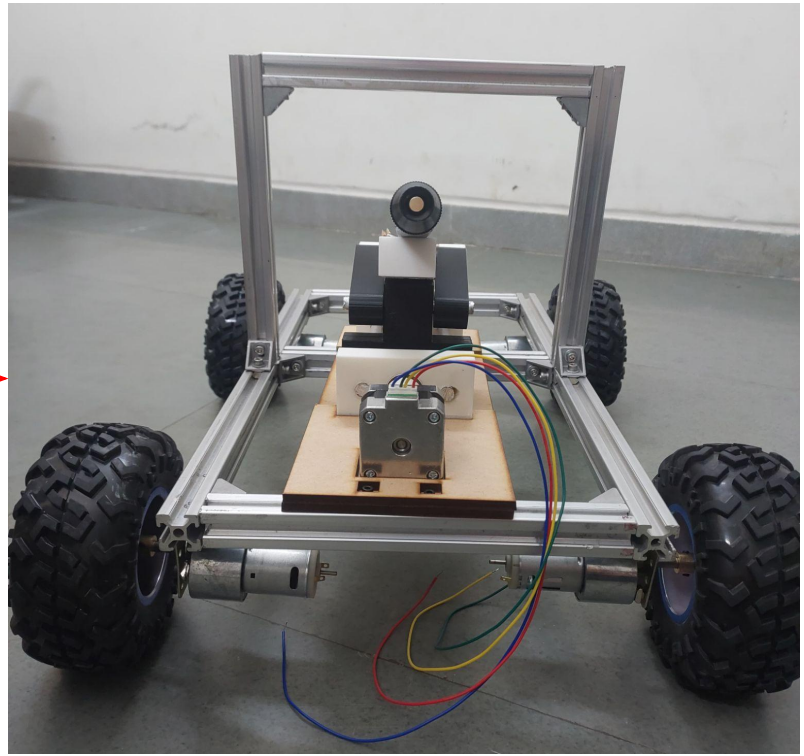
On horizontal surface: **5m**, On Slope(θ) = 16° : **3.9m**

Fire-Detection Algorithm

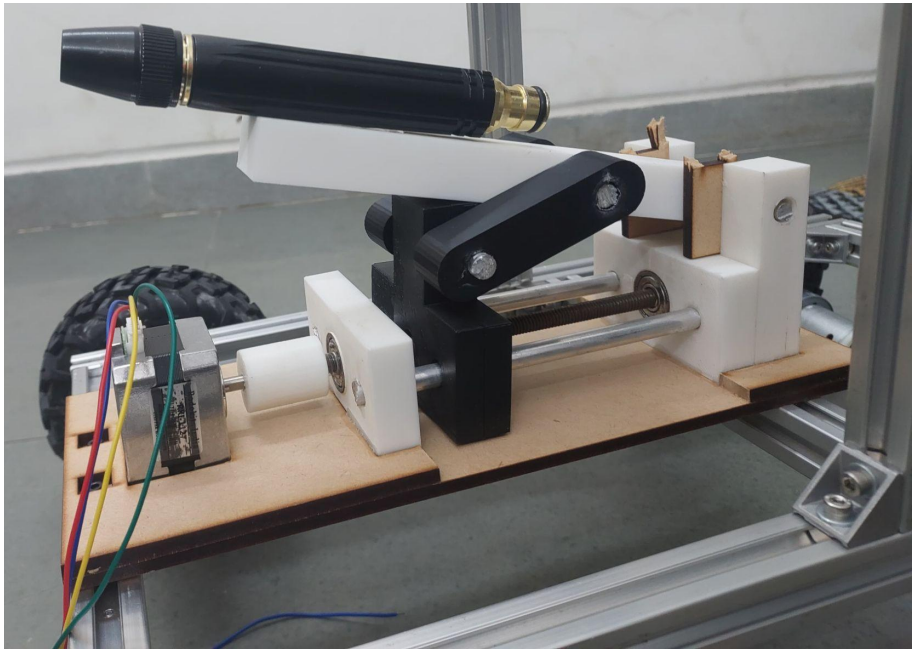
Known width = __
Focal Length = __
Distance = (known_width * focal_length) / perceived_width
Upper_Bound & Lower_Bound = __
Start Video Capture:
    Convert into HSV color space
    Binary Masking & Plot Contours
    Draw Bounding-box
    Estimate distance

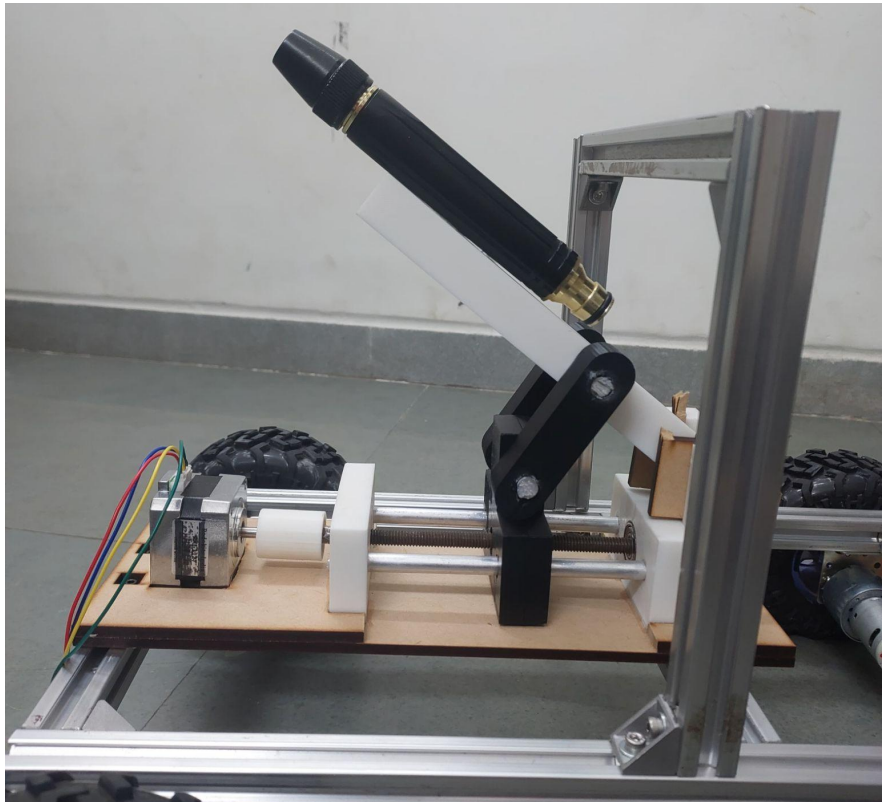
Work	Assigned to	Status (Before)	Status (Now)
Designing and CAD modelling	Nitya	Done	Done
Bill of Materials & Materials Ordering	Both	Remaining	Done for Chassis
Construction of Robot Chassis	Both	Remaining	Done (80%)
Connection of electrical hardware	Both	Remaining	Started Purchasing
Codes	Mayur	Remaining	Looking for Sources

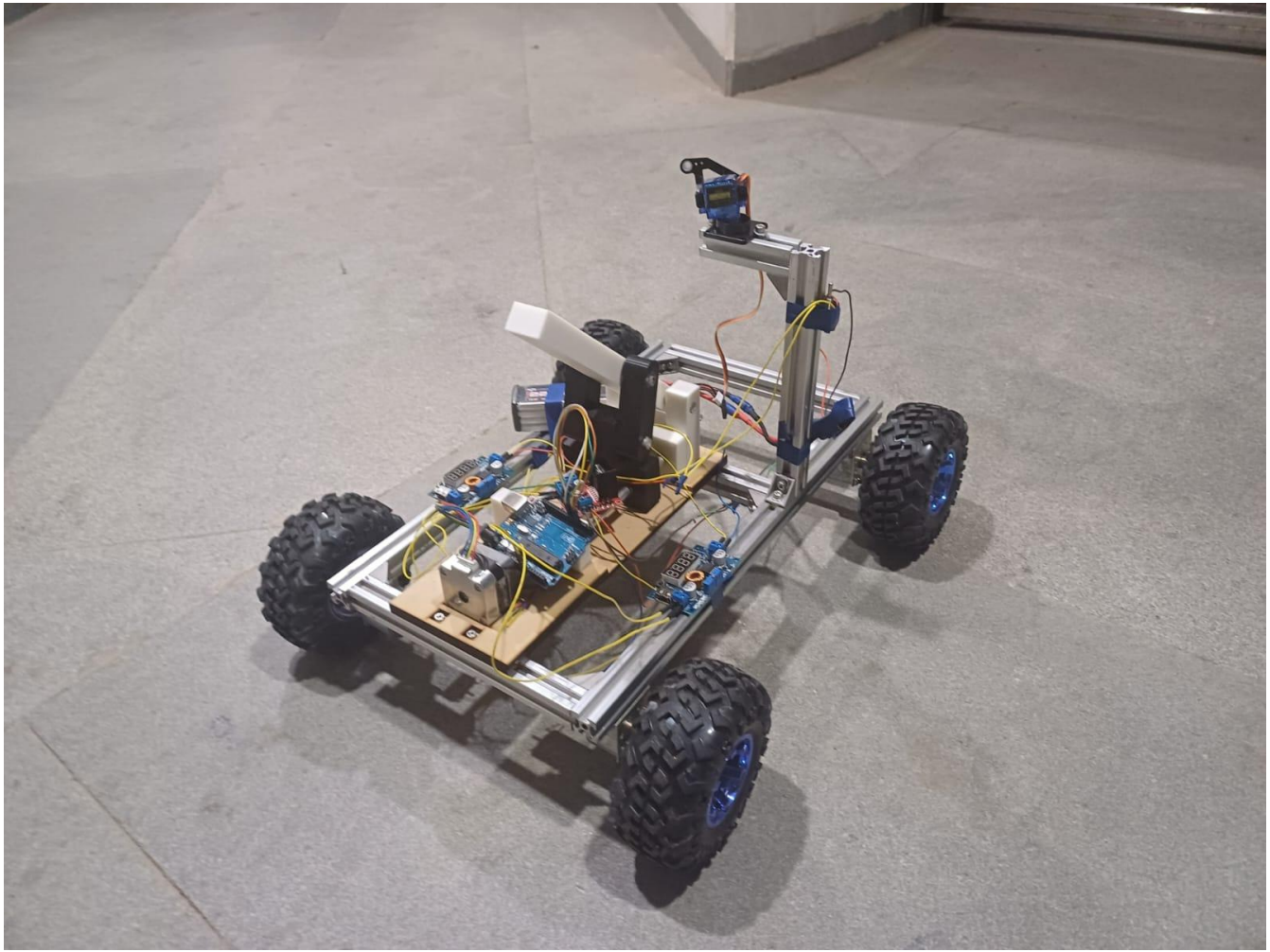
Robot chassis



Robot chassis







Video Demonstration

Electronics setup

Camera setup is not installed
Yet