# Fire-Fighting Robot

Group-9

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# Problem Statement

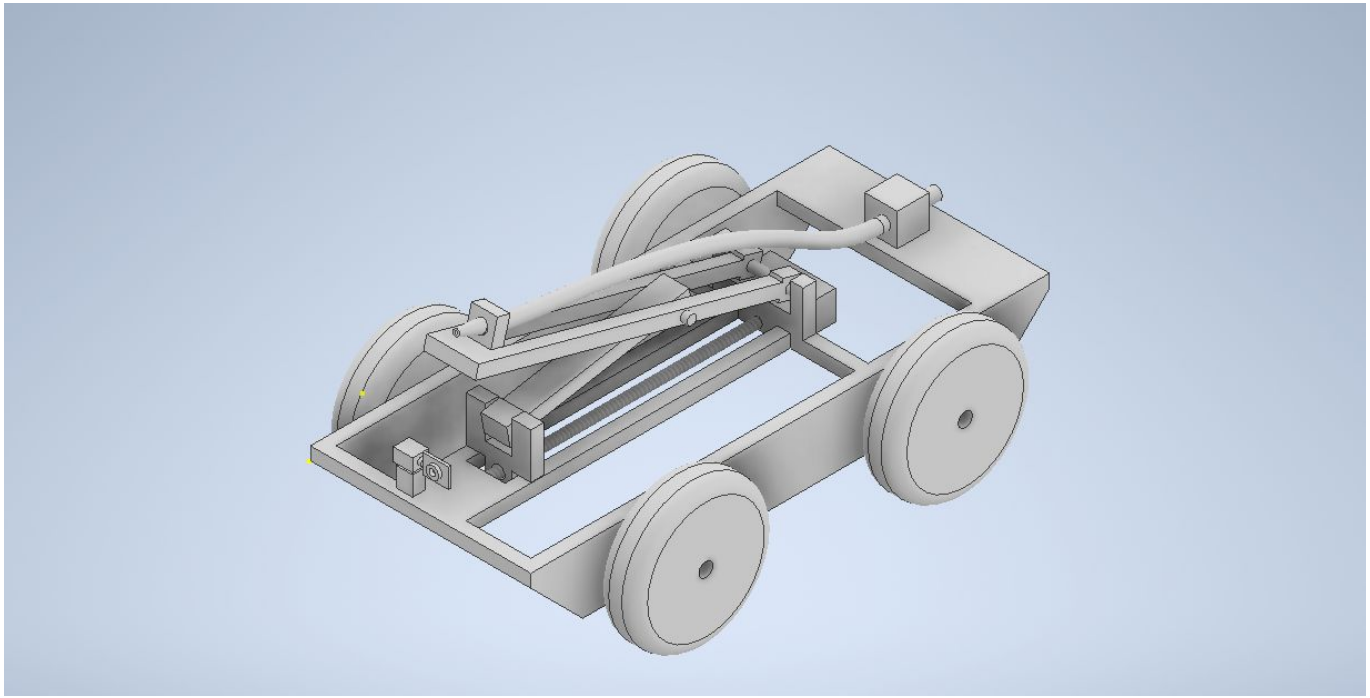
Firefighters face serious risks from heat, toxic smoke, and dangerous environments, leading to potential burns, long-term health issues, and physical injuries.

- Heat
- Smoke and Gases
- Dangerous Locations

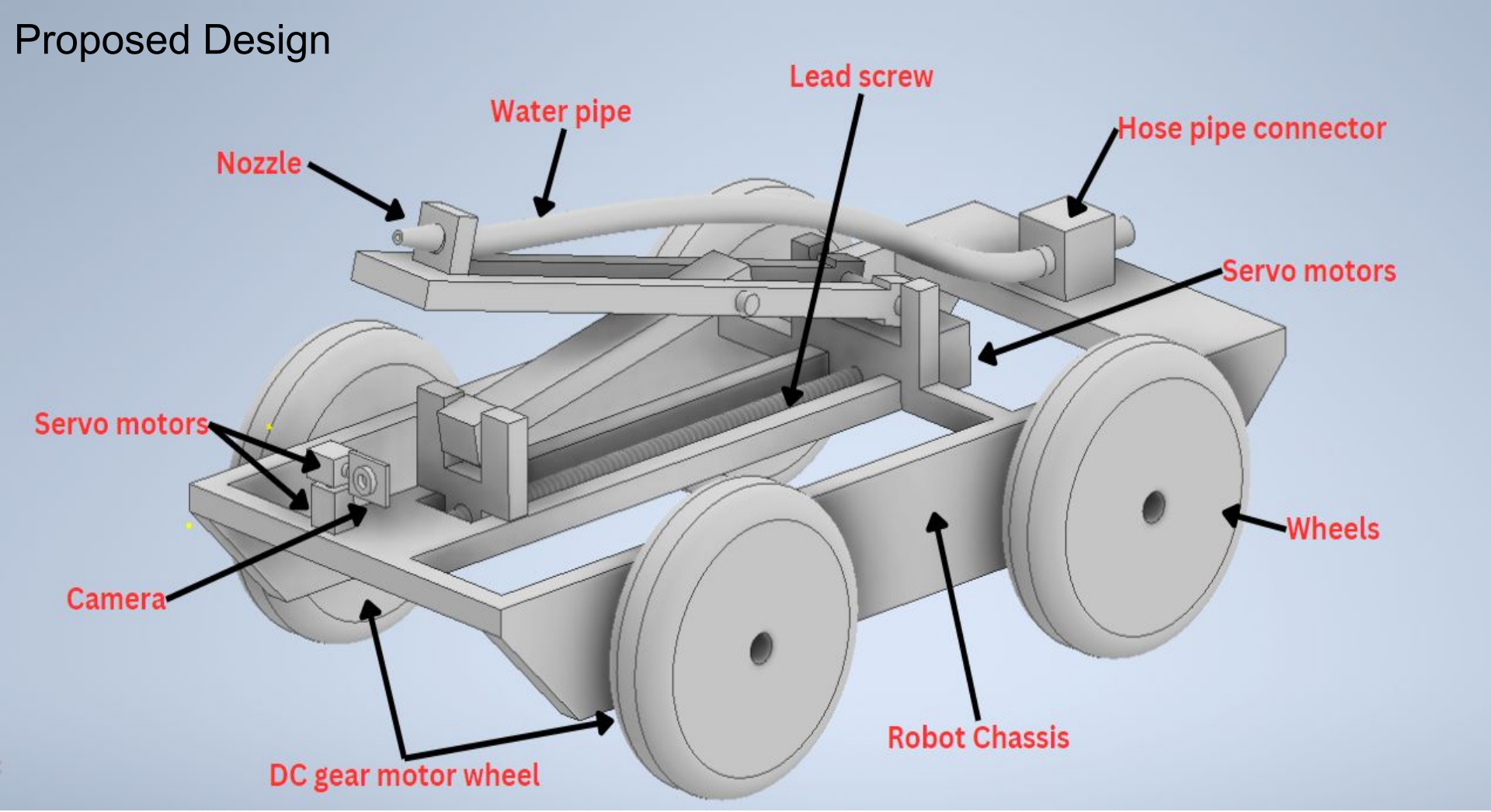
“why a problem”.

# Proposed Solution

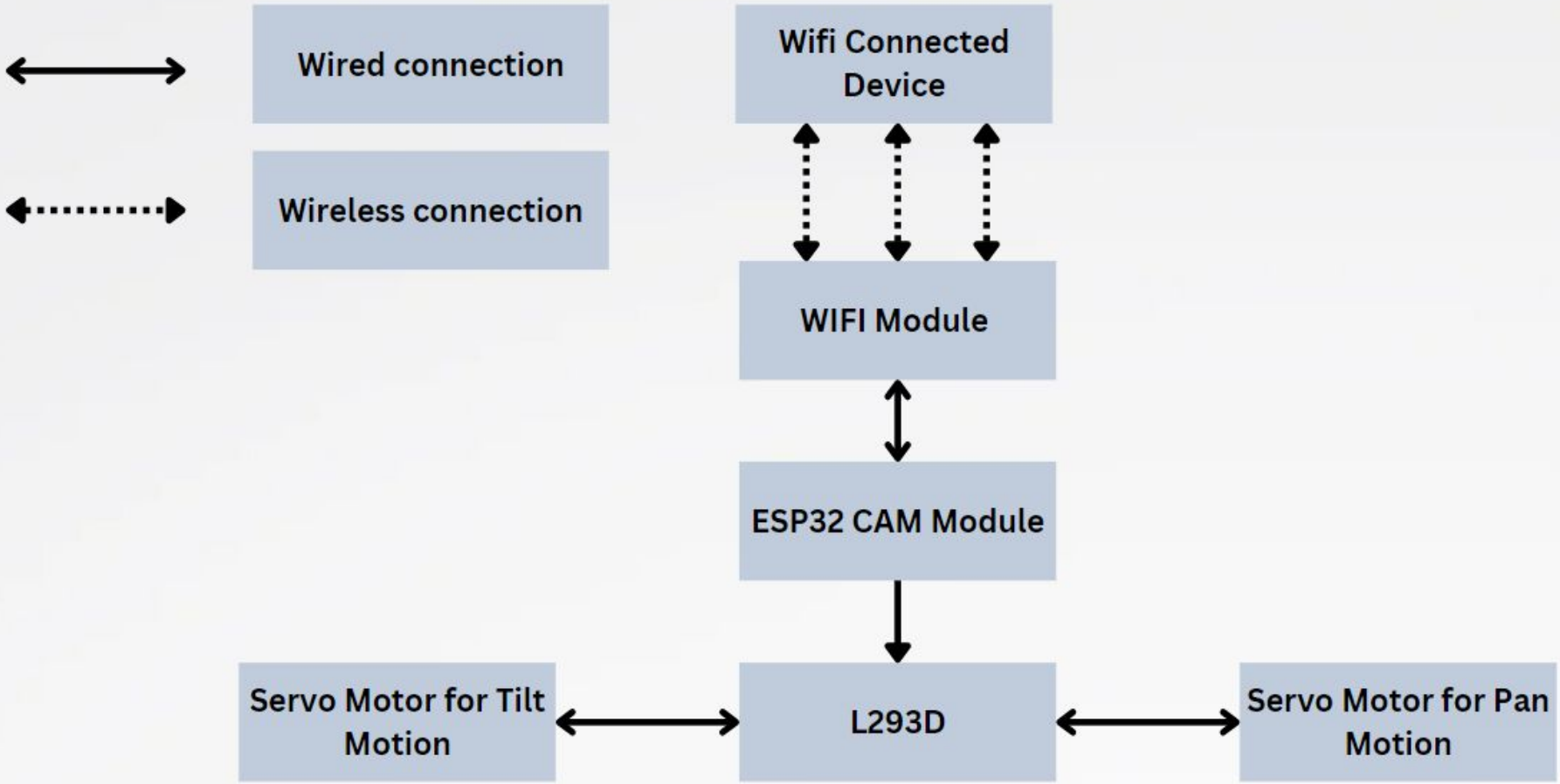
Developing the fire fighting robots to enhance the safety of the firefighters.



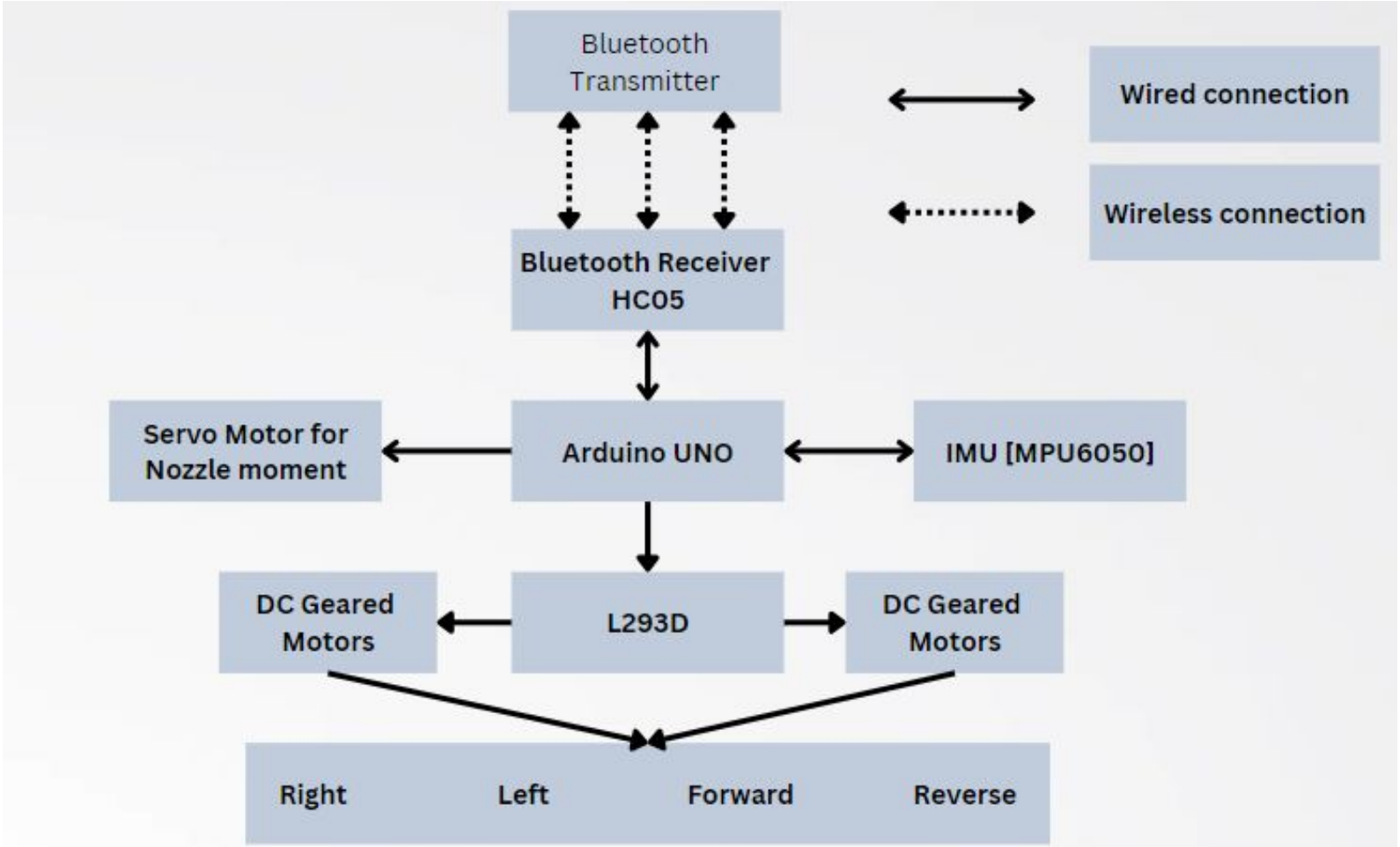
# Proposed Design



# 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**

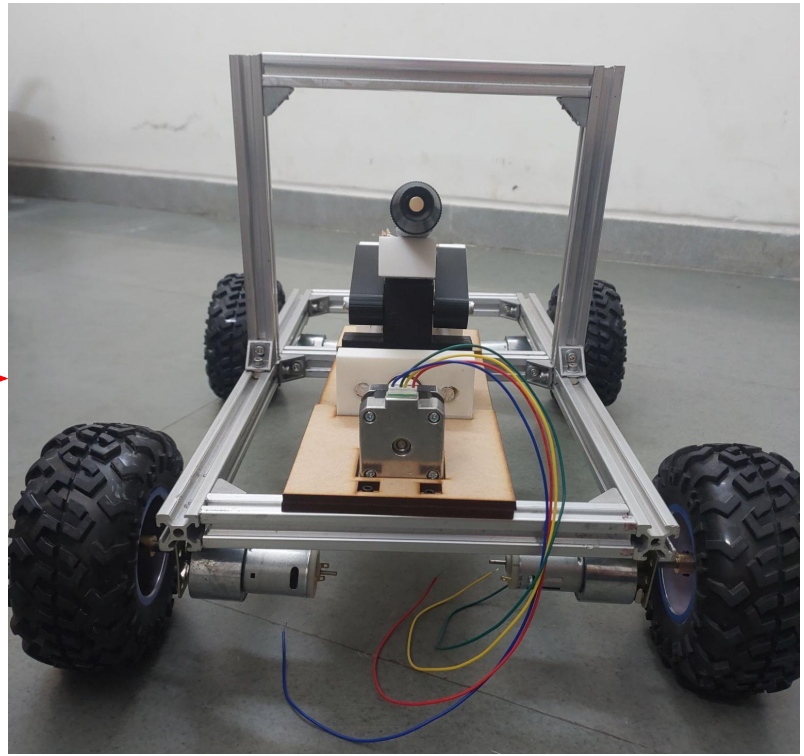
On horizontal surface: **5m**,  On Slope(θ) = 16° : **3.9m**

# 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