

**Problem 1: Remote-Controlled Robotic Humanoid System**

**a. Minimal List of Structural Things:**

1. The robotic humanoid system includes the following structural components as listed below.
  - Robotic Unit (Hardware & Software)
  - Microcontroller – The central brain that executes commands.
  - Motors & Wheels – Support movement (go, back, turn).
  - Sensors – Inform of obstacles or environmental change.
  - Webcam – Records real-time video for observation.
  - Wireless Communication Module – Supports remote control.
  - Speaker – Speaks greeting messages
2. The remote control unit (Smartphone app) would have the following units:
  - UI Components – Movement command buttons.
  - Live Video Interface – Shows real-time video feed.
  - Wireless Communication Interface – Transmits commands to the robot

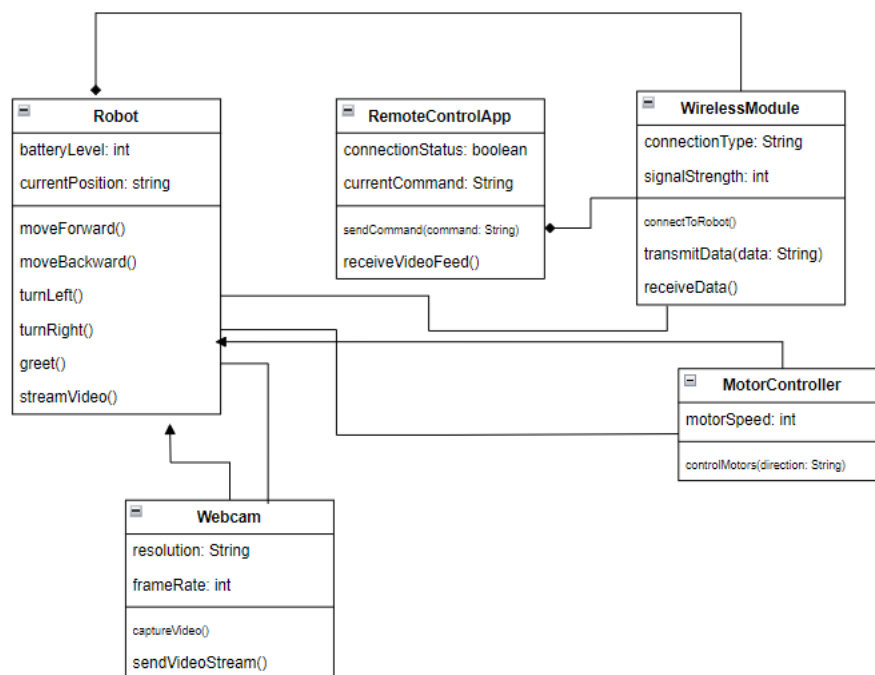
**b. Use Case List and Relationships**

Use Case	Actor	Description	Relationships
Move Robot	User	User sends movement commands (Forward, Backward, Left, Right).	Association (User → Robot)
Monitor Video Feed	User	The robot streams video from its webcam to the remote control unit.	Association (User → Robot)
Greet on Power Up	Robot	When turned on, the robot plays a greeting message.	Association (Robot → User)
Emergency Stop	User	The robot stops	<i>Extends</i> "Move

		movement when it detects an obstacle or receives a stop command.	Robot"
Authenticate User	System	The system verifies user credentials before enabling video streaming.	<i>Includes</i> "Monitor Video Feed"

**c. Draw the following UML diagrams:**

**Class diagram:**



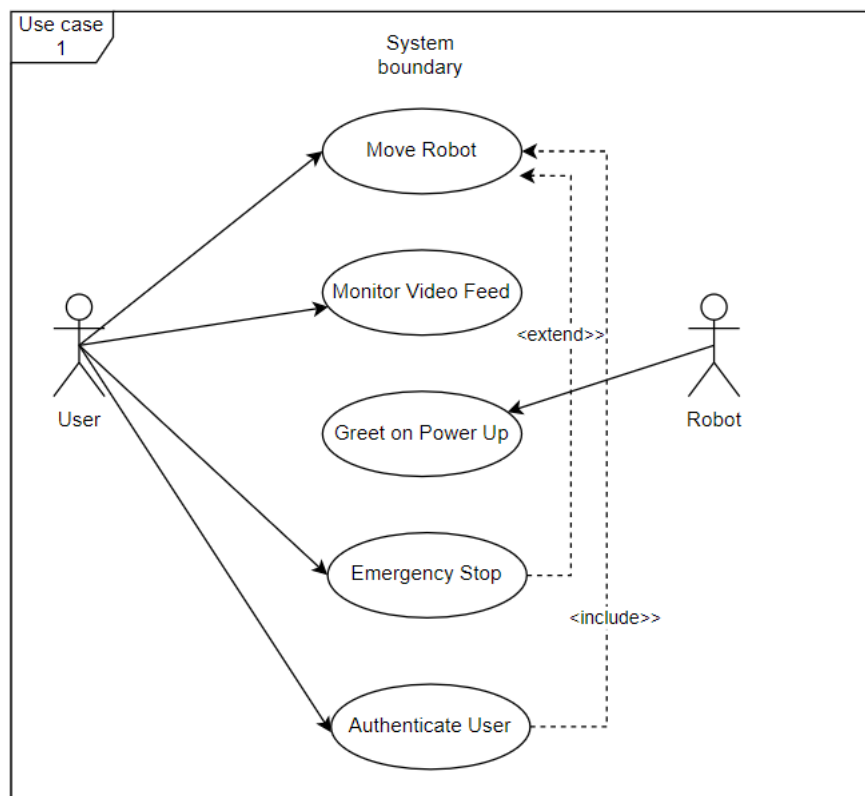
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**Deployment Diagram:**



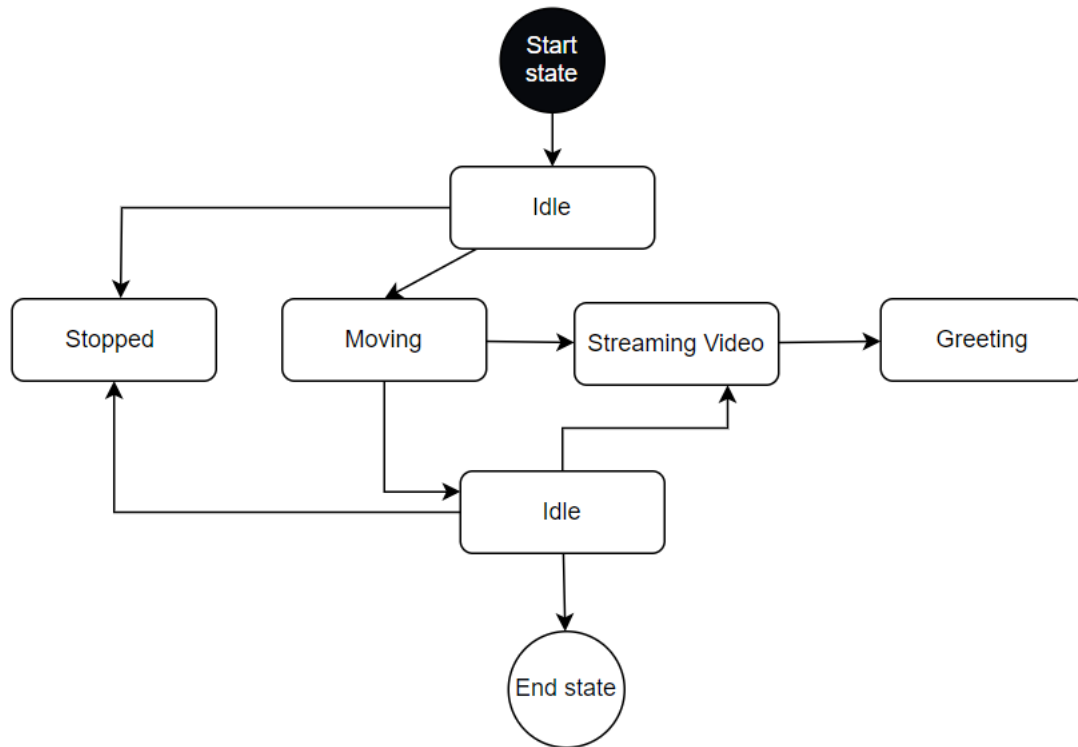
**Use case diagram:**



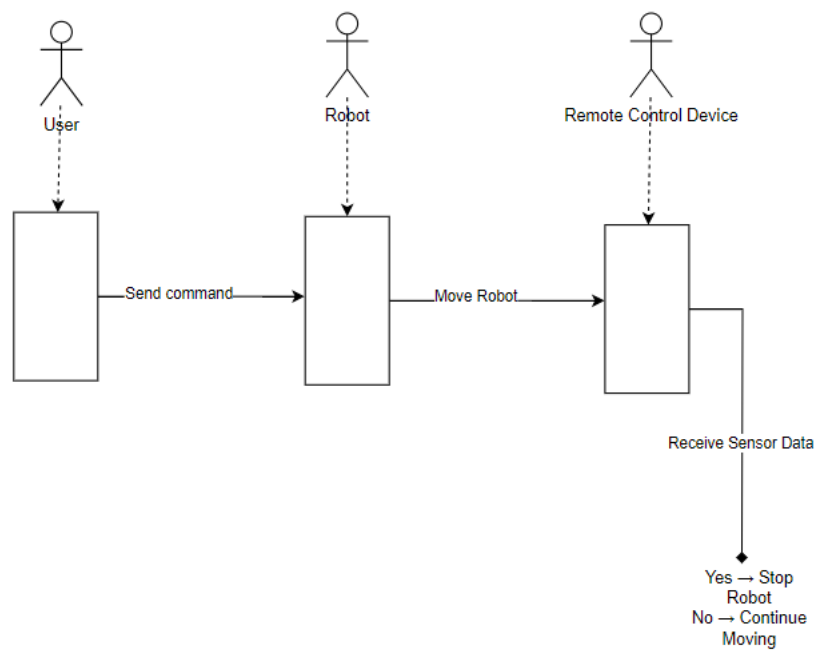
**State Chart Diagram space:**

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**Sequence Diagram:**



**Problem 2: Elevator System Design**

**2a. Structural Components**

**1. Elevator System (Hardware & Software)**

- Elevator Cab – The moving physical unit.
- Motor & Pulley System – Regulates movement between floors.
- Sensors – Sense doors, floors, and occupancy.
- Control Panel – Selection of floors within the elevator.
- Call Buttons – Outside buttons to call for the elevator.
- Fan & Light System – Turned on when occupied.

**2. Components in an Embedded System**

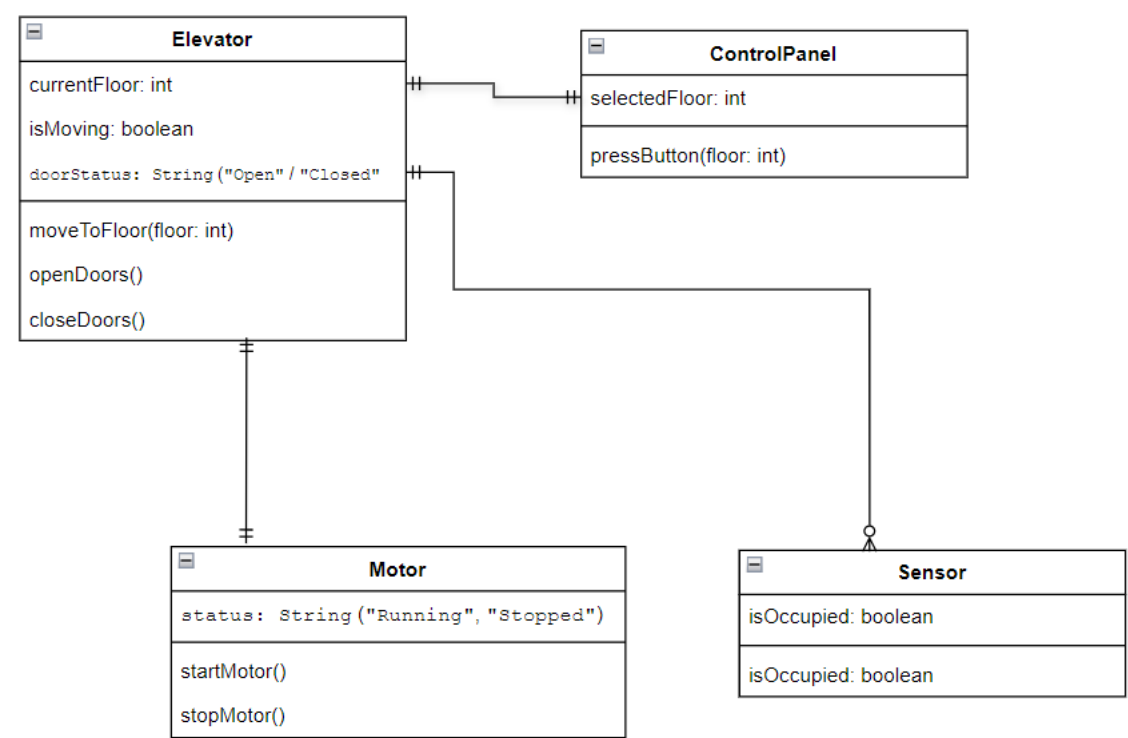
- Microcontroller – Executes the elevator logic.
- Actuators – Close/open doors, mobilize the elevator.
- Communication Module – Processes the button pressings and logic.

**2b. Use Case List and Relationships**

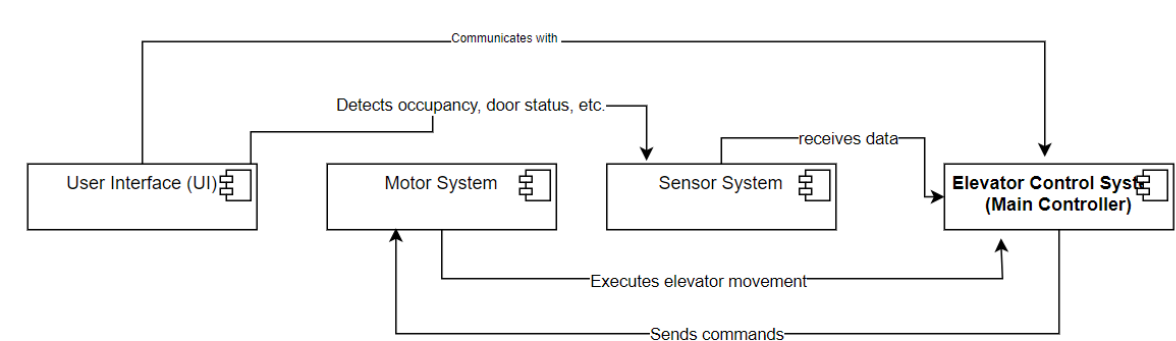
<b>Use Case</b>	<b>Actor</b>	<b>Description</b>	<b>Relationships</b>
Call Elevator	User	User presses an external button to call the elevator.	Association (User → Elevator)
Select Floor	User	Inside the elevator, the user chooses a floor.	Association (User → Elevator)
Move Elevator	System	The elevator moves to the selected floor.	<i>Extends</i> "Select Floor"
Open/Close Doors	User	The user can open or close the doors manually.	Association (User → Elevator)
Automated Fan & Light Control	System	The system turns on fan/light when occupied.	<i>Includes</i> "Move Elevator"

b. Generate the following UML diagrams:

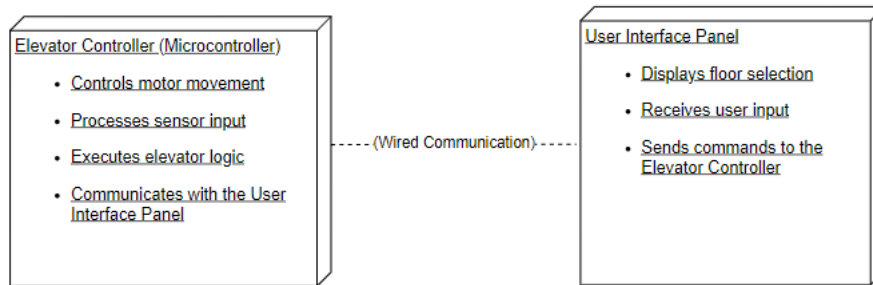
Class Diagram:



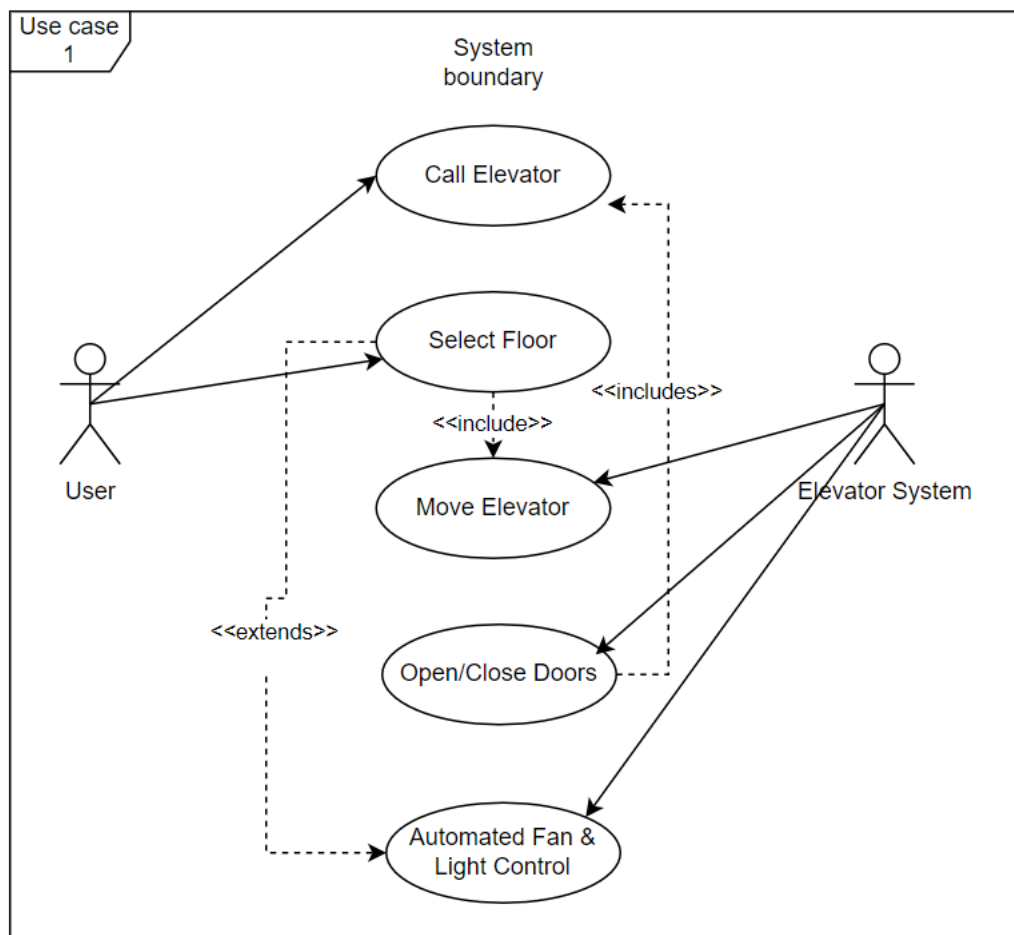
Component Diagram:



Deployment Diagram:



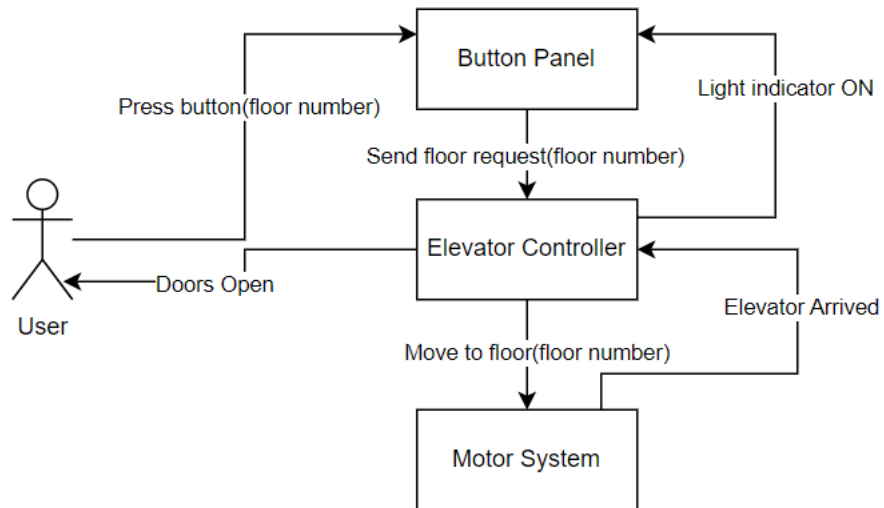
**Case Diagram:**



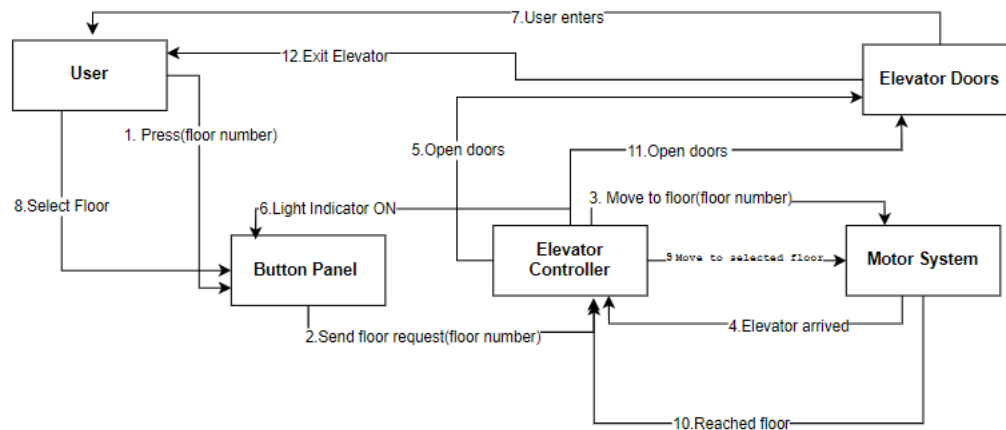
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**Interaction Diagram:**



**Collaboration Diagram:**

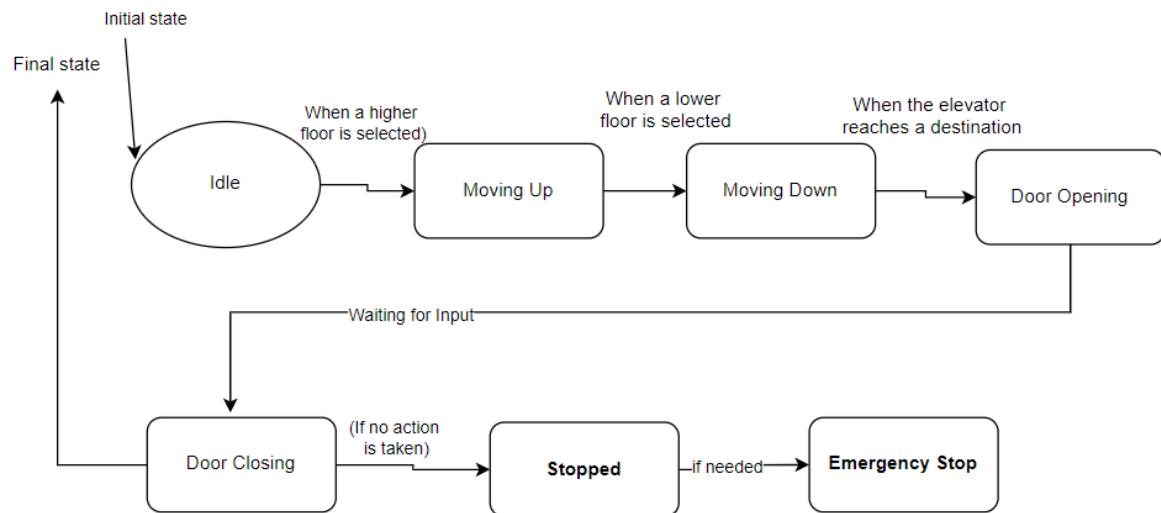




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**State Chart diagram:**



**Activity Diagram:**

