4.3.3 Use Case Diagram – EcoSweep Cleaning Robot

☑ 🎯 Purpose of Use Case Diagram

To clearly represent the interaction between the **actor (user)** and the **system (EcoSweep components)** showing all key use cases (functionalities the system provides).

Actor	Description
User	The person operating EcoSweep through the mobile app to perform cleaning, control, and system management tasks.

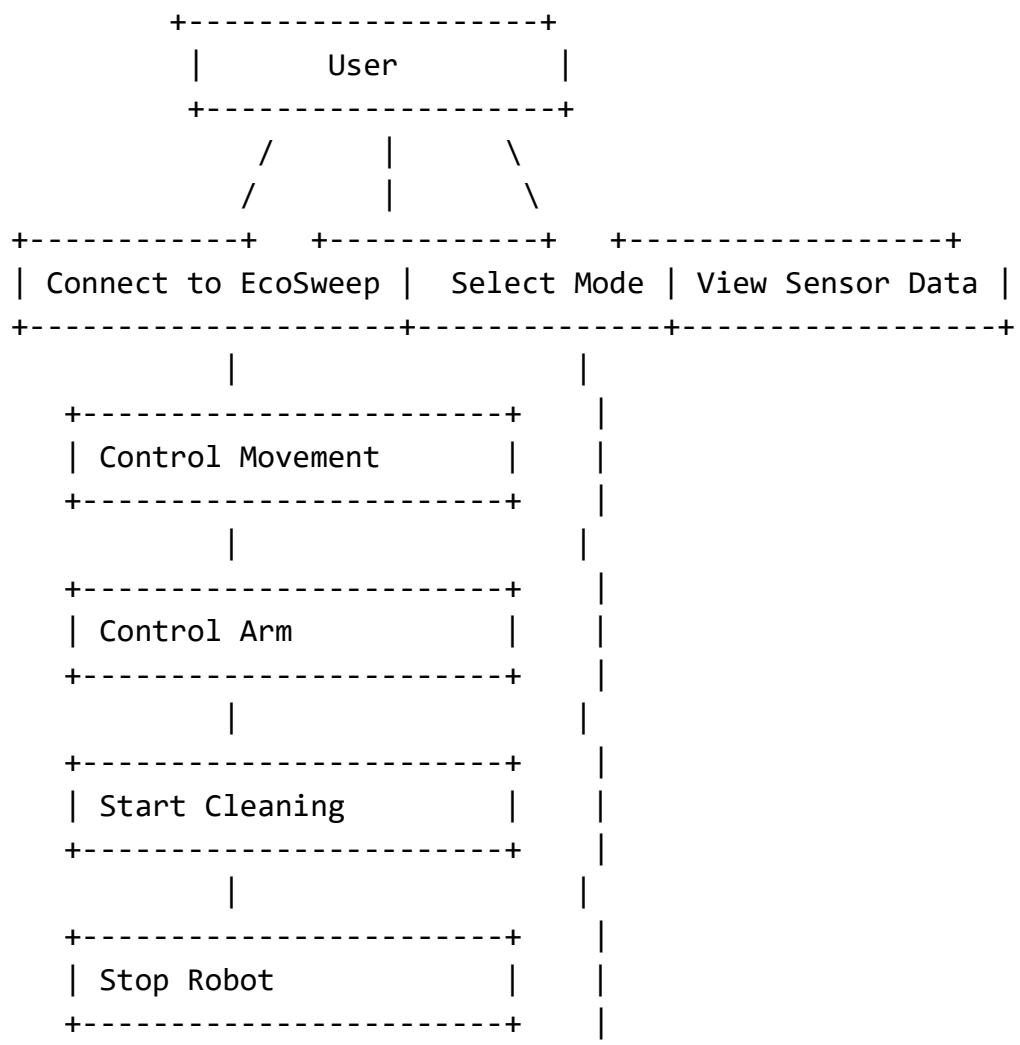
☑ ▶ Key Use Cases

Use Case	Description
Connect to EcoSweep	User connects mobile app to Raspberry Pi via Bluetooth.
Select Mode	User selects operating mode ('Manual', 'Semi-Automatic').
Control Movement	User sends commands to move the robot forward, backward, left, or right.
Control Arm	User controls robotic arm (move up/down, adjust servo angles).
Start Cleaning	User starts cleaning operation in selected mode.
Stop Robot	User stops the robot anytime.
View Sensor Data	(Optional) User views real-time sensor data (Ultrasonic, GPS, IMU) for debugging or status.

☑ ▶ Sample Use Case Table (to include in documentation)

Use Case Name	Description	Actor
Connect to EcoSweep	Establish Bluetooth connection between App and Raspberry Pi	User
Select Mode	Choose 'Manual' or 'Semi-Automatic' mode of operation	User
Control Movement	Send movement commands (forward, backward, left, right) with speed	User
Control Arm	Adjust robotic arm position by setting servo angles	User
Start Cleaning	Activate cleaning mechanism to start operation	User
Stop Robot	Send stop command to stop motors and arm	User
View Sensor Data	(Optional) Show live sensor values in the mobile app for feedback	User

☑ Suggested Use Case Diagram Structure (UML Style)



☑ Explanation to Add in Documentation

- The **actor "User"** interacts with the system by sending commands through the mobile app.
- The system responds by executing movement commands, controlling the robotic arm, and starting or stopping the cleaning operation.
- Optionally, the user can view sensor data for debugging or monitoring purposes.
- The Bluetooth connection is essential to establish the communication channel between the app and Raspberry Pi.

☑ Summary of Data to Add in Documentation

1. ▶ Actor Definition:
    a. User (via mobile app).
2. ▶ Use Cases Table:

As shown above with clear description of each use case.

3. ▶ Use Case Diagram:

A visual diagram showing “User” and all associated use cases as oval bubbles connected to the actor.