☑ 4.3.5 Activity Diagram – EcoSweep Cleaning Robot

🎯 Purpose of the Activity Diagram

To show the flow of activities (process steps) performed when the user operates EcoSweep, focusing on how the system proceeds step-by-step from start to stop.

☑ ▶ Example Scenario: Manual Operation of EcoSweep

☑ *Activity Flow Steps*

1. User opens the Mobile App.
2. User connects to EcoSweep via Bluetooth.
3. User selects mode (‘Manual’ or ‘Semi-Automatic’).
4. System checks connection status.
    a. If connection fails → Show error → End.
    b. If connection successful → Continue.
5. User selects action:

a. Control Movement

b. Control Arm

c. Start Cleaning

6. Based on action:
    a. If movement → Send movement command → Raspberry Pi → Arduino → Motor Driver → Move Motors.
    b. If arm → Send arm control command → Raspberry Pi → Arduino → Servo Driver → Move Servo.
    c. If start cleaning → Start cleaning process → Control motors & robotic arm.
7. Optionally, sensor data is read → Feedback sent to Raspberry Pi → Displayed in App (optional).
8. User can stop operation anytime → Send stop command → Stop Motors & Servo.
9. End operation.

☑ ▶ Activity Diagram Structure (Textual)

```
[Start]
    ↓
Open Mobile App
    ↓
Connect to EcoSweep (Bluetooth)
    ↓
[Decision] Connection successful?
    → No → Show Error → [End]
    → Yes → Proceed
    ↓
Select Mode (Manual / Semi-Auto)
    ↓
[Decision] Action Type
    → Movement → Send Movement Command → Raspberry Pi → Arduino →
Motor Driver → Move Motors
    → Arm → Send Arm Control Command → Raspberry Pi → Arduino →
Servo Driver → Move Servo
    → Start Cleaning → Activate Cleaning Mode (Tires + Arm control)
    ↓
(Optional) Read Sensor Data → Display in App
    ↓
[Decision] Stop Command Sent?
    → No → Continue Operation
    → Yes → Stop Motors and Servos → [End]
```

☑ ▶ Example Activity Diagram Table (to add in report)

Step	Activity
1	Open Mobile App
2	Connect to EcoSweep via Bluetooth
3	Check Connection Status
4	Select Operation Mode (Manual / Semi-Auto)
5	Select Action Type (Movement / Arm / Start Cleaning)
6	Process Command → Raspberry Pi → Arduino Mega → Motor Driver / Servo Driver
7	(Optional) Read Sensor Data → Forward to Mobile App

8	Loop: Wait for Next Command or Stop
9	If Stop → Stop Motors/Servo → End

☑ Explanation to Add in Documentation

- This **activity diagram** shows how the system reacts to user inputs from app launch to controlling EcoSweep and ending the operation.
- Each decision point (e.g., connection successful, type of action) determines the next step in the system's workflow.
- Loops continue until the user sends a stop command.
- Optional feedback shows that sensor data can be displayed in the app.

☑ Summary of Data to Add in Documentation

▶ Activity Diagram Flow (as shown above in textual format).

▶ Activity Steps Table (as shown above).

☑ Visual Guidelines for Designing the Diagram

- Use rounded rectangles for activities.
- Use diamonds for decision points (e.g., connection success, action type).
- Use arrows to represent flow direction.
- Mark start and end points clearly.
- Optionally display parallel activities (e.g., movement control and sensor reading).