ESP32 Robot Control Lab 2: IR Remote Speed & Motion Control

Course: Robotics / Embedded Systems
Topic: 4-Wheel Robot Control using IR Remote
Submission Type: Group
Marks: 100

I. OBJECTIVE

The objective of this lab is to design and implement a control system for a 4-wheel robot using an IR remote controller. Students will decode IR signals and map remote buttons to robot motion and speed control.

II. BACKGROUND

IR remote control is widely used in robotics for teleoperation. Each button sends a unique code that can be decoded by the microcontroller. This lab focuses on motion control, speed adjustment, and numeric speed entry.

III. HARDWARE SETUP

IR Receiver:
- Signal → GPIO (e.g., 36)
- VCC → 3.3V
- GND → GND

Robot:
- ESP32
- Motor driver
- 4 DC motors

IV. IR REMOTE ROBOT CONTROL

1. Arrow buttons control movement:
- UP → Forward
- DOWN → Backward
- LEFT → Turn Left
- RIGHT → Turn Right
- OK button stops the robot.
- Default speed = 50.
- Speed range = 0–100.

2. Speed Control Logic
- '*' button decreases speed by 5.
- '#' button increases speed by 5.
- Speed must remain within 0–100.

3. Numeric Input Speed
- Buttons 1–9 store digits.
- Button 0 confirms the speed.

Example:
Press 1 → 5 → 6 → 0 → Speed = 156
If value exceeds 100, limit it to 100.

V. FLOWCHART REQUIREMENT

Students must design a flowchart including:
1. Start
2. Initialize IR and motors
3. Read IR input
4. Identify button type
5. Update speed or motion
6. Apply limits
7. Drive motors
8. Loop

VI. DEMONSTRATION

Students must demonstrate:
• All motion directions
• Speed increase/decrease
• Numeric speed entry
• Stop function

VII. SUBMISSION REQUIREMENTS

1. Source code (.ino)
2. Flowchart diagram
3. Video demonstration
4. Short explanation (½ page)