Task: Rotary Encoder and LCD Interfacing with ESP32

Objective of the Task

The objective of this task is to help students gain practical experience in:

- Interfacing a rotary encoder with a microcontroller.
- Reading encoder pulses and determining the direction of rotation.
- Interfacing an LCD display with a microcontroller.
- Displaying real-time sensor data on an LCD.
- Understanding digital input processing and embedded system programming.

Instructions for Performing the Task

Using **Wokwi Online Simulator** and an **ESP32**, perform the following:

1. Circuit Design

Create a simulation containing:

- ESP32 (or preferred microcontroller)
- Rotary Encoder
- 16×2 LCD (I2C or Parallel Interface)
- Necessary wiring and connections

2. Program Development

Write a program that:

- Reads the rotary encoder signals.
- Detects:
    - Clockwise (CW) rotation
    - Counter-Clockwise (CCW) rotation
- Maintains a pulse count based on encoder movement.
- Displays the following information on the LCD:
    - Total Encoder Pulse Count
    - Direction of Rotation (CW or CCW)
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Example LCD Output

Pulses: 125

Dir: CW

3. Functional Verification

Verify that:

- Clockwise rotation increases the pulse count.
- Counter-clockwise rotation decreases the pulse count.
- Direction updates correctly on the LCD.
- Pulse count is displayed and updated in real time.
- The program operates smoothly without missed counts during moderate rotation speeds.

Requirements for Submission

1. Wokwi Project Link

- Publicly accessible Wokwi simulation link.

2. Source Code

- Complete ESP32/Arduino source code.

3. Demonstration Video

- A short screen recording (30–60 seconds) showing:
    - Rotary encoder operation.
    - Pulse count updating on the LCD.
    - Direction changing between CW and CCW.