Day - 18

Circuit Simulation Challenge

Date : 18/07/2025

Duration : 24 Hours

Challenge Brief

Control two DC motors with precision using encoder feedback and guide them to a target position. The challenge encourages multiple solutions — from simple proportional control to advanced PID, or even creative input methods like buttons, Bluetooth, or sensors. Your goal is to build a smart, responsive motion system using real-time data and feedback logic.

Objective

The primary objective is to build a responsive motion system where motors track position using encoder data. Students should implement a control method—ranging from basic P-control to more sophisticated PID—that moves the motors toward a desired target. Real-time information like position, speed, error, or current should be output through the Serial Monitor or an optional display.

Participants are also encouraged to customize the project. For example, you may introduce dynamic setpoint updates via user input (buttons or sensors), integrate external indicators like buzzers or LEDs, or log motor behavior for visualization. The key is to create a working system that balances precision, feedback, and usability, while also demonstrating your understanding of embedded control.

General Guidelines

1)Use Arduino Uno and L298 or L293-based motor driver shields .

2)Use encoder feedback to calculate real-time position and speed.

3)A0 and A1 are reserved for current sensing and should not be used for other input.

4)You may keep the setpoint fixed, adjustable via code, or make it dynamic using buttons or serial input.

5)Code must be modular and understandable. You are free to extend, simplify, or repurpose sections to suit your control strategy.

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Deliverables

Arduino code:

- Motor control using encoder feedback
- Any working form of feedback logic (P/PID/open-loop)
- Serial Monitor output or display of real-time variables

2. **Circuit Diagram**

3. **Demo Evidence**
    - Short video or screenshots of Serial Monitor / motors moving
    - Optional: description of tuning, limitations, or customizations
4. **Documentation (1-pager)**
    - Summary of the approach taken (type of control used, assumptions, and improvements)
    - Notes on how participants tweaked or extended the system

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Evaluation Criteria

Criteria	Description
Motor Response	Motors reach setpoint using feedback (P or PID control)
Encoder Integration	Encoders correctly count and update position/speed
Output Monitoring	Serial Monitor or display shows useful values (e.g., position, speed)
Code Quality	Clear, modular, and well-commented code
Creativity (Bonus)	Use of buttons, sensors, Bluetooth, or enhancements like safety logic

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Addition resources or dataset if required

https://www.digikey.com/en/maker/tutorials/2024/how-to-read-and-use-encoders

https://circuitdigest.com/microcontroller-projects/arduino-based-encoder-motor-using-pid-controller

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Support

For any queries, reach out to:

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Name & contact: N HARIHARAN,6300816001

WhatsApp Community: https://chat.whatsapp.com/CEjhrp1QolYLs1m4OgslMT

Submission

Please Submit here - https://forms.gle/uV7ZXBaHxTNSGAU17

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