JSPM's

Rajarshi Shahu College of Engineering, Pune

Department of Electronics & Telecommunication Engineering

INNOVATIONS IN TEACHING AND LEARNING

Course: PLC & SCADA

Class: BTech (Regular Track)

Topic: PID controller Tuning

NAME OF THE ACTIVITY: Flipped Classroom

I. Concept:

Flipped Classroom Methodology was employed to teach the fundamental concepts of **PID Controller Tuning**, including proportional, integral, and derivative actions, and their impact on system stability and performance. This approach shifts passive content delivery (lectures) to pre-class study, reserving in-class time for active problem-solving, simulation exercises, and discussions.

Core Topic: PID Controller Tuning: Types of controllers, tuning methods (Ziegler-Nichols, trial-and-error), and applications in control systems.

II. Objective (Goal)

1. **Cognitive:** Ensure students grasp basic PID control principles and tuning methods before class to enable deeper analysis during in-class exercises.
2. **Skill-Based:** Develop ability to tune PID controllers in simulation and practical scenarios to achieve desired system performance.
3. **Engagement:** Foster peer collaboration through interactive problem-solving and simulation-based activities during class.

III. Appropriateness (Relevance of Selected Method)

Pedagogical Justification:

1. **Cognitive Load Theory:**
   - Pre-class videos reduce intrinsic load (basic concepts) → Frees working memory for in-class complex tuning and performance analysis.
2. **Bloom's Taxonomy Alignment:**
   - **Pre-class:** Remembering/Understanding (via video lectures)
   - **In-class:** Applying/Analyzing/Evaluating (through simulations and case studies)

Technical Relevance:

- PID concepts require:
  - Visualization of system response and tuning effects (best delivered via animated videos)
  - Immediate feedback on overshoot, settling time, and steady-state error (addressed through real-time simulation)

IV. Effective Presentation (Implementation Details)

Pre-Class Phase (Home Assignment):

Resource: https://ggsestc.digimat.in/nptel/courses/video/108105088/L14.html

Date: (15 January 2025)

Tasks:

- Note-taking on PID tuning methods and controller actions.
- Submit 2 questions on confusing concepts via LMS.

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