Analog Lab 4:

Experiment4:

PI Controller

Date: 2024/04/08

Class: 電機三全英班

Group: Group 11

Name: B103105006 胡庭翊

B103015018 劉姵妤

B103015006 胡庭翊

This experiment primarily focused on exploring the functionality of a PI Controller. Initially, we constructed a first-order differential circuit using amplifiers, resistors, and capacitors to observe its steady-state error. We then varied the resistor values to simulate a proportional controller and observed the resulting changes in steady-state error.

To further reduce the steady-state error, we replaced specific resistors with series RC circuits to implement a proportional-integral (PI) controller. To control the percent maximum overshoot and the time of maximum overshoot within specified ranges, we calculated the required resistor and capacitor values using formulas. We then input square wave and ramp signals to observe the steady-state error.

I found this experiment to require a high level of attention to detail. While the concepts seemed straightforward, the actual wiring encountered various challenges. Fortunately, my teammates were reliable, allowing us to smoothly complete the experiment.

B103015018 劉姵妤

The experiment where we implemented a PI controller using analog circuitry was like a thrilling adventure in the world of electronics. We carefully assembled a series of electronic components to create our controller, paying close attention to every detail of the circuit design.

Once our controller was set up, we conducted tests to see how well it performed. We measured things like how much the signal exceeded its desired level (overshoot) and how quickly it settled back down after a change (settling time). These measurements helped us understand if our controller was working according to the theories we'd learned.

As part of our exploration, we experimented with different types of electronic parts to see which ones worked best in our setup. It was like trying out different ingredients in a recipe to find the perfect combination. By measuring things like overshoot, settling time, and steady-state error, we were able to determine which components were most effective at minimizing errors in our system.

Beyond the technical aspects, the experiment taught us the importance of teamwork and collaboration. Each member of the team brought their own insights and expertise to the table, enriching the learning experience for everyone involved. Working together, we were able to overcome challenges and achieve our goals.