

control theory assignment

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July 31, 2024

1 question 1

Briefly explain in 4-5 lines how you arrived at your final values of P, I, and D for both your controllers. (Did we just drop a hint there? uh-oh!)

answer:- first of all i made integral(I) and derivative (D) '0' and proportional term to be some value (P) that stabilised the bot angularly but then to reduce the steady state error i increased the I value and then to smoothen the process i increased the derivative. then did some tweeking in values and got the desired result , same thing i did for other PID to stabilise in linear direction. i saw that hint part after i completed my assignment i was literally confused in the same thing, than i also used two PIDs one for angular and one for transitional stability.

2 question 2

Are we using a negative feedback system or a positive one? Did you try, out of curiosity or by mistake, using a positive feedback system? And how did that turn out XD

answer:- here we are using a negative feedback system, because In a negative feedback system, the control system takes the difference between the desired state and the current state and applies corrections to reduce this difference. Negative feedback helps in creating a dynamic response to disturbances. When the bot starts to fall in a particular direction, the feedback system quickly reacts by adjusting the motors to counteract the fall and bring the bot back to balance. on using positive feedback system it will just apply force in the wrong direction and our bot will to be stabilised and will run away to infinity.

3 question 3

. What differences do you think we'll need to implement if we were to build the bot in the real world and not in an ideal environment like Simscape?

answer:- Sensors in simulations like Simscape are idealized and do not suffer from noise or inaccuracies. but in real life there will be errors and inaccuracies. Physical components have imperfections, such as misalignments, friction, and wear and tear. These factors can affect the bot's balance and require adjustments in the control algorithms can also need a very different control algorithms. Safety mechanisms must be in place to take care of unexpected failures. This includes fail-safes and emergency shutdown procedures to protect both the bot and its surroundings including us.