

Project 2: Radar control in 3-dimensional space

Description:

Design a target tracking system for a radar in 3-dimensional space. The radar antenna can change its azimuth and elevation angles using two servo motors. The moment of inertia for azimuth and elevation angle controlling motor is 500 kgm^2 and 600 kgm^2 . You have to design the radar system that will track the target automatically.

Deliverables:

1. A mathematical model of radar and target system.
2. A control system design.
3. Demonstration using Simulink and corresponding 3-dimensional animation.

Part 1: System modelling and simulation

Deadline: 25th October 2020

The servo motor specifications are as follows:

Motor viscous friction coefficient	0.1 N.m.s
Electromotive force constant	0.01 V/rad/sec
Motor torque constant	0.01 N.m/Amp
Electric Resistance	1 Ohm
Electric Inductance	0.5 H

- a) Using the above information, develop the state-space model for the radar system motion.
- b) Linearise the above model to develop a linear design model for this system.
- c) Develop a Simulink model to simulate the motion of the car and demonstrate the working of the model using simulations and plots.

Requirements:

1. Functioning simulink model
2. 3 minutes of group meetings
3. A report describing the methodology, derivation, simulation results
4. A presentation

Ps. As a group, you may ask for 2 meetings with the instructor for understanding and clarification of the design requirements

Upload Simulink model, minutes of meeting and the report in the google class-room using a single zip file. File name should be: **ECE533project_group#no.zip**. Note that the report must be in pdf format and **photographs of handwritten notes will not be accepted as a valid report. The submission will not be considered for evaluation if the naming format or prescribed report format is not followed.**