

Introduction and Basic Concepts

- Introduction to Colab and Webots
- Simulation with keyboard orientation like a course teaser
- All topics which will be covered through the semester
- Course Outcomes

Transfer Functions and Block Diagrams

- Colab Introduction
- Block diagram operations as in Simulink
- Passing from Laplace domain to time domain

Modeling Physical Systems

- 4-bar, slider-crank, ball and the beam simulations with varying parameters

Basic Features of Control Systems

- Introduction to open loop and closed loop
- Vehicle simulation (While target is fixed, the control type will be changed and some disturbances are given.)
- Solar collector simulation

Basic Control Actions and Electronic Controllers

- P, PI, PID Control types in Colab
- Vehicle(cruise) simulation, solar collector simulation

Time Response

- Time responses in Colab
- Extra exercises

Stability

- Pole demonstration in Colab
- Quadcopter simulation, ball and the beam simulation

Steady State Response and Error

- P, PI, PID control types in steady-state
- Vehicle(cruise) simulation, solar collector simulation

Transient Response

- P, PI, PID control types in transient response
- Vehicle(cruise) simulation, solar collector simulation

Frequency Response

- Mass-spring-damper
- Bode diagrams in Colab
- Bode extra exercises

Final Project – Ball and the beam, quadcopter

