



Module PMRF-ISSS020/2022

Introduction to Controller Synthesis

Name of the PMRF student

Nikhil Kumar Singh

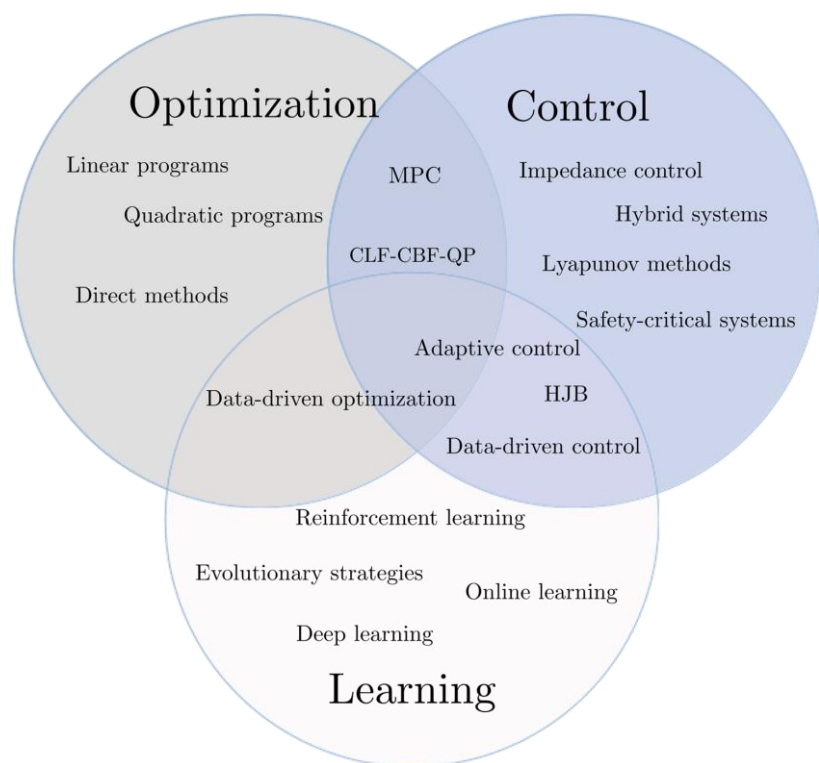
Required background of the students taught

Introductory level course for students of
CSE, EE, AE

Prerequisites: Programming in Python,
Basics of control theory, Linear Algebra and
Calculus

Online session coordinator

Will be chosen from the list of registrants



Details of the content of the module

Week 1: Introduction to Closed-loop System and Controller Synthesis.
Week 2-3: Mathematical Background : Linear Algebra, Probability, Calculus.
Week 4-5: Classical Controller Synthesis : (Static (PID), Dynamic(MPC), Principles of Optimal Control, LQR).
Week 6: Formal Specification for Controller Synthesis : Signal Temporal Logic (STL)
Week 7: Specification Guided Controller Synthesis for CPSs.
Week 8: From Classical Controller Synthesis to Learning-based Controller Synthesis, Introduction to Reinforcement Learning (RL).
Week 9: Model-based RL, Model-free RL (Policy-gradient, Actor critic)
Week 10: Recent Works on Learning based controller synthesis

Schedule of the module

Start Date - 1st Sept, 2022.

Lecture Schedule – Recorded lectures will be uploaded every Saturday; 8 – 10 lectures

End Date – Tentatively by end of Nov '22;

Meeting link : Will be shared later

[Link](#)

Contact email ID: issforum@gmail.com

Registration link:

<https://forms.gle/VUBytwHMPLDkohR9>