Kasra Sinaei

Electrical Engineering PhD. Student and Mechanical Engineering BSc.

Research Area: Control Theory, Robotics, State Estimation, Reinforcement learning, Mechatronics

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Education

MSc. The Pennsylvania State University (UP), Electrical Engineering — 2022-2024
GPA: 3.84
Thesis: Safety-critical Control of Robotic Systems

BSc. University of Tehran, Mechanical Engineering — 2017-2021
GPA: 3.6
Thesis: Dynamic Balance Control of a 6-DoF Wheeled Biped Robot

Publications

- K. Sinaei, H. Wu, D. Ebeigbe ***"Safety-Critical Position Control of Robots: A Model-Free Approach"*** American Control Conference (ACC) 2025 — June 2025
- K. Sinaei, D. Ebeigbe ***"Robust Control and Safety for Systems with Uncertain Regressor and Parameter Vector"*** IEEE Control System Letters — Nov 2024
- P. Abdolahnezhad, A. Yousefi-Koma, A. Vedadi, Kasra Sinaei, B. Maleki, M. Shafiee ***"Online Bipedal Locomotion Adaptation for Stepping on Obstacles Using a Novel Foot Sensor"***, 2022 IEEE-RAS 21st International Conference on Humanoid Robots — Dec 2022
- AH. Vedadi, K. Sinaei, P. AbdolahNejad, SS. AbouMasoudi, AY. Koma ***"Bipedal Locomotion Optimization by Exploitation of the Full Dynamics in DCM Trajectory Planning"*** ICRoM 2021, 9th annual RSI Conference — Nov 2021
- K. Sinaei, MR. Yazdi ***"Tuning a PID Controller with Deep Reinforcement Learning Policy Gradient Methods"*** 29th Annual ISME Conference — May 2021

Research Experience and Laboratory

Control and Robotics Lab (CARL) — 2022-Now
Graduate Research Assistant
Pennsylvania State University at University Park, Electrical Engineering West-05

Center of Advanced Systems and Technology (CAST) — 2019-2022
Responsibilities: Research Assistant and Officer
University of Tehran, Mechanical Engineering Faculty
Supervisor: Dr. Aghil Yousefi Koma CAST website

Teaching Assistant Experience

- Mechanical Vibrations — Fall 2020
- Electrical Circuits and Electrical Machines — Fall 2020
- Automatic Control of Linear Systems — Winter 2021
- Artificial Intelligence in Mechanical Engineering — Fall 2021
- Introduction to Digital Control Systems — Spring 2024

Language Skills

English C2 level, Fluent Speaking and Advanced writing

Spanish A1 level, Basic speaking, reading, and writing skills

Awards and Honors

Bloom Memorial Graduate Fellowship	Melvin P. Bloom Memorial Graduate Fellowship in Electrical Engineering (1000 USD)	June 2024
CoE Graduate Fellowship	One-time College of Engineering scholarship (8000UDS)	2022-2023
BSc. Scholarship	Governmental tuition waiver for BSc. Program	2017
Olympiad	Admitted to the second round of the Physics Olympiad – Iran	2016

Computer/ Software Skills

Programming:

- CPP (Advance)
- Python (Advance)
- MATLAB (Proficient)
- C# (Proficient)
- LabView (Proficient)
- Rust (Beginner)
- Go (Beginner)

Simulation:

- Gazebo (Advance)
- PyBullet (Advance)
- RaiSim (Intermediate)
- MuJoCo (Intermediate)
- Choreonoid (Advanced)
- ADAMS (Intermediate)
- Proteus (Intermediate)

Others:

- ROS1/2 (Advance)
- Git (Advance)
- Docker (Proficient)
- LaTeX (Advance)
- Unity (Intermediate)
- MS Office (Proficient)

Computer Aided Design (CAD): SolidWorks (Proficient), CATIA (Proficient), AutoCAD (Proficient)

Selected Projects (Open Source)

SurenaV Humanoid Robot (GitHub 1, 2) (CAST website) 2020-2022

Implementing gait pattern generation for bipeds with DCM (divergent component of motion); Developing a ROS based software for robot's motion; Improving gait by combination of closed loop controllers

Optimal Design and Simulation of a 6-DoF Wheeled Bipedal Robot (Github Repo) 2021-2022

Optimizing Joint Mechanisms and creating CAD files; Designing a novel control strategy for robust motion and jumping; Simulation and test the robotic control software in Choreonoid; Thesis documentation and presentation available

Tuning PID Controller with Reinforcement Learning (PPO, AC) (Github Repo) 2021

A framework to design classic PID controllers by training them on simulated robots in PyBullet (conference proceeding and course project)

Music Genre Classification (Github Repo) 2022

Data collection and labeling; Signal processing and feature extraction; Dimension reduction LDA/PCA; Classification using SVM, MLP, KNN (Pattern recognition course project)

Sensor Fusion and State Estimation for a Differential Drive Robot 2023

Modeling simple vehicle dynamics; Implementing Extended KF and Unscented KF to fuse IMU, Gyro, Odometry and GPS data (AERSP556 course project)

Model-free Safety Critical Control of Robotic Systems (MSc paper project) 2024

Development of a novel position controller for robotic systems capable of enforcing safety requirements, Numerical simulation, Experimental test on quadrupedal robot

Work Experience

Middle East Water and Environment (MEWE) MEWE website 2019 (Summer)

CAD Drawing, Financial analysis, Pump Station Design, Firefighting Systems