# Kasra Sinaei

*Electrical Engineering Graduate Student and Graduate Researcher*

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


*Email:* kasra.sinaei@gmail.com | *Google Scholar:* kasra-sinaei | *GitHub:* Kassra-Sinaei
*Email:* kasra@psu.edu | *ResearchGate:* Kasra_Sinaei | *GrabCAD:* Kasra.sinaei-1
*LinkedIn:* kasra-s-496843a2 | *Skype ID:* live:.cid.3dac2409969ea3b4


## Education

**MSc.** The Pennsylvania State University (UP), Electrical Engineering — 2022-2024
GPA: 3.78
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

- 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 — Nov 2022
- K. Sinaei, D. Ebeigbe ***"Model Free Control Barrier Functions for Position Control and Force/Torque Control Robotic Systems"*** — In preperation
- 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 (head of RL group) — Fall 2021

## Awards and Honors

| | | |
|---|---|---|
| **CoE Graduate Fellowship** | One-time College of Engineering scholarship fund (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# (Intermediate)
- Rust (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)
- Arduino (Advance)
- Unity (Intermediate)
- MS Office (Proficient)

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

## Selected Projects (Open Source)

**SurenaV Humanoid Robot** (Github Repo 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

**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)

## Work Experience

**Middle East Water and Environment (MEWE)** MEWE website 2018 (Summer)
CAD Drawing, Financial analysis, Pump Station Design, Firefighting Systems