Kasra Sinaei

Robotic Software Developer and **Control** Engineer | **Authorized** to work in the **US**
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EDUCATION

PENNSYLVANIA STATE UNIVERSITY
PhD in Electrical Engineering
Thesis: Safety Guarantee for Learning Controllers via Barrier Functions
Summer 2027 | State College, PA

PENNSYLVANIA STATE UNIVERSITY
MSc. in Electrical Engineering
Paper: Model-free Safety-critical Position Control of Robots
May 2024 | State College, PA

UNIVERSITY OF TEHRAN
BSc. in Mechanical Engineering
Capstone Project: Motion Planning & Control of Wheeled-legged Robot
Jan 2022 | Tehran, Iran
Cum. GPA: 17 / 20

SKILLS

PROGRAMMING
C++ • Python • C • MATLAB • C# • Shell

SIMULATION
Nvidia IsaacSim • MuJoCo • Gazebo • Unity • RaiSim • PyBullet • Choreonoid

COMPUTER VISION & AI
PyTorch • OpenCV • JAX • Hugging-face • YOLO

DEVELOPER TOOLS
ROS1/2 • Git • Docker • CUDA • .NET

THEORETICAL
Nonlinear Control• Convex Optimization • MPC • Adaptive/Robust Control • RL • Multi-body Dynamic • State Estimation and Filtering

CAD/CAE
SolidWorks • ANSYS • CATIA • AutoCAD • Onshape

TEACHING ASSISTANT

Continuous-Time Linear Systems (EE350)	FA25
Intro. to Digital Control Systems (EE482)	SP24
AI and ML in Mechanical Engineering	FA21
Automatic Control of Linear Systems	SP21
Electrical Circuits and Electrical Machines	FA20

LANGUAGE SKILLS

ENGLISH
Full Professional Proficiency C2 (CEFR)

PERSIAN
Native or Bilingual Proficiency

SPANISH
Elementary Proficiency A2 (CEFR)

EXPERIENCE

ALPHAZ INC. | Robotics Software Developer Intern
May 2025 - Aug 2025 | Palo Alto, CA
Developed motion controllers and trajectory planners for dual-arm mobile manipulator for door opening tasks. Built real-time perception pipeline using ROS2, C++, and Python for door handle detection and 6-DoF pose estimation.

MEWE CO. | Mechanical engineering Intern
May 2019 - Aug 2019 | Tehran, Iran
Practicing the Engineering design process, CAD, Pump Station design, numerical analysis, and helping the ME and CE teams in the ongoing projects.

RESEARCH

CARL | Graduate Researcher
Aug 2022 - Now | State College, PA
Control & Autonomous Robotics Lab (CaRL) is advised by **Dr. Donald Ebeigbe** in the Electrical Engineering department. I researched the **safety control** of **robotic** systems, established rigorous **nonlinear control** theorems, and validated them in simulation and hardware experiments.

CAST | Undergraduate Researcher
Sep 2019 - Mar 2022 | Tehran, Iran
I studied gait controllers for a full-size position-controlled **humanoid robot** at Center of Advanced System & Technology (CAST). Implemented trajectory generation based on DCM (divergent component of motion) and closed-loop controllers for traversing **uneven terrain**.

AWARDS & HONORS

MELVIN P. BLOOM MEMORIAL GRADUATE FELLOWSHIP | $850 | 2024
Awarded to outstanding graduate students in Electrical Engineering based on academic excellence and research potential.

MILTON & ALBERTHA LANGDON MEMORIAL GRADUATE FELLOWSHIP | $810 | 2023
Merit-based fellowship recognizing exceptional graduate student performance and research contributions.

DR. ARTHUR H. WAYNICK GRADUATE SCHOLARSHIP IN EE | $3,147 | 2022
Prestigious scholarship awarded to top-performing graduate students in Electrical Engineering department.

COLLEGE OF ENGINEERING GRADUATE FELLOWSHIP | $6,000 | 2022-2023
Competitive fellowship supporting outstanding graduate students pursuing advanced degrees in engineering disciplines.

GOVERNMENTAL BSC. SCHOLARSHIP | Full Tuition Waiver | 2017-2021
National merit-based scholarship covering complete undergraduate tuition for academically distinguished students.

PUBLICATIONS

[1] Kasra Sinaei, Kasun Weerakoon, Christopher Bradley, Seyed Abolfazl Fakoorian, and Donald Ebeigbe. Optimal motion planning for mobile manipulators navigating doorways via nonlinear mpc. In *2026 IEEE International Conference on Robotics and Automation (ICRA)*, 2026.

[2] Kasra Sinaei and D. Ebeigbe. Safe robust control of nonlinear systems with uncertain regressor and parameter vector. In *IEEE Conference on Control Technology and Applications (CCTA)*, aug 2025.

[3] Kasra Sinaei, H. Wu, and D. Ebeigbe. Safety-critical position control of robots: A model-free approach. In *American Control Conference (ACC)*, jun 2025.

[4] Pezhman Abdolahnezhad, Aghil Yousefi-Koma, Amirhosein Vedadi, Kasra Sinaei, Behnam Maleki, and Milad Shafiee. Online bipedal locomotion adaptation for stepping on obstacles using a novel foot sensor. In *2022 IEEE-RAS 21st International Conference on Humanoid Robots (Humanoids)*, pages 344–349. IEEE, 2022.

[5] Amirhosein Vedadi, Kasra Sinaei, Pezhman Abdolahnezhad, Shahriar Sheikh Aboumasoudi, and Aghil Yousefi-Koma. Bipedal locomotion optimization by exploitation of the full dynamics in dcm trajectory planning. In *2021 9th RSI International Conference on Robotics and Mechatronics (ICRoM)*, pages 365–370. IEEE, 2021.

[6] Kasra Sinaei and MRS Yazdi. Pid controller tuning with deep reinforcement learning policy gradient methods. In *Proceedings of the 29th Intermational Conference of Iranian Society of Mechanical Engineers & 8th Conference on Thermal Power Plants, Tehran, Iran*, pages 25–27, 2021.

PROJECTS

AUTONOMOUS DOOR OPENING WITH MOBILE MANIPULATORS | Internship Project

2025 | AlphaZ Inc.

Developed a complete autonomous system for door handle detection and manipulation using mobile manipulator. Implemented a novel motion planning algorithm and real-time control and perception pipelines to make the entire operation autonomous.

MODEL-FREE SAFETY-CRITICAL ROBOT CONTROL | Master's Thesis Project

2022 - 2024

Created a model-free safety control framework using control barrier functions for position controlled robotic systems. Validated safety guarantees through Lyapunov analysis and demonstrated on Unitree Go1 quadrupedal robot.

HUMANOID ROBOT GAIT CONTROLLER | Undergraduate Capstone Project

Jan 2020 - May 2022 | University of Tehran

Developed DCM-based trajectory generation and closed-loop control for full-size humanoid robot. Implemented adaptive gait patterns for uneven terrain traversal with real-time balance control. Achieved stable walking on 10cm height variations.

AUTONOMOUS RACING: OPTIMAL RACING LINE & VEHICLE CONTROL | Course Project

2023-2024 | Penn State University

Demonstrated differnet approaches for finding the optimal racing and comparing model-based method (MPC) to model-free learning algorithms (RL). Showcasing the vehicle control using policy-based learning methods and classic controllers.

DEEP REINFORCEMENT LEARNING FOR PID TUNING | Independent Research

2021 | University of Tehran

Implemented policy gradient methods (PPO, A3C) for automatic PID controller parameter optimization. Compared against traditional tuning methods and achieved 40% improvement in settling time and overshoot reduction.

EXTRACURRICULARS & HOBBIES

- Astrophotography and Astronomical Data Aquisition
- 2D Game Development and Design (Unity and .NET frameworks)
- Sports and Recreational Activities: Snowboarding, Tennis, Volleyball, Surfing, Hiking