PENGCHENG CAO

CONTACT INFO

E-mail p5cao@eng.ucsd.edu

Phone Nr +1 619-381-1659

Address 7560 Charmant Dr Apt 1514, San Diego, CA 92122

ORCID orcid.org/my-orcid?orcid=0000-0001-6652-3523

LinkedIn linkedin.com/in/pengcheng-frank-cao-a5349b125

GitHub github.com/p5cao

ABOUT ME

Pronouns He/His/Him.

Researcher, teacher, mechanical and computer engineer with a demonstrated history of working in multiple engineering disciplines, including robotics, controls, remote sensing, computer vision, and aerospace. Currently Ph.D. candidate in Mechanical Engineering at UC San Diego, expect to graduate Dec 2023.

WORKING EXPERIENCE

COMPUTER SCIENCE LECTURER — 2023

UC San Diego Extension | *San Diego, CA*

- Instructor of the one-month summer course Introduction of Python Programming.
- Managed and Lectured a group of 21 pre-college students, monitored their progress of learning and communicated biweekly with program manager and parents.
- Mentored new-to-programming students in completing final projects, including data analyses, building various games, and making a music player from scratch.

PROJECT ENGINEER — 2017-2018

Value Windows & Doors Inc. | *Moreno Valley, CA*

- CNC machining, structural design, and constructional compatibility of Eurotek products.
- FEA and stress tests of tempered glass to meet California Building Code requirements.
- Helped build the Cantor ERP system interfaces for the company.
- Developed Python scripts to automatically generate barcode labels for machined windows and doors parts. This increased the working efficiency of assembling workers by 16%.

RESEARCH INTERNSHIP **2016-2017**

UCSD Center for Energy Research | *San Diego, CA*

(Advised by William Torre and Dr. Jan Kleissl)

- Simulated SoCal micro-grids as decentralized linear load-flow models.
- Hardware test for smart solar inverters to verify their compliance with CA Rule 21.
- Prepared final report to California Energy Commission.

EDUCATION

PhD in Mechanical Engineering **2018-2023**

University of California, San Diego | *San Diego, CA*

- Specializations: Dynamic System and Control, Advanced Robotics and Artificial Intelligence, UAV Aerial Imaging, Remote Sensing and 3D Reconstruction.
- Participated Research Projects: ALERTCalifornia (NSF and CalOES funded), NHERI Shaketable Modular Testbed Building (MTB2) and Tallwood test projects (17 M Grant from NSF), and DamBot-mini Tunnel Imaging Robot with USACE Engineer Research and Development Center, a DoD agency.
- Dissertation: "Design, Control, and Deployment of Mobile Robots for Sensor Data Collection".

Master in Computer Science (Online) **2022-2024**

Arizona State University | *Tempe, AZ*

- Specialization: Operating Systems, Scientific Computing, Data Analysis.

BEng Thermal Energy and Power Engineeering **2012-2016**

Shandong University | *Jinan, Shandong, China*

- GPA: 3.81/4.00, Ranking: 15/309 in department. Graduated with Distinction.
- **One year exchange at Ulm University of Germany and practicum at Heimholtz-Institut Ulm.**
- Thesis topic: "Life Cycle Assessment of Plastic/Polymer Packaging for the Planning of Green Cities in China".

GRANTS AND AWARDS

Awards

- 2014-2015 Merit Student Scholarship by Shandong University.
- 2015-2016 Strategic-Partnership-U5 Scholarship from German Academic Exchange Service (DAAD).

Grants

- 2021-2023 Graduate Student Travel Grant by UC San Diego.
- 2021-2025 5-year GSR funds from US Army Corps of Engineers (USACE) Center of Structural Health Monitoring for Risk-Based Infrastructure Management.

PUBLICATIONS

Pengcheng Cao, John T Hwang, Thomas Bewley, and Falko Kuester (2022). "Mission-Oriented Trajectory Optimization for Search-and-Rescue Multi-rotor UAVs in Cluttered and GPS-Denied Environments". In: *Proceedings of AIAA AVIATION 2022 Forum*, p. 3999.

Pengcheng Cao, Eric Lo, John Driscoll, Tanner Norton, Michael Morano, Tara Hutchinson, Shiling Pei, and Falko Kuester (2024). "UAV-Based Video Analysis and Semantic Segmentation for SHM of Earthquake-Excited Structures (In Review)". In: *Proceedings of 2024 World Conference on Earthquake Engineering*. The International Association for Earthquake Engineering (IAEE).

Pengcheng Cao, Joseph Phillips, Thomas Bewley, and Falko Kuester (2023). "QuadGlider: Towards the Design and Control of a Bio-Inspired Multi-Modal UAV with Compliant Wings". In: *Proceedings of 2023 IEEE Aerospace Conference*. IEEE, pp. 1–17.

Pengcheng Cao, James Strawson, Thomas Bewley, and Falko Kuester (2021). "Decoupled translational and rotational flight control designs of canted-rotor hexacopters". In: *Proceedings of AIAA Scitech 2021 Forum*, p. 1058.

Pengcheng Cao, James Strawson, Xuebin Zhu, Everbrook Zhou, Chase Lazar, Dominique Meyer, Zhaoliang Zheng, Thomas Bewley, and Falko Kuester (2022). "BeagleRover: An Open-Source 3D-Printable Robotic Platform for Engineering Education and Research". In: *Proceedings of AIAA SCITECH 2022 Forum*, p. 1914.

Pengcheng Cao, Zhaoliang Zheng, Falko Kuester, and Jiaqi Ma (2023). "Real-time Voxel-based Dynamic Object Filtering for Building Static 3D Point Cloud Maps". In: *Proceedings of 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (accepted)*. IEEE.

Guibert, Alexandre T, Robert J Chambers, **Pengcheng Cao**, H Alicia Kim, Shengqiang Cai, and Falko Kuester (2023). "Gripping Aerial Topology Optimized Robot (GATOR)". In: *Proceedings of 2023 IEEE Aerospace Conference*. IEEE, pp. 01–10.

Strawson, James, **Pengcheng Cao**, Thomas Bewley, and Falko Kuester (2021). "Rotor orientation optimization for direct 6 degree of freedom control of multirotors". In: *Proceedings of 2021 IEEE Aerospace Conference (50100)*. IEEE, pp. 1–12.

Strawson, James, **Pengcheng Cao**, Danny Tran, Thomas Bewley, and Falko Kuester (2021). "Monocoque Multirotor Airframe Design with Rotor Orientations Optimized for Direct 6-DoF UAV Flight Control". In: *Proceedings of AIAA AVIATION 2021 FORUM*, p. 2431.

REFERENCES

Dr. Falko Kuester
Professor
Department of Structural Engineering & CALIT2,
University of California, San Diego
+1 (858)-353-6385
fkuester@eng.ucsd.edu

Dr. Thomas Bewley
Professor
Department of Mechanical Engineering,
University of California, San Diego
+1 (858)-997-8369
bewley@eng.ucsd.edu