ZHIANG CHEN

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ACADEMIC APPOINTMENTS

Arizona State University (ASU) *present*
Postdoctoral Scholar
School of Earth and Space Exploration (SESE),
Tempe, AZ

California Institute of Technology (Caltech) *Dec 2025*
& United States Geological Survey
Postdoctoral Scholar
Division of Geological and Planetary Sciences
Pasadena, CA

EDUCATION

Ph.D., Exploration Systems Design *Dec 2022*
School of Earth and Space Exploration
Arizona State University, Tempe, AZ

M.S., Mechanical Engineering (Robotics) *Aug 2017*
Department of Mechanical and Aerospace Engineering
Case Western Reserve University (CWRU), Cleveland, OH

B.Eng., Mechanical Design, Manufacture, and Automation (Mechatronics) *Jun 2015*
College of Mechanical and Electrical Engineering
Central South University (CSU), Changsha, Hunan

PUBLICATIONS

In preparation

14. **Chen, Z.**, Rodge, D., Kottke, A., Madugo, C., & Arrowsmith, R. (2026). Mapping, Segmentation, and Geometric Analysis of Freestanding Rocks. *Applied Computers & Geosciences*. In preparation

Peer-reviewed publications

13. **Chen, Z.**, Mahalle, A., Saifullah, K., Wittich, C., Das, J., Madugo, C., Kottke, A., & Arrowsmith, R. (2026). Fragility Modeling of Precariously Balanced Rocks: Calibration, Benchmarking, and Sensitivity. *Seismica*, 5(2).

12. **Chen, Z.**, McPhillips, D., Scharer, K., & Ross, Z. E. (2025). 3D semantic mapping of surface geological features. *Computers & Geosciences*, 106181.

11. **Chen, Z.**, Geyman, E., & Lamb, M. P. (2026). Rapid hazard assessment and prediction of post-fire debris flows using UAV lidar: Eaton Fire, California. *Landslides*, 1-15.

10. **Chen, Z.**, Mahalle A, Saifullah MK, Wittich C, Das J, Kottke A, Madugo C, Arrowsmith R. Rapid mass simulations for global seismic response of 3D freestanding structures: A case study of

PBRs. *Proceedings of the 13th National Conference in Earthquake Engineering, Earthquake Engineering Research Institute*, Portland, OR. 2026.

9. **Chen, Z.**, Keating, D., Shethwala, Y., Pandian Saravanakumaran, A., Arrowsmith, R., Kottke, A., Wittich, C., & Das, J. (2024). Shakebot: A Low-cost, Open-sourced Shake Table for Earthquake Research and Education. *2024 IEEE International Conference on Automation Science and Engineering*.

8. **Chen, Z.**, Arrowsmith, R., Das, J., Wittich, C., Madugo, C., & Kottke, A. (2024). Virtual Shake Robot: Simulating Dynamics of Precariously Balanced Rocks for Overturning and Large-displacement Processes. *Seismica*. 3(1).

7. Sung, Y., **Chen, Z.**, Das, J., & Tokekar, P. (2023). A Survey of Decision-Theoretic Approaches for Robotic Environmental Monitoring. *Foundations and Trends® in Robotics*, 11(4), 225-315.

6. **Chen, Z.**, Scott, C., Keating, D., Clark, A., Das, J., & Arrowsmith, R. (2023). Quantifying and Analyzing Rock Trait Distributions of Rocky Fault Scarps Using Deep Learning. *Earth Surface Processes and Landforms*. 48(6), 1234-1250.

5. Antervedi, P., **Chen, Z.**, Anand, H., Martin, R., Arrowsmith, R., & Das, J. (2021, August). Terrain-Relative Diver Following with Autonomous Underwater Vehicle for Coral Reef Mapping. In *2021 IEEE 17th International Conference on Automation Science and Engineering* (pp. 2307-2312). IEEE.

4. Anand, H., Rees, S. A., **Chen, Z.**, Poruthukaran, A. J., Bearman, S., Antervedi, L. G. P., & Das, J. (2021, August). OpenUAV Cloud Testbed: a Collaborative Design Studio for Field Robotics. In *2021 IEEE 17th International Conference on Automation Science and Engineering* (pp. 724-731). IEEE. (Best Application Paper Award Finalists)

3. **Chen, Z.**, Wagner, M., Das, J., Doe, R. K., & Cerveny, R. S. (2021). Data-Driven Approaches for Tornado Damage Estimation with Unpiloted Aerial Systems. *Remote Sensing*, 13(9), 1669.

2. **Chen, Z.**, Scott, T. R., Bearman, S., Anand, H., Keating, D., Scott, C., Arrowsmith, R., & Das, J. (2020, August). Geomorphological analysis using unpiloted aircraft systems, structure from motion, and deep learning. In *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems* (pp. 1276-1283). IEEE.

1. Wagner, M., Doe, R. K., Johnson, A., **Chen, Z.**, Das, J., & Cerveny, R. S. (2019). Unpiloted aerial systems (UASs) application for tornado damage surveys: Benefits and procedures. *Bulletin of the American Meteorological Society*, 100(12), 2405-2409.

Contributed papers and abstracts

19. Arrowsmith, R. & **Chen, Z.** (2025). Advancing Analysis of 2D and 3D Scenes Using Deep Learning and Physics-engines. GSA Connects 2025.

18. **Chen, Z.**, McPhillips, D., Scharer, K. M., & Ross, Z. E. (2025). Mapping and statistical analysis of precariously balanced rocks at Centennial Bluff, CA, using UAV-based 3D semantic mapping method. Poster presentation at 2025 SCEC Annual Meeting.

17. Arrowsmith, R., **Chen, Z.**, Rodge, D., Mahalle, A., Saifullah, K., Das, J., Wittich, C., Kottke, A., & Madugo, C. (2025). From field to simulation: 3D segmentation of precariously balanced rocks and dynamic simulation of their response to earthquake ground motions. Poster presentation at 2025 SCEC Annual Meeting.

16. **Chen, Z.**, Rodge, D., Mahalle, A., Arrowsmith, R., Das, J., Wittich, C., Madugo, C., & Kottke, A. (2025). 3D Mapping and Dynamic Analysis of Precariously Balanced Rocks for Fragility Modeling. In *Seismological Society of America 2025 Annual Meeting*.

15. **Chen, Z.**, McPhillips, D., Scharer, K., & Ross, Z. (2025). Rapid Assessment of Precariously Balanced Rocks Using UAVs and 3D Semantic Structure from Motion. In Seismological Society of America 2025 Annual Meeting.

14. **Chen, Z.**, Scott, C., Schwarz, M., Johnstone S., Crosby C, & Arrowsmith, R. (2023). Segmenting geologic landforms using zero-shot deep learning and lidar topography. In AGU Fall Meeting 2023.

13. **Chen, Z.**, Arrowsmith, R., Das, J., Wittich, C., Madugo, C., & Kottke A. (2023). Studying Overturning and Large Displacement Processes of Precariously Balanced Rocks for Ground Motion Estimation. Poster Presentation at 2023 SCEC Annual Meeting.

12. **Chen, Z.**, Keating, D., Shethwala, Y., Pandian Saravanakumaran A., Arrowsmith, R., Das, J., Madugo, C., & Kottke A. (2022). Shakebot: a low-cost, open-source shake table for structural seismology research. Poster Presentation at 2022 SCEC Annual Meeting.

11. **Chen, Z.**, Das, J., & Arrowsmith, R. (2022). Leveraging Robotics and AI for Geoscience: Rock Search, Mapping, and Dynamics Analysis. In 2022 SAGE/GAGE Community Science Workshop.

10. **Chen, Z.**, Das, J., Wagner, M, & Arrowsmith, R. (2022). High-resolution Tornado Damage Estimation Using UAV and Machine Learning. In ICRA Workshop on Robotics for Climate Change.

9. Keating, D., **Chen, Z.**, Das, J., & Arrowsmith, R. (2021, December). Machine Learning Approach to Wildfire Effects on Debris Flow Hazard in Tonto, Arizona. In AGU Fall Meeting 2021.

8. **Chen, Z.**, Arrowsmith, R., & Das, J. (2021, December). Autonomous 3D Rock Detection for Geomorphology. In AGU Fall Meeting 2021.

7. Collins, C., Anand, H., **Chen, Z.**, Aparecido, L. M. T., Das, J., & Throop, H. (2021, December). Artificial Intelligence Assists in the Estimation of Hypolith Distribution in the Namib Desert. In AGU Fall Meeting 2021.

6. **Chen, Z.**, Keating, D., Das, J., Wittich, C., & Arrowsmith, R. (2021, August). Virtual Shake Robot: Dynamics Simulation of Precariously Balanced Rocks for Hazard Analysis . Poster Presentation at 2021 SCEC Annual Meeting.

5. Das, J., **Chen, Z.**, Scott, T., Scott, C., Keating, D., & Arrowsmith, R. (2020, December). Robotics and AI weave surface process narratives from rock geomorphology. In AGU Fall Meeting Abstracts.

4. Raming, L. W., **Chen, Z.**, Keating, D., Whipple, K. X., Yager, E., Strauch, A. M., & Das, J. (2020, December). Extreme Discharges and Thresholds of Boulder Mobility in Steep Mountainous Streams on Maui, Hawai'i. In AGU Fall Meeting Abstracts.

3. **Chen, Z.**, Bearman, S., Arrowsmith, J. R., & Das, J. (2020). Localization and Mapping of Sparse Geologic Features with Unpiloted Aircraft Systems. In RSS Workshop on Robots in the Wild.

2. Bearman, S., **Chen, Z.**, Anand, H., Sprague, S., Gagnon, J., & Das, J. (2019). Towards Automated Monitoring of Animal Movement using Camera Networks and AI. In RSS Workshop on Robots in the Wild.

1. **Chen, Z.**, & Zhang, Y. (2018). Explain by Goal Augmentation: Explanation Generation as Inverse Planning. In RSS Workshop on Adversarial Robotics.

Theses

Ph.D. Dissertation: Automated Geoscience with Robotics and Machine Learning: A New Hammer of Rock Detection, Mapping, and Dynamics Analysis. Arizona State University. 2022.

M.S. Thesis: Deep-learning Approaches to Object Recognition from 3D Data. Case Western Reserve University. 2017.

ACADEMIC ACTIVITIES

Presentations

Geological Society of America Annual Meeting on Innovations in Geological Mapping. Semantic SfM: Enhancing Geological Mapping with Automated 3D Semantic Analysis. Sep 2024. California.

IEEE International Conference on Robotics and Automation Workshop on Robotics for Climate Change. High-resolution Tornado Damage Estimation Using UAV and Machine Learning. May 2022. Philadelphia.

AGU Fall Meeting 2021 on Decoding Geophysical Signatures With Machine Learning. Autonomous 3D Rock Detection for Geomorphology. Dec 2021. Online.

IEEE/RSJ International Conference on Intelligent Robots and Systems. Geomorphological Analysis Using Unpiloted Aircraft Systems, Structure from Motion, and Deep Learning. Oct 2020. Online.

Robotics: Science and Systems Workshop on Robots in the Wild. Localization and Mapping of Sparse Geologic Features with Unpiloted Aircraft Systems. July 2020. Online.

Invited talks

IIAC Presentation. Earthscope. Robotics for geoscience: more data, new analyses. October 2025. Online.

Science Seminar. California Geological Survey. Robotics for geoscience: more data, new analyses. December 2024. Online.

Geophysics Seminar. University of California, Los Angeles. Robotics for Earthquake Science: more data, new analysis. October 2024, Los Angeles CA.

Plenary Talk. Session 5: What's Next in Earthquakes and AI? 2024 SCEC Annual Meeting. Robotics for Earthquake Science: more data, new analysis. September 2024, Palm Springs CA. `https://central.scec.org/publication/13534`

Seminar Talk. Department of Geological Sciences. University of Alabama. Automated Geoscience with Robotics and Machine Learning. March 2024, Tuscaloosa AL.

Earthquake Science Center Seminars. U.S. Geological Survey. Utilizing Robotics and Machine Learning for Fault Zone Mapping and Fragile Geological Feature Analysis. October 2023. Pasadena CA. *Available on Apple Podcasts,* `https://podcasts.apple.com/us/podcast/earthquake-science-center-seminars/id413770595`

Brown Bag Seminar. Division of Geological and Planetary Sciences. Caltech. Automated Geoscience with Robotics and Machine Learning. March 2023, Pasadena CA.

Researcher Seminar. Lawrence Berkeley National Laboratory. Automated Geoscience with Robotics and Machine Learning. March 2023. Berkeley CA.

UW Data Science Seminar. eScience Institute. University of Washington. Automated Geoscience with Robotics and Machine Learning. Feb 2023. Online.

Event organization

SESE Symposium 2023

Publication review

Journal of Field Robotics (7)

IEEE Robotics and Automation Letters (3)

IEEE Transactions on Artificial Intelligence (1)

IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (1)

IEEE International Conference on Robotics and Automation (ICRA), 2020 (1), 2021 (2), 2023 (1), 2024 (1)

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021 (1), 2023 (2)

IEEE International Conference on Automation Science and Engineering (CASE), 2024 (2)

IEEE/SICE International Symposium on System Integration (SII), 2024 (1)

ICLR 2023 Workshop on Machine Learning for Remote Sensing (1)

Journal of Structural Geology (1)

EGU Earth Surface Dynamics (2)

International Journal of Digital Earth (1)

Natural Hazards (11)

Cogent Engineering (2)

Grant review

Summer Undergraduate Research Fellowships (SURF) Program Reviewer, Caltech

Research Grant Reviewer, ASU Graduate and Professional Student Association

TEACHING

Teaching experience

Guest Lecturer, GEO 101 The Dynamic Earth, University of Alabama *Spring 2024*

Instructor, Robotic Exploration Systems, Metavisionaries Academy *Summer 2023*

Taught robotic exploration systems in Metaversity (virtual-reality-based education)

Worked with Dr. James Green (former NASA chief scientist)

Instructor, SES 598 Autonomous Exploration Systems, ASU *Spring 2023*

Guest Lecturer, SES 230 Coding for Exploration, ASU *Fall 2021*

Graduate Teaching Associate, SES 230 Coding for Exploration, ASU *Fall 2020*

Educational training

GRD 593, Impacting Inequality: Inequities and Education, ASU *Spring 2022*

GRD 791, Preparing Future Faculty & Scholars, ASU *Fall 2021*

International Teaching Assistant Training, ASU *Summer 2018*

Mentoring

Programs

Caltech Summer Undergraduate Research Fellowships (SURF) program *Summer 2024*

USGS Earthquake Science Center Internship program *Summer 2024*

Caltech Connection *Fall 2023 - present*

Students

Emily Stanton (Undergraduate student, Caltech)

Charles Williamson (Undergraduate student, Caltech)

Ernest Adjetey (Undergraduate student, Caltech)

Frank Xiao (Undergraduate student, Caltech)

Yunha Jo (Undergraduate student, Caltech)

Mark Hu (Undergraduate student, Caltech)

Deep Rodge* (Master's student, ASU)

Akshay Sopan Mahalle* (Master's student, ASU)

Yash Shethwala* (Master's student, ASU)

Aravind Adhith Pandian Saravanakumaran* (Master's student, ASU)

Moira Iñiguez (Undergraduate student, Compton College)

Jana Al Saif (High school student, Safwa First Secondary School, Saudi Arabia)

Emily Etheridge (Undergraduate student, Marietta College)

* Students advised with publications

OUTREACH AND COMMUNITY ACTIVITIES

Delivered a lecture on robotics and machine learning applications for assessing fragile geological features, Caltech Earthquake Fellows program *Summer 2025*

Mentored students for research projects at the Caltech First-Year Success Research Institute (FSRI) (`https://fsri.education/24su/research`) *Summer 2024*

Joined the Caltech Connection as a mentor, providing one-on-one STEM mentorship to undergraduates in partner schools *Nov 2023*

Participated in Caltech Center for Teaching, Learning, and Outreach (CTLO) Workshop on How to Support First-generation College Students (`https://ctlo.caltech.edu/`) *Oct 2023*

Mentored students at the Geosciences Education & Mentorship Support (`https://gems-program.org/`) *Oct 2022*

Organized education and outreach event at Percy L. Julian Elementary School, Understanding STEM Identifies from Learning Mar Exploration Missions *May 2022*

Received an interview for ABC15 News, ASU Scientists Say Drones Could Play Major Role in Tornado Disaster Rescue Efforts (`https://www.abc15.com/news/region-southeast-valley/tempe/asu-scientists-say-drones-could-play-major-role-in-tornado-disaster-rescue-efforts`) *Dec 2021*

EXPERIENCE

Research Analyst PRN *Feb 2025 - Dec 2025*
School of Earth and Space Exploration, ASU, Tempe, AZ

Member *Dec 2023 - Dec 2025*
Center for Autonomous Systems and Technologies (CAST), Caltech, Pasadena, CA

Member *Jul 2023 - Dec 2025*
Seismological Laboratory, Caltech, Pasadena, CA

Research Analyst PRN *May 2024 - Sep 2024*
School of Earth and Space Exploration, ASU, Tempe, AZ

Member *Nov 2019 - Jun 2023*
Center for Global Discovery and Conservation Science, ASU, Tempe, AZ

Graduate Services Assistant *Aug 2022 - Dec 2022*
School of Earth and Space Exploration, ASU, Tempe, AZ

Graduate Research Associate *Aug 2018 - Aug 2022*
School of Earth and Space Exploration, ASU, Tempe, AZ

Graduate Teaching Associate *Aug 2020 - Dec 2020*
SES 230 Coding for Exploration, ASU, Tempe, AZ

Member *Apr 2018 - Aug 2018*
Cooperative Robotic Systems Lab, ASU, Tempe, AZ

Graduate Research Associate *Aug 2017 - Dec 2017*
Robotics and Intelligent SystEms Laboratory, ASU, Mesa, AZ

Research Assistant *Sep 2016 - Oct 2016*
CWRU, Cleveland, OH
Funded by Bendix Commercial Vehicle Systems LLC

COMPETITIONS

Mathematical Contest in Modeling, Meritorious Winner award *2014*

Mixed Dynamic Traffic Stream Model Based on the Keep-right-except-to-pass Rule

National Undergraduate Mechanical Innovation Competition, National Second Prize *2014*

Smart Cam Mechanism Studying Instrument with Visual Motor Integration

PATENTS

Das, Vishwanatha, Brauer, **Chen** et al. (2023). Terrestrial Observing Network for Digital Twins: Real-Time 3D Mapping of Metric, Semantic, Topological, and Physicochemical Properties for Optimal Environmental Monitoring. *US Utility Patent*, in application.

Das, Jain, Shethwala, Saravanakumaran, **Chen** et al. (2023). QUAD-FLIP: Quadrotor Aerial Delivery with Flipping for Limited-access inspection. *Provisional US patent.*

Chen et al. (2023). Shakebot: A Low-cost, Open-sourced Shake Table for Earthquake Research and Education. *US Utility Patent*, in application.

Chen et al. (2017). *Cam Mechanism Studying Instrument. Utility Model Patent CN201420378143, State Intellectual Property Office of the P.R.C.*

RESEARCH GRANTS (PRINCIPAL RESEARCHER)

CLaSH Small Grant Program, USD 37,894 *2026*
Caltech GPS Division Research Award, USD 10,000 *2024*
Caltech CAST Grant Program, USD 90,000 *2024*
Pacific Gas and Electric Research Gift, USD 92,900 *2024*
Caltech GPS Division Research Award, USD 10,000 *2023*
Pacific Gas and Electric Research Gift, USD 99,986 *2022*
Pacific Gas and Electric Research Gift, USD 99,568 *2021*
Southern California Earthquake Center Award #20129, USD 26,801 *2020*
Southern California Earthquake Center Award #19179, USD 26,502 *2019*

AWARDS AND RECOGNITIONS

Registration Grant for 2023 EERI Annual Meeting, Computers and Structures, Inc. *2023*
Travel Scholarship for 2023 GAGE/SAGE Workshop, EarthScope *2023*
SESE Safety Star Winner, ASU *2022*
Graduate Student Designer Award for Mutually Enriching Mentorship, ASU *2022*
Student Scholarship for 2022 SAGE/GAGE Workshop, IRIS *2022*
Graduate College Online/Remote Travel Award, ASU *2021*
Graduate Excellence Award, ASU *2021*
Graduate College Online/Remote Travel Award, ASU *2020*
Fulton Fellowship, ASU *2017*
Outstanding Graduate, CSU *2015*
Meritorious Winner, Mathematical Contest in Modeling *2014*

PROFESSIONAL CERTIFICATES

FAA Remote Pilot License

TECHNICAL SKILLS

Programming Languages:	C++, Python, Matlab
Robotics:	ROS, Gazebo, RViz, Pixhawk, PX4
Machine Learning:	PyTorch, Tensorflow, scikit-learn
Mechanical Engineering:	Pro/ENGINEER, AutoCAD, Adams, ANSYS, Mitsubishi PLC
GIS:	ArcGIS, QGIS, StraboSpot, GeoPandas, GDAL, Google Earth Engine

PERSONAL INFORMATION

Citizenship:	People's Republic of China
Visa status:	H1-b
Languages:	English, Mandarin

REFERENCES

Ramón Arrowsmith
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