# PERSONAL INFORMATION:

#### Mohammad Afrazi

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Email: mohammad.afrazi@student.nmt.edu

Address: PO Box 2521, 801 Leroy Pl, Socorro, NM 87801, USA

Professional Profiles: LinkedIn, Google Scholar, Publons, ResearchGate

#### **EDUCATION:**

M.S. in Mechanical Engineering

Aug 2022 – May 2025

Specialization in Robotics and Mechatronics Systems

New Mexico Institute of Mining and Technology, Socorro, NM 87801, USA

Thesis: Development of a New Multi-Agent System Scheme and Its Implementation for Search and Rescue Mission Using a Multi-Robot System (NSF Funded Project)

Advisor: Dr. Kooktae Lee

GPA: 4.0/4.0

M.S. in Civil Engineering

Sep 2015 - Feb 2018

Tarbiat Modares University, Tehran, Iran (Ranked 2nd/3rd nationally)

Thesis: Experimental and Numerical Simulation of Soil Lateral Pressure on Flexible Retaining Walls Using a Hybrid Discrete-Finite Element Method (Grade: 20/20, **Best Thesis Award**)

Advisors: Dr. Mahmoud Yazdani and Dr. Ali Fakhimi

GPA: 17.42/20 (equivalent to 4.0/4.0, First-ranked Student)

Best Graduate Student Award, Class of 2018, School of Civil and Environmental Engineering (Link)

B.S. in Civil Engineering

Sep 2010 - Sep 2014

Shiraz University, Shiraz, Iran (Ranked 5th nationally)

GPA: 15.16/20 (80th percentile)

#### **EXPERIENCE:**

Graduate Research Assistant

Jan 2024 – present

Department of Mechanical Engineering, New Mexico Tech, Socorro, NM 87801, USA

- Working on a density-driven controller for multi-agent robots
- Working on the formation control of multi-agent robots

Graduate Teaching Assistant

Jan 2023 – present

Department of Mechanical Engineering, New Mexico Tech, Socorro, NM 87801, USA

- MENG-4083(L): Mechatronics and Lab
- MENG-4005(L): Dynamic Systems and Controls and Lab

Graduate Research Assistant

Jan 2023 – Jan 2024

Department of Mechanical Engineering, New Mexico Tech, Socorro, NM 87801, USA

- Designed and assembled an autonomous tour robot
- Programmed a wheeled robot using Python

• Worked on the Kalman Filter to enhance the accuracy of odometer calibration for a four-wheeled robot, improving position estimation and reducing drift over time

Mechanical Engineering Intern

May 2023 – Aug 2023

Kennecott Copper Mine, Rio Tinto, Salt Lake City, UT 84009, USA

• Worked as a mechanical engineer in the tailing dam and the pit

Graduate Research Assistant

Aug 2022 - Dec 2022

Department of Mechanical Engineering, New Mexico Tech, Socorro, NM 87801, USA

• Conducted Research on consensus algorithm-based distributed operation of microgrids during grid-connected and islanded modes

Civil Engineer Researcher

Dec. 2019 – Mar. 2021

Regional Water Company of Tehran, Tehran, Iran

- Conducted research on slope stability and the Latian Dam landslide.
- Designed slopes and addressed geotechnical engineering challenges.

Graduate Research Assistant

Sep 2015 - Jul 2022

Tarbiat Modares University, Tehran, Iran

• Conducted research on various topics in civil engineering and materials science

#### HONORS AND AWARDS:

• Pat Miller Scholarship, New Mexico Tech

- 2023, 2024
- Best Book Award for the Title "Elastic Theory of Materials," Tarbiat Modares Press
- President's Tuition Assistance Scholarship, New Mexico Tech

2023 2023

- $\bullet$  4<sup>th</sup> Place, Three Minute Thesis Competition, New Mexico Tech
- Outstanding Reviewer Award, Journal of Research on Engineering Structures and Materials 2022, 2023
- 15<sup>th</sup> Place Among Over 500 Participants, SRK Scholarship

2023

- Highly Cited Paper: "Strength and Deformation Behaviour of Sand-Rubber Mixture," International Journal of Geotechnics 2022
- 2<sup>nd</sup> Place, Student Poster Competition, American Society of Civil Engineering (ASCE) Conference, New Mexico State
- Best National Academic Competition Award, President of Geowall National Competition, Iranian Ministry of Science, Research, and Technology
- Best Student Magazine Award, Chief Editor of Palar Magazine, Iranian Ministry of Science, Research, and Technology 2017&2018
- Best Master's Thesis Award, School of Civil and Environmental Engineering, Tarbiat Modares University
- Best Graduate Student Award, Class of 2018, School of Civil and Environmental Engineering, Tarbiat Modares University
- National Ph.D. Admission as an Exceptional Talent for Outstanding GPA and Publication Record
- First-Ranked Student, Class of 2018, Civil Engineering, Tarbiat Modares University 2018
- Best Association Award, Vice President of Civil Engineering Student Scientific Association, Iranian Ministry of Science, Research, and Technology 2018

- Best Paper Award, First National Conference on Fundamental Research in Civil Engineering, Architecture, and Urban Planning, Tehran, Iran 2017
- Qualified Member, Iranian National Foundation of the Elite Since 2017
- Best Association Award, President of Civil Engineering Student Scientific Association, Tarbiat Modares University 2017
- Best Student Magazine Award, Chief Editor of Palar Magazine, Iranian Ministry of Science, Research, and Technology 2016
- $\bullet$  Ranked  $89^{th}$  Among Approximately 55,000 Participants in the Iranian Entrance Exam for Graduate Programs 2015
- Ranked 247<sup>th</sup> Among Approximately 90,000 Participants in the Iranian Entrance Exam for Undergraduate Programs (equivalent to SAT) 2010
- Ranked 4th in Nationwide Competition of Inventions, Kerman Province, Iran 2008

# TECHNICAL SKILLS:

Operating System: Linux, Windows

Programming: MATLAB, Python, C

Technical Software: LabVIEW, Arduino IDE, Raspberry Pi (including programming and integration with sensors/actuators), ABAQUS, AutoCAD, ETABS, SAP2000, Revit, ArcGIS, SolidWorks, ImageJ, Dragonfly, PFC, CA2, CA3

General Software: IATEX, Microsoft Office (Word, PowerPoint, and Excel), Photoshop

Hardware Skills: Digital Signal Processing (DSP) Development Boards, Additive Manufacturing (polymers), CNC Milling, Laser Cutting, Machining, Welding and Joining

#### PATENT:

P1. **Afrazi, M.**, Asadipour, M. J., and Farshidi, B. "Optimization of Performance of Heating Systems", Iranian State Organization for Registration of Deeds and Properties, Jul 2008.

#### **BOOKS:**

- B3. Afrazi M. and Yazdani M., (2024) "Programming the Finite Element Method with Special Application in Geotechnical Engineering 2", Simaye Danesh Publisher, Tehran. (Accepted/In press)
- B2. Fakhimi A. and **Afrazi M.**, (2023) "Elastic Theory of Materials", Tarbiat Modares University Press. (Link)
- B1. Yazdani M., **Afrazi M.**, and Akhoundan M., (2019) "Programming the Finite Element Method with Special Application in Geotechnical Engineering 1", Simaye Danesh Publisher, Tehran. (Link)

# BOOK CHAPTERS:

- CH2. Afrazi M. and Lee K. (2024) "The Use of Robotics in Tunnel Inspection and Maintenance: A Comprehensive Review", Advancements in Underground Infrastructures, CRC press. (Accepted/In press)
- CH1. **Afrazi M.** and Lee K. (2024) "Autonomous Mapping and Exploration of Underground Structures", Advancements in Underground Infrastructures, CRC press. (Accepted/In press)

# JOURNAL PAPERS:

- J26. **Afrazi M.**, Lee K., (2024) "Optimization of Multi-Agent UAV Systems for Air Pollution Monitoring in Large Areas", IEEE Transactions on Automatic Control. (Under-preparation)
- J25. Afrazi M., Seo S., Lee K., (2024) "Enhanced Density-Driven Control of Multi-Agent UAV Systems for Efficient Victim Detection in Large-Scale Disaster Scenarios", International Journal of Control, Automation and Systems. (Under-review)
- J24. Afrazi M., Lee K., (2024) "Analysis of Asynchronous Communications on Microgrid State Estimation", Computer Modeling in Engineering & Sciences. (Will be Re-submitted Soon)
- J23. Armaghani D. J., Rezaei M., Afrazi M., Rezaei M., He B., Hasanipanah M., (2024) "Estimating the Brittleness Index of Rock Materials: Addressing Data Shortage and Imbalance with Augmentation Techniques", Applied Soft Computing Journal. (Under-review)
- J22. Majnooni A., Afrazi M., Yazdani M., (2024) "Application of Taguchi Method to Determine Geomechanical Parameters of Jointed Rock Mass Based on Monitoring Results - Case Study: Siah bisheh Power Plant Cavern", Tunnelling and Underground Space Technology. (Under-review)
- J21. **Afrazi M.**, Fakhimi A., and Yazdani M., (2024) "Evaluating Continuum and Discrete Element Approaches for Deformation Analysis in Retaining Walls", Computers and Geotechnics. (Under-Review)
- J20. Fareghian M., Afrazi M., Armaghani D. J., Afrazi H., Asghari N., Yazdani M., (2024) "Machine Learning in the Modeling of 3D Printed Soil-Cement Materials: A short overview", Journal of Soft Computing in Civil Engineering.(Minor Revision Received)
- J19. Armaghani, D. J., Liu Z, Khabbaz H., Fattahi H., Li D., Afrazi M., (2024) "Tree-based solution frameworks for predicting tunnel boring machine performance using rock mass and material properties", CMES-Computer Modeling in Engineering and Sciences.DOI: 10.32604/cmes.2024.052210
- J18. Afrazi M., Armaghani DJ., Fattahi H., Afrazi H., (2024) "Real-time Monitoring of Tunnel Structures Using Digital Twin and Artificial Intelligence: A Short Overview", Deep Underground Science and Engineering. (Accepted/In press)
- J17. Yang B., Armaghani DJ., Fattahi H., Afrazi M., Koopialipoor M., Asteris P., (2024) "Classification of Rock Mass in TBM Construction Proposing Optimized-based Random Forest Models", Engineering Applications of Artificial Intelligence. (Under-review)
- J16. Afrazi M., Armaghani DJ., Afrazi H., Rouhanifar S., (2024) "Geotechnical Implications of Sand-Rubber Mixture in Transportation Infrastructure: Assessing Shear Strength and Compressibility Characteristics", Innovative Infrastructure Solutions. (Minor Revisions Received)
- J15. Barkhordari M.S., Fattahi H., Armaghani Dj., Khan N.M., Afrazi M., Asteris P., (2024), "Predictive Failure Mode Identification in Reinforced Concrete Flat Slabs Using Advanced Ensemble Neural Networks", Multiscale and Multidisciplinary Modeling, Experiments and Design. DOI: 10.1007/s41939-024-00554-9
- J14. Shariati M., Pourteymuri M., Naghipour M., Toghroli A., Afrazi M., Shariati M., Aminian A., Nematzadeh M., (2024) "Enhancing Urban Building Efficiency: Sustainable Development of Confining Stress Mechanisms in Concrete Filled Steel Tube Columns", Sustainability. DOI: 10.3390/su16177544

- J13. Shariati M., Afrazi M., Kamyab H., Rouhanifar S., Toghroli E., Safa M., Afrazi, H., (2023), "A state Of The Art Review On Geotechnical Reinforcement With End Life Tires", Global Journal of Environmental Science and Management, 10(1), 385-404. DOI: 10.22034/gjesm.2024.01.25
- J12. Afrazi M., Razavi M., Monjezi M., Bhatawdekar R., Mohamad E., (2023) "Development and Evaluation of a Computer-Aided Educational Platform for Advancing Understanding of Slope Stability Analysis", Civil Engineering Infrastructures Journal. DOI: 10.22059/ceij.2023.362554.1945
- J11. Riazi E., Afrazi M., Yazdani M., (2023) "Numerical Study Of Slip Distribution At Pre-existing Crack In Rock Mass Using Extended Finite Element Method (XFEM)" Iranian Journal of Science and Technology, Transactions of Civil Engineering, 47, 2349-2363. DOI: 10.1007/s40996-023-01051-8
- J10. Afrazi M., Lin Q., Fakhimi A., (2022) "Physical and Numerical Evaluation of Mode II Fracture of Quasi-Brittle Materials", International Journal of Civil Engineering, 20, 993–1007. DOI: 10.1007/s40999-022-00718-z
- J9. Fareghian M., Afrazi M., Fakhimi A., (2022) "The Effect of Waste Tire Textile Fibers on the Mechanical Behavior of Soils", Journal of Materials in Civil Engineering, 35(2), 04022402. DOI: 10.1061/(ASCE)MT.1943-5533.0004574
- J8. Erfanian Pour A., Afrazi M., Golshani A., (2022) "Experimental Study Of The Effect Of Length And Angle Of Cross Cracks On Tensile Strength Of Rocklike Material", Iranian Journal of Science and Technology, Transactions of Civil Engineering, 46, 4543-4556. DOI: 10.1007/s40996-022-00891-0
- J7. Rezamand A., Afrazi M., Shahidikhah M., (2021) "Study of Convex Corners" Effect on the Displacements Induced by Soil-Nailed Excavations", Journal of Advanced Engineering and Computation, 5 (4), 277-290.
  DOI: 10.55579/jaec.202154.344
- J6. Afrazi M., Yazdani M., (2022) "Determination of the Effect of Soil Particle Size Distribution on the Shear Behavior of Sand", Journal of Advanced Engineering and Computation, 5 (2), 125-134. DOI: 10.25073/jaec.202152.331
- J5. Nowroozi V., Hashemolhosseini H., Afrazi M., Kasehchi E., (2021) "Optimum Design For Soil Nailing To Stabilize Retaining Walls Using FLAC3D", Journal of Advanced Engineering and Computation, 5 (2), 108-124. DOI: 10.25073/jaec.202152.331
- J4. Majedi M.R., **Afrazi M.**, Fakhimi A., (2021) "A Micromechanical Model for Simulation of Rock Failure Under High Strain Rate Loading", International Journal of Civil Engineering, 19 (5), 501-515. DOI: 10.1007/s40999-020-00551-2
- J3. Rouhanifar S., Afrazi M., Fakhimi A., Yazdani M., (2021), "Strength and Deformation Behavior of Sand-Rubber Mixture", International Journal of Geotechnical Engineering, 15 (9), 1078-1092.
  DOI: 10.1080/19386362.2020.1812193
- J2. Rouhanifar S., **Afrazi M.**, (2019), "Experimental Study on Mechanical Behavior of Sand-Rubber Mixtures", Modares Civil Engineering Journal, 19(4), 83-96. www.sid.ir/en/Journal/ViewPaper.aspx?ID=744447
- J1. Afrazi M., Yazdani M., Alitalesh M., Fakhimi A., (2018), "Numerical Analysis of Effective Parameters in Direct Shear Test by Hybrid Discrete-Finite Element Method", Modares Civil Engineering Journal, 18(3), 13-24. www.sid.ir/en/Journal/ViewPaper.aspx?ID=710094

## SELECTED CONFERENCE PROCEEDINGS AND PRESEN-TATIONS:

Author of 21 Conference Papers (Link), Including:

- C12. **Afrazi M.**, Seo S., and Lee K. (2024) "Density-Driven Formation Control of a Multi-Agent System with an Application to Search-and-Rescue Missions", American Control Conference (ACC), IEEE. (Under-review)
- C11. Seo S., **Afrazi M.**, and Lee K. (2024) "An Optimal Transport-based Downsampling Technique for Handling Imbalanced Datasets", American Control Conference (ACC), IEEE. (Under-review)
- C10. Tarlani Beris A., Afrazi M., Naghdi M, and Hassanalian M. (2024) "Designing Dispersal Mechanism for Dandelion-inspired Flying Sensors", AIAA AVIATION Forum and 2025 ASCEND. (Under-review)
- C9. Afrazi M. and Lee K. (2022) "Analysis of Asynchronous Communications on Microgrid State Estimation", The 2022 New Mexico Research Symposium, Albuquerque, New Mexico, USA.
- C8. Afrazi M., Lin Q., Fakhimi A., and Razavi M., (2022) "Experimental and numerical investigation of Mode II fracture", poster presentation at 2022 ASCE Fall Conference, Socorro, New Mexico, USA.
- C7. Majedi M., **Afrazi M.**, and Fakhimi A., (2020) "FEM-BPM Simulation of SHPB Testing for Measurement of Rock Tensile Strength", 54<sup>th</sup> US Rock Mechanic/Geomechanics Symposium, Golden, Colorado. (Link)
- C6. Afrazi M. and Yazdani M., (2018) "Laboratory Study of Elastic Modulus of Sand in Triaxial -and Confined Compression- Test", First National Conference on Fundamental Research in Civil Engineering, Architecture, and Urban Planning, Tehran, Iran.
- C5. **Afrazi M.** and Yazdani M., (2018) "Mechanics of Sand-Rubber Mixtures", National Conference on Civil Engineering and Architecture, September 2018, Tehran, Iran.
- C4. **Afrazi M.**, Pirjalili A., Golshani A., and Fakhour Nezhad A., (2017) "MATLAB Codes for Finite Element Analysis of a Tunnel", 4<sup>th</sup> International Conference on Advanced Technology in Civil Engineering, Architecture and Urban Planning, Tehran, Iran.
- C3. Afrazi M., Yazdani M., and Fakhimi A., (2017) "The Numerical Study of the Effect of an Oversize Particle on the Shear Strength of Sand in Triaxial Test", 4<sup>th</sup> International Conference on Recent Innovations in Civil Engineering, Architecture, and Urban Planning, Tehran, Iran. (In Persian)
- C2. **Afrazi M.**, Yazdani M., and Fakhimi A., (2017) "The Numerical Study of Effect of an Oversize Particle on the Shear Strength of Sand in Direct Shear Test", 4<sup>th</sup> International Conference on Recent Innovations in Civil Engineering, Architecture, and Urban Planning, Tehran, Iran. (In Persian)
- C1. **Afrazi M.** and Dehghani M., (2014) "Choosing the Best Route Variants Base on Environmental Parameters by Means of Remote Sensing and GIS", 3<sup>rd</sup> International conference on recent advances in, railway engineering, Tehran, Iran. (Link)

## EDITORIAL BOARD

- E3. American Journal of Engineering and Applied Sciences (Link) 2024 present
- E2. International Journal of Researches on Civil Engineering with Artificial Intelligence (Link)

  2024—present
- E1. International Journal of Urban Environment Research (UER) 2022 2023

# **REVIEWER:**

JOURNAL AND Reviewer for 39 Prestigious International Journals, With More Than 300 Verified Peer **CONFERENCE** Reviews Including (Full List):

- Building and Environment (Link)
- Construction and Building Materials (Link)
- Scientific Reports (Link)
- Tunnelling and Underground Space Technology (Link)
- Theoretical and Applied Fracture Mechanics (Link)
- Journal of Advances in Mechanical Engineering (Link)
- Journal of Building Engineering (Link)
- Journal of Measurement (Link)
- IEEE Transactions on Nanotechnology (Link)
- Environmental Earth Sciences (Link)
- Journal of Mechatronics and Robotics (Link)
- 2025 American Control Conference (ACC), Denver, CO, USA (Link)
- Computer Modeling in Engineering and Sciences (Link)
- Innovative Infrastructure Solutions (Link)

## **TEACHING ASSISTANT:**

TA15.	Dynamic Systems and Controls, New Mexico Tech	Fall 2023
TA14.	Dynamic Systems and Controls Lab, New Mexico Tech	Fall 2023
TA13.	Mechatronics - New Mexico Tech	Spring 2023 – Present
TA12.	Mechatronics Lab - New Mexico Tech	Spring 2023 – Present
TA11.	Continuum Mechanics - Tarbiat Modares University	Fall 2016 – 2021
TA10.	Rock Mechanics - Tarbiat Modares University	$Fall\ 2017-2018$
TA9.	Advanced Mathematics - Tarbiat Modares University	Fall 2018 – 2019
TA8.	Soil Mechanics Laboratory - Tarbiat Modares University	$Fall\ 2017-2021$
TA7.	Rock Mechanics Laboratory - Tarbiat Modares University	Fall 2017 – 2021
TA6.	Soil Dynamics - Tarbiat Modares University	Fall 2017
TA5.	Advanced Foundation - Tarbiat Modares University	Spring $2017 - 2018$
TA4.	Finite Element Analysis - Tarbiat Modares University	Fall 2017 – 2018
TA3.	Design of Reinforced Concrete Structures $1\&2$ - Shiraz Un	niversity Fall 2014
TA2.	Statics - Shiraz University	Spring 2012
TA1.	Survey - Shiraz University	Fall 2013 – 2014

## **PROFESSIONAL AFFILIATIONS:**

• Vice President of Investment Club, NMT 2024 - present • Vice President of The Union of Iranian Civil Engineering Student Scientific Associations 2017 - 2018• President of Graduate Student Scientific Association, TMU 2015 - 2018• Member of Student Scientific Association, Shiraz University 2010 - 2014

## EXTRA CURRICULAR ACTIVITIES:

Editorial board of Palar Magazine, Tarbiat Modares University (Link) 2019
 Chief Editor of Palar Magazine, Tarbiat Modares University (Link) 2016 – 2018
 Editorial Board of Harekat Magazine, Tarbiat Modares University 2017
 Editorial Board of Rahsaz Magazine 2017
 Chief Editor of Khesht Magazine, Shiraz University 2014
 Editorial Board of Khesht Magazine, Shiraz University 2011 – 2014

# MEDIA COVERAGE:

• Dchieftain News Paper (Link)

It Is a local Newspaper in New Mexico State.

# ONLINE COURSES:

- Differential Equations for Engineers (Certificate)
- Vector Calculus for Engineers (Certificate)
- Matrix algebra for Engineers (Certificate)
- Numerical Methods for Engineers (Certificate)
- Programming for Everybody (Getting Started with Python) (Certificate)
- Python Data Structures (Certificate)
- C for Everyone: Programming Fundamentals (Audit)
- Modern Robotics, Course 1: Foundations of Robot Motion (Certificate)
- Modern Robotics, Course 2: Robot Kinematics (Audit)
- Introduction to Self-Driving Cars (Audit)
- State Estimation and Localization for Self-Driving Cars (Certificate)
- Digital Signal Processing 1: Basic Concepts and Algorithms (Certificate)
- Digital Signal Processing 2: Filtering (Certificate)
- Digital Signal Processing 3: Analog vs Digital (Certificate)
- Digital Signal Processing 4: Applications (Certificate)
- Introduction to Additive Manufacturing Processes (Certificate)
- Material Extrusion (Certificate)
- Material Jetting and Stereolithography (Certificate)
- Selective Laser Sintering and Metal Laser Powder Bed Fusion (Certificate)
- Design for Additive Manufacturing (Certificate)

## REFERENCES: Dr. Kooktae Lee

Associate Professor, Department of Mechanical Engineering, New Mexico Institute of Mining and Technology, NM 87801, USA

Email: kooktae.lee@nmt.edu

#### Dr. Ali Fakhimi

Professor, Department of Mineral Engineering, New Mexico Institute of Mining and Technology, NM 87801, USA

Professor, School of Civil and Environmental Engineering, Tarbiat Modares University, Tehran, Iran

Email: ali.fakhimi@nmt.edu

#### Dr. Mahmoud Yazdani

Assistant Professor, Department of Civil and Environmental Engineering, Tarbiat Modares University, Tehran, Iran

Email: myazdani@modares.ac.ir