SHASHWAT MAHARJAN, E.I.T.

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PROFILE SUMMARY

Shashwat is a PhD candidate at Villanova University, specializing in biomechanics research focused on leveraging finite element analysis (FEA) and machine learning (ML) to develop preventative strategies for musculoskeletal stress fractures. With a strong background in machine learning and structural health monitoring, he has authored multiple publications in esteemed peer-reviewed journals and conferences. His academic excellence has been recognized through several prestigious awards, including the Undergraduate President's Award for Research at Central Michigan University and the Outstanding Undergraduate Student of the Year 2022 by the Engineering Society of Detroit. Additionally, Shashwat was selected for a Department of Energy research internship at Geologica Geothermal Group, where he helped pioneer a machine learning technique to estimate static formation temperature within sub-surface geothermal reservoirs.

EDUCATION

PhD in Mechanical Engineering	Villanova University	GPA: 3.9	2024 - 2028
Masters of Engineering	Central Michigan University	GPA: 3.8	2022 - 2024
Bachelors of Mechanical Engineering	Central Michigan University	GPA: 3.8	2018 - 2022

SKILLS

Modeling: ABAQUS, ANSYS, ScanIP Simpleware, SolidWorks, Fusion360, and NX Siemens.
Programming: Python, Julia, MATLAB, SQL, Linux, TensorFlow, PyTorch, and LabView.
Courses Taken: Advanced Engineering Analysis, Machine Learning, FEA, Mechanics of Materials.

PROFESSIONAL EXPERIENCE

Research Assistant August 2024 - Present
Villanova University *Villanova, PA*

- Supported interdisciplinary research in computational modeling and advanced biomaterials aimed at improving healthcare and structural applications
- Applied ANSYS, Abaqus, Python, MATLAB, and Julia to develop models, streamline workflows, and integrate machine learning into research methods
- Delivered scalable insights that improved prediction accuracy, reduced experimentation time, and guided innovations with potential impact in injury prevention and bio-inspired material design

Geothermal Research Intern July 2023 - May 2024
Geologica Geothermal Group *San Diego, CA*

- Optimized Volsung automation with Python, reducing processing time by 70% and enabling faster decision-making for geothermal field assessments
- Built TensorFlow ML models for static formation temperature estimation, boosting accuracy by 35% to improve drilling safety and lower exploration costs
- Modeled a generalized geothermal well to simulate subsurface heat transfer and fluid flow, creating a scalable framework that accelerates geothermal project evaluation across diverse sites

Research Assistant August 2020 - May 2024
Central Michigan University *Mount Pleasant, MI*

- Applied Python ML techniques to reduce simulation runtimes from days to 1 second, enabling real-time structural analysis and freeing researchers to test more designs
- Automated workflows in ANSYS, increasing throughput by 50% and allowing larger, more complex structural models to be tested with the same resources
- Built MATLAB FE abstractions for seismic/structural modeling, cutting design-test cycles by 30% and helping researchers evaluate earthquake resilience more efficiently

Neuroscience Research Intern May 2022 - Aug 2022
Brown University *Providence, RI*

- Automated data analysis by developing MATLAB and Python scripts, reducing manual processing time by 80%
- Applied advanced signal processing on high-resolution sensor data, doubling data throughput and accuracy
- Achieved 1ms verification accuracy for neurophysiological results, boosting experimental reliability by 25%

PUBLICATIONS

Kim, B., **Maharjan, S.**, Guidio, B., Thomas, J., Pranto, F. M., Schaal, C., & Jeong, C. (2026). Elastodynamic imaging of voids in a PML-truncated layered solid using a deep convolutional neural network. Engineering Geology, 108545. https://doi.org/10.1016/j.enggeo.2026.108545. Journal Paper Link.

Kim, B., **Maharjan, S.**, Pranto, F. M., Guidio, B., Schaal, C., & Jeong, C. (2024). Convolutional neural network and level-set spectral element method for ultrasonic imaging of delamination cavities in an anisotropic composite structure. Ultrasonics, 107254. https://doi.org/10.1016/j.ultras.2024.107254. Journal Paper Link.

Maharjan, S., Guidio, B., & Jeong, C. (2024). Convolutional neural network for identifying effective seismic force at a DRM layer for rapid reconstruction of SH ground motions. Earthquake Engineering & Structural Dynamics, 53(2), 894-923. https://doi.org/10.1002/eqe.4049. Journal Paper Link.

Pranto, F. M., **Maharjan, S.**, & Jeong, C. (2023). Level-Set and Learn: Convolutional Neural Network for Classification of Elements to Identify an Arbitrary Number of Voids in a 2D Solid Using Elastic Waves. Journal of Engineering Mechanics, 149(6), 04023035. https://doi.org/10.1061/jenmdt.emeng-6840. Journal Paper Link.

Maharjan, S., Guidio, B., Fathi, A., & Jeong, C. (2022). Deep and Convolutional Neural Networks for Identifying Vertically Propagating Incoming Seismic Wave Motion into a Heterogeneous, Damped Soil Column. Soil Dynamics and Earthquake Engineering, 162, 107510. https://doi.org/10.1016/j.soildyn.2022.107510. Journal Paper Link.

CONFERENCE PRESENTATIONS

Poster at The American Society for Bone and Mineral Research (ASBMR) 2025. Poster Link.

Poster at Society for Biomaterials (SFB) Conference 2025. Poster Link.

Short Paper at the Engineering Mechanics Institute (EMI) Conference 2024. Presentation Link.

Poster at International Mechanical Engineering Congress & Exposition (IMECE) 2022. Presentation Link.

Short Paper at the Engineering Mechanics Institute (EMI) Conference 2022. Presentation Link.

AWARDS AND HONORS

- **$110,000 grant** by the **US Department of Energy** for geothermal research internship.
- **Outstanding Undergraduate Student of the Year 2022** by the Engineering Society of Detroit.
- **Most Enthusiastic Presenter** at IMECE-22 Conference by the **American Society of Mechanical Engineers**.
- **National Science Foundation Student Poster Competition Travel Grant** for the IMECE-22.
- **Undergraduate President's Award** for research excellence at Central Michigan University.
- **Richtmeyer-Foust Award** for outstanding Mathematics senior at Central Michigan University.
- **Best Undergraduate Poster** at the IMECE-21 Conference by the National Science Foundation.
- **Undergraduate Summer Scholars 2021** to pursue machine learning research in structural health monitoring.
- **Runner Up** in the **Integration Bee 2019** hosted by the American Mathematical Society.
- **Winner** of the **Integration Bee 2018** hosted by the American Mathematical Society.
- **World Prestige Award** for a full scholarship at Central Michigan University, covering tuition, housing, and food for four years.