

MUKUNDAN CHARIAR

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EDUCATION

Carnegie Mellon University

Master of Science in Mechanical Engineering - Research

Pittsburgh, PA

May 2025

Manipal Institute of Technology

Bachelor of Technology in Mechatronics

Manipal, India

June 2023

PROJECTS

Physical-Therapy Assessment with Uncalibrated Cameras and Inertial Sensors

June 2023 - December 2024

Carnegie Mellon University

Pittsburgh, PA

- Optimized a graphical body model to noisy body keypoints and inertial measurement unit orientations.
- Extracted body segment orientations from body models and applied machine learning to detect exercise errors with 72.3% accuracy.
- Developed a heuristic to classify exercise errors using body segment orientations, achieving 55.5% accuracy.

Instant3D: Revolutionizing Reconstruction with AI

August 2023 - December 2023

Carnegie Mellon University

Pittsburgh, PA

- Built a 3D reconstruction pipeline based on Structure from Motion in collaboration with fellow students. Results were compared to Neural Radiant Field based reconstructions.

Machine Learning for Squat Analysis and Correction

January 2023 - June 2023

Manipal Institute of Technology

Manipal, India

- Collaborated with fellow students to collect data of volunteers doing squats. Obtained joint locations using pose estimation.
- Created a neural network to classify collected data. The neural network reached an accuracy of 94.0%.
- Published paper titled 'AI Trainer: Autoencoder Based Approach for Squat Analysis and Correction'. DOI: 10.1109/ACCESS.2023.33160090.

Bio Inspired Designs

May 2022 - December 2022

Manipal Institute of Technology

Manipal, India

- Designed 3D models of Bio-Inspired structures such as honeycombs and rhombic dodecahedrons using Fusion 360, in collaboration with a classmate.
 - Fabricated 3D prints of these structures, stress tested by another group. Analysis showed using an internal structure enhanced efficiency of filament usage by 61.2%.
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EXPERIENCE

24-703 Numerical Methods in Engineering

January 2025 - Present

Course Assistant

Pittsburgh, PA

- Conducted office hours and recitations with a group of course assistants, proctored and graded exams, graded homework, supported students to improve the quality of submissions for a class of 50 students.

24-679 ST: Computer Vision for Engineers

August 2024 - December 2024

Course Assistant

Pittsburgh, PA

- Held office hours, proctored and graded quizzes, graded homework, provided detailed feedback for students on improving the quality of submissions for a class of 60 students as part of a group of course assistants.

Rex Engineering and Metal Works

June 2022 - July 2022

Floor Intern

Thane, India

- Studied operations on CNC machines, helped inspect completed jobs, created models, generated g-codes for jobs using Fusion 360, AutoCAD and MasterCam Mill 9.
 - Fabricated a CNC milled tray under supervision of senior engineers.
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SKILLS

Programming Languages: Python, Java, C, C++, Embedded C, Assembly, SQL, Matlab, Julia.

Libraries: PyTorch, NumPy, Pandas, OpenCV,

Application Software: Fusion 360, MakerBot Print, Matlab Simulink.

LEADERSHIP

Vice President

June 2021 - September 2022

Institution of Engineers, Mechatronics Students' Chapter, Manipal

Manipal, India

- Organized multiple events, coordinated over projects and mini projects, volunteered for collaboration with other student clubs, organized and budgeted funds for the club and projects under the club, held recruitment sessions, etc.
- Managed an executive board of 3 members and ran weekly meetings to oversee progress in essential parts of the chapter.
- Led chapter of 120+ members to work towards goals that promote community service, academics, and unity.