Neel Joshi

ndjoshi@andrew.cmu.edu ♦ (412)954-8693 ♦ www.linkedin.com/in/neeldjoshi ♦ https://neeldjoshi97.github.io/website/

EDUCATION

Carnegie Mellon University — Pittsburgh, PA
Master of Science in Mechanical Engineering - Advanced Study — Dec 2022
QPA: 3.80/4.00
Relevant Coursework:
- Introduction to Machine Learning
- Localization and Mapping
- Robot Dynamics and Analysis
- Visual Learning and Recognition

Manipal Academy of Higher Education [MAHE] — Manipal, India
Bachelor of Technology in Mechanical Engineering (Medal for Academic Excellence) — Nov 2019
CGPA: 8.90/10.00

SKILLS

Programming Languages:	Advanced - *Python, R*	Intermediate - *C++*
Programming Packages:	Advanced - *PyTorch, Scipy, OpenCV*	Intermediate - *TensorFlow, PySpark, Numba*
Application Softwares:	Advanced - *Minitab, AWS, SolidWorks*	Intermediate - *CATIA, MATLAB, CoppeliaSim*
Languages:	**English** (Fluent), **German** (Basic), **Hindi** (Native) and **Marathi** (Native)	

EXPERIENCE

Musculoskeletal Biomechanics Lab, CMU — Pittsburgh, PA
Graduate Research Assistant — Jun 2022 – Aug 2022
- Researched on state-of-the-art deep learning architectures for human activity recognition achieving 98.2% accuracy
- Fine-tuned more than 50 models for making predictions generalizable on unseen sparse data from patients with ACL injury

INTERNSHIPS

Indian Institute of Technology Bombay — Mumbai, India
Intern — Jan - Aug 2019
- Modelled a novel Thermal Barrier Coating (TBC) withstanding temperatures of around 2000^{o}C in toxic environment
- Conducted mechanical and thermal tests on different compositions to optimise for high temperature strength in TBCs

PROJECTS

Carnegie Mellon University — **Pittsburgh, PA**

Error-State Extended Kalman Filter using Observations from CARLA Simulator — July 2022 – Aug 2022
- Implemented classic ES-EKF from scratch in Python using observations generated by CALRA simulator
- Tuned the filter within 3 sigma limits for safety-critical scenarios e.g. miscalibration, loss of signal from GNSS

Digital Twin Simulation of Deceiving Perception in Car Autopilot — Jan 2022 – Apr 2022
- Researched on response of autopilot to full moon wrongly perceived as yellow traffic light as inspired by real life incident
- Successfully showed that 98% of such incidents can be easily avoided using real time and definitive solutions
- Project featured in Dept. of Transportation video on Cyber Security [*https://www.youtube.com/watch?v=l84QFbJ4AbQ*]

Controller Design for Unmanned Vehicles Simulation — Nov 2021 – Dec 2021
- Programmed a PID and infinite horizon Linear Quadratic Regulator (LQR) using discretized and linearized vehicle dynamics
- Executed A-star path planning algorithm with extended Kalman Filter SLAM to guide autonomous vehicle around obstacles
- Analysed performance of Model Reference Adaptive Controller (MRAC) against LQR after sudden loss of thrust in quadrotor

Dense Point Cloud Rendering for 3D Reconstruction — Nov 2021 – Dec 2021
- Collaborated with 3 classmates for developing Structure from Motion model with modular Python scripts
- Implemented Quasi Dense Matching from scratch by best-first propagation algorithm as part of the multi-step process

Trajectory Optimization of Hybrid Contact Systems — Oct 2021 – Dec 2021
- Programmed time-stepping simulations with MATLAB for event based contact kinematics and dynamics
- Implemented state-of-the-art numerical methods for solving inverse kinematics while analysing their precision

Individual Participation

Data Centric AI Competition — Jun 2021 – Sep 2021
- Improved accuracy of ResNet50 on Roman MNIST dataset from 0.64421 to 0.80702 (top contestant at 0.86570) using image augmentation and logical reasoning while maintaining reproducibility with Python scripts and Git for version control

LEADERSHIP

Team Lead (24-784 Trustworthy AI Autonomy), CMU – Pittsburgh, PA — Jan – Apr 2022
- Led a team of 3 fellow students for ambitious course project on Digital Twin simulation of safety-critical scenarios
- Provided direction throughout the project, starting from conceptualization to designing and deploying of software

HONORS AND AWARDS

- **Research Fellowship** — June 2022