RAHUL RATHNAKUMAR
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GitHub | Portfolio

EDUCATION

Doctor of Philosophy, Mechanical Engineering, GPA 3.67/4.00 **2020-Present**
Arizona State University, Arizona, USA
(Transfer from MS in Mechanical Engineering - 3 Semesters, Fall 2018 to Fall 2019)
Bachelor of Technology, Aeronautical Engineering **2013-2017**
Manipal Institute of Technology, Manipal, India

WORK EXPERIENCE

- **Prognostic Analysis & Reliability Assessment Lab, Graduate Research Associate** **Jan 2020 – Present**
  - **AI-Enabled Interacting Threat Detection in Gas Pipelines (Jan 2020-Sep 2022)**
    - Led the successful, on-time and on-budget execution of a $250,000 project by the US Department of Transportation, actively leading the cross-functional process of machine vision prototype development.
    - Responsibilities included system integration, dataset creation, data analysis, training machine learning models, sensor integration, SLAM, and structural analysis.
    - Managed & mentored 6 graduate students over the duration of the project on using microcontrollers, sensor integration, Kalman and Bayes Filtering.
    - Developed a defect detection model, improving performance over the baseline by 10%. (Link to paper)
    - Developed a semi-supervised neural network model that showed approximately 2% improvement against existing approaches on the defect segmentation task. (Link to paper)
  - **Improving Situational Awareness for General Aviation (GA) Operations (Apr 2022 - Present)**
    - Proposed a decision-support framework to improve situational awareness for General Aviation (GA) pilots, with the objective of avoiding inadvertent entry into dangerous weather conditions, as part of a $10 million grant from NASA. (Link to paper)
    - Created a new benchmark dataset using flight simulation software for threat detection.
  - **Constrained Deep Learning for Generative Materials Modeling (Aug 2023-Present)**
    - Proposed a model for implementing constrained learning for multiple use cases such as regression & generative models.

  Relevant skills: Python, MATLAB, Machine Learning, Deep Learning, Computer Vision

- **School for Engineering of Matter, Transport and Energy, *Lead Teaching Associate*** **Aug 2023 – Present**
  - Developed materials for quizzes, handling recitations, grading homework, exams, and conducting office hours for a Mechanics of Materials class consisting of 200+ students.
  - Led a 4-person team to fulfill the grading and recitation tasks across multiple sections of the class.
  - Delivered guest lectures for a graduate course in probabilistic methods for a class of 40+ students.
- **Mercedes-Benz Research & Development India, *Intern-Passive Safety & Simulation*** **Jan 2017 - Aug 2017**
  - Modeling of gravel trajectories ejected from tires using a structural mechanics and fluid dynamics approach.
- **Center for Avionics, Manipal University, Undergraduate Research Assistant** **Jan 2014 – Dec 2016**
  - Performed aerodynamics simulations, flight dynamics evaluations, and preliminary design for hybrid airships.
  - Instructed students on the systems and operations of the Cessna C172 using a Fixed-Base Flight Simulator.

ADDITIONAL INFORMATION

- Published journal manuscripts and presented my work at conferences. (Details on my portfolio)
- Host of The Cogitations Podcast, a STEM podcast hosted on Spotify. (Spotify)
- Led the planning and organizing of events at ASU Changemaker Central to aid student engagement and innovation.