Archana Tikayat Ray

Atlanta, GA, USA

Cell: +1 321-877-5818
E-mail: **atr@gatech.edu**

https://www.linkedin.com/in/archanatikayatray/

https://archanatikayatray.com

https://github.com/archanatikayatray19

Academics

Doctor of Philosophy at Georgia Institute of Technology, Atlanta, GA	Aug 2017 - Present
Master of Science in AE System Design and Optimization at Georgia Institute of Technology, Atlanta (GPA:3.92/4)	Aug 2017 - Dec 2018
Bachelor of Science in Aerospace Engineering at Florida Institute of Technology, FL (GPA: 3.94/4)	Jan 2014 - May 2017

Technical Skills

Languages	Python, R, SQL, MATLAB, C++
Libraries	NumPy, Pandas, scikit-learn, TensorFlow, keras, spaCy, NLTK
Visualization	Tableau, Python (matplotlib, seaborn), R (ggplot2)
Version Control	Git
Database	PostgreSQL, MySQL
Techniques	Machine Learning (logistic/linear regression, naïve Bayes, SVM, decision trees, random forests, clustering, principal component analysis, regularization), statistical modeling, Natural Language Processing (NLP)

Work Experience

Applying NLP methods to Requirements and Systems Engineering	**Ph.D. Thesis**	Nov 2020 – Present

Highlight: Applying Natural Language Processing (NLP) methods (Information retrieval, Named Entity recognition, text generation, Topic Modeling) to problems in requirements and Systems engineering – automate the standardization and verification of requirements
Technologies Used: Python, SQL, SysML, NLP, Requirements engineering
Roles and Responsibilities:
- Working on converting natural language requirements into standardized machine-readable form
- Develop methods to automatically carry out requirements verification
- This work aims to cut down the manual work performed by systems engineers when checking for completeness and consistency of requirements

LEADER-X	**Graduate Research Assistant**	Aug 2019 – Sept 2020

Highlight: Utilized data fusion techniques to combine data sources available at Georgia Tech, to provide situational awareness
Technologies Used: Python (TensorFlow, keras), Arduino microcontroller, IoT sensors (Temperature and CO_2)
Roles and Responsibilities:
- Created data-driven models of key metrics to enable prediction of future performance (for energy, building use) under defined conditions
- Used uncertainty quantification and management techniques to determine confidence in predictions
- The pattern-recognition machine model was able to predict the real time occupancy of rooms with ***97% accuracy*** which can be leveraged in energy efficiency, air-quality improvement, and emergency evacuation
- Worked in a team of 4 people where I led the experimental setup, data collection, pre-processing, exploratory data analysis, development of test cases part of the project and helped with the development of the Machine Learning model

Accident Analysis for Georgia Tech Atlanta Campus	**Graduate Research Assistant**	Oct 2018 – July 2019

Highlight: Identified the hotspots (areas where accidents are more likely to occur) and the contributing factors – this is of concern since GT campus has a high pedestrian traffic concentration
Technologies Used: SQL, Tableau, Python, JMP Pro 14
Roles and Responsibilities:
- Extracted data from the accident database provided, performed pre-processing, data visualization and exploratory data analysis
- Used text mining techniques to analyze the accident reports to find the ones in which a pedestrian was involved
- Looked into the correlations between the different contributing factors to an accident (such as weather, location, lighting condition, etc.)
- Created an interactive dashboard with different filters for the police department to visualize the frequency of accidents at a location, etc.
- **Results**:
  - Most of the accidents on campus occurred between 3pm – 6pm which is justified by the fact that there is more traffic flowing through the campus during that time
  - Ferst Drive NW saw the maximum number of accidents (***36.36%***) of the accidents involving pedestrians (out of the top 5 accident hotspots on campus) since it is the main street passing through GT and caters to a lot of pedestrians (people on foot, bicycles, skateboards)
  - Of all the accidents involving pedestrians, ***47.5%*** were caused by improper action by the pedestrian (improper crossing of roadway/intersection(jaywalking), inattentive, failure to yield right-of-way, etc.)
  - Hilly terrain of GT campus served as a contributing factor that led to accidents at certain locations such as intersection of Fowler and 5th
  - A high number of accidents involving pedestrians were going unreported since students are usually in a rush to get to class or due to minimal damage – cross verified with the help of CCTV camera footage around campus

Mission Adaptive Composite Aero-structure Technologies	Graduate Research Assistant	Apr 2018 – Sept 2018

Highlight: Performed cost benefit life-cycle analysis for MADCAT wing composed of carbon fiber composites - to design and test efficient, ultra-light wings that can adapt on the fly - developed at NASA Ames Research Center
Technologies Used: OpenVSP, SEER-MFG (CAD technologies)
Roles and Responsibilities:
- Assessed the life-cycle cost benefits brought by MADCAT technology to aviation industry
- Conducted a qualitative design study to identify potential needs to bring MADCAT technology to the next technology readiness level
- Conducted a comparative study involving a full-scale civil transport aircraft (SR22) wing model using a conventional aluminum design and manufacturing technologies with a wing using voxel lattice

GE Combined Cycle Gas Turbine (CCGT) Optimization	Graduate Research Assistant	Sept 2017 – Apr 2018

Highlight: The goal of the project was to maximize the profitability of CCGT plants by optimizing the operation schedule, accounting for the time of the day and the electricity demand in a deregulated electricity market
Technologies Used: MATLAB, Simulink
Roles and Responsibilities:
- Developed optimization algorithm to establish a connection between the electricity trading model and the combined-cycle plant model to maximize the profitability of the CCGT plant in a deregulated electricity market
- Historical data from ISO New England was used for validation of the model

Publications

[1] Saleh JH, **Tikayat Ray A**, Zhang KS, Churchwell JS (2019) Maintenance and inspection as risk factors in helicopter accidents: Analysis and recommendations. PLOS ONE 14(2): e0211424. https://doi.org/10.1371/journal.pone.0211424

[2] Kempezidou SI, **Tikayat Ray A**, Duncan S, Balchanos M, Dimitri MN (2020) Real-time occupancy detection with physics-informed pattern-recognition machines based on limited CO_2 and temperature sensors. Elsevier Energy & Buildings. [Accepted]

[3] White RT, **Tikayat Ray A** (2021) Practical Discrete Mathematics. ISBN: 978-1838983147. Packt Publishing. **[BOOK]**

Relevant coursework

- ISYE 6414 Regression Analysis
- ISYE 6739 Statistical Analysis
- CS 7641 Machine Learning
- MATH 6701 Mathematical methods of Applied Sciences
- AE 6310 Optimization for Design of Engineered Systems
- AE 8803 Numerical Analysis and Algorithms
- Neural Networks and Deep Learning (Coursera)
- Natural Language Processing with TensorFlow (Coursera)

Leadership/Volunteering

- Actively involved in AE Diversity, Equity & Inclusion Council – Promotion of Underrepresented Minority student success at Georgia Tech where I represent Women in Engineering Program
- Judge for K-12 InVenture Prize where I provided feedback to student inventors on their ideas/projects
- Visited public schools in and around Atlanta, GA to interact with female students and inspire them to take up STEM careers
- Mentored undergraduate students as a part of the Mentor Jackets Program where I answered questions about research, grad school, etc.
- Worked as a part of STEP program where I guided 15 high school students to design, manufacture and test a small electric car. This served as testbed for learning about core systems engineering principles behind complex systems design and challenges faced with the electrification of modern vehicles.