Rishav Sen

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Summary: Currently a graduate student at Vanderbilt University, Nashville, TN, USA. I am pursuing a Doctorate of Philosophy degree in Electrical and Computer Engineering (EECE). My research interests lie in machine learning, optimization theory, and electrical and electronic systems, nurturing an interest in decision theory.

Education

- **Vanderbilt University** — Nashville, TN
  Pursuing PhD — *Fall 2021 - Present*
  Courses: *Random Processes, Artifical Intelligence, Computational Game Theory, Big Data, Geometric Deep Learning, Data Visualization*
  Teaching Assistant: *Embedded Systems (grad-level course)*

- **Heritage Institute of Technology** — Kolkata, India
  Bachelor of Technology - Electronics and Communications; GPA: 8.34/10 — *August 2016 - June 2020*
  Courses: *DBMS, Calculus and Discrete Mathematics, Computer Networking, Data Structures and Algorithms*

Skills Summary

- **Languages**: Python, C++, JavaScript, SQL, Java
- **Frameworks**: Scikit, Cplex, PyTorch, PySpark, D3.js
- **Tools**: Docker, GIT, MySQL, SQLite, Spark
- **Platforms**: Linux, Web, AWS
- **Soft Skills**: Leadership, Event Management, Writing, Public Speaking, Time Management

Experience

- **ScopeLab** — Vanderbilt University
  Research Assistant — *Jan 2022 - Present*
  - Working on a research project for optimizing electric bus charging and its impact on the power grid using state of the art simulation.
  - Simulating movement of buses and optimizing its deployment.
  - Locating Emergency response centers in and around Nashville

- **TATA Consultancy Limited** — Kolkata, India
  Assistant Systems Engineer — *Sep 2020 - Aug 2021*
  - Carried out web development using Angular based on JavaScript; worked on Adobe Experience Manager
  - Salesforce Customer Relationship Management - for the designing delivery piplelines and maintain schedules for Emirates Catering Services

Publications

- **E-Transit-Bench: Simulation Platform for Analyzing Electric Public Transit Bus Fleet Operations**: A framework of transportation-grid co-simulation, analyzing the spatio-temporal interaction between the transit operations with electric buses and the power distribution grid. - Accepted (yet to be published at ACM)
- **Low-Cost Air Pollution Monitoring Device Based on Air Quality Index**: *Received Best paper award at I3SET2K19.* It uses a portable battery powered hub based on an 8-bit micro-controller, equipped with several Metal Oxide Semiconductor (MOS) based gas sensors and Particulate matter (PM) sensors. SSRN
- **Microcontroller Based Sensor-Array Data Acquisition System for Electronic Nose**: The development of a microcontroller-based data acquisition for the processing of the real-time data of a QCM Sensor array-based E-Nose system and its output on a graphical user interface (GUI) has been discussed. It also shows a light and easy to move working prototype. IEEE Xplore
- **Development of an android platform for monitoring QCM sensor-array based Electronic Nose**: The objective is to develop a microcontroller-based, real-time data acquisition, and remotely operated system, also called the Remote Sensing System for a Standalone E-Nose System (IEEE Xplore
- **Development of the Data Acquisition System and GUI for QCM Sensor Based System**: The development of a Quartz crystal Microbalance (QCM) sensor-based data acquisition system along with Graphical user interface (GUI) for proper sensing functionality has been described in this work. SSRN

Projects

- **Inducing Self-Supervised Learning in GANs**: Focuses on exploring two potential self-supervised tasks, rotational and contrastive learning on images. We mainly test the quality of the generated image samples using FID based scores. We show that our method was able to improve upon Vanilla GANs, with the Contrastive Learning GAN performing the best (May '22)
- **Predicting Location of Emergency Response Centers**: provide a framework to address this issue by spatio-temporally aggregating the traffic and the accident data over the area of interest and make optimal predictions for locating the emergency response hubs (April '21)
- **Investigating Nashville's Traffic Incidents**: give a comprehensive visualization of Nashville's traffic incidents, revealing their spatial and temporal patterns and convey how different conditions such as weather, location, collision type, and time of day have impact traffic incidents rates in Nashville. (May '21)
- **Optimizing electric bus charging with cost and grid load considerations**: The project aims to use game theoretic approach to find the optimum time for the EVs to charge, minimizing grid load, and in turn reducing the electricity cost of the Transit Agency. This is done by setting up a Stackelberg game between the EVs and the Charging station.(November '21)
- **Automating Games and live browser tasks)**: Using pattern recognition in live video feeds to track and then act on them to play games and perform browser automation. (Feb '21)
- **Automated nearby warning for COVID-19**: Produces warning messages if any infected person with who has been detected to have COVID-19, sets their system accordingly and approaches an uninfected person. (May '20)
- **Tic-Tac-Toe and ConnectFour playing bots**: This project used the minimax alogrithm to automate the logic behind the two games, allowing for iteractive and auto play options. (September '20)
- **UI based Automatic folder sorter**: Sorts all files in a folder according to their extensions (April '20)
- **IEEE HITK website**: Developed and maintained the website - adding in SEO and built on HTML and Javascript IEEE HIT Student Branch(Sep '19)
- **4-bit micro-controller**: Using Xilinx FPGA board to design a micro-controller to perform fundamental mat operations - outputs displayed using onbaord LEDs and time graphs (Jan '19)

Volunteer Experience

Google
Developer Student Club *June 2019 – March 2020*

- Organized workshops on advancements in Machine learning, spread interest in automation.

IEEE
IEEE HIT Student Branch *April 2018 – June 2020*
Branch chair from Jun '19 to Jun '20

- Technical seminars, trainings and workshops organized.
- Conducted technical fests in and around the city with more than 1000 students participating.
- Seminar on drone building. Propagated interests in RC drones and airplanes.