

# Ibrahim Ahmed

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## Education

### Vanderbilt University

*PhD - Electrical Engineering*

Expected May 2021

Projects in AI, Statistical Pattern Recognition, High-Performance Computing, Algorithms, Real-time Systems, Image Processing, Computer Vision, Embedded Systems, Digital Electronics, Semiconductor Physics

*BS - Electrical Engineering and Physics*

May 2016

Modeling and Simulation, Applied Machine Learning, Algorithms, VLSI Design, Microcontrollers, FPGA Design, Galactic and Stellar Astrophysics

## Research Experience

### Vanderbilt University Department of Electrical Engineering

Aug 2016 - Present

*Graduate Researcher/Teaching Assistant*

- Apply reinforcement learning-based control for fault recovery on aircraft.
- Process clinical surveys by feature selection, clustering, and classification to diagnose genetic disorders.
- Mentor 7 engineering design teams over the year for their capstone project.

### Vanderbilt University Department of Physics & Astronomy

Jun 2016 - Aug 2016

*Research Assistant*

- Studied formation of dark matter halos in galaxies via high performance computer simulations.
- Developed algorithms to fit particle clouds to ellipsoids to verify Cold Dark Matter models of halo formation.
- Wrote a multiprocessor compatible data mining library to visualize 3.7TB of n-body physics simulation output.

### Institute for Space and Defense Electronics, Vanderbilt University

Jun 2014 - Aug 2014

*Research Intern*

- Researched effects of solar and cosmic radiation on memory chips in space.
- Designed an interface in VHDL on a FPGA to test SRAM chips for single event upsets after irradiation.
- Documented code and interface operation procedures for use by graduate student researchers.

## Projects

### QLearning

<https://github.com/hazrmard/QLearning>

- Developed a reinforcement learning library for modeling systems and adapting to faults.
- Programmed hierarchical temporal difference learning with tabular and functional policy approximations.

### SatTrack

<https://github.com/hazrmard/SatTrack>

- Led a team of 5 engineers to develop a satellite communications system using software-defined radios.
- Implemented satellite tracking on an Arduino board, and interface on a mobile-friendly web application.

### imgurPCA

<https://github.com/hazrmard/imgurPCA>

- Developed a machine learning library that employs dimensionality reduction for natural language processing.
- Implemented native supervised and unsupervised algorithms for classification and clustering tasks.

## Skills

**Programming:** Python, C, C++, Java, JavaScript, SQL, Go, Assembly, VHDL, Bash, Powershell

**Frameworks:** Pandas, Nltk, Scipy, Sklearn, Flask, OpenMP, CUDA, PETSc, AngularJS, D3.js

**Applications:** MATLAB, Mathematica,  $\text{\LaTeX}$  2 $\epsilon$ , SPICE, Cadence

## Other Experience

### Schneider Electric

Jun 2015 - Aug 2015

*Business Intelligence Intern*

- Programmed SQL procedures to consolidate 40 million overlapping transactions into 1.5 million records.
- Rewrote periodic table back-up procedures to eliminate redundancies and reduced backup sizes by 75%.

### Vanderbilt University Office of Residential Education

Aug 2015 - May 2016

*Resident Adviser*

- Identified residents facing academic or personal challenges and provided support.
- Arranged recreational and educational events like movie nights and talks in collaboration with campus organizations to serve a community of 700 residents.

## Leadership and Teamwork

### Vanderbilt Institute for Digital Learning

Aug 2017 - Present

*Graduate Fellow*

- Explore novel uses of digital media (virtual reality, data visualization) to promote learning in classrooms.
- Produce videos and presentations to convey academic research to a broad audience.
- Collaborate with a multi-disciplinary team of graduate fellows to make on-campus digital resources more accessible.

### Vanderbilt Student Volunteers for Science

Jan 2014 - May 2014

*Volunteer*

- Taught 8<sup>th</sup> graders in Nashville public schools fundamentals of robotics using LEGO Mindstorms kits.
- Hosted interactive sessions with students on university education and careers in engineering.

## Publications

### Conference Papers

Ibrahim Ahmed, Gautam Biswas, Hamed Khorasghani. "Comparison of model predictive and reinforcement learning methods for fault tolerant control" in IFAC-PapersOnLine, Warsaw, Poland, 2018 (Accepted).