Ibrahim Ahmed

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Education

Vanderbilt University

PhD - Electrical Engineering — Expected May 2021

Neural Networks, Projects in AI, 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.

PoorMansNN
https://github.com/hazrmard/PoorMansNN
- Designed a modular, dimension-agnostic, and extensible Neural Network library in Python.
- Implemented stochastic gradient descent and momentum optimizers, cross-entropy and squared loss functions.

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, $\LaTeX\,2_\varepsilon$, 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 8th 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).