Ibrahim Ahmed

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Education

Vanderbilt University Aug 2016 - Present

PhD in Electrical Engineering

Research focus: Fault-tolerant control using reinforcement learning.

Coursework in: High-Performance Computing, Algorithms, Real-time Systems, Image Processing, Computer Vision, Embedded Systems, Digital Electronics, Semiconductor Physics

Vanderbilt University Aug 2012 - May 2016

BS Electrical Engineering and Physics

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

Experience

Vanderbilt University Department of Physics & Astronomy Jun 2016 - Aug 2016

Research Assistant

- Researched formation and classification of dark matter halos in galaxies via high performance computer simulations.
- Developed algorithms to fit simulation data to ellipsoids to check against λ-Cold Dark Matter models of halo formation.
- Wrote a multiprocessor compatible data mining library to visualize 3.7TB of n-body physics simulation output.

Schneider Electric Jun 2015 - Aug 2015

Business Intelligence Intern

- Programmed SQL procedures to consolidate 40 million overlapping transaction records into 1.5 million records with no loss.
- Rewrote periodic table back-up procedures to eliminate redundancies and reduced backup sizes by 75%.
- Designed workflows in Alteryx to process bulk sales data into interactive dashboards for regional managers.

Institute for Space and Defense Electronics, Vanderbilt University Jun 2014 - Aug 2014

Research Intern

- Researched effects of solar and cosmic radiation on electronics in space.
- Designed an interface in VHDL using a DE2 FPGA to test SRAM chips for single event upsets after irradiation.
- Documented code and interface operation procedures for use by graduate student researchers.

Leadership and Teamwork

Vanderbilt Institute of 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 University School of Engineering Aug 2016 - Present

Teaching Assistant

- Mentor 7 electrical engineering design teams through their senior year capstone projects.

- Liaise between instructors and students on administrative issues.
- Train students in use of available prototyping equipment like 3D printers.

Vanderbilt University Office of Residential Education Aug 2015 - May 2016
Resident Adviser

- Oversaw residential administration of 60 students.
- Identified residents facing academic or social challenges and directed them to relevant support resources.
- Arranged weekly recreational and educational events like movie nights and talks in collaboration with campus organizations.

Projects

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

- Artificial Intelligence with a focus on reinforcement learning for dynamic systems.
- A python framework for modelling continuous and discrete environments with faults and learning optimal behavior.
- Implements hierarchical temporal difference learning with tabular and functional value approximation.

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

- Real-time satellite trajectory visualization, tracking, and prediction.
- A python/JavaScript application for computing satellite coordinates.
- Uses servo motor-controlled antenna to communicate with cube satellites.

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

- Modular machine learning library that employs dimensionality reduction techniques to simplify text processing.
- Uses imgur.com as default text corpus. Can be sub-classed to any text source.
- Native implementation of various supervised and unsupervised regression and classification algorithms.

Skills

Programming: Python, C, C++, Java, JavaScript, SQL, Go, Assembly, VHDL, Bash, Powershell
Libraries/Frameworks: Numpy, Flask, Django, OpenMP, CUDA, PETSc, AngularJS, D3.js
Applications: MATLAB, Mathematica, LaTeX 2_ε, SPICE, Cadence

Publications

Conference Papers

Ahmed, Ibrahim, et al. "Comparison of model predictive and reinforcement learning methods for fault tolerant control" in IFAC-PapersOnLine, Warsaw, Poland, 2018 (Submitted).

Blog Posts (Selected)

Ahmed, Ibrahim. Escaping Echochambers. Iahmed.me, 20 Oct. 2017, `http://iahmed.me/post/escaping-echochambers/`.

Ahmed, Ibrahim. Algorithms: Balancing. Iahmed.me, 6 Feb. 2017, `iahmed.me/post/algorithm-concepts/algorithms-balancing/`.