Karan N. Shah

CONTACT INFORMATION

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EDUCATION

Georgia Institute of Technology, Atlanta, Georgia USA

M.S. Computational Science & Engineering *In Progress*
Specialization area: Machine Learning, Application area: Computational Chemistry *GPA: 4.0*

B.S. Computer Science (Threads: Intelligence, Modeling-Simulation) *May 2018*
B.S. Physics *GPA: π*
Thesis: *"Analysis of Uncertainty in Machine Learned Density Functionals"*
Advisor: Dr. Andrew Medford

EXPERIENCE

Lawrence Livermore National Laboratory, Livermore, CA USA

Technical Scholar, Physics Division *Aug 2017 - present*
Intern, Data Science Summer Institute *May 2017 - Aug 2017*
Hosted by: Dr. Michael Schneider
Project: Hierarchical Probabilistic Inference of Cosmic Shear & Intrinsic Galaxy Properties
Used MCMC techniques to determine cosmic shear and galaxy morphology (for LSST)

Georgia Institute of Technology, Atlanta, GA USA

Gravity Group, Center for Relativistic Astrophysics *Aug 2018 - present*
Advisor: Dr. Deirdre Shoemaker
Project: Modeling surrogate neutron star merger waveforms through Gaussian Processes

Medford Group, School of Chemical & Biomolecular Engineering *Jan 2017 - present*
Advisor: Dr. Andrew Medford
Project: Determination of Exchange Correlation Functionals through Deep Learning
Using ensembles of neural networks to build surrogate density functionals

Graduate Teaching Assistant, College of Computing *Aug 2018 - present*
TA for Graduate Level *CSE 6730 - Modeling & Simulation* course, under Dr. Richard Vuduc *S'19*
TA for Senior Level *CS 4510 - Automata & Complexity* Course, under Dr. Richard Peng *F'18*

Otte Lab, Center for Relativistic Astrophysics *Jan 2016 - May 2018*
Advisor: Dr. A. Nepomuk Otte
Project: Segmented Schwarzschild-Couder Telescope Model for GrOptics ray tracing package
Open Source Contrib.: Added telescope model to GrOptics, written in C++(with CERN ROOT)

Data Driven Education, Center for 21st Century Universities *Aug 2015 - May 2018*
Advisor: Dr. Robert Kadel, Dr. Amanda Madden
Project: Inferring student success predictors from Georgia Tech MOOC data

Wolfram Research, Boston, MA USA

Wolfram Mentorship Program *Nov 2016 - Jan 2017*[1]
Wolfram Summer School *June 2016- July 2016*[2]
Advisors:[1]Dr. Todd Rowland, [2]Dr. Giorgia Fortuna
Project: Classifying Cellular Automata using Machine Learning

Publications

Shah, K., & Schneider, M. D., 'Hierarchical Probabilistic Inference of Galaxy Size Morphology Relation for Wide-Field Optical Imaging Surveys" MANUSCRIPT IN PREP

Presentations

Hierarchical Probabilistic Inference of Multivariate Galaxy Properties — *Dec 2018*
Bay Area LSST & Machine Learning Meeting, Berkeley, CA (*talk*)

Analysis of Uncertainty in Machine Learned Density Functionals — *Apr 2018*
Annual Undergraduate Research Spring Symposium, Georgia Tech, Atlanta GA (*poster*)

Inferring Student Success Predictors for CS1301x Online Course at Georgia Tech — *Nov 2017*
Georgia Tech STEM Education Research Expo, Atlanta GA (*poster*)

Hierarchical Bayesian Inference of Cosmic Shear & Intrinsic Galaxy Properties — *Aug 2017*
LLNL Summer Symposium, Livermore CA (*poster*)

Introduction to Blockchain & Cryptocurrencies — *July 2017*
DSSI Brownbag Seminar, Livermore GA (*talk*)

Classifying cellular automata using machine learning — *July 2016*
Wolfram Summer School Symposium, Waltham MA (*poster*)

Cellular Automata — *Mar 2016*
Senior Seminar, School of Physics, Georgia Tech, Atlanta GA (*poster*)

Research Products

Machine Learning approaches to Density Functional Theory
Link: http://www.github.com/karanprime/surrogate_functionals

GrOptics Telescope Package (Open Source)
Link: http://www.github.com/groptics/GrOptics (branch "karan")

Cellular Automata Classification through Machine Learning
Link: http://www.github.com/karanprime/mlforca

Selected Academic Projects

Predicting Chaos using Deep Reservoir Computing (For CS 7643 Deep Learning)
Link: http://karan.sh/TiamathsPool/

Modeling human migration as an N-body problem (For CX 4230 Simulations)
Link: http://www.github.com/karanprime/MigrationSimulator

Cellular Automata Simulator (For PHYS 3226 Computation Physics)
Link: http://www.github.com/karanprime/Cellular-Automata-Project

Computer Skills

Python (Data) Science Stack, PyMC3, Keras(Tensorflow), PyTorch
Mathematica, C/C++, Matlab, LaTeX, Arduino Processing

Memberships

- Laser Interferometer Gravitational-Wave Observatory (LIGO) Scientific Collaboration
- Large Synoptic Survey Telescope Dark Energy Science Collaboration (LSST-DESC)
- Cherenkov Telescope Array Consortium
- American Physical Society
- Society of Industrial and Applied Mathematicians

Honors and Awards

- Datmo Applied Machine Learning Fellowship, December 2017
- Amazon Web Services Research Grant ($8000), September 2017 (Advisor: Dr. Madden)
- President's Undergraduate Research Award: Fall 2017, Fall 2016
- Fellow, Data Science Summer Institute, LLNL, Summer 2017
- Student Travel Awards: JupyterCon 2017 (NYC), WSSSPE 2016 (Manchester, UK)
- Top 10 percentile in Indian National Astronomy Olympiad, 2012

Outreach and Leadership

Senator, Graduate Student Senate, Georgia Tech *Sept 2018 - Present*
Representing Computational Science & Engineering in the Student Government Association.

Reviewer, President's Undergraduate Research Award (PURA) *May 2018 - Present*
Reviewed Physics and CS research proposals for PURA, a competitive undergraduate research award.

Co-founder, Bitcoin@Tech, Georgia Tech's Bitcoin Club *Aug 2014 - May 2015*

Supplemental Experience

Analyst and Developer, Cryptomen.com - Startup *July 2014 - Feb 2015*
Part of a five-person startup that raised $47,000 in cryptocurrency investment.

Student Assistant, Center for Non Linear Science, GT *Jan 2015 - Aug 2015*
Assisted Dr. Predrag Cvitanovic in producing video lectures and maintaining website for a MOOC on chaos theory (Link: http://chaosbook.org)

Misc

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