

Troy J. Raen

✉ troy.raen@pitt.edu
☎ (801) 860-7003

👤 troyraen
🌐 troyraen.github.io

OBJECTIVE *Contribute to the software pipelines and user tools necessary to process, sort, and analyze data from large-scale astronomical surveys.*

EXPERIENCE

University of Pittsburgh

Ph.D. Candidate

2016 – 2022 (anticipated)

- Lead developer of the Pitt-Google Alert Broker. Designed the pipeline using Google Cloud services like Pub/Sub (message service), BigQuery (database), and Cloud Run (serverless processing), consulting with contacts at Google on cloud-based design. Wrote the end-to-end pipeline to ingest, process, store, and distribute live message streams from large-scale astronomical surveys. Implemented cross matching with static catalogs, and community-developed filters and classifiers to curate smaller streams more suitable for individual researchers and collaborations. Wrote user tools and tutorials, including demos integrating our broker's live streams and databases with the TOM Toolkit.
- Designed a prototype Bayesian belief network meta-classifier to provide initial classifications of objects spanning a broad range of classes, as delivered by astronomical alert streams.
- Investigated machine learning classification of cataclysmic variable stars, including distinct methods to search for low amplitude variability phases and higher amplitude outbursts (novae).
- Tested various machine learning algorithms on photometric redshift estimation and investigated how the errors scaled with training sample size.
- Studied the effects of energy transport by dark matter on stellar evolution by running models with Modules for Experiments in Stellar Astrophysics (MESA). Wrote a Fortran module incorporating energy transport by dark matter into MESA's calculations of stellar structure. Generated isochrones to compare results with observations of star clusters.

Vista Treatment Centers

IT and Medical Records Manager

2007 – 2016

- Centralized and standardized both the IT and medical records of the company's five facilities.
- Purchased, set up, and maintained IT equipment including computers, server, copiers, network equipment.
- Implemented HIPAA-compliant security systems for computers, mobile phones, and other BYOD devices.
- Built databases on Microsoft Access to track medical and HR records.
- Implemented and supported medical charting software.
- Audited and maintained medical records. Enforced documentation standards. Handled medical records releases.
- Built & maintained facility websites.

Other positions

2002 – 2007

- Human Resources Manager: new hire training and paperwork, payroll coordination, tracking and scheduling employee certifications.
- Office Manager: Supervised day staff, maintained reference records, compiled reports from all departments, greeted and directed parents/visitors.
- Program Coordinator: Managed the young adult, outpatient facility. Created and implemented programming. Trained and supervised staff.
- Direct Care staff: Supervised adolescents in inpatient treatment; mentored patients in support of specific treatment goals. Often involved deescalating agitated patients.

EDUCATION

Doctor of Philosophy, Physics and Astronomy	2016 – Present
Master of Science, Physics and Astronomy	2016 – 2018
University of Pittsburgh	
Thesis: <i>Transients in the Event Streams of Astronomical Surveys</i>	
Bachelor of Science, Physics	2011 – 2016
Bachelor of Science, Applied Mathematics	2011 – 2016
Undergraduate Research Scholar Designation	
Bachelor of Science, Psychology	1999 – 2002
University of Utah	




TEACHING & MENTORING

Instructor: Intro to Physics 1 (PHYS 0110, 2 semesters) University of Pittsburgh	2020 – 2021
Teaching Assistant: Graduate courses (2 semesters) University of Pittsburgh	2020 – 2021
Teaching Assistant: Undergraduate courses (7 semesters) University of Pittsburgh	2016 – 2019
Mentoring: Rachel Tao, Elizabeth Meador	2018, 2021

PUBLICATIONS & PRESENTATIONS

Refereed publications, first author: 1 plus 1 in prep.
Presentations: 10 oral, including 3 invited talks

CORE TECHNICAL SKILLS

Languages & Tools: Python, git, shell, SQL, Fortran
Google Cloud Platform: Pub/Sub, BigQuery, virtual machines, Cloud Functions, Cloud Run, billing
Open Source Projects:  Pitt-Google Alert Broker,  tom_pittgoogle,  Dark Matter in Stars