

SHREYAS SUNDARA RAMAN

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COMPUTER SCIENCE (Artificial Intelligence & Data Science Specialization)

Interested in enabling autonomous agents to better use multimodal feedback by combining vision, NLP, RL

EDUCATION

Brown University, Rhode Island, U.S.A
ScB. Computer Science; Senior
GPA: 4.0/4.0

September 2019 - December 2023

Selected Courses

CSCI1470 : Deep Learning	CSCI1420 : Machine Learning
CSCI1951A : Data Science	CSCI1430: Computer Vision
CSCI0220 : Introduction to Discrete Structures & Probability	CSCI1460: Computational Linguistics
CSCI2951F: Learning & Sequential Decision Making [grad level]	CSCI2951X: Reintegrating AI [grad level]
CSCI2952N: Advanced Topics in Deep Learning [grad level]	CSCI1600: Real-time & Embedded Software
CSCI1970: Independent Study [Honors Thesis]	CSCI 1951L: Blockchains & Cryptocurrencies
CSCI1951R: Introduction to Robotics	
CSCI2951K: Topics in Collaborative Robotics [grad level]	

Dubai International Academy, Dubai, U.A.E.

September 2009 - May 2019

International Baccalaureate Diploma Program

Subjects: Mathematics HL, Physics HL, Chemistry HL, English SL, Spanish B SL, Geography SL; Extended Essay in Physics

Final IB Score: 44/45

Academic Accomplishments

Valedictorian, Class of 2019: IB DP Examinations (44/45 across 6 subjects)	June 2019
Academic Achiever of the Year, 11 th Grade	June 2018
Valedictorian, Class of 2017: IB MYP Examinations (56/56 across 8 subjects)	June 2017
GATEWAY (gifted student program): Student of the Year	June 2016

Additional Academic Background

ACT with writing (34/36)	July 2018
Subject SATs: Math II SAT (800/800) Physics SAT (800/800)	August 2018
Breakthrough Junior Challenge (<i>Khan Academy</i>): Top 10% among 3000+ entries, 131 countries	August 2016

SELECTED PUBLICATIONS

CAPE: Corrective Actions from Precondition Errors using Large Language Models *Fall 2023*
First Author | Accepted, LangRob @ CoRL; Under Review, ICRA 2024 | *Python: PyTorch, GPT-3, VirtualHome, Robotics*

Plug in The Safety Chip: Enforcing Constraints for LLM-driven Robot Agents *Fall 2023*
Co-Author | Under Review, ICRA 2024 | *Python: PyTorch, OpenAI GPT-3, Virtual Home, Robotics*

Tiered Reward Functions: Specifying and Fast Learning of Desired Behavior *Summer 2023*
Co-Author | Under Review, AAAI 2024 | *Python: OpenAI Gym, PPO, Gym-MiniGrid*

Development of a CNN for GPD Classification in Cardiac Arrest Patients (with PhD Syphong Ha) *Summer 2022*
Acknowledgement: Code Development | Published to Brown University Archives | *Python: PyTorch, 1D CNN, Signal Processing*
• Helped develop 1D-CNN (L2 regularization) to classify EEG signals as *GPD* or *non-GPD*; >97% accuracy and F1 score

Categorizing the Visual Environment and Analyzing the Visual Attention of Dogs *Fall 2022*
Co-Author | Karen T. Romer Undergraduate Teaching and Research Award Recipient | Submitted to Animal Behaviour, Journal | Accepted to WACV 2024, CV4Smalls Workshop | *Python: Tensorflow, CV2, matterport*

WORK IN PROGRESS

Visual-language embeddings with improved latent semantics for image editing *Summer 2023*
Co-Author | under Prof. Boris Katz & PhD student David Mayo @ MIT CSAIL | *Python: PyTorch, Stable Diffusion v1.5, CLIP*

Following Open Vocabulary Robot Instructions with Pre-Trained Vision language Models

Fall 2023

Co-Author | under Prof. George Konidakis & PhD student Benedict Quartey | *Python: Robotics, GPT-4, CLIP*

Hierarchical Task Planning using LLMs

Summer 2023 - Fall 2023

Co-Author | under Prof. Stefanie Tellex & PhD student Ifrah Idrees | *Python: PyTorch, OpenAI GPT-3.5, VirtualHome*

Learning Disentangled Representations for RL by Constructing Factored MDPs

Spring 2022

Co-Author | Manuscript in Preparation | Dreamer V2 (Google Brain) | *Python: Tensorflow, DreamerV2*

WORK & RESEARCH EXPERIENCE

Business Analyst Intern, McKinsey & Co.

December 2023 - February 2024

Reviewer, ICRA 2024

Fall 2023

Head Teaching Assistant: Artificial Intelligence, CS1410

Fall 2022

- Working with Prof. George Konidakis to design course assignments; supporting 120+ students and managing 20+ TAs
- Working to improve course content with the professor, automating systems for assignments and coordinating
- Mentoring 10+ students on developing novel heuristics towards a final project (adversarial zero-sum game)

Machine Learning Engineer, Wisdomise (www.wisdomise.io)

Summer 2022

Optimizing Liquidity Provision on UniswapV3 using ML | *Python: GraphQL, scikitlearn, web3.py, TheGraph Protocol*

- Applied different regression models to optimize high and low tick prediction for liquidity provisioning in order to maximize active time and fees earned. Best approach achieved accuracy of >95% and utility of >98% with MSE $\sim 10^{-4}$
- Scraped UniswapV3 transaction data (80 features on the BTC/WETH pool) using graph protocol and smart contract data

Blockchain Developer, Rario (www.rario.com)

Summer 2022

Worked with CTO to develop a P2P (web-3) Messaging Platform | *Solidity: Smart Contracts, HTML/CSS, Javascript, Hardhat*

- Worked with the CTO of this fast scaling venture (US\$120m funded) on building a custom messaging platform leveraging blockchain for storage and transparency
- Built fully functional smart contracts to manage platform backend and deployed smart contracts on Polygon (Mumbai)

Teaching Assistant: Graduate-level Data Science Course, DATA1030

Fall 2021

Supporting 50+ students via virtual TA hours | Grading

- Holding weekly TA hours & mentoring 14 grad students on Machine Learning (ML) final projects

Serre Labs: Research Intern

Fall 2020

Paleobotany AI | Taxonomic Classification & Generative Modeling | *Python: Selenium, sqlite3, Pandas, Tensorflow*

- Expanded leaf datasets 8× by adding 300,000+ images of mounted leaf specimens, with unique ids and taxonomical details. New data improved model accuracy to >80%
- Cycle-GAN Model | *Python (Tensorflow)*: worked with grad students to enhance Cycle-GAN model between leaf and fossil image domains; used to generate training examples in the fossil domain

Yahsat Space Lab: Research Intern

June 2017 - March 2019

The only high school student accepted into a selective program for graduate students; explored satellite design, energy-budget calculations and orbit efficiencies of CubeSats. Supported Professor in developing models/resources for incoming students

McKinsey & Company, Dubai, U.A.E: Job Shadowing

May 2017

Job Shadowing a Research Analyst. Worked on short research pieces: country trade-profiles, efficiency of car rentals

PROFICIENCY & PROJECTS

Python: *Highly Proficient* | *sqlite3, Pandas, matplotlib, sklearn, Kivy, pytorch, tensorflow, functional programming*

- Zebra-horse CycleGAN, Faster-RCNN for traffic sign detection, Pose-Estimation models for ASL hand-sign classification, LSTM/GRU for (french-english) translation, semantic parsing: natural language to SQL, DQN on CartPole
- Regression and hypothesis testing (sklearn) correlating AirBnB and local housing prices in NYC

Java: *Proficient* | multi-threading, JavaFX (applets and AWT)

- Classical games e.g. Tetris, Doodle Jump, Fruit Ninja; genetic algorithm based neural network for learning Flappy Bird
- Graph and decision-tree algorithms [Dijkstra, Prim-Jarnik, PageRank] and SeamCarve implementation

C: *Moderately Proficient* | multithreading, signals, signal safety, I/O registers [stdin, stdout], read-write locks

- Shell: a Bash Unix shell that parses input commands [pwd, ls, chdir etc.] and executes with appropriate error-handling
- Malloc + Database: interactive program allowing clients to add, query, sort, remove and print a database (handled/hosted by a server socket) using multi-threaded processes; implemented with signal handling, thread safety and read-write locks

HTML, CSS & Python-Django: *Highly Proficient* | CSS stylesheet; slider, gallery, image effects

- Back-end web server and storage: SQL database connection (with Django) and standard queries (editing, conditionals, join-operation) for SQL data display in HTML, loading and saving files with Django

SQL & SQLite: *Proficient* | SQL syntax, table JOINS and merges, searching, filtering and sorting

Javascript: *Moderately Proficient* | d3 + SVG elements: transformation, tool tips; importing csv data

- Data Dashboard: stylized graphs, pie-charts and scatter plots (with summary tooltips) hosted on a HTML page with interactive text/button inputs to filter displayed data or perform scatter point regression in real-time [with animation]

MATLAB + SolidWorks (CAD): *Proficient* | MATLAB: systems of equations, excel output, graphical outputs | SolidWorks: image imports, part assembly and engineering-drawings

- Intelligent kinematically accurate predator-prey simulation; COVID-19 infection spread (SIR model) simulation
- Generated 3D printed models of designs; constructed bridge/truss structures and a bottle-opener design

Solidity & Smart Contracts: *Proficient* | contract creation, mappings, keccak256, contract deployment, integration with hardhat

Go: *Proficient* | used in conjunction with Solidity for blockchain network creation and smart contract deployment/testing

AWARDS & INTERESTS

Meiklejohn Mentor	Selected to advise incoming freshmen (Class of 2024) on courses, research, student life etc...
Brown Space Engineering	Member of the avionics and manufacturing divisions. Learned to use circuitry softwares (EAGLE) and develop logic gate design for satellite payloads
Chess	Founder of high school chess club: coached 25+ members and led team to win 3 consecutive inter-schools FIDE member; 2nd place in Ivy League Spring Tournament, Fall 2022 Participated in 4-vs-4 Chess Collegiate League Tournament, Fall 2023
STEMS Tutoring Program	Tutored physics and SAT preparation at Hope High School (Providence) weekly, after school
Math Acceleration Group	Initiated a mentorship program for high-potential juniors to help meet their HL aspirations. Many of the 20+ students have now been able to meet their goal.
Poetry	Published a collection of 25 poems influenced by events that impacted my childhood
Duke of Edinburgh Award	DoE Silver Award
Founder, Inspire Science	Founded a science website and blog (https://inspirescienceclub.com) during senior year with extensive followership and active publications on science in real life
Languages	English (native), Spanish (professional working), Hindi (limited working), Tamil (native)