Siddharth Shridhar Diwan

Sc.B. Computer Science & A.B. Astronomy @ Brown '24
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This Résumé contains embedded links. Please click almost anywhere with † for more information!

Education

Brown University

Providence, RI
Sc.B. Computer Science & A.B. Astronomy, GPA: 4.0 *Class of 2024*
Coursework: current courses: *; vagabonded courses: †

Computer Science
- Deep Learning
- Computer Vision*
- Operating Systems*
- Operating Systems Laboratory*
- Probabilistic Methods in Computer Science*†
- Introduction to Computer Systems
- Introduction to Software Engineering
- Individual Independent Study*
- Accelerated Introduction to Computer Science

Other
- Cybersecurity and International Relations

Physics
- Advanced Classical Mechanics*
- Electricity and Magnetism
- Astronomy and Astrophysics
- Intro to Relativity, Waves and Quantum Physics
- Analytical Mechanics

Mathematics
- Honors Linear Algebra
- Partial Differential Equations*†
- Statistical Inference I
- Discrete Structures and Probability
- Intermediate Calculus

Udemy Coursework:
- Data Science: Natural Language Processing in Python
- 20 Web App Projects w Vanilla JavaScript
- Advanced Web Scraping using Scrapy and Splash
- Interactive Python Dashboards w Plotly and Dash

Oakridge International School

Hyderabad, India
Computer Science, Physics & Math Higher Level, IBDP Score: 44 *Class of 2020*
Coursework:

Computer Science HL	7	English A Lang & Lit SL	7	History Extended Essay	B
Physics HL (Astrophysics Option)	7	Hindi B SL	6	Theory of Knowledge	A
Mathematics HL (Calculus Option)	7	Economics SL	7		

Skills

Programming Languages
- Python
- Java
- JavaScript
- C
- Go
- SQL
- x86-64
- Racket

Frameworks & Libraries
- React & React Native
- Django
- Flask
- Plotly
- Dash
- Expo
- PyTorch
- TensorFlow

Languages
- English
- Hindi
- Marathi

Miscellaneous
- LaTeX
- Wolfram
- Bash
- Microsoft Office

Research

Machine Learning Research

Gravitational Lensing and Astrophysics Group, Brown University
Deblending Images of Strong Gravitationally Lensed Galaxies *December 2021 – Present*
Mentor: Prof. Ian Dell'Antonio†
- Developing a **neural network** that can **deblend** images of strong gravitationally lensed galaxies to determine the original galaxy structure without distortion. Doing this by taking inspiration from **VAEs** that deblend images of linearly transformed galaxies†.

Computer Vision Research

Interactive 3D Vision and Learning Lab, Brown University†
Analysis of Image Flows for Self-Supervised Segmentation *June 2021 – November 2021*
Mentor: Prof. Srinath Sridhar†

◇ Analyzed varying **image flow** implementations of the **Motion Grouping RAFT** algorithm† to develop an optimal **Self-Supervised Segmentation** model that disambiguates left and right hands within **procedural frames** of culinary videos.

Schwarzschild Geometry Research
Wheaton College MA†

Schwarzschild (Black Hole) Ray Tracing — *December 2020 - Present*

Mentor: Prof. Dipankar Maitra†

◇ Developed an educational **React Native** app (in open testing on the **Play Store**†) that plots light ray trajectories in Schwarzschild geometries in 2D and 3D space to visualize how light bends near black holes.

◇ Hosted the backend as a **Django REST API** which calculates the ray traces using an **ODE solver** (solve_ivp†) and **elliptic integrals** (ellipkinc†).

Euclidean Geometry Research
Wheaton College MA†

Light Echoes in Euclidean Geometries — *December 2018 – November 2020*

Mentor: Prof. Dipankar Maitra†

◇ Hosted an interactive interface† with **Plotly** and **Dash** to model light echo emissions† from Broad Line Clouds in Euclidean geometries using **Plotly Distribution Plots** and **Kernel Density Estimation** curves.

Conferences

Sigma Pi Sigma PhysCon†
November 2019

Exploring Light Echoes in Astronomy — Diwan, S., Maitra, D.

◇ **Only high schooler** to present the code† and an academic poster† of the research results.

Work Experience

Brown CS Department
Brown University

Undergraduate Teaching Assistant for Introduction to Software Engineering (CSCI 0320) — *June 2021 – Present*

◇ Developed lecture content and **Java** assignments† for **Dijkstra**, **A*** and **LPA*†** algorithms, and hosted weekly TA hours for 60+ students.

◇ Built traffic servers in **Python** that stream arbitrary coordinates of obstacles to provide **real-time test data** for the LPA* algorithm.

Indian School of Business
Hyderabad, India

Data Science Intern — *October 2020 – March 2021*

◇ Designed and built an interactive dashboard† with **Plotly**, **Dash** and **Heroku** to visualize trends in privacy labelled tweets.

◇ Utilized techniques† such as **web-scraping**, **multiprocessing**, **task scheduling** and **named entity recognition** to collect, process and classify tweets based on sentiment, retweets, favorites, hashtags, and organization references.

Awards & Achievements

◇ **Valedictorian**, IBDP Segment (IBDP Score: 44, ACT: 35, SAT Subject Math II: 790, SAT Subject Physics: 800). 2020

◇ **Recipient**, Principal's Award (Grades 9, 10 & 12) for top academic performance. 2017, 2018, 2020

◇ **Recipient**, International Honor Roll, The Diana Award. 2019

◇ **Full Scholarship**, Wheaton College MA Global Leaders Program. 2018

◇ **National Bronze Medalist**, Pramerica Spirit of Community Awards. 2018

Projects

CS Concentration Validator†
April 2021 - Present

◇ As a member of Full Stack at Brown†, working with the Brown CS Department† to develop a concentration **validator** that verifies if students' course plans (pathways) satisfy degree requirements.

◇ Created **Python** scripts and **Django** endpoints to check concentration declarations against a **Forge** validation file in bulk.

Text Simplifier Web App†
November 2021 – December 2021

◇ Developed a **React** app that reduces the lexical complexity of English sentences using a **Multi-headed Transformer** (deployed and accessed using a **Flask REST API**†) coded with **TensorFlow** and **Keras**.

◇ Built custom metrics and a loss function to hyperparameter-tune the model via **Tensorboard†**, achieving 81% test accuracy and 2.8 test **perplexity per symbol** over 10 epochs of training.

Radio Streaming App†
January 2020 – November 2021

◇ As a member of Full Stack at Brown†, developed a **React Native** app to stream radio content from Brown Student Radio.

◇ Added functionality to preserve the **state** of tracks and let titles play in the background.

Pyret† Date-Time Library† *November 2020 – July 2021*

◇ As a member of Brown Programming Languages Team†, implemented the **Pyret Date-Time Library** by introducing new datatypes† such as Duration, ZoneOffset, ZoneId, UTCDateTime and OffsetDateTime to support the representation of durations and calendar-times.

Journal Texter† *February 2021 – May 2021*

◇ Built a **web app** with **Maven** and **MySQL** to record and organize user journal entries.
◇ Developed a **word count vectorization** algorithm in **Java** to extract terms from entries and built a **sentiment analysis** model using **PyTorch** to attach contextual sentiment to the terms for **recommending** successive entry topics.

Finding Blueno† *March 2021 – April 2021*

◇ Built a **UNET** from scratch in **PyTorch** to detect any chosen target image zoomed arbitrarily over a random background image.
◇ Achieved a mask prediction test accuracy of 84.7%† after three epochs of training.

Leadership

Flight Software Co-Lead — Brown University

Brown Space Engineering *October 2020 – Present*

◇ Leading a team of 30+ members to develop features of the PVDX cube satellite† scheduled to be launched by **NASA** in 2024.
◇ Using **Embedded C** and **FreeRTOS**† to build the satellite's **multi-threaded** Camera Driver to take images from space and UFH Radio Transmitter module to communicate with the ground station.

Secretary General — Oakridge International School

OakridgeMUN† *August 2018 – July 2019*

◇ Organized the ninth edition of Oakridge Model United Nations of 450+ delegates.
◇ Raised ₹4.2 million in sponsorships while overseeing agendas, delegate allocations, venue and accommodation.

Volunteer Work

Breaking Barriers – One Line of Code at a Time† — Oakridge International School

Founder *May 2017 – October 2019*

◇ Conducted **The Hour of Code**† for 200+ students from government schools of Hyderabad in collaboration with the India Literacy Project†.
◇ Created **localized lesson plans**† in Telugu and Hindi to enable teachers and the ILP staff to continue conducting The Hour of Code.

Handlooms – Our Pride and Privilege† — Oakridge International School

Campaign Director *February 2017 – May 2018*

◇ Filmed a **minidocumentary**† featuring handloom revivalist Suraiya Aapa and her weaving studio, and the process of making traditional handlooms.
◇ Built an **HTML** website to campaign about the significance of handlooms and raise awareness about the necessity of its revival.

Standardized Test Scores

◇ ACT 35, Writing: 11/12 ◇ SAT Subject Math Level 2 790 ◇ SAT Subject Physics 800

Hobbies

Interests

◇ Debate ◇ Rocketry ◇ Badminton

Music

◇ Synthwave ◇ Chiptune ◇ Drum & Bass