Sidharth Baskaran

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EDUCATION

Liberal Arts and Science Academy (LASA) High School, Austin, TX 2018–2022

- **Weighted GPA**: 4.4923/4.0
- **SAT**: 1560/1600 (790 Math, 770 Reading/Writing)
- **AP Exams**: **2022**: Physics C: Mechanics, Physics C: Electricity & Magnetism, English Literature & Composition, Government & Politics, Macroeconomics; **2021**: Physics 1 (5), Physics 2 (5), Statistics (5), English Language and Composition (4); **2020**: Calculus BC (5), World History (5), Computer Science A (5)
- **BC Precalculus:** rigorous 3-week summer class; advanced to BC Calculus for 10th grade **150 hrs 9th Summer**
- US History II at Austin Community College (Dual Credit) **25 hrs/wk, 6 wks 10th Summer**

LEADERSHIP

Science Olympiad Captain **5 hrs/wk, 44 wks/yr 11, 12**

- Develop club (60+ members) goals and strategies with coach and fellow captains
- Form 15-member competitive teams, including for 2021 National tournament
- Conduct tryouts for competitive team selection, pioneered scheduler program for efficiency
- Organize in-person after-school practices and/or administer Discord server for virtual practices
- Mentor junior team members, teach skills for engineering/physics events, led information sessions
- Campaign to generate school-wide interest, organize various fundraising activities
- Actively manage club website (lasascioly.com)
- Itemize supply lists and manage club inventory

RESEARCH EXPERIENCE

Research Intern, University of Texas at Austin **15-20 hrs/wk, 10 wks 11th Summer**

- Supervised by Prof. Maruthi Akella, Aerospace Engineering and Engineering Mechanics Department
- Solved transcendental equations describing spacecraft flight
- Learned and implemented Newton-Raphson and bisection methods to find roots of above equations
- Employed curve-fitting techniques such as Chebyshev polynomials and least-squares regression
- Used complex interpolation methods and Python libraries (SciPy, NumPy) and GNU Octave (Source code)
- Presented progress (writeup) routinely during weekly meetings with Prof. Akella

Independent Research, Visual Informatics Group, UT Austin **4 hrs/wk, 17 wks (to date) 11, 12**

- Guided by Dr. Zhangyang (Atlas) Wang in the Electrical & Computer Engineering Department
- Train and modify PyTorch deep neural networks on the Deep Plastic Surgery project for use on the Monster Project dataset and preprocess data with image processing routines
- Wrote web scraper (source code) to aggregate artist renderings of childrens' monster drawings from website
- Use Texas Advanced Computing Center's Maverick supercomputer and Slurm job manager to run compute-intensive workloads
- Share timely progress updates via slides to Dr. Wang and his PhD student and solicit feedback on the same

ACTIVITIES

Science Olympiad (soinc.org) **8 hrs/wk, 44 wks/yr 9, 10, 11, 12**

- Focus on building balsa devices, vehicles, and theoretical physics events
- **Wright Stuff** *(Aerospace Engineering, Materials Science, Woodworking)* – a lightweight, rubber-powered indoor free-flight balsa monoplane designed to achieve the maximum flight time (~2-3 minutes)
  - Trimmed aircraft iteratively, one variable at a time, to optimize flight radius and ascent/descent rates
  - Identified various knobs on the aircraft to tune yaw, roll, and pitch behavior
- **Boomilever** *(Mechanical Engineering, Materials Science, Woodworking)* – a lightweight wood structure optimized for the best structural efficiency (~1700) within challenging design constraints
  - Used free body diagrams and force analysis to help conceptualize design
  - Employed systematic and iterative design process, focusing on one to two design parameters at a time

- **Gravity Vehicle** *(Mechanical Engineering)* – design and construct a vehicle & launch ramp that uses potential energy to reach a target point as accurately as possible
    - Utilize rapid prototyping and CAD software to 3D print components with high attention to detail
    - Develop wingnut braking system and steering adjustment mechanisms
- **Circuit Lab** *(Electrical Engineering)* – theory event covering DC and AC circuit techniques
    - Developed fluency in various circuit analysis techniques including KCL/KVL, node, and mesh analysis
    - Learned theory of electricity and magnetism, including Faraday, Biot-Savart, and Lenz laws
- **Sounds of Music** *(Acoustics)* – a comprehensive test covering acoustic theory, sound waves, and music theory
    - Apply physics concepts to behavior of musical instruments
    - Studied history of instruments and pioneers in acoustic physics
- **Data Science** *(Machine Learning, Probability & Statistics)* – theory event covering machine learning concepts, statistics, and Python language
    - Developed intuition of linear and logistic regression, neural networks
    - Solved problems in combinatorics and applied statistical tests to hypothetical datasets

Optical Character Recognition, Independent Project **30 hrs** **11th Summer**

- Convert handwritten data to LaTeX codes to create professionally typeset work
- Used TensorFlow Keras and iPython Notebooks hosted in Google Colab to recognize handwritten digits
- Implemented convolutional neural networks and carefully tuned hyperparameters

Personal website design, Independent Project **25 hrs** **11**

- Learnt the React JS web design framework to design my website

Tryouts scheduler, Independent Project **30 hrs** **11**

- Wrote a program using Google Apps Scripts to manage Science Olympiad club tryouts (Source code)
- Reduced workload and minimized human error
- Deployed over Spring 2021 season; resolved issues and made improvements over Summer 2021

Ad-blocking script, Independent Project **15 hrs** **10**

- Developed a program in Python to block Spotify ads

Blood Pressure data formatter, Independent Project **2 hrs** **10**

- Wrote Python program to convert my grandfather's blood pressure data over 6 months into a format he could share easily with his physician

Chemical equation balancer, Independent Project **30 hrs** **10**

- Developed program in Java to balance chemical equations and perform stoichiometry calculations
- Learned to implement basic data structures & algorithms, linear algebra concepts in Java
- Presented a writeup and code to my Pre-AP Chemistry class

Online Machine Learning Coursework, Coursera & DeepLearning.AI **11, 12**

- Convolutional Neural Networks, DeepLearning.AI (ongoing)
- Structuring Machine Learning Projects, DeepLearning.AI (Certificate) **8 hrs**
- Improving Deep Neural Networks, DeepLearning.AI (Certificate) **26 hrs**
- Neural Networks and Deep Learning, DeepLearning.AI (Certificate) **27 hrs**
- Machine Learning, Stanford online (Certificate) **60 hrs**
- Curated meticulous notes on concepts in Markdown/LaTeX using Git version control (GitHub Repository 1, Repository 2)

HONORS AND AWARDS

School Level

- National Merit Commended Scholar **11**
- AP Scholar with Distinction award **11**
- Austin Independent School District Trustee award **10**
- National Honor Society inductee **10, 11, 12**

Science Olympiad **10, 11, 12**

- 6th Wright Stuff, 9th Boomilever, **National** tournament hosted by ASU (11, *Remote*)
- 1st Data Science, 2nd Circuit Lab, 2nd Sounds of Music, **State** tournament hosted by Texas A&M (11, *Remote*)
- 5th Circuit Lab, 14th Sounds of Music, MIT Invitational (2021, *Remote*)
- 5th Boomilever, 5th Wright Stuff, MIT Invitational (2020, *Cambridge, MA*)
- 2nd Circuit Lab, 7th Sounds of Music, Rice University Invitational (2021, *Remote*)
- 6th Boomilever, UPenn Invitational (2020, *Philadelphia, PA*)
- 1st Circuit Lab, UT Austin **Regional** tournament (2021, *Remote*)
- 1st Boomilever, 2nd Wright Stuff, **Regional** tournament hosted by Texas A&M (2020, *San Antonio, TX*)
- 4th Gravity Vehicle, UT Austin Invitational (2021, *Austin, TX)*
- 1st Wright Stuff, 3rd Boomilever, UT Austin Invitational (2020, *Austin, TX*)
- 2nd Circuit Lab, 2nd Sounds of Music, 3rd Solar Power, CyFalls Invitational, (11, *Remote*)
- 1st Wright Stuff, CyFalls Invitational (2020, *Cypress Falls, TX*)

COMMUNITY SERVICE

Front desk volunteer, Chinmaya Mission Austin **3 hrs/wk, 4 wks** **12**

- Operated the temple main desk on Saturday mornings
- Responsible for securing doors/entrances and tending to temple routines

Bookstore database project, Chinmaya Mission Austin **1 hr/wk (ongoing)** **12**

- Communicate with volunteers to architect a system for managing the books via a web app

Event Mentor, Science Olympiad Club, Kealing Middle School **1 hr/wk (ongoing)** **12**

- Mentor students at my middle school's club by sharing study tips and strategies in physics events

Volunteer, Summer Youth Program, Chinmaya Mission Austin **4 hrs/wk, 4 wks** **10th Summer**

- Assisted adult teachers in imparting core values of CMA to young students through interactive activities
- Led younger students in the process of preparing for food drive
- Developed patience in working with younger kids

Greeting cards for Texas Children's Hospital **20 hrs** **11**

- Created and mailed 20 greeting cards for children

Road Cycling for Charity **10 hrs** **11**

- Raised money for American Heart Association using the Charity for Miles app

Judge for Elementary Division projects, Austin Energy Regional Science Fair **11 hrs** **9**

- Judged over 50 projects
- Learnt to communicate with young students effectively

SKILLS

Programming Languages

- **Fluent**: Java, C++, Python, TeX; **Familiar**: GNU Octave, JavaScript, HTML/CSS

Technologies, Tools, and Frameworks

- Git, LaTeX suite, Jupyter Notebooks, TensorFlow, NumPy, Matplotlib, TailwindCSS, ReactJS
- Visual Logic Simulation, SPICE simulation, ARM assembly programming, Unix Shell Configuration and Scripting, Arduino (Sketch programming and development)
- Autodesk Fusion360, 3D printing, rapid prototyping

Languages

- **Speak**: Telugu (mother tongue); **Read/Write/Speak**: English, French

Hobbies

- Road cycling
- Violin **6, 7, 8, 9**