

A researcher newsletter of the Aspiring Scholars Directed Research Program

From the editor

ASDRP's Fall 2023 has been filled with amazing research, community building, learning, and mentorship. We are excited to continue to see our researchers, faculty, staff, parents, and community support each other to do fantastic work. Please enjoy the first issue of Volume 5 of ASPIRE. Thank you all for reading!

December 1
2023
VOL. 5 ISS. 1

ASDRP Holiday Party

SAVE THE DATE

Saturday, December 16, 2023 from 1:00-3:00 PM is the ASDRP Annual Holiday Celebration on campus from 1:00 - 3:00 PM. Parent Volunteers needed! See more information on volunteering in the parent section

Friendsgiving

Here at ASDRP, we have a lot to be grateful for: Our researchers for their enthusiasm and eagerness to learn; our advisors and mentors for their expertise and dedication; our facilities and instruments for making our research possible; parents for all their time and unwavering support; all our donors and staff for making ASDRP possible.



ASPIRE



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This year, we were also graced with visits from some **ASDRP alumni!** (*Images below*)

Emily Dai BASIS '23 [Yamamoto Lab](#)
UC Berkeley Chemistry '27

Spencer Ye Homestead '23 [Njoo Lab](#)
Johns Hopkins CSE '27

Nathaniel Thomas Homestead '23
[Downing / Njoo lab](#)
UCLA Computer Science '27

Shloka Raghavan Amador '23 [Njoo Lab](#)
Santa Clara Chemistry '27

Elena Brierly-Green Palo Alto '23 [Njoo Lab](#)
UCLA Chemistry '27



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SCCUR Conference

[Southern California Conferences for Undergraduate Research \(SCCUR\)](#) is an organization who shares the common goal of improving education for **college and university students** through hands-on experiences of undergraduate research, scholarship, and creative activity. SCCUR supports inquiry-based education, in which students learn while doing, working closely with faculty mentors on significant academic projects and presenting their results to audiences in a professional manner.

The conference has been hosted annually by a local institution, always on the Saturday before Thanksgiving. The 2023 SCCUR took place at Cal State Fullerton and **ASDRP was proud to send 36 research projects with 11 advisors adding up to a staggering 155 researchers!**



(Left to Right) Clinton Cunha, David Linnevers, Harman Brah, Robert Downing and Sahar Jahanikia

Besides the pictured above, the event was chaperoned by the following advisors (Alphabetically): *Akira Yamamoto, Bharat Poudyal, Edward Njoo, Larry McMahan, Michael Amadi, Phil Mui, Vasudha Salgotra.*

ASPIRE



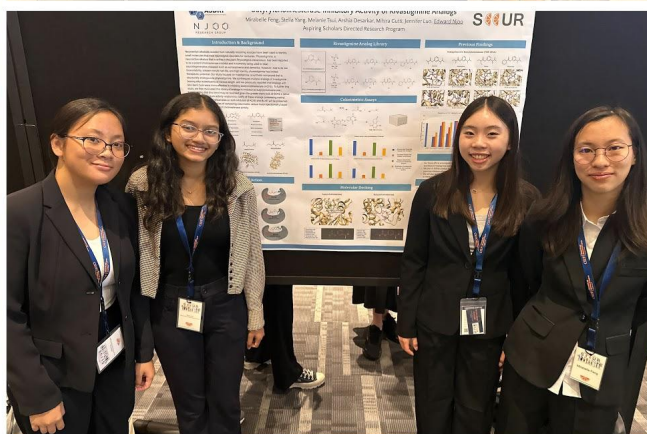
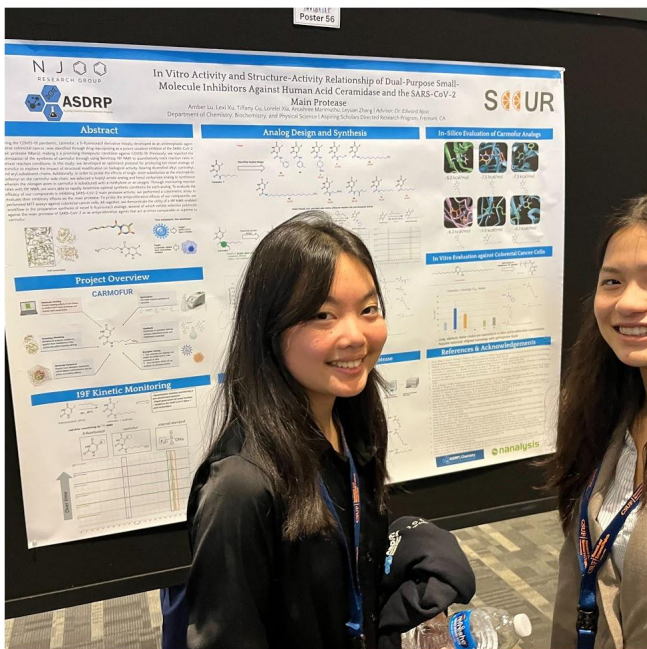
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Visit our SCCUR Photo Gallery

[Go to 2023 SCCUR Gallery on the ASDRP Website!](#)



Publication Shoutouts

A huge congratulations to
all our labs who have
recently published articles!

Outstanding work!

R. Shinha, H. Poosarla, H. Fu, A. Suen, A. Suen, A. Gandhi, V. Lo, L. Avigad, H. Senthikumar (2023) "[Statistical Analysis of Bias in ChatGPT Using Prompt Engineering](#)", International Journal for Research in Applied Science & Engineering Technology.

Falak Chhatre, Sudhanva Deshpande, Sidhant Malik, Grace Yan; Suresh Subramaniam (2023) "[Brain Tumor Detection Using Convolutional Neural Network](#)" in [Volume 12 Issue 2 of the Journal of Student Research - High School Edition](#).



International Journal for Research in Applied Science & Engineering Technology (IJRASET)

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538

Volume 11 Issue VI Jun 2023- Available at www.ijraset.com

Statistical Analysis of Bias in ChatGPT Using Prompt Engineering

Rishi Sinha^{1*}, Hires Poosarla^{1*}, Hayden Fu³, Alexander Suen⁴, Aamod Gandhi⁵, Vincent Lo⁶, Lavi Avigad⁷, Harish Senthikumar⁸, Harshaan Chugh⁹, Karthik Subramanian¹⁰

^{1,2}BASIS Independent Silicon Valley, Mission San Jose High School

^{3, 4, 5, 6}Saratoga High School, Dublin High School, Mission San Jose High School, Evergreen Valley High School

^{7, 8, 9, 10}Amador Valley High School, BASIS Independent Silicon Valley, Bellarmine College Preparatory, American High School



Volume 12 Issue 2 (2023)

Brain Tumor Detection Using Convolutional Neural Network

Falak Chhatre¹, Sudhanva Deshpande², Sidhant Malik², Grace Yan¹ and Suresh Subramaniam[#]

¹Mission San Jose High School

²Monta Vista High School

[#]Advisor

ABSTRACT

Early and accurate diagnosis of brain tumors, a lethal disease caused by the abnormal growth of cells in the brain, is imperative to increase survival rates. A popular method for detection, diagnosis, and treatment is magnetic resonance imaging (MRI) because it is non-invasive and provides high-quality visuals. Unfortunately, analyzing them manually can often be time-consuming and requires medical expertise. Image classification, a subset of computer vision, is a computer's ability to classify and interpret objects within images. It can support a doctor's diagnosis and serve as an entry-level screening system for brain tumors. This study aims to build an accurate machine learning model to predict the existence of brain tumors from magnetic resonance images. We used the Br35H dataset to build two different convolutional neural network (CNN) models: Keras Sequential Model (KSM) and Image Augmentation Model (IAM). First, images from our dataset were preprocessed, augmented, and standardized to improve efficiency and reduce inaccuracies. Then, the data was normalized, and our models were trained. Lastly, aside from the validation accuracy and loss observed while training, we cross-referenced the accuracy of our model using the accuracy validation dataset. Of our two models, the IAM outperformed the KSM. The IAM had a validation accuracy of 97.99% and a validation loss of 4.94% on the Br35H dataset, and a 100% accuracy when classifying MRIs from the accuracy validation dataset.

Guest Speakers Series

Science is a collaborative and interdisciplinary endeavor; it requires diverse fields and perspectives to tackle the most pressing challenges of our time. Thus, we created the *ASDRP Guest Speaker Series*; over the past few months, we have had the privilege of hosting distinguished professionals from diverse disciplines. As we continue this series, we look forward to enriching the ASDRP experience and further fostering a culture of intellectual curiosity.



Prof. Ho Leung Ng, PhD

Hexagon Bio

Director, Computational Chemistry

Kansas State University

Adj. Associate Professor of Chemistry

“Artificial-Intelligence Driven Drug Discovery”

Dr. Ng is the Director of Computational Chemistry at Hexagon Bio, a leading biotech company working in drug discovery. Dr. Ng is also the founder of Rise Bio, a startup working on **AI drug discovery for drug-resistant breast cancer**. Previously, Dr. Ng was a Principal Scientist at Atomwise, a leading AI drug discovery company. He spent most of his career in academia, as a professor of biochemistry at Kansas State University and professor of chemistry at the University of Hawaii. Dr. Ng completed his B.A. at **Harvard**,

PhD at **UCLA**, and postdoc at **UC Berkeley**.

Professor Ng gave an overview of the use of machine learning in computational drug discovery chemistry, and discussed the use of **machine learning in computational drug discovery** and generating new molecules for drug discovery. These new AI tools allow researchers to more deeply explore chemical space and accelerate the entire drug discovery process.



Morgan Richards

ValleyDAO

Product and Tokenomics

Co-Founder

"Unlocking the Future with Synthetic Biology"

Morgan is an early career scientist, driven by a deep desire to make lasting change on the world. Having originally set his sights on becoming a veterinarian, he spent most of his free time in his teens working with animals and environmental conservation. This connection with nature, inevitably, meant that recent developments or lack thereof in **climate and sustainability** were deeply upsetting. This raised the question, how can he maximize his impact? Taking this passion for the natural world forward, he dove headfirst into biology where he became fascinated by the potential to leverage nature's own language to save it.

Completing an undergraduate in **Microbiology** at the **University of Liverpool**, followed by an **MRes in Systems and Synthetic Biology**, he set about to gain a deeper understanding of the world around him and how he could play his part in preserving it. This eventually led him to join ValleyDAO in November 2022 as a co-founder where he began building out a **global community of passionate climate synthetic biologists**. He now leads Product and Tokenomics for ValleyDAO and is heavily involved in the **Decentralized Science movement**.

ValleyDAO accelerates the development of new technologies in Synthetic Biology through:

- Funding & supporting translational research
- Incubating technologies into climate solutions
- Building global scientific communities



ValleyDAO



Jafar Orangi, Ph.D.

Amprius Technologies

Sr Process Engineer

“Advances in materials synthesis, development and applications, with a particular focus on the cutting-edge field of two-dimensional (2D) as the building block of three-dimensional (3D) ordered structure.”

Dr. Orangi holds a Doctor of Philosophy (PhD), Materials Science and Engineering from **Auburn University's**, Samuel Ginn College of Engineering.

During his talk, Dr. Orangi provided a perspective on the latest progress in the development and application of **material synthesis**, with a special emphasis on the innovative domain of two-dimensional (2D) materials that serve as the foundation for three-dimensional (3D) structured assemblies. Dr. Orangi delved into the

innovative applications and potential breakthroughs that 2D materials, in part MXene family of materials, offers in **energy storage technologies**. ASDRP members had the opportunity to join him as he uncovered the incredible properties and promising prospects of this **nanomaterial**, paving the way for a future of enhanced efficient energy storage solutions. He took us on a journey into the realm of materials science that has the potential to revolutionize various industries toward a more **efficient and sustainable future**.

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Jimmy J. Qian

*COO, Osmind Public Benefit Company
President*

**“Frontiers in neuropsychiatry inflection points
in neuroscience and mental health research”**

Jimmy J. Qian received his MS in Biochemistry and BA in Biophysics from the **University of Pennsylvania as a Vagelos Scholar**, and his postgraduate studies at Stanford Medical School. Following this Jimmy was part of the **founding leadership at ASDRP**, where he served as the Director of Admissions from 2018-2020.

In 2020, Jimmy was the co-founder at Osmind Public Benefit Company, which is pioneering new directions in using artificial intelligence and machine learning to

streamline and **improve mental health treatments**, including software which can be used real time by physicians for prescribing anti-depression medications. Jimmy has been featured on [Medium](#) and on [Forbes](#), and is featured on the [2022 list of Forbes' 30 under 30](#).

Jimmy shared the new insight on the story of Osmind, and how **AI, computer science, neuroscience, psychiatry, and medicine** have converged in their most recent research.



Kin Chan, PhD

Simpson Interventions

Co-Founder; Chief Technology Officer

**“A Novel Image-Guided Catheter for Percutaneous
Coronary Intervention of Chronic Total Occlusions”**



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For the Parents

Are you a parent interested in joining us as a research advisor?

Email a CV to asdrp.admin@asdrp.org!

Required: Must be enthusiastic about research and about mentoring teenagers; Graduate degree (Master's or PhD) with extensive academic or industry research background; Submit a CV with a list of research experiences, publications, patents, etc. "Scientist-mentor" - This is who we are looking for.

Join Us at the ASDRP Parent Fireside Chat in Zoom!

Every 2 weeks on Wednesday. (Next: December, 13, Then: December, 27 and so on!)

<https://us06web.zoom.us/j/86896953073?pwd=a2pNc0d5WmhNbzMmRXVXclJ2eXlLQT09>

Meeting ID: 868 9695 3073 Passcode: 211534

Parent Slack Workspace

Be sure you join the ASDRP Fall 2023 Parent Slack workspace (download the app). Email asdrp.admin@asdrp.org and we will add you and this is the only way you can be a part of the Parent Carpool channel. Stay up to date and get the latest news and announcements - fast!

Parent Volunteers

We have volunteer opportunities available! Our next volunteer opportunity will be helping set up and facilitate our ASDRP Holiday Celebration on **Saturday, December 16 from 12:30-3:30pm**. We need volunteers to help BBQ, set up, arrange the seminar room and help make the party fun for everyone. Email david.linnevers@asdrp.org if you want to join in the volunteer fun!



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Donate to ASDRP!

As a non-profit our ability to create opportunities for aspiring scholars depends on the generosity of our community and industry donors. We sincerely thank all donors for their generous contributions.

We have more information about ways to donate, equipment needs, conference travel and more. If you would like to learn more, please email asdrp.admin@asdrp.org and send you the full details of our 2023-2024 donation campaign.

ASDRP accepts donations from community members, parents, and alumni. The link below to access the PayPal donation page. All donations are tax-deductible, and you will receive a donation receipt by email.

[Donate to ASDRP](#)

We have received over \$50,000 in donations. We are well on our way in reaching our goal of \$400,000 by June 2024. Thank you!

Visit asdrp.org/donate for more information about how to support us!

Connect with ASDRP!

Find us on [LinkedIn](#) [Instagram](#) [Facebook](#) [Twitter](#) [YouTube](#) [Website](#)