**TIMESTEP 2024 Summer Tech Internship Symposium**
**University of Arizona, Steward Observatory**
**933 N. Cherry Avenue, Tucson, AZ 85719**
**Wednesday, September 4, 2024 ✦ 5:00 - 7:30 pm**




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**Agenda**

5:00 - 5:30 Check-in, catered reception in the west courtyard outside Steward Observatory, room N210

5:30 - 5:45 Welcome by Rebecca Lipson and Dr. Gurtina Besla
Join remotely at 5:30 at https://arizona.zoom.us/j/82615759625

5:45 – 6:20 Keynote Address by Dr. Erika Hamden, Director of the Arizona Space Institute

6:20 - 6:30 Move to breakout rooms for student presentations

6:30 - 7:30 Student presentations- see project summaries below

| **Room N210- Vikram & Rebecca** https://arizona.zoom.us/j/82615759625 | **Room 204- Erik & Meredith** https://arizona.zoom.us/j/5073648758 | **Room 208- Christa & Christian** https://arizona.zoom.us/j/83934770937 |
|---|---|---|
| Isabella Olin | Drishikaa Thimmaiah | Aakanksha Adya |
| Keenan Fiedler | Justin Klingele | Namit Chandak |
| Taylor Kalish | Jessica Gurney | Gabe Barros |
| Suhani Surana | Diego Torres-Barajas | Ava Doty |
| Simon Ngandu | Shashank Verma | Drew Stonestrom |
| Suraj Bharaj | Eason Wang | Pranav Chiploonkar |
| Jonah Lotz | Adeline Tai | Andres Silva-Castellanos |
| Christian Burt | Reid Grotevant | |

**Kindly RSVP here**

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**Thank you to the following for their support of the 2024 program!**

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THE UNIVERSITY OF ARIZONA RESEARCH, INNOVATION & IMPACT Societal Impact

Student Engagement & Career Development

Space Institute

**Steward Observatory, Room 210**
**Graduate Coordinator: Vikram Manikantan**



**Isabella Olin**
**NOIR Lab's Astro Data Lab** is dedicated to making catalogs from large astronomical surveys accessible to the public and hosting a science platform that teaches users how to implement these data sets across many research topics. Working with my mentor Stephanie Juneau, I created a Jupyter Notebook to be added to the Data Lab's public Science Examples collection. This notebook displays the application of the Cosmic Slime Value Added Catalog and SDSS spectra to investigate the relationship between galaxy quenching (the process by which galaxies stop forming stars) and environment (matter density). Through this process, I developed my ability to visualize data, develop code, analyze spectra, and use git for version control.



**Keenan Fiedler**
**NOIRLab Astro Data Lab** is a section of NOIRLab dedicated to centralizing astronomy data for the scientific community, and providing science examples for further research. There, I created a new Github workflow to automate a time-consuming and recurring task: converting new and updated Jupyter Notebook science examples to HTML format for easy previewing.. Using Github actions, I successfully automated this process. I also completed a research project using machine learning to study the torus of dust around active galactic nuclei (AGN). I found a range of model parameters that will reproduce realistic AGN data.



**Taylor Kalish**
As a software engineering intern for **NOIRLab's Community Science and Data Center** (CSDC), I helped migrate repositories from GitHub to GitLab by setting up code mirroring between the two platforms. I was then able to build continuous integration (CI) pipelines in GitLab that automatically run tests and check code formatting every time changes are made. These CI pipelines will help maintain code quality and readability, and make sure all unit tests run properly before changes are committed.



**Suhani Surana**
**Airth.io** is a software company dedicated to AI driven solutions to revolutionize the mining industry. I worked on the machine learning side of things where I developed adaptive/generic ML algorithms to make inferences over any custom datasets. This also included complex visualizations for data containing multiple features. My interactive ML algorithm development study includes algorithms for both supervised and unsupervised data. After having worked on the individual algorithms catering to the mining data, my work included parametrizing all these algorithms for general datasets including pre/post processes.



**Simon Ngandu**

At **Leonardo Electronics** I wrote a python program that analyzes data collected from experiments. I ran simulations of specific circuits to understand the behavior of the components in the circuit. I also worked on a LiDAR project.



**Surajinder Bharaj**

**Securaplane Technologies Inc.** is a leading supplier of avionics products for various aircraft, focusing on innovative safety and security solutions. This summer, I contributed to the further development of the Modular Automatic Camera Focusing System (MACFS), aimed at improving the focusing capabilities of their CMX and CDSS camera systems. My work involved redesigning mechanical components and streamlining the electrical system, enhancing both functionality and user experience. The project not only addresses customer feedback but also reinforces Securaplane's commitment to advancing aviation safety standards.



**Jonah Lotz**

At **Madden Media** I conducted the full breadth of visitation analysis for a specific destination, transforming raw data into actionable insights through an interactive dashboard. I then developed personas and delivered a strategic presentation to showcase key insights and proposed marketing strategies, demonstrating proficiency across the data lifecycle. I developed a web app to automate the creation of 'Study Geos' for area-based data processing, reducing the process from hours to minutes. To do this, I utilized Python and web technologies (Flask, CSS, JavaScript, HTML) to streamline a traditionally manual task into a quick and efficient workflow.



**Christian Burt**

During my internship with **Lightsense Technology Inc.**, I was tasked with organizing the company files in an intuitive manner for the employees. To this end, I first created a part number system to identify all the components used in the development of the spectrometer. In addition, I chose to automate this process, so that part number creation, file manipulation, and more can be done with a few clicks of the mouse. Employees are now able to access a GUI made using the Tkinter library in Python to perform these tasks. I had an incredible time working at Lightsense, and I am excited about the prospect of working with them in the future.

**Steward Observatory, Room 204**
**Graduate Coordinators: Erik Wessel & Meredith Stone**



**Drishikaa Thimmaiah**

At **Paramium Technologies**, a startup working in dish antenna manufacturing, I had the opportunity to work on various projects contributing to their goals. Key in them were programming features for a robotic arm such as motion restrictions for it and a safety light. These features ensure safe usage of the robotic arm, avoiding damage to its wiring and the light allowing the operator to be aware of its state. Other projects I worked on contributed to outreach for the company. I programmed a raspberry pi model robot to demonstrate the usage of the robotic arm at outreach events, and utilized VFX to place a 3D animation of a dish antenna in a video of potential locations for Paramium's new ground station as a service program.



**Justin Klingele**

While at **Paramium Technologies,** I primarily worked on designing and constructing a small scale test article / technology demonstration for their adjustable mold system. I also led the research, quote acquisition, and preliminary setup for an industrial laser cutter to be used for rapid prototyping. Much of my time was also spent helping other employees with the assembly of their current full-scale adjustable mold and on various other lab tasks.



**Jessica Gurney**

**FreeFall Aerospace** is a company developing revolutionary spherical reflectors for space and ground based antenna systems. During my internship I was involved in helping with the dual feed antenna system being developed for the company SES. First, I had to learn how antenna's worked so that I could develop a testing proposal for the system. I learned that waves could have different polarizations, and the antenna's horn design determines which type of waves can enter into the device. The waves travel through the electronics which filter the needed information and that gets sent to the user. All antenna's need to be tested at a range to see if their radiation pattern meets specs. After writing a testing proposal I got to see how the antenna was fitted together. I got to study the solidworks files, help create assembly sheets, and see how some of the parts came together in the shop. Overall it was neat to see the development of antennas systems, and understand the purpose of each little part.



**Diego Torres-Barajas**

At **Fringe Metrology,** I have designed and tested hardware with potential uses for metrology systems to measure objects many meters in diameter. The tool I used is an FMCW LiDAR, and I not only tested (and pushed) its limits to determine and improve its characteristics, but also I designed and analyzed optical systems to build a prototype of a rapid-scanning metrology solution.



**Shashank Verma**

I worked with **Fringe Metrology**, a company specializing in innovative surface measurement systems, particularly for radio telescope panels, to develop a dual-camera system for measuring radio dish flatness. I handled the hardware setup, synchronized Blackfly S cameras with Arduino, and developed MATLAB software for precise image analysis. My work involved camera calibration, laser dot analysis, and extensive testing to ensure accuracy. This prototype aimed to advance an SBIR grant by providing a scalable, accurate solution for surface measurements.



**Eason Wang**

My main project this summer at **Fringe Metrology** was to improve the software component for their precision measurement routine, which turns stereo camera images into millions of 3D points showing how smooth a surface is. My algorithm utilizes a computer vision concept called epipolar geometry to match pixels in both cameras efficiently and accurately, giving measurements with micrometer-level precision. I was also able to utilize GPUs in my programming to further increase the computing speed.



**Adeline Tai**

During my internship at **Tucson Optical Research Corporation (TORC)**, I focused on fabricating lenses with different materials and thicknesses to gain hands-on experience in the optical manufacturing process. I participated in every step, from generating to grinding, polishing, and testing the lenses.



**Reid Grotevant**
At **Ampcera** I participated in multiple projects to support the battery research they perform. My main project was screening cathode materials to evaluate performance at different charging rates. The second project I completed was designing and machining acrylic molds to assist in the production of pouch cell batteries. I also assisted with various other tasks around the research lab.

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**Steward Observatory, Room 208**
**Graduate Coordinators: Christa DeCoursey & Christian Cooper**

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**Aakanksha Adya**
The goal of my project with **NeuroVRD** was to understand the current market for FDA-approved AI/ML medical devices by analyzing the relevant characteristics of the companies that produce these products. This included creating a market research plan to outline the research process and consolidate all collected information in a large spreadsheet database. After collecting general company information (such as the size and age of the companies) and financial information (such as revenue and profit information), I analyzed the data within the spreadsheet to determine important statistics that would provide an overview of the current market, such as the average FDA approval process time; I then presented this information in a formal presentation to company stakeholders. This information provided a foundation upon which, with access to more resources, further investigation will be done by NeuroVRD.



**Namit Chandak**
My project at **Kitship** involved me consolidating tools to help them develop their pro-connection technology. I worked with the founders, to create a website and mobile application design. I conducted market research for them, looking at competitors and their products, and their place in the market. These would then go on to use to build their website and mobile application and help Kitship launch their product in about 2025.



**Gabriel Barros**

**OppsSpot, LLC.** is a technology consulting company, specializing in assisting small tech companies secure government funding in order to commercialize their product. This summer, I was tasked with developing and expanding a web application used to organize and visualize OppsSpot's company data. This application is written in TypeScript and utilizes libraries such as React and Next.js. Overall, the project enhances OppsSpot's technical capabilities and efficiency as a company.



**Ava Doty**

**Ampcera, Inc.** is an innovator in high performance solid-state electrolyte materials and technology for next-gen lithium batteries. In my first project at Ampcera, I established a protocol for exploring new material formulations to potentially be used in scaled production. I experimented with a variety of element combinations and ratios. My second project examined the bulk ionic conductivity of two materials already used in scaled production, with the goal of maximizing bulk ionic conductivity.



**Drew Stonestrom**

**Ampcera, Inc.** creates materials for next-generation lithium batteries that enable power hungry, innovative technologies to succeed. My responsibility was to create professional, educational materials in order to create relationships with investors and development partners and to track those relationships to ensure company growth. My day to day work involved finding relevant information to include while building presentations as well as recording the status of ongoing business transactions.



**Pranav Chiploonkar**

At **Clear Core**, I was responsible for researching, testing, and deploying a Large Language Model (LLM) integrated with the existing ArangoDB querying infrastructure, alongside a Node.js front-end. My internship involved conducting a feasibility study of LLM technology in the financial reporting sector, demonstrated through proof-of-concept demos coded in Python. OpenAI's GPT-4o model and SDK were selected for implementation.



**Andres Silva-Castellanos**

In my time as an intern at **Clear Core**, I developed an account page for the company's latest product. This way, customers could easily sign up, change their subscriptions, see plan details, and manage payment methods. I used HTML, CSS, Node.js, and a payment gate API to make the customer experience fully automatic, saving time for both the company and the customer. Clear Core's FIVue product allows customers to query large amounts of cleaned data in order to make informed decisions for their institutions.

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**Not present**

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**Animesh Garg**

At **Tucson Optical Research Corporation (TORC)** I made flat lenses to be used at the Keck observatory. In this process I learnt the basics of manufacturing glass and coring it with efficiency and accuracy. This developed further into understanding the process of grinding and polishing. My experience effectively taught me the entire process of glass manufacturing and about the types of glass that can be used.