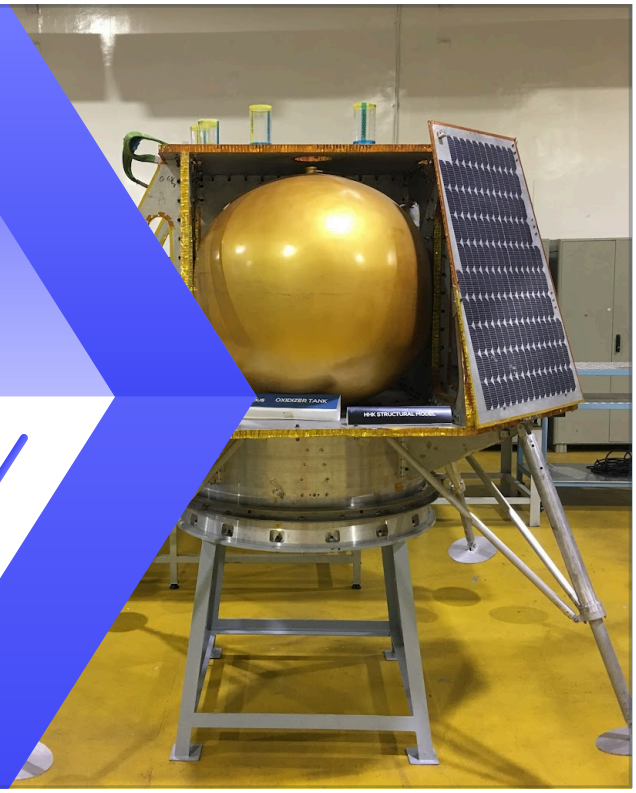
Jaahnavi M

AXIOM RESEARCH LABS

Team Indus

Why Axiom Research Labs

- Career aspirations
- Learning expectations
- Why Team Indus
- Applying for Internship



- This company is extremely relevant to my career aspirations. I've always wanted to do physics research work, and this company offers me the opportunity to do just that. They focus on real application-based research, which aligns perfectly with my interests in physics.
- Firstly, I'll hoped to understand what it's like to work in a real research environment. Additionally, after I got to read the materials given to me, I relaised the work going on here is too advanced for me. So I expected more of a learning experience where I'll gain in-depth knowledge about these areas of physics and their practical applications.
-I found this internship through networking. I connected with an alumni's dad - Kavya's dad, to be specific. The process was pretty straightforward. I wrote an email to him and included my resume. I didn't write a separate cover letter. After reviewing my information, he gave me a start date and provided some reading material about satellites and guidance and navigation to prepare me for the internship.
- I chose this company because they're very open to interns, which is great for someone like me who's looking to gain experience. Also, their focus on real application-based research really interests me. It's exactly the kind of work I want to be involved in.
There were other interns who were mostly graduate students working on their own projects like helium powered satellites for instance under the guidance of the people here.

About Team Indus

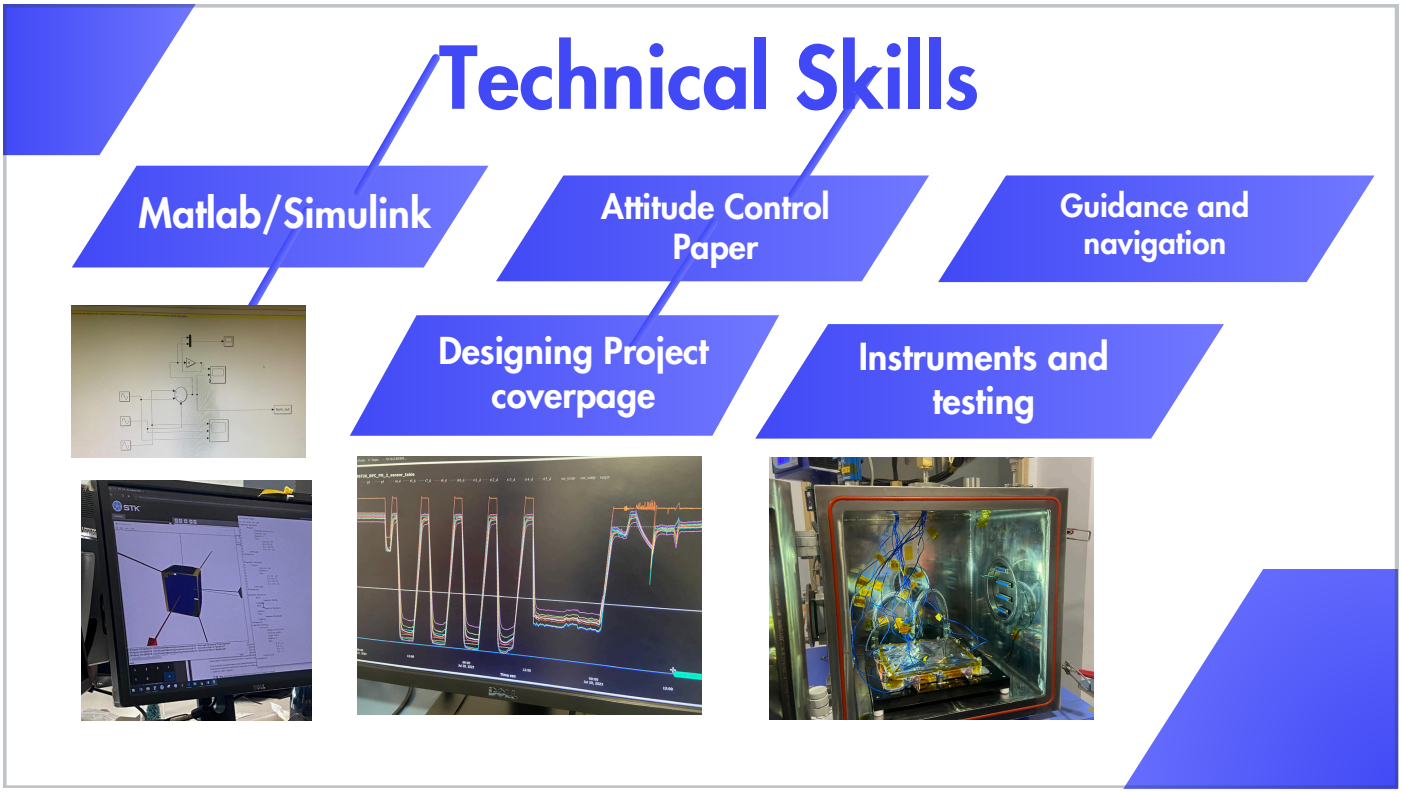
- Industrial role
- Work/ projects undertaken
- My team and Mentoring

-Axiom Research Labs was established in 2010 to compete for the Google Lunar X Prize, and the following year it registered its team as TeamIndus. What started as a group of researchers working towards developing and launching their lunar rover mission sometime in 2020 became a company dedicated to designing a lunar lander and two rovers with minimal cost and efficient systems. They plan for the two rovers to be deployed together, which have a combined total mass of approximately 15 kilograms.
There is ongoing research into this field funded by America's Star Ops and OrbitBeyond. Their main domains include Space Research and Technology, Support Activities for Air Transportation, Public Administration
- clients can be university faculty for research satellites or communication companies requiring telecom satellites.
- each project undertaken is distributed into their teams:
The guidance and navigation team works to chart out the course of the satellite based on clients requirements then the thermal engineering and software team works on different aspects of each mission.
Each satellite is a culmination of the efforts of each team with each team member playing a significant role in the project. Their main aim is to make the satellites fuel efficient and affordable, which is why there is much research on materials and thrusters done here.
- I was part of the GNC team.
I was mentored by Shilpee Prasaad, who was in charge of the assignment of my tasks and helped me understand what I as a high school student can do. 2 other employees part of the team JOY and Rehan also supported and helped me navigate through my work.

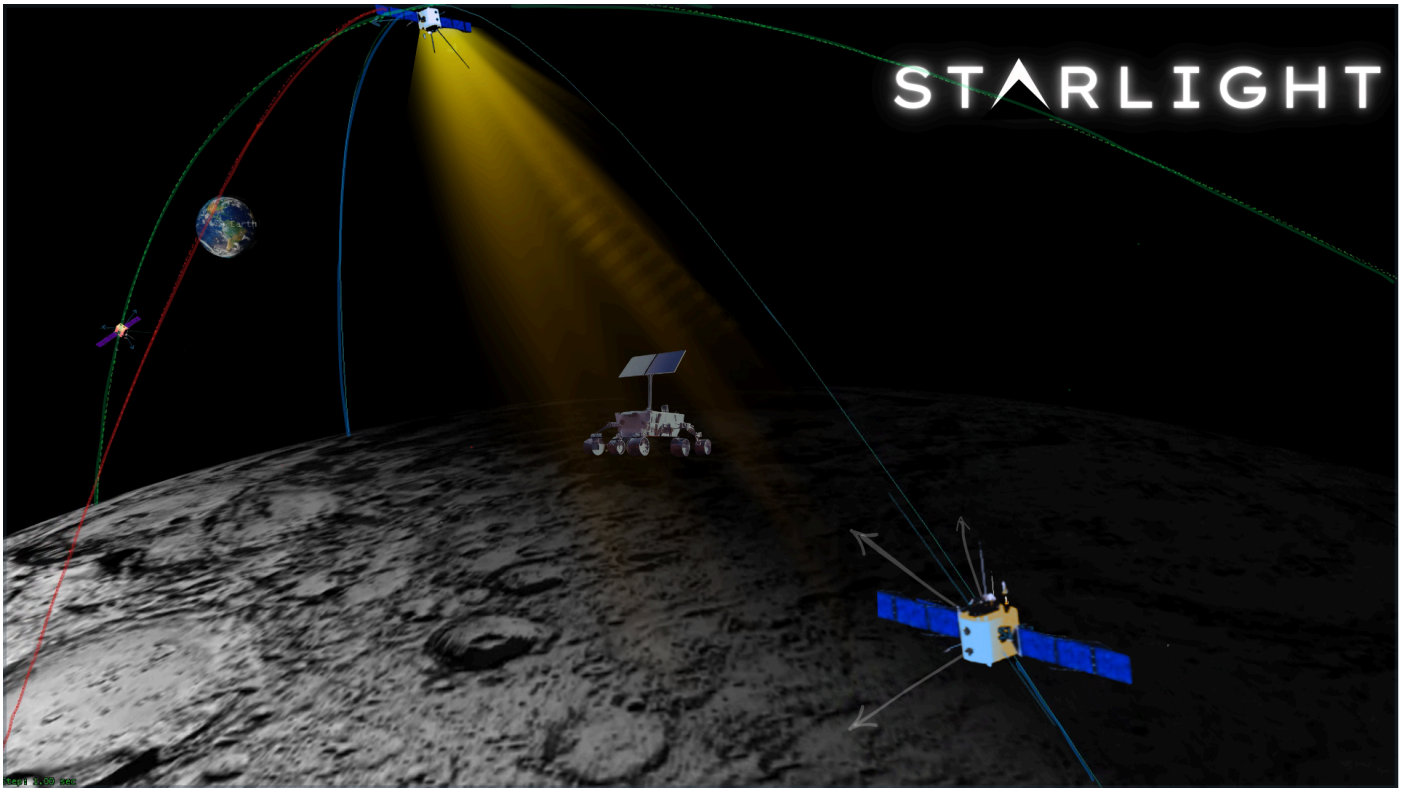
My role- Expectations and Preparations

- Office Timings- 9:00 am - 4:30 pm
- Attire, commute and food
- 250 hours of work- online and offline
- Icecream, badminton,office space and discussions.

attire- office formals
commute BMTC bus: I walked to the Bellandur bus stop and took a bus usually 7:30 am in the morning to go to Kalyan Nagar bus stop. From there I took an auto to the office and would usually reach on time.
Coming back was the same procedure. Getting the bus on time was an issue. Transport would take almost 2 hours on the way back.
- I carried home food like everyone at office and we ate it during lunch break. This was my favorite time since I was quick to gel with all the people from diverse research backgrounds and age groups at work.
- After lunch sometimes we would go for ice cream to the shop below.
The office space was very worker-friendly with carrom boards and chess board games. Whenever calculations became difficult or a roadblock was faced people would take a break and play badminton in office. This is one thing I loved the most about being here.
I met with like-minded people and spoke about my interest in theoretical physics and was overjoyed to be met with an enthusiastic response. One day at lunch I was talking about my antimatter paper and they all read it and came back to me with feedback.
It was intellectually stimulating environment to work in.



- Initially, in the first few visits to the office I explored MAT lab and SIMULINK applications. These are standard tools for understanding the technical processes behind any engineering process.
I undertook a course that involved learning complex functions like LAPLACE and transform functions that I used to solve a few questions that were assigned to me. these mainly involved converting first-order systems to second-order systems which are essential for engineering and system dynamics.
- I looked at testing facilities that emulate space situations by using thermocouples and state changing materials to subject the equipment/ thrusters to face the harsh situations in space. I understood how to read their graphs and their test filing system.
- I worked as part of the GNC team and I understood their work and how they construct orbits and relay information to each team as per the
- I helped design a cover page for Starlight- one of their lunar missions
- I am currently working on an article to be published on a student reviewed journal website to share my research experience and collate the knowledge I have gathered through working here at Star Ops. Being part of the guidance and navigating team, My paper will highlight the significance of the attitude control system and provide a brief overview to high school students.



Utilized animations and simulations to help design a cover for the company’s mission of landing a rover that uses solar panels on the dark side

Significance of Attitude Control and Control Systems in Satellites

Jaahnavi Maheshwari

Star Ops Team

Abstract

This literature paper briefly overviews major topics concerning attitude control systems in satellites. This paper introduces these topics by highlighting the significance of these mechanisms, before elaborating on the physics principles behind attitude dynamics and the need for recovery strategies through control systems.

This paper, produced after analysing scholarly articles and incorporating first-hand research of professionals working in this stream, underscores the need for these robust control systems for precise satellite pointing and stabilisation in our daily lives to an audience interested in knowing the basics behind this phenomenon.

In conclusion, this review demonstrates the vital role of attitude control systems in satellite missions and suggests avenues for future research to enhance satellite performance and mission success.

link

- Meeting discussion I attended: Calculated satellite attitudes (orientation) and torque (rotational forces) to counteract the torque caused by pawning of solar panels in satellites
-The Thermodynamic engineers, I discovered, play a vital role in managing the satellite's temperature in the extreme conditions of space. They design systems to prevent overheating or freezing of critical components. On the other hand, software engineers are responsible for developing and maintaining the complex programs that control the satellite's functions, from data processing to communication systems.
Observing these distinct yet interconnected roles helped me understand the multidisciplinary nature of satellite engineering. It also allowed me to reflect on my own interests and strengths.

Lessons Learnt

-I learned that most of my work required me to go around and ask questions to different people in various teams, like the thermocouple team or the actuators and thrusters team. This was crucial because everyone has different specializations, and I needed to tap into their diverse knowledge.
-During my internship, I learned valuable lessons about when to take breaks and how to work without distractions. This helped me manage my time and energy more effectively.
-One of the biggest lessons I learned is that even in a professional setting, no single person has all the answers. This realization highlighted the importance of collaboration and continuous learning in the field.
- I discovered that reading and research are incredibly important in this field. In fact, I spent almost a week just researching before doing any practical work.

Other Internships (Online)

I love Mondays
~100 hours

In Grades 9-10, I wanted to figure out what I wanted to do so I joined I Love Mondays Internships.
I did 3 internships under them in design, writing and public speaking.

Vidbazaar

Company

~ Design Creative PowerPoint & Canva Multi Product Ad Templates for Branding. ~ VidBazaar is the founded by Partha Bhattacharya.

~ specializes in bespoke and innovative video ads, animated product display, brand building, visual identities and social media ads design.

My role

- helped make templates for given topics- social media posts regarding clothing brand office work presentations, and educational templates
- Learned to animate using PowerPoint

Online
3 weeks
15 hours

Worked under Partha bhattacharya- founder CEO

During the pandemic, I worked in making presentation templates to assist with the disruptions caused by the switch to digital platforms.

Reena D'souza Talk Show

About Reena D'souza show

The Reena D'Souza Show is a sports based talk show which focuses on bringing out the untold stories from sports personalities' lives. This is the first ever sports based talk show on YouTube & Indigo 91.9 FM which focuses all sports. Reena D'Souza is the first ever sports presenter from Karnataka, India to take up this initiative.

My work

Created research briefs for the Reena D'souza Talk Show.
I developed the script for the interview with cricketer Venkatesh Prasad: In Breif with Venkatesh Prasad and questions for the interview.

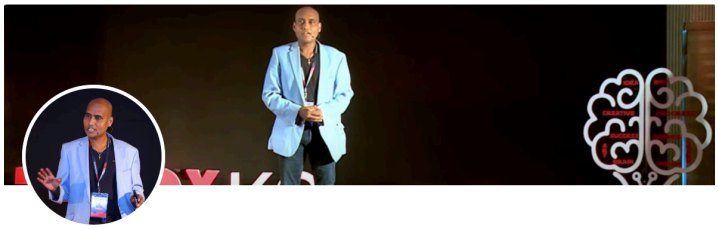
Online
1.5 weeks
6 hours

Worked with Reena maam to understand her requiremnts and expectations

Deepak Justin- Book research

Online
2 weeks
16 hours

Worked with Deepak sir to understand his requiremnts and expectations



Deepak Justin (CEO, deejays Inner Circle)
Corporate Trainer, Motivational Speaker
Award-winning speaker, Trainer, 5 times TEDx Speaker, Motivational Speaker, LinkedIn top Public Speaking voice who powered 1000s of individuals and 100s of organizations to reap the rewards that come from empowerment

deejays Inner Circle

Loyola College

My work for Deejays Inner Circle

- Researched the Greek origins of Public speaking to be utilised as content for Public Speaker, Deepak Justin's Book on Speech and Articulation.

Research for DEEPAK SIR, Greek Orators Research and Education In Greece and Public Speaking- DJ sir

- Wrote and edited small versions of a child's POV for his book
- Helped send out and create surveys to analyse what aspects of public speaking do most people struggle with for him to address in his book on public speaking and articulation