

## S. Shailja — Mentorship Statement

**Contact:** shailja@ucsb.edu, <https://web.ece.ucsb.edu/shailja/>.

**Background:** *I am a PhD candidate in Electrical and Computer Engineering at the University of California, Santa Barbara (UCSB). I have been honored as an NSF iRedefine fellow for my leadership and research potential. Throughout my academic career, I have actively sought out opportunities to mentor and support students in the field. As a volunteer mentor for the American Association of University Women program and Research Mentorship Program at UCSB, I have gained valuable experience in mentoring and supporting students at various stages of their academic journeys. As a graduate researcher in the ECE Department, I have taken on a leadership role in mentoring and motivating undergraduate and high school students to pursue research. Over the course of my PhD program, I have had the privilege of mentoring 5 pre-college program students, 4 undergraduate students, and 1 master's student.*

### **Reflections on Mentorship: How Mentoring Has Shaped My Academic Journey**

Through my mentorship, I aim to identify the individual needs of students at different levels (with little or no previous research experience), from master's to pre-college programs, and create a collaborative learning environment. My goal is to inspire and empower the next generation of researchers to solve research problems related to complex neurological disorders. While I regularly meet with my mentees, I also prioritize defining boundaries and allowing them to develop independent research skills. I have adopted the approach of asking my mentees bigger-picture questions about their research goals and the potential impact of their work for social good.

### **The Role of Mentorship in My Education**

I work in Vision Research Lab under the guidance of Prof. B. S. Manjunath. When I first joined the lab, I was mentored by two senior graduate students (Po-Yu Kao and Angela Zhang) who helped me develop my research skills and provided valuable guidance as I worked on my own research projects. Inspired by their mentorship and my vision of better learning in collaborative environment, I decided to become a mentor myself and have since worked extensively with students from pre-college to master's program. With their support, I have been able to pursue independent research and hone my skills as a researcher.

My own research focuses on developing mathematical tools to model neuronal fibers in the brain using advanced imaging techniques like diffusion tensor imaging. By representing these fibers as geometrical objects in three-dimensional space, my research aims to provide a more comprehensive and quantitative understanding of the complex interactions between different brain regions. When Vikram Bhagavatula approached me for mentorship, I had just completed the first part of my thesis work, which involved modeling the neuronal fibers as a graph. He came on board to work on the second part, which was to match the graph models and quantify the difference between them. Together, we brainstormed and developed a novel approach for quantifying topological changes in brain. Vikram implemented the algorithm from scratch and his contributions were incredibly helpful in advancing our research. Our collaborative work resulted in a co-authored paper that we submitted to a high-impact journal, IEEE Transactions on Medical Imaging, which is currently in the final stage. In plain words, "*Vikram developed the code that can help compare two brains*".

Vikram's work has helped me conclude my PhD thesis.

I would like to add that Vikram is an excellent coder and very systematic in his work. I have learned from his coding style and incorporated it into my own work. Vikram will be studying computer vision at CMU. It has been rewarding to watch my mentees develop research skills and become independent in the lab, pursuing their own ideas and continuing their research careers in graduate school.

During my graduate school, I became aware of the gender biases in scientific publishing and the underrepresentation of women role models in STEM. This leads to a high attrition rate of women in STEM. To address this issue, I sought mentorship from women professors (Lilla Zöllei from Harvard University) in my field and participated in the MICCAI student board. Similarly as a way to give back, I mentor high-school and undergraduate women, participating in workshops such as Women in Machine Learning (WiML) at NeurIPS. These experiences helped me establish a peer network and develop my mentoring skills while promoting diversity and inclusion in ECE. As one of the few women graduate researchers in the ECE Department at UCSB, I volunteer to mentor women in STEM and motivate them to pursue research. Out of the 10 students I mentored in four years, 7 were women researchers. Recently, I have been mentoring Krithika Thanigaivelan, along with Vikram, towards submitting a clinical paper to a high-impact neurosurgery journal. They are developing an AI method to diagnose Normal Pressure Hydrocephalus in the aging brain and have developed a web interface for easy diagnosis using CT scans. According to Dr. Chen who is a neurosurgeon collaborating with us, "Shailja and her group has demonstrated great insight and initiative into the development of the machine learning algorithms for the quantitative studies of cerebrospinal fluid volumes in normal pressure hydrocephalus, a neurodegenerative disorder affecting nearing 700,000 people in the US. These novel and innovative studies have great potential in helping us to better understand this disorder and develop effective treatment paradigms." I love to expand my research and showcase the application of AI methods in diverse fields, and my mentees have helped me achieve that vision.

Besides academia, mentorship has allowed me to cultivate compassion and understanding, while developing important soft skills such as flexibility, attentiveness, and active listening to the fresh ideas brought to the table by my mentees. Mentorship has provided me with valuable experience in project management, team motivation, and meeting research expectations. It has helped me develop skills in balancing these responsibilities while ensuring the success of the research project.

### **Future Career Aspirations**

Mentorship is crucial for me and has motivated me to pursue a career in academia. I'm excited to pursue research and mentor students as a faculty member. I aim to train an interdisciplinary and diverse team of researchers working together to address fundamental problems at the intersection of computer vision and computational geometry theory for neuroscience applications. To achieve this, I will collaborate with scientists, such as neurosurgeons and biologists, as well as engineers, including MRI engineers and software developers. My experience in mentoring at UCSB has provided me with a headstart that will enable me to scale up my mentoring skills. Over the past four years, I have been fortunate to work with outstanding undergraduates and hope to have made a positive impact on them.