

ARYAN YAMINI SENTHIL

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RESEARCH INTERESTS

Deep Learning • Reinforcement Learning (Agents) • Multimodal AI

EDUCATION

B.S. Engineering Physics

Expected: Dec 2025

The University of Oklahoma | Norman, OK | Curriculum GPA: 3.4

RESEARCH EXPERIENCE

Undergraduate Research Assistant | University of Oklahoma

May 2022 – September 2024, August 2025 - Present

Advisor: Dr. Mrinal Saha; Postdoctoral Mentor: Dr. Kuntal Maity

- Conducted experimental research on **smart materials** exhibiting **flexoelectric, piezoelectric, and pyroelectric properties**, investigating their **electrical response to mechanical and thermal stimuli** and applying **deep learning to analyze and predict these responses**, leading to a publication.
- Designed and fabricated **smart sensors** using **silica-based polymers** integrated with these **smart materials** to capture and characterize their **electromechanical behavior**. These sensors were **3D printed using a custom-formulated gel**, making them **soft, flexible, and ultrasensitive**.
- Developed and researched **deep learning algorithms** that leverage the **intrinsic electric fields** of these smart sensors to generate measurable outputs **without the need for external power**, advancing progress toward **autonomous, AI-driven sensing technologies**.
- Developed a **novel multi-task architecture** that simultaneously predicts **load type and deformation** from voltage-time data. Designed a **spectrogram-based CNN** achieving **100% classification accuracy** and a **Wide & Deep network** achieving **RMSE of 0.041mm** for regression. Merged both into an **end-to-end model** handling classification and continuous prediction.
- Developing a **transformer-based architecture** for **damage detection and localization** in carbon fiber composites. Established baseline with an initial **CNN achieving 100% accuracy**, now advancing to transformers to capture **long-range dependencies** for precise spatial localization.
- Implemented **end-to-end Python ML pipelines** incorporating preprocessing, feature engineering, training, **hyperparameter optimization**, and evaluation, demonstrating proficiency in **production-grade workflows**.

PUBLICATIONS

"Design of Flexible and Ultrasensitive 3D Printed Flexoelectric Sensor for Self-Powered Damage Detection of Composite Structures"

Kuntal Maity, Mrinal Saha, **Aryan Senthil**, Anirban Mondal.

39th Annual Technical Conference of the American Society for Composites (ASC) [In Press]

<https://composites.uw.edu/ASC/?q=2024>

HONORS & AWARDS

Dean's List, Gallogly College of Engineering, University of Oklahoma

PROFESSIONAL EXPERIENCE

CEO and Cofounder

Dirac Technologies | Norman, OK

May 2024 - Jun 2025

- Secured funding to design and develop **two autonomous 6 axis robotic arms** capable of learning manipulation tasks through **imitation learning** frameworks.
- Engineered and integrated **object detection, teleoperation, and embedded control modules**, enabling the system to **learn and reproduce human-guided teleoperated demonstrations with high precision**.
- Led a 5-member cross functional team in hardware design, embedded systems, and AI integrations, directing efforts to synchronize teleoperation data with autonomous robotic performance.

Math Tutor

Math Center - University of Oklahoma | Norman, OK

Oct 2022 - May 2023

- Delivered personalized tutoring** in *Calculus, Differential Equations, Linear Algebra, and Physical Mathematics* for individuals and small groups.
- Guided students** through homework, exam preparation, and practice tests, resulting in **improved academic performance and confidence**.

LEADERSHIP EXPERIENCE

Community Service Chair

Pi Kappa Phi Fraternity - University of Oklahoma | Norman, OK

Aug 2022 - Dec 2023

- Directed and organized **The Ability Experience**, Pi Kappa Phi's national philanthropy initiative, to empower individuals with disabilities through service and awareness campaigns.
- Coordinated and managed fundraising and volunteer events, raising funds to support children with disabilities and expanding accessibility initiatives.
- Collaborated with university officials and community partners to develop outreach programs and recruit fraternity members for sustained volunteer engagement.
- Led chapter participation in **University of Oklahoma's "The Big Event" & "The Small Event,"** the university's largest community service project, strengthening partnerships with local nonprofits.

Executive Board Member

OU Cousins - University of Oklahoma | Norman, OK

Sep 2020 - May 2021

- Coordinated and facilitated intercultural programs fostering friendship and cultural exchange between U.S. and international students.
- Collaborated with university departments and student organizations to promote diversity, inclusion, and global awareness across campus.