

# ARYAN SENTHIL

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## EDUCATION

**B.S. Engineering Physics (Physics & Aerospace Engineering)**  
The University of Oklahoma | Norman, OK  
GPA: 3.4 | Dean's List | Top 10% of program

Graduated: Dec 2025

## PROFESSIONAL EXPERIENCE

**Undergraduate Research Assistant | University of Oklahoma**

May 2022 - Dec 2025

Advisor: Dr. Mrinal Saha

- Operated **Direct Ink Writing (DIW)** 3D printers to fabricate **CAD**-designed lattice structures with a proprietary silica-polymer gel, reducing print failure rate from 90% to 10%
- Performed tensile testing on flexible sensor specimens using **Instron Universal Tensile machine**, analyzing stress-strain data in **MATLAB** to characterize load distribution across 140+ samples
- Developed a spectrogram-based CNN in **TensorFlow** to detect and localize damage in carbon fiber composites, achieving 90% classification accuracy
- Built and deployed a full-stack application on **Linux (Python backend, TypeScript frontend)** for data preprocessing, model training, and report generation, leading to lab-wide adoption of deep learning

**CEO and Cofounder | Dirac Technologies**

May 2024 - Aug 2025

- Secured \$10K in funding and led a 5-member cross-functional team to design and develop two autonomous 6-axis robotic arms capable of learning manipulation tasks through imitation learning
- Engineered object detection (**YOLO**), teleoperation, and embedded control modules on NVIDIA Jetson, enabling the system to reproduce human-guided demonstrations with 90% accuracy after 2-3 hours of training

## PUBLICATIONS

Kuntal Maity, Mrinal Saha, **Aryan Senthil**, Anirban Mondal. "**Design of Flexible and Ultrasensitive 3D Printed Flexoelectric Sensor for Self-Powered Damage Detection of Composite Structures**"

The American Society for Composites (ASC), Volume 4, San Diego, CA, 202

[https://doi.org/10.1007/978-3-032-05216-2\\_20](https://doi.org/10.1007/978-3-032-05216-2_20)

## PROJECTS

**Deep Learning-Enabled Bio-Sourced Piezoelectric Pressure Sensor**

[https://github.com/AryanSenthil/Onion\\_Sensor](https://github.com/AryanSenthil/Onion_Sensor)

- Formulated self-powered bio-composite piezoelectric sensors using onion peel cellulose dispersed in Ecoflex silicone matrix; tuned ink rheology for dimensional stability and optimized electrode design for signal extraction
- Built two-stage TensorFlow pipeline for pressure sensing: CNN classifier on STFT spectrograms for load type identification (100% accuracy) and Wide & Deep regressor for applied load prediction ( $R^2 = 0.9987$ )

**AI-Enabled Structural Health Monitoring for Carbon Fiber Composites**

[https://github.com/AryanSenthil/final\\_capstone](https://github.com/AryanSenthil/final_capstone)

- Developed CNN and ResNet architectures for damage detection in carbon fiber composites using custom STFT resolutions, achieving >90% classification accuracy with spatial localization
- Built full-stack diagnostic platform (FastAPI + TypeScript) with end-to-end ML pipelines, CUDA-accelerated training, and real-time interactive visualizations
- Designed agent-compatible tool architecture exposing ML pipelines to LLMs, enabling natural language-driven damage diagnostics for non-technical users

**Autocalibration Algorithm for Instron Contact Detection**

<https://github.com/AryanSenthil/Contact-Detection>

- Developed autocalibration algorithm to identify load cell contact point using binning-based slope transition detection, eliminating positioning errors in force-displacement data and improving test repeatability ( $\pm 0.013$  mm precision)

**Automated Laser Tracking for Cavendish Experiment**

<https://github.com/AryanSenthil/Cavendish>

- Developed computer vision algorithm in Wolfram Mathematica for Cavendish experiment, replacing manual observation with automated laser coordinate mapping; adopted as laboratory-wide standard

## SKILLS

**Software:** Python, TensorFlow, PyTorch, Keras, MATLAB, TypeScript, React, FastAPI, Linux, Git, CUDA, Docker, AWS, Redis, PostgreSQL, Computer Vision, Deep Learning, Signal Processing

**Aerospace & Mechanical Engineering:** CAD, Structural Analysis, Composites, Stress-Strain Analysis, Finite Element Methods, Flight Dynamics

**Materials:** DIW 3D Printing, Instron Tensile Testing, Rheology, Silica Polymers, Carbon Fiber Composites, Sensor Fabrication, Piezo/Flexo/Pyroelectric Materials