

# Aryan Senthil

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## EDUCATION

B.S. Engineering Physics (Physics & Aerospace Engineering)

The University of Oklahoma

GPA: 3.4 | Dean's List | Top 10% of program

**Relevant Coursework:** Solid Mechanics, Dynamics, Fluid Mechanics, Thermodynamics, Aerodynamics, Flight Mechanics, Space Systems & Astrodynamics, Electricity & Magnetism, Electronics, Quantum Mechanics, Design & Manufacturing Process

## PROFESSIONAL EXPERIENCE

Undergraduate Research Assistant | University of Oklahoma

May 2022 - Dec 2025

- Operated **Direct Ink Writing (DIW)** 3D printers to fabricate **CAD**-designed lattice structures with a proprietary silica-polymer gel, iterating on lattice design in **SolidWorks** to reduce print **failure rate from 90% to 10%**
- Performed **static and dynamic** tensile testing on flexible sensor specimens using **Instron Universal Tensile machine**, conducting **stress-strain analysis** in **MATLAB** to characterize load distribution across **140+ samples**
- Fabricated carbon fiber sandwich composite panels through **hand layup and vacuum bagging**; performed **finite element analysis** in **ANSYS** to predict failure locations, optimizing face sheet-to-core-thickness ratios to increase **Young's modulus by 15%**
- Streamlined **CNC toolpaths** through **CAM** optimization, removing redundant path segments to reduce cycle time by **12-15%** for steel test fixtures used in **aerospace composite testing**
- 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 engineer two autonomous **6-DOF robotic arms** capable of learning manipulation tasks through **imitation learning**
- Designed full **6-DOF robotic arm** assemblies in **Fusion 360**, including joint housing, servo mounts, and end-effector interfaces; **3D printed PLA** components with optimized **G-code** slicer parameters, achieving **±1mm dimensional accuracy**
- 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

Robotics Engineer Intern | AIROU

Jun 2024 - Aug 2024

- Designed custom **ultrasonic rangefinder PCB** in **Altium Designer**, reducing module weight by **20%**; wired and soldered sensor modules, **UART** motor controllers, and power distribution to **Arduino/Raspberry Pi** flight controller systems
- Performed **CFD** analysis in **ANSYS Fluent** to evaluate airflow over drone frame geometry, optimizing aerodynamic profile to reduce drag by **10%**
- Implemented **LiDAR SLAM** in **MATLAB** and **ROS** using Intel RealSense depth camera for autonomous mapping, achieving **1-2% Absolute Trajectory Error**

## 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, 2024

[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 agent-compatible tool architecture exposing pipelines to LLMs for natural language driven damage diagnostics

## SKILLS

**Software:** Python, C/C++, TensorFlow, PyTorch, Keras, MATLAB, TypeScript, React, FastAPI, Linux, Git, CUDA, Docker, AWS, Redis, PostgreSQL, Bash, CLI, CI/CD, ROS, LLMs, Agents, RAG, Computer Vision, Deep Learning, Signal Processing, SLAM

**Hardware:** SolidWorks, Fusion 360, Altium Designer, ANSYS, Shapr3D, ANSYS Fluent, FEA, CFD, CAM, CAE, CNC, G-code, DIW 3D Printing, Hand Layup & Vacuum Bagging, Instron Tensile Testing, Soldering, UART, Arduino, Raspberry Pi, Intel RealSense, NVIDIA Jetson