

# Suhas Cristy Mathey

I completed my master's in electrical & computer engineering with a strong focus on Data Science, Signal Processing, and Machine Learning. My MS research involved developing Machine Learning algorithms for artwork analysis

[✉ Email](#) [🔗 website](#) [in ms-cristy](#) [👤 Cristy210](#) [🎓 Google Scholar](#)

## Education

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**Master of Science in Electrical & Computer Engineering** | GPA: 3.67/4.0

Feb 2025

University of Delaware | Newark, DE

**Thesis:** *Hyperspectral Image Analysis via Subspace Clustering* [🔗](#)

**Bachelor of Technology in Electronics & Communication Engineering** | GPA: 7.21/10.0

May 2021

Indian Institute of Information Technology, Tiruchirappalli | India

## Relevant Coursework

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### **Imaging & Deep Learning, Statistical Learning, Matrix & Tensor Decomposition for Signal Processing, ML & DS**

- Explored digital imaging systems, focusing on **mathematical modeling** and **signal processing** (sampling, filtering).
- Topics: Linear/Non-Linear **Regression**, Logistic Regression, Bayesian Analysis; SVMs and **Deep Learning** (ANNs, transformers).
- Hands-on **TensorFlow** labs: training vs. testing, VC dimension, model evaluation.
- Matrix Decomposition – **Eigen Decomposition**, **Singular Value Decomposition**, and their Geometric Interpretation.

### **Signals & Systems, Digital Signal Processing, Electronic Circuits, Digital Circuits and Systems, Digital Electronics Laboratory**

- Covered the analysis of continuous and discrete-time signals, including **Fourier series, Laplace, and Z-transforms** for **time/frequency** domain representation.
- Developed and analyzed analog and digital circuits using BJTs and MOSFETs, focusing on signal gain, biasing, and small signal models.
- Applied stability analysis and control techniques to **oscillators** and **filter circuits**, ensuring signal processing accuracy and supporting power and performance optimization in **hardware design**.
- Utilized **oscilloscopes, spectrum analyzers**, and **logic analyzers** for detailed testing and troubleshooting, providing in-depth technical data on signal behavior and circuit integrity.
- Implemented **FIR/IIR filters** using **MATLAB** for real-time DSP applications.

## Experience

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### **Graduate Research Assistant**

University of Delaware - Electrical & Computer Engineering

Feb 2024 – May 2025  
Newark, DE, US

- Worked on an inter-disciplinary project in Hyperspectral Image Analysis using **Unsupervised Learning** techniques.
- Utilized matrix decomposition techniques from linear algebra to handle high-dimensional image data, transforming it into lower-dimensional subspaces for efficient **Image analysis & Processing**.
- Developed and implemented **machine learning algorithms** in Julia to cluster and analyze hyperspectral image datasets using unsupervised learning methods.
- Presented** research findings through weekly lab meetings using data visualizations created using **CairoMakie**, focusing on clear and actionable insights from hyperspectral data analysis.
- Utilized **GitHub** for version control and continuous integration, managing branching strategies, and ensuring efficient collaboration with the research team for end-to-end development workflow management.
- Co-developed a Julia **Software Package**, **SubspaceClustering.jl** [🔗](#), which implements various subspace-based clustering algorithms for efficient analysis of high-dimensional data.
- Designed and implemented **unit tests** to verify algorithm robustness across different data types and dataset structures.

### **Computational Researcher**

University of Delaware - Chemical Engineering

Jan 2024 – Feb 2024  
Newark, DE, US

- Implemented algorithms in **Python** for advanced numerical computations and used CuPy to leverage GPU acceleration.
- **Developed** synthetic datasets using **Pandas**, enhancing ML models for accurate prediction of atomic scattering patterns.
- Engineered parallel processing solutions via **Thread Pool Executors** for computational efficiency.

#### **Senior Multimedia Student Assistant**

University of Delaware - Library, Museum & Press

Sept 2023 – Jan 2024

Newark, DE, US

- Led a team of 8 student assistants, helping faculty and students address their multimedia needs.
- Awarded the **2024 Library Student Assistant Scholarship award** in recognition of my work and demonstrated leadership potential.

#### **IT Field Support Technician**

University of Delaware - IT Client Support & Services

Jan 2023 - Sep 2023

Newark, DE, US

- Provided IT support to the University's facilities department, comprising about 500-600 employees, and managed an average of 1300 client devices including iPhones, iPads, and Laptops.
- Configured local system network and installed security certificates to route client's devices to the university Wi-Fi.
- Imaged laptops and desktops to the client's needs through MDT and deployed them in their workspace.
- Maintained up-to-date customer records on TeamDynamix and interacted with customers through email, phone, and in person.
- Addressed domain problems on the university-owned laptops and managed the devices through Active Directory.
- Used TeamViewer to remote into clients' computers for troubleshooting purposes.

#### **Assistant System Engineer**

TATA Consultancy Services

Mar 2022 – Dec 2022

Chennai, IN

- Dealt with vulnerability assessment checks for the Citi Corp's networks and applications.
- Collaborated with a **global** team of 50 in consolidating client's applications security.
- Developed data sheets using advanced **Excel** tools to present data and communicate insights to the **clients**.

## **Projects**

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#### **MS Research: Pigment Mapping in RIS Datasets via Subspace Clustering**

in

Language: *Julia*

- **Developed and optimized** clustering algorithms in Julia and Python for pigment mapping, to enhance clustering performance and accuracy in hyperspectral **Reflectance Imaging Spectroscopy (RIS)** datasets.
- Achieved over **95% accuracy** in clustering results through the development and optimization of machine learning algorithms for spectral signature-based pigment identification in hyperspectral imaging datasets.
- Results from this project have been accepted for a keynote talk at **Techno Heritage 2024** and for poster presentation at **2024 IEEE Baltimore Technical Colloquium**, underlining the contribution to technical innovation in the field of Machine Learning and Signal Processing.

#### **Hyperspectral Image Analysis - Unsupervised Learning**

in

Language: *Python, Julia, MATLAB*

- Implemented clustering algorithms, including K-Means, Spectral Clustering, and K-Subspaces Clustering, for hyperspectral image analysis.
- Analyzed and classified hyperspectral datasets such as **Pavia, Salinas, Indian Pines, and Onera Satellite**, focusing on **spectral** and **spatial** feature clustering.
- Optimized clustering techniques to enhance accuracy in segmenting **high-dimensional** hyperspectral data.
- Developed scalable workflows to process and visualize results, aiding in comprehensive analysis and actionable insights from **hyperspectral imagery**.
- Developed interactive pluto notebooks and hosted static web-pages demonstrating the implementation of **K-Subspaces Clustering (KSS)** and **Threshold Subspace Clustering (TSC)** algorithms on remote sensing datasets.

#### **Feature Engineering with Analytical Data – Dow Chemical (Spring 24)**

in

Language: Python

- Implemented **regression models** to analyze spectroscopy datasets of different materials provided by **Dow Chemical**.
- Employed **peak finding** function from the **SciPy library** to accurately detect and pre-process key **spectral features**, improving the precision of data analysis.
- Implemented pre-processing strategies like **normalization** and **dimensionality reduction** to enhance the integrity of the data by minimizing noise and variability amongst the features.
- Leveraged **NumPy** and **SQL** for efficient data manipulation, **querying**, and **analysis** of large spectroscopy datasets, enabling seamless data extraction, pre-processing, and feature selection for **regression analysis**.
- Utilized statistical models, specifically linear regression, to link analytical data with polymer performance, establishing quantitative feature-performance relationships.
- Applied **PCA** to reduce dimensionality and for **feature selection**, simplifying complex high-dimensional data and enabling clearer insights into material behavior.
- Leveraged **Matplotlib** for advanced data visualization techniques, utilized **scree plots** for dimensionality reduction analysis and **parity plots** to evaluate model accuracy.

### Biomolecular Identification Algorithm for Mass Spectrometry



Language: Julia

- Investigated **bio-informatics** methods for identifying several biological targets with minimal spectrum pre-processing needed.
- Implemented and compared **clustering algorithms**, including **K-Means**, **Spectral Clustering**, and **K-Subspaces Models**, to enhance the identification and classification of biological targets.
- Designed a robust pipeline for data **pre-processing**, **dimensionality reduction**, and clustering, optimizing the algorithm's accuracy and performance on bio-informatics datasets.
- Validated the algorithm's effectiveness on diverse datasets, demonstrating its adaptability and reliability in identifying bio-molecular targets across varying experimental conditions.

### Smart Irrigation system using Internet of Things (IoT)

Language: C++

- **Designed** and **simulated** an IoT-based irrigation system using Proteus 8 Professional, focusing on circuit design and sensor integration.
- **Programmed** sensors in Arduino IDE to collect and analyze soil moisture data, transmitting real-time updates via a Wi-Fi module to optimize irrigation based on environmental conditions.
- **Performed** data analysis on sensor feedback to fine-tune water usage, addressing efficiency in water management.
- Developed a scalable system architecture, ensuring reliability and energy efficiency for continuous field use.
- Drafted detailed documentation covering essential details regarding components, materials, and system assembly, supporting seamless implementation and user accessibility.

## Presentations & Talks

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<b>Udel GECE Hour – Graduate Student Seminar</b> (Talk) Mapping Pigments in Reflectance Imaging Spectroscopy (RIS) Datasets via Subspace Clustering	Nov 1, 2024
<b>2024 IEEE Baltimore Technical Colloquium Conference</b> (Poster Session & Lightning Talk) Mapping Pigments in Reflectance Imaging Spectroscopy (RIS) Datasets via Subspace Clustering <a href="#">🔗</a>	Nov 2, 2024
<b>Delaware Data Science &amp; Darwin Computing Symposium</b> (Poster Session & Lightning Talk) Mapping Pigments in Reflectance Imaging Spectroscopy (RIS) Datasets via Subspace Clustering <a href="#">🔗</a>	Feb 13, 2025

## Awards & Scholarships

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<b>2024 Library Student Assistant Scholarship award</b> <a href="#">🔗</a> Recognized for leadership and excellence in supporting multimedia and digital services at the University of Delaware Library.	2024
<b>Graduate Research Assistant Scholarship</b> Awarded full tuition support and stipend for MS research - University of Delaware	2024 – 2025

## **Community Service**

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### **Hope Worldwide Ltd**

- Active volunteer in Hope Worldwide since freshman year in college
- Organized a volunteer event to renovate Hope Worldwide orphanage in Tiruchirapalli, India with 200+ participants.
- Organized a clean-up with about 50 people from the locality at White Clay Creek Park in Newark, DE

### **Hen Hacks, University of Delaware**

- Participated in a 24-hour hackathon conducted by the University of Delaware.
- Built a website in improving financial literacy in underserved communities in Delaware.
- Successfully launched a website to facilitate the community in providing the best resources when it comes to looking out for a loan.