# Sneha Jayaganthan

**I**ndian **I**nstitute of **T**echnology, **G**oa

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## Education

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| **B.Tech, Electrical Engineering, IIT Goa** | CPI: 9.67/10 | 2019 - PRESENT |
| **Class 12: Maharishi Vidya Mandir, FIITJEE-Chennai** | Aggregate: 96.8 % | 2017 – 2019 |
| **Class 10: Maharishi Vidya Mandir, FIITJEE-Chennai** | CGPA: 10.00/10.00 | 2015 – 2017 |

## Experience

**Technical Intern (Artificial Intelligence), Siemens, Bengaluru, India** *[Jun'22-Nov'22]*

- Worked in the area of **Predictive Analytics** in the Advanced Data Management organization for analyzing **multivariate** process parameters that define the manufacturability of a prominent consumer firm in the Process Management Industry.
- Developed **Forecasting** and **Anomaly Detection** models and libraries for the features using ML/Deep Learning frameworks such as **LSTM, Convolutional Neural Networks,** and **Autoencoders** based on deep neural nets and LSTM architecture on TensorFlow.
- Devised a novel batch pre-processing procedure for the Time series datasets that enhanced the efficiency of models by **10** times**.**
- Utilised the **SHAP** model explanation tool to obtain visual representations of the impact of all control variables on model predictions.

**Google explore-CS Research Intern, Department of AI, Indian Institute of Technology (IIT), Hyderabad** *[May'22-July'22]*
**Title:** *'Open World Object Detection using one-stage object detection models'*
**Guide: Prof. Dr. Vineeth N Balasubramanian**

- Implemented contrastive clustering techniques to identify objects in images that have not been labeled explicitly as `unknown' using one-stage object detection models such as **YOLO** and **RetinaNet**.
- Auto-labelled unknowns by transforming the Feature pyramid Network of RetinaNet into a Region Proposal Network and built a Helmholtz Energy-based identifier for detecting the "unknowns" in images.

**Research Assistant, Perdue School of Business, Salisbury University, US** *[Jan'22- Mar'22]*
**Guide: Prof. Dr. Asli Eksi**

- Conducted a Literature survey to examine the effect of competition that the automated Robo advisors exert on the Investment Management Industry; Carried out Machine Learning and Textual Analysis of financial information (Form ADVs).
- Performed classification using unsupervised methods (PCA, Hierarchical clustering) and obtained detailed summary statistics (Assets Under Management, Institutional and Retail clients %) of different Robo/Non-Robo advisors by extracting information from Form ADVs for the period 2000-2021.

**Research Intern, Electrical Engineering Department, Indian Institute of Technology (IIT), Madras** *[May'21-July'21]*
**Title:** *'Classification of coal-deposited epoxy micro-nanocomposites by adopting Machine Learning techniques to LIBS analysis'*
**Guide: Prof. Dr. R. Sarathi**

- Performed Analysis, Classification & Prediction of epoxy micro-nanocomposite-based insulation structures exposed to coal atmosphere using varied types of **Machine Learning** Algorithms applied to LIBS Spectral Data.
- **Gaussian Radial Basis Kernel-based Support Vector Machine, K-Nearest Neighbours,** and **Multinomial Logistic Regression** were applied to the spectral dataset producing results with accuracy over **95%** on the test data.
- Feedforward Artificial Neural Networks (**Multi-Layer Perceptron Classifier**) with the Adam optimizer was used for comparison.
- Published a full-length Research Paper in the **Journal of Physics Communications, IOP Publishing, UK** as the first author. **[Paper]**

**Research Intern, Electrical Engineering Department, Indian Institute of Technology (IIT), Madras** *[Dec'20-Jun'21]*
**Title:** *'Identification and Classification of Incipient Discharges in GIS Adopting Machine Learning Techniques'*
**Guide: Prof. Dr. R. Sarathi**

- Identified sources of Partial Discharges (PD) in Transformer Insulation and extracted features using Multi-Resolution Signal Decomposition.
- Performed Fast Fourier Transform of UHF Frequency data in MATLAB to obtain the spectral dataset of the UHF PD signals.
- Worked on classifying & predicting the signals using ML Algorithms - Random Forests, K-Nearest Neighbours producing results with over **95% Accuracy.**
- Improved the model's performance by incorporating optimization techniques such as Random Search in Python.
- The Research Paper was presented at the IEEE International Conference on the Properties and Applications of Dielectric Materials'21 **(IEEE ICPADM July 2021, Malaysia)** and published in **IEEE Xplore. [Paper]**

## Projects

**Prediction of efficiency of intracellular drug delivery and cell viability using Deep Learning**
**Guide: Prof. Dr. Tuhin Subhra Santra, Department of Engineering Design, IIT Madras** *[July'22-Present]*

- Utilised state-of-the-art Deep Learning models such as **RPN (Region Proposal Network), Faster R-CNN,** and **RetinaNet** for predicting drug delivery efficiency and cell viability from molecular delivery images (such as PI dye, Dextran, RNA, DNA, and enzyme) of different cell types.
- Such images of biomolecular uptake by the cell influenced through different morphology of gold nanoparticles mediated photoporation, and pulsed laser are classified via **Deep Learning algorithms** for quantifying the best cell viability and drug delivery efficiency. [Work in progress]

**Kalman Filter Implementation for Multi-Object Tracking [Code]**
**Guide: Dr. Satyanath Bhat, School of Mathematics and Computer Sciences, IIT Goa** *[Mar'22-May'22]*

- Implemented **Kalman Filter** for performing multi-object tracking to predict the trajectory of a particular object where the locations are estimated based on detections from previous frames using Python and OpenCV techniques.
- Obtained **A+ Grade** for Outstanding Performance and Excellence in the academic course "Machine Learning" involving the project.

**Automatic Modulation Classification system using Deep Learning for Software Defined Radio Communication.**
**Guide: Prof. Dr.Neelakandan Rajamohan, School of Electrical Sciences, IIT Goa** *[Jun'21-Dec'21]*

- Implemented **Deep Learning** models like **CNN, ResNet,** and **InceptionNet** for classifying signals belonging to 8 digital and 3 analog modulations at varying signal-to-noise ratios in a Software Defined Radio using Tensorflow-Keras.
- Achieved a maximum accuracy of **90.2%** on the test set of the DeepSig GNU RadioML Modulation dataset.

**Techfest Chatbot [Code]** *[Jan'21]*

- Created a Chatbot using the **RASA Framework** that answers all possible questions of the participants regarding a Technical Festival.
- Incorporated Custom Actions by importing the Wikipedia Package through Python code that gives a brief description of the technologies used in each event when prompted by the user.
- **Winner** of Chatbot building Competition at IIT Goa's Annual Technical Festival.

**Document Scanner using OpenCV [Code]** *[Dec'20]*

- Implemented Image **Pre-processing** and **Contour detection** techniques using **OpenCV** frameworks on the Video/Document Input.
- Utilized the **Warp-perspective** function in OpenCV to produce a Scanned format of the input document.

**Mathematical Modelling of Covid-19 [Code]** *[Apr'20-Jun'20]*

- Formulated SIR- SEIR Models for the analysis of Covid-19 cases in UK & performed Numerical Simulation and curve fitting in python.
- Incorporated the **Runge Kutta** Technique of the fourth order to solve differential equations and effectively simulate the problem.
- Obtained **A* Grade** for Outstanding Performance and Excellence in the academic course "Introductory Biology" involving the project.

## Publications and Conferences

- **Sneha Jayaganthan,** Nagaraju Guvvala, Sarathi Ramanujam**, *"Identification & Classification of Incipient Discharges in GIS Adopting Machine Learning Techniques",*** 2021 IEEE International Conference on the Properties and Applications of Dielectric Materials (IEEE ICPADM 2021), 12-14 July 2021
  Proceedings and Research Paper Published in **IEEE Xplore. Paper**

- **Sneha Jayaganthan,** Myneni Sukesh Babu, N J Vasa, R.Sarathi, Takahiro Imai**, *"Classification of coal-deposited epoxy micro-nanocomposites by adopting machine learning techniques to LIBS analysis"*,**
  Research Paper published in **Journal of Physics Communications, IOP Publishing. Paper**

## Skills

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|---|---|
| **Computer Software Skills:** | C, C++, Python, MATLAB, Kotlin, VHDL, SQL, HTML, AutoCAD, Latex, MS Word, MS Excel. |
| **Tools and Technologies**: | RASA, TensorFlow, Keras, Android Studio, Jupyter/Colab, Git and Github. |
| **Electrical Software Skills:** | VHDL, Arduino, MagNet, TINA |
| **Relevant Coursework:** | Computer Programming, Machine Learning, Probability, Statistics & Random Processes, Embedded Systems, Signal Processing, Adaptive Control, Network Theory, Calculus, Linear Algebra, Complex Analysis. |
| **Coursera Courses:** | Neural Networks and Deep Learning, Machine Learning, Introduction to TensorFlow for Artificial Intelligence, Machine learning & Deep Learning, Structuring Machine Learning Projects, Data Structures and Algorithms. |
| **Other Skills**: | Economics, Innovation & Entrepreneurship, Leadership, Presentation, and Communication Skills. |

## Positions of Responsibility

**Secretary, IEEE, IIT Goa Student Branch**: *Organized various Hackathons and Invited Talks from Industry and Academia*.
**Core Member, Google Developer Student Club (DSC), IIT Goa**: *Conducted 3 solo sessions on Android App Development and Kotlin Programming language as an Android Study Jam Facilitator for over 130 participants*.
**Core Member, IIC (Institute Innovation Council), IIT Goa**: *Collated content and created a repository of info about Entrepreneurship.*
**Campus Representative**, **Girlscript Foundation, IIT Goa Chapter**: *Organized webinars on Tech topics like AI, Google Analytics, AR/VR*.
**Student Mentor, IIT Goa, for the Batch of 2020 undergraduates**.

## Achievements

- Selected as a Research Intern as a part of **Google explore-CS Research'22** program among 1000+ applications to pursue research in the area of Computer Vision at the Department of AI, IIT Hyderabad.
- **Ranked 2** nationally in the Deep Learning Course Examination conducted by the Centre for Development of Advanced Computing (C-DAC, India) in collaboration with IIT Kharagpur, IIT Madras, IIT Goa, and IIT Palakkad.
- Research Paper titled 'Classification of coal deposited epoxy micro-nanocomposites by adopting machine learning techniques to LIBS analysis' presented at the **Student Research Convention** (SRC'21), Indian Institute of Technology, Kanpur (March 28, 2021) and published in the **Journal of Physics Communications, IOP Publishing, UK** as the first author.
- Research Paper titled 'Identification & Classification of Incipient Discharges in GIS Adopting Machine Learning Techniques' was presented at **IEEE ICPADM Conference in July 2021, Malaysia,** and published in **IEEE Xplore.**
- Won the **Chatbot Building Competition** at the IIT Goa's Annual Technical Festival in **2021**.
- Qualified among the **Top 5%** of JEE Advanced examination conducted in **2019.**
- Qualified among the **Top 0.9%** of JEE Main (99.1 Percentile) examination conducted in **2019**.
- Qualified **Pre-RMO** (Regional Mathematics Olympiad) conducted in **2017**.
- Placed among the **Top 10%** in National Standard Examination in Junior Science (**NSEJS 2015-2016**) among the students of Chennai Centre, India.
- Secured **Silver Medal** in the State Level Abacus and Mental Arithmetic Competition (Prodigy-2009, India); Completed 8 Abacus and Mental Arithmetic Program levels.