Sweta Kumari

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Academic Qualifications

Year	Degree	Institute	CPI/%
2020 - 2024	Bachelor of Technology (B. Tech)	Indian Institute of Technology Kanpur	8.2/10.0
2020	Class XII (CBSE)	The Pentecostal Assembly School	96.60%
2018	Class X (CBSE)	The Pentecostal Assembly School	97.40%

Work Experience

- **UG Fellow Research Intern,** *C3i Hub* (*May'21 - Ongoing*)
  - Worked on Cyber Security with the aim to address the issue of cyber security of Cyber Physical Systems in its entirety.
  - Implemented **Peerclear** - A botnet detection tool for IoT devices on attacks including **DDoS, Trojan**, etc using **PyShark** and **Wireshark**
  - Fabricated a dataset by setting up IoT system and process the pcap files using **Zeek - Bro**
  - Two-phase detection - **NIDS** on the system from the above obtained fabricated dataset with behavioural IDS on individual IoT devices. Thus, making the whole system significantly more robust.
- **Web Development Intern,** *Geochemistry Lab, IITK* (*Dec'21 - Feb'22*)
  - Developed a responsive multiple page website using **HTML5, CSS3, JS** and **Bootstrap** templates.
  - Off-screen images were deferred using **lazy-loading** scripting technique to maximize loading speed.

Key Projects

- **P2P Botnet Detection System,** *Mentor: Sr. Research Engineer, Anand Handa, C3i Hub* (Link) (*Nov'21 - Jan'22*)
  - Analyzed botnet network traffic patterns to derive inferences and strategies to prevent intrusion attacks. Proposed and implemented an IDS model which is **content-agnostic** and can also handle **encrypted data packets**.
  - Using **Benign and Malicious P2P** network data packets, built a model that is independent of payload - uses only the header information of **TCP control packets**.
  - For sophisticated P2P traffic categorization, used a more straight forward approach for categorizing P2P traffic like **failed connections threshold, destination diversity threshold,** etc.
  - For feature selection, used a **classification and regression tree method**.
- **Accelarated Computing with CUDA Python,** NVIDIA Deep Learning Institute (Link) (*Sep'21*)
  - The project aimed at implementing fundamental techniques needed to GPU-accelerate Python applications using **Numba**.
  - **Custom CUDA Kernels**, **multidimensional Grids** and **Shared Memory** for CUDA Python were used for initial optimizations.
  - Utilized **grid stride** loops for working in parallel over large data sets and leveraging **memory coalescing**.
  - Used **atomic operations** to avoid race conditions when working in parallel.
  - Used shared memory to coordinate threads within a block and **facilitate coalesced memory access patterns** and **resolved shared memory bank conflicts.**
- **Fundamentals of Deep Learning,** NVIDIA Deep Learning Institute(Link) (*Sep'21*)
  - Initially prepared **Image Classification** of an American Sign Language Dataset, then taught our model to be more robust when looking at new data, using **Data Augmentation**.
  - Used **Keras** to load a very well-pretrained model. Preprocessed the images to work with the model and performed accurate inference on the images.Performed **transfer learning** with our own small dataset on a pretrained model and further **fine tuned** the model for even better performance.
  - Compiled the model with **categorical crossentropy** on a dataset from Kaggle and procured **95.74**% **accuracy.**
- **Intrusion Detection System,** HCL-Hackathon (Link) (*Dec'21 - Feb'22*)
  - Trained an ML model which takes inputs from the sensor measurements at a time stamp 't' and classify it either in "ATTACK" or "NORMAL" categories using dataset provided.
  - Performed **feature extraction using Principal Component Analysis** to implement dimensionality reduction of the feature vectors. Then developed an **unsupervised time-series ML model** for better accuracy is suggested as first part of the phase.
  - In the second phase, developed a **Linux based malware detection and classification tool** that extracts features from **ELF Files** using **Command-Line Tool - objdump** and parse the output using python script to obtain the dataset.
  - Then build the Detection System by implementing **PCA**, and **Random Forest**.

- **Deep Into CNNs,** Summer long Project, Programming Club, IITK(Link) (*May'21 - Jul'21*)
  - Built Multi layer Perceptron Convolutional Neural Networks **(MLP-CNNs)** on datasets like **CIFAR10, MNIST** and analyse the effectiveness of proposed Networks , and compare their performances.
  - Executed **AlexNet, Inception, Xception, VGG11**, as State-of-the-art models. And optimised the models using **Adam gradient descent, weight initialization, Adagrad**, etc.
  - Applied **Simple, Convolutional and denoising Auto-encoders** for **Unsupervised learning**.
  - Participated in **Tabular Playground Series - Jun 2021** at Kaggle (Link)
- **Enigma,** Self Project (Link) (*May'21 – Jul'20*)
  - A technical imitation of mechanical machine- **ENIGMA** to obtain working model using **Object-Oriented Programming**.
  - It encrpyts messages to Ciphertext based on the complex **Enigma algorithm**.
  - Then decrypts the encoded to same message with using the famous **Turing Algorithm** and pre-defined congifuration.
- **Simulations,** Self Project (Link) (*May'21 – Jul'21*)
  - Analysing the nature of result for **drunkard walk** to observe interesting intersection of probablistic mathematics.
  - Simulation of **perfectly elastic collisions** to observe relation of obtained result for number of collisons with pie.
  - Designed and fabricated a working model for **collision of two galaxies** with centre of mass at the centre of the eclipse and mass varying with cosine relation from the centre.

Technical Skills

Languages	C/C++, Python3, MongoDB, HTML/CSS/JS, Bootstrap, jQuery, SQL, LaTeX
Softwares/Tools	Github, Postman, mySQL, MATLAB
Machine Learning	PyTorch, Scikit-Learn, Tensorflow, Seaborn

Relevant Coursework

Fundamentals of Computing Linear Algebra and Ordinary Differential Equation Malware Analysis and Intrusion Detection+	Introduction to Electronics+ Probability and Statistics+ Partial Differential Equations	Neural Networks and Deep Learning** Web Developer Bootcamp 2021 * NSM-Computer Architecture Winter School

**: Coursera | +: Ongoing| *:Udemy

Positions of Responsibility

- **Web Secretary,** Games and Sports Council, IIT Kanpur (*May'21 - Ongoing*)
  - Mentored more than **100** freshers in several workshops and events organized by the GNS council in online mode.
  - Took initiative and revamped website for the club using **JS** and **Bootstrap** (Link)
  - Organized offline workshops and tournaments for students in campus.
- **Company Coordinator,** Students' Placement Office, IIT Kanpur (*Jun'21 - Ongoing*)
  - Coordinated with 100s of companies for the placement if about 1200 graduating students in the Placement drive 2021.
  - Organized pre-placement talks and sessions for internships and placement for pre-final year students.

Extra Curricular

- 2022 — Secured **24th position** in HCL-Hack IITK 2021 among **12496 participants** from 2100 colleges and 12 countries.
- 2021 — Came in **top 15** teams at Techweek conducted by SNT council among more than 100 teams.