Gunjan Dhanuka

Roll No.: 200101038
B.Tech - Computer Science and Engineering
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Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
B.Tech. Major	Indian Institute of Technology, Guwahati	9.02 (Current)	2020-Present
B.Tech. Minor	Indian Institute of Technology, Guwahati	9.00 (Current)	2021-Present
Senior Secondary	CBSE Board	97.6%	2020
Secondary	ICSE Board	97.5%	2018

Research Experiences and Projects

Carnegie Mellon University, USA *May 2022 - Ongoing*
Research Intern under the supervision of Dr. Min Xu in Xu-Lab *Pittsburgh, USA (Remote)*

- Performing **Video Anomaly Detection** on real-world benchmark datasets like UCF-Crime and ShanghaiTech, with an **improvement of over** 1.62% over the existing State-of-the-art methods.
- Using **Feature-level Knowledge Distillation** to reduce model complexity, along with **Disentangled Attention** for the temporal processing, to compensate for the small dataset size of UCF-Crime.

Indian Institute of Technology, Guwahati *July 2023 - Ongoing*
Bachelor Thesis Project under Dr. John Jose in Multi-core ARchitecture and Systems (MARS) Lab *Guwahati, India*

- Working on analyzing the impact of **Hardware Trojan (esp. Black Hole Router Attack)** on **Network-on-chip** systems.
- Studying impact on the cache operations along with the CPU throughput using the **gem5 simulator** in **C++ and Python**, and coming up with possible detection and mitigation techniques for such attacks.

University of New South Wales (Sydney) & CSIRO Australia *Nov 2021 - May 2022*
Research Intern under Dr. Rohitash Chandra (UNSW) & Dr. SS Vasan (Science Leader, CSIRO) *Sydney(Remote)*

- Extracted and visualized **graph representation** of Protein Structures of various virus strains of **SARS Cov-2**.
- Analyzed **Node and Edge Centralities** in the graph to correlate and predict significant mutations in the strains.

Industrial Experience

Rubrik Inc. *May 2023 - July 2023*
Software Engineering Intern in the RSC-P Platform team *Bengaluru, India*

- Implemented **Multi-Node Scaling Support in RSC-P Cluster**(Rubrik Security Cloud - Private) using **Kubernetes**.
- Developed a **Command Line Interface (CLI) in Golang** for the users to add/remove nodes to an existing RSC-P Cluster, view cluster status, and perform live updates using **Gravity**, a k8s management service.
- Devised and implemented a **Leader-Worker architecture** to **pin the stateful services** like Object Storage, Database, and Messaging Queue on the leader node, while **scaling the stateless services automatically** to the newly joined nodes.

Key Projects

Route Planning and Optimization with Volume Estimation for Last-Mile Deliveries *Feb 2023*
Inter-IIT Tech Meet, 2023 (held at IIT Kanpur) *GitHub link*

- Performed **volumetric weight estimation** of objects using a stereoscopic RGB Camera setup and developed an **end-to-end physical system** to measure the dimensions of the object with **very low latency** and **95%** accuracy.
- Used **Deep Neural Networks** to classify the shape of the object, for background removal to estimate **Pixel Per Metric ratio**, and using **Similarity Scaling** and **Background Averaging** to predict accurate object height.
- Optimized the Last-Mile-Delivery problem by devising **Optimal Rider Routes**, incorporating **Dynamic Pickups** and forming rider-bags using **3-D Bin Packing heuristics**. Improved scalability by using a iterative **Sweep Clustering Algorithm**.

Model Extraction Attack for Video Classification Models *Mar 2022*
Inter-IIT Tech Meet, 2022 (held at IIT Kharagpur) *Final Report Link | GitHub Link*

- Developed **Swin-T** and **MoViNet-A2-Base** model extraction pipelines through synthetic query generation.
- Trained **Temporal Segment Networks (TSNs)** and **EfficientNet-LSTM** models in Greybox and Blackbox setting
- Used *Kinetics-400* and *Kinetics-600* action video classification datasets to obtain victim model similarity.

NanoC Compiler *May 2022*
Guide: Prof. Sukumar Nandi | Compilers Lab, IIT Guwahati *GitHub Link*

- Developed a compiler for NanoC, a subset language of C having essential features like **I/O management, error-handling, and control statements** using **Lex, Bison, and C++**.
- Implemented generation of **assembly language quads** for the given code and an executable for the same.

xv6: Unix-based Operating System *May 2022*
Guide: Prof. John Jose | Operating Systems Lab, IIT Guwahati *GitHub Link*

- Implemented a **SJF** and **Round-Robin** based **hybrid scheduling algorithm** and tested for CPU and I/O bound tasks.
- Incorporated **lazy memory allocation** & **dynamic page swapping** based on LRU policy for active processes.

Other Projects

Semantic Word Embeddings Visualizer - Word2Vec *May 2022*
Self Project *GitHub Link*

- Deployed **Gensim Word2Vec model** with custom parameter tuning, **interactive semantic similarity plots**, and **training-on-the-fly** features. Option to upload custom text corpus or tabular conversational data also provided to the user.
- Performed **Dimensionality Reduction** on the Word Vectors to map them to 2D and 3D space using **PCA & TSNE**.

VR Electronics Lab Simulator *Mar 2022*
Guide: Prof. Samit Bhattacharya | VR and AR Systems Course, IIT Guwahati *GitHub Link*

- Created a **VR based** simulation lab on **Unity** using **SpiceSharp** to simulate the electric circuit, with unlimited components support, **electron-flow animation** and adaptable bulb intensity, using **C#** to implement the logic.
- Employed **Depth-First Search** from each battery to iterate component-wise, allowing **multiple circuit** simulations.

Majuli Island Virtual Tour (Govt. Funded Project) *May 2022*
Guide: Prof. Samit Bhattacharya | Software Engineering Lab, IIT Guwahati *GitHub Link*

- Developed a **VR application** for a **3D tour** of Majuli Island using **300+ 360°images** and videos in **Unity** for Oculus Rift, also implementing interactive objects, movement, and maps for navigation and teleportation using **C# scripts**.

Sentiment-based Reinforcement Learning for Stock Trading *Jul 2022*
Self Project *GitHub Link*

- Performed **Text Summarization** and **Sentiment Analysis** of scrapped News Articles using *PEGASUS* model. Trained the **A2C model** on a custom environment in **OpenAI gym** using **scrapped data**, adding **SMA, RSI and OBV** indicators.

Covid Management System *Jan 2022*
Research and Industrial Conclave Hackathon, IIT Guwahati (First prize) *GitHub Link*

- Developed a **Django** based **web application** for students, faculty, doctors, and shopkeepers of the IITG, which facilitated scheduling appointments, online medicine shopping, and **real-time monitoring** of individual patient status.

Technical Skills

Programming languages: C, C++, Python, Golang, Javascript
ML/AI: Pytorch, Tensorflow, Numpy, Pandas, Matplotlib
Software Dev: Django, Flutter, Firebase, React*, Node.js*
Miscellaneous: MySQL, Git, Shell, Latex, Kubernetes

Achievements

Research Conclave Hackathon IITG	Awarded with the **first prize** for the best solution to manage on-campus Covid outbreak.	2022
Amazon ML Challenge	Secured a **rank of 26** from over **5000 teams** in a two-day competition.	2023
Amazon ML Summer School	Selected from more than **17,000** students in India.	2022
Reliance Foundation Scholarship	Selected as one among **37 students across India** in CS & AI.	2021
JEE Mains 2020	Secured **All India Rank 382** out of approx. **900,000** candidates.	2020
JEE Advanced 2020	Secured **All India Rank 469** out of approx. **250,000** candidates.	2020
KVPY Fellowship	Selected as **KVPY Scholar** out of 40,000 candidates in the SX Stream.	2020

Relevant Coursework

- **Computer Science:** Compilers Lab, Machine Learning, Operating Systems, Computer Networks, Software Engineering, Data Structures & Algorithms, Formal Languages & Automata Theory, Database Management Systems, Computer Architecture & Organization, VR & AR Systems, System Software Lab, Smart Systems (Sensors) Lab, Computer & Network Security, Hardware Security, Parallel Algorithms, Deep Learning Specialisation (Coursera).
- **Mathematics:** Linear Algebra, Calculus, Probability Theory & Random Processes, Mathematical Finance.
- **Robotics and AI:** Introduction to Robotics, Mechatronics, Robotic Vision and Control, Fundamentals of AI

Leadership Positions

- **Coding Club, IIT Guwahati**
  - **Secretary** *(2022-23)*: Overall leadership of one of the largest college coding clubs of India (∼10,000 followers, 100 members) and its activities, which included conducting national-level hackathon, preparing programming courses, conducting live workshops, and releasing summer projects. Conducted CodePeak (∼5000 participants, nationwide Open Source event) and Ethos (∼1500 participants, largest hackathon in North-East India).
  - **Co-ordinator** *(2021-22)*: Raised awareness about opensource activities on campus by conducting live Git-GitHub workshop, and coordinating the conduction of CodePeak.
- **Computer Science and Engineering Association(CSEA), IIT Guwahati**
  - **Treasurer** *(2023-Present)*: Managing the finances along with the overall planning and execution of CSEA's activities, especially driving the planning of a new Undergraduate Research Program.
  - **Technical Executive** *(2022-23)*: Organising guest talks, research awareness sessions, hackathons, and coding contests to enhance the coding culture on the IITG Campus.

Extracurriculars

- **Quizzing:** Won the fifth prize in India Quiz at Inter-IIT Cultural Meet 2023 and was a National Finalist at Aqua Regia School Quiz 2016 (top 8 teams among 2.4 lakh students).
- **Trekking:** Completed the Valley of Flowers and Brahmatal Treks in the Himalayas, and several short treks in the Western Ghats.