

HIMANSHU GOYAL

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Objective: Interested in building reliable software solutions leveraging computer systems and security ideas.

Education

Georgia Institute of Technology

Aug 2022 - May 2024

Master of Science - Computer Science (Specialisation: Computing Systems); **GPA: 4.0/4.0**

Indian Institute of Technology (IIT), Bhubaneswar

July 2017 - May 2022

Dual-Degree (B.S/M.S) in Computer Science and Engineering; **GPA: 3.8/4**

Courses: Distributed Computing, Computer Networks, Operating Systems, Malware Analysis, Blockchain and Cryptography, Database Systems, Computer Architecture, Compiler Design, Cloud Computing, Network Security, Machine Learning

Technical Skills: C, C++, Rust, Java, Python, Javascript, Bash, Assembly, SQL, HTML, GDB, CSS, x86, ARM, MongoDB, Docker, Kubernetes, AWS VPC, BigQuery, Tensorflow/Pytorch, IDA Pro, Wireshark, Postman, Burp Suite, Linux

Experience

Galois Inc. | Software Engineering Intern

(Portland, OR)

May 2023 - Aug 2023

- Developed a platform-independent Format Transforming Encryption scheme for censorship circumvention in collaboration with Cryptography engineering team. Resulted in performance improvement of upto $1.5x$ and a reduction in errors by 45% .
- Also contributed to the design of a *compiler* that converts any *LLVM* program into *SIEVE IR* specifications. This aided zero-knowledge backends in reducing verification time by up to 30% .

Decentralised and Smart Systems Research Group | Research Engineering (Orissa, IN) May 2020 - Oct 2022

- Worked towards designing and implementation of reliable decentralised systems. Developed a synchronous communication protocol for Byzantine consensus, achieving up to 80% speed improvement and 82% energy reduction.
- Additionally, engineered a privacy-centric, single-round protocol for gathering aggregate statistics, utilizing cryptography and wireless communication concepts. It resulted in up to 80% faster operation and up to 78% less energy consumption.

Cryptography and Information Security Lab | Software Engineering Intern (Bangalore, IN) Aug 2021 - Feb 2022

- Collaborated with *Prof. Arpita Patra* on designing privacy-preserving algorithms for Secure ML training and inference.
- Used Secret Sharing to develop privacy-preserving algorithms and tested them on the ABY3 framework, reducing communication and computation time and improved throughput by at least $11X$ than existing techniques for semi-honest adversaries.

CNeRG - Complex Networks Research Lab | Software Engineering Intern (Kharagpur, IN) May 2021 - Aug 2021

- Engaged in the design of methodologies for the time ahead workload characterization in multi-tier cloud infrastructure under the guidance of *Prof. Sandip Chakraborty*.
- Developed a monitoring system with $\sim 85\%$ accuracy using Gaussian Mixture Model (GMM), Mixture Density Network (MDN), and Bayesian Belief Network (BBN). The system also detected users performing DDoS attacks.

Tata Consultancy Services - Research | Software Engineering Intern (Kolkata, IN) Feb 2021 - May 2021

- Collaborated with the robotics engineering team to develop a customised language model for robotic cognitive applications.
- Our optimized language models performed invariably better than the existing state-of-art statistical language models in accuracy, latency and resource consumption.

Projects

Web Domain Impersonation opportunities amidst TLS availability [Source]

Jan 2023 - May 2023

- Studied 150 domains from the top 1500 domains in Tranco's list to understand web domain impersonation attacks.
- Chrome Browser study shows 45% of look-alike domains are purchasable, enabling adversaries to host malicious webpages.

Distributed Key-Value Storage System [Source]

March 2023 - May 2023

- Designed scalable key-value storage service using gRPC, separating both control and data plane communication.

Discovering vulnerabilities in Industrial Networks through Internet Scanning [Source]

Aug 2022 - Dec 2022

- Performed comprehensive ICS network vulnerability assessments, utilizing network scanning to identify high-risk devices.

Blockchain based Network Slice Auctioning

May 2022 - Sept 2022

- Developed a Hall's matching based auctioning mechanism for network slice auctioning among Virtual Network Operators. Validated the devised algorithm using Hyperledger-Fabric Blockchain platform.

Publications

[1]* Goyal H. *et al.*, LiPI: Lightweight Privacy-Preserving Data Aggregation in IoT. *IEEE TrustCom 2023*.

[2] Kaushik M *et al.*, ZoneSync: Real-Time Identification of Zones in IoT-Edge. *IEEE COMSNETS 2023*.

[3]* Goyal H. *et al.*, Multi-Party Computation in IoT for Privacy-Preservation. *IEEE ICDCS 2022*.

[4]* Goyal H. *et al.*, Real-Time Lightweight Byzantine Consensus in Low-Power IoT Systems. *IEEE CNSM 2022*.

Other Experience

Teaching Assistant | Undergraduate+Graduate Courses, Georgia Tech | IIT Bhubaneswar

Aug 2021 -

Event Planner | E-Summit-The Entrepreneurship Fest, IIT Bhubaneswar

Jan 2017 - Apr 2020

Drama Club | The Fourth Wall, IIT Bhubaneswar

Jan 2017 - Apr 2019

*Goyal H. Primary Author