Sandhya Saravanan

Research Fellow, Microsoft Research

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Education

2017–2021 **National Institute of Technology, Tiruchirappalli**
B.Tech Computer Science, GPA: 8.66/10
Courses: Cryptography, Discrete Structures, Probability and Statistics, Data Structures and Algorithms, Database Management, Operating Systems, Networks, Automata and Formal Languages

Research Interests

Applied Cryptography, Security, Secure Multi-Party Computation, Privacy-preserving Systems

Publications

Divyanshu Bhardwaj, Sandhya Saravanan, Nishanth Chandran, Divya Gupta. "**Securely Training Decision Trees Efficiently**". 31st ACM Conference on Computer and Communications Security (CCS)
Presented at Main Conference Paper , ACM CCS 2024

Research Experience

2023- Present **Microsoft Research, Bangalore**
Research Fellow
Advisors: Dr. Divya Gupta, Dr. Nishanth Chandran
- **Securely Training Decision Trees Efficiently** (ACM CCS'24): Designed and implemented a privacy-preserving decision tree training protocol such that no party learns any information about the input training dataset or the resulting decision tree achieving 10× lower communication and 9× faster runtime compared to the state-of-the-art.
- Contributed to MP-SPDZ, a widely used MPC library among researchers. Code
- In addition to working on problems in **privacy-preserving machine learning** and **database operations**, investigated Cut-and-Choose Techniques, Verifiable Distributed Point Functions, Fuzzy Private Set Intersection, and Privacy-Preserving Clustering.
- Currently working on designing protocols for privacy-preserving wildcard matching queries.

2020–2021 **Indian Institute of Science, Bangalore**
Research Intern, CrIS Lab
- Implemented the Astra protocol in C++ to evaluate its concrete improvements in online communication and round complexity over the then state-of-the-art 3PC protocol, ABY3.
- Explored whether linear approximations of sigmoid and softmax functions, with their lower circuit complexity, enable efficient MPC implementations of logistic regression and neural networks without losing numerical accuracy using MP-SPDZ

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Winter 2018 **Indian Institute of Technology, Madras**
Research Intern, Biomedical Engineering Lab
- Implemented lung field segmentation using Convolution Neural Networks (CNNs).

Honors and Awards

2022 Runner up in **Cloud CTF**, an Azure Cloud ethical hacking contest, Microsoft.
2022 Top 5 in **Contoso Skate and Contoso Financial CTF**, a web hacking contest, Microsoft.
2020 Finalist in **Smart India Hackathon**, a nationwide government-funded hackathon
2018 Top 10 in **InCTF**, India's first Attack Defence Capture the Flag.

2013-17 Top 250 in India to qualify for **Indian National Olympiad of Informatics (INOI)**.

2016 Top 300 in India to qualify for **Indian National Mathematical Olympiad (INMO)**.

Work Experience

2021–2023 **Microsoft, India**

Software Developer

- Backend development of actionable messages and connectors integrated into Outlook and Teams.
- Designed and optimized scalable and reliable data pipelines to support data-driven decision making.
- Contributed to improving the performance, cross-platform compatibility, and cloud-native capabilities of our applications using .NET Core.

Summer 2020 Software Developer Intern

- Built a Power BI dashboard to enable cost optimization on Azure using Azure Databricks.

2018-2021 **Delta Force, NIT Trichy**

Core Member and System Administrator

- Problem setting and platform setup of Applied Cryptography challenges for Capture the Flag contests as a member of the university programming club.

Skills

Python, C++, C#, Bash, Javascript *Programming Languages*

MP-SPDZ, ASP.NET, React, NodeJS, MongoDB, Django, MySQL *Development*

Linux, Git, Vim, Docker, Visual Studio *Tools and Systems*

Volunteer Experience

- **Teaching Assistant, ACM India Cryptography Summer School**: I designed a tutorial and exercises to acquaint students with MP-SPDZ (a Secure Multi-party computation framework).
- **Women Inclusivity Network**, NIT Trichy: Co-founded a community of female students and alumni of NIT Trichy that aims to improve the representation of women in STEM fields.
- **Teach for India**: As a volunteer, developed workgen.org, an educational tool to automate question paper generation, with the goal of minimizing the gap in quality of teachers between cities and rural areas.
- Actively contributed to promoting coding culture on-campus by organizing hackathons, CTFs, programming contests and workshops for the student community as a member of Delta Force, NIT Trichy.
- Actively promoted events across music, arts, English lits and dramatics clusters for the annual cultural fest of NIT Trichy.