Gargi Mitra

Ph.D. Student, IIT Madras

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https://gargi-mitra.github.io/website

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Research Interests

Network Security and Privacy, Encrypted network traffic analysis, Blockchain technology

Education and Employment

2015 – Present • **Doctor of Philosophy (Ph.D.).**
Indian Institute of Technology Madras.
Advisors: Prof. Kamakoti V (Dept. of CSE), Prof. Nitin Chandrachoodan (Dept. of EE)

2013 – 2015 • **Work Experience.**
Cognizant Technology Solutions India Pvt. Ltd., India.
Position: Programmer Analyst

2009 – 2013 • **Bachelor of Technology (B.Tech).**
St. Thomas' College of Engineering and Technology (WBUT), West Bengal, India.
Discipline: Computer Science & Engineering
Grade: 85/100

2007 – 2009 • **Senior High School (Class XII).**
Bidya Bharati Girls' High School, West Bengal, India. Grade: 85/100

1996 – 2007 • **High School (Class X).**
Bidya Bharati Girls' High School, West Bengal, India. Grade: 84.75/100

Research Publications (Peer-Reviewed)

1. Mitra, G., Vairam, P. K., SLPSK, P., Chandrachoodan, N. & Veezhinathan, K. (2019). White Mirror: Leaking Sensitive Information from Interactive Netflix Movies using Encrypted Traffic Analysis. In *Proceedings of the ACM SIGCOMM 2019 Conference Posters and Demos, SIGCOMM 2019, Beijing, China, August 19-23, 2019* (pp. 122–124). doi:10.1145/3342280.3342330

2. Vairam, P. K., Mitra, G., Manoharan, V., Rebeiro, C., Ramamurthy, B. & Veezhinathan, K. (2019). Towards Measuring Quality of Service in Untrusted Multi-Vendor Service Function Chains: Balancing Security and Resource Consumption. In *2019 IEEE Conference on Computer Communications, INFOCOM 2019, Paris, France, April 29 - May 2, 2019* (pp. 163–171). doi:10.1109/INFOCOM.2019.8737487

3. Vairam, P. K., Mitra, G., Rebeiro, C., Ramamurthy, B. & Veezhinathan, K. (2018). ApproxBC: Blockchain Design Alternatives for Approximation-Tolerant Resource-Constrained Applications. In *IEEE Communications Standards Magazine* (Vol. 2, *3*, pp. 45–51). doi:10.1109/MCOMSTD.2018.1800021

Posters

1. Mitra, G., Vairam, P. K., Veezhinathan, K. & Chandrachoodan, N. (2017). Hastakshara: A passive side channel based webpage fingerprinting attack for uncovering client intent. *ACM Internet Measurement Conference (IMC'17), Poster Session*.

2. Mitra, G., Veezhinathan, K. & Chandrachoodan, N. (2017). Blockchain as an infrastructure to build secure network services. *PhD Conclave, ISEA Asia Security and Privacy Conference*.

3 Vairam, P. K., Saxena, K., Mitra, G., Rebeiro, C. & Veezhinathan, K. (2017). Samata: A framework for identifying net-neutrality violations using evidence structures. *ACM Internet Measurement Conference (IMC'17), Poster Session*.

Awards and Recognitions

2019 • **AWSAR top 100 Award**, Awarded for being among the *top 100* contestants in a national scientific story-writing competition organized by the Department of Science & Technology, Govt. of India, as part of the AWSAR (Augmenting Writing Skills for Articulating Research) initiative.

2018 • **Gandhi Hazare Award**, *first prize* for proposing technical solutions to fight corruption in the public distribution system in the country.

• **TCS Poster Competition Winner**, *second prize* for presenting 'Ankapala: The Account Book for Fighting Corruption in Public Distribution System'

2017 • **Embedded Security Challenge Winner**, **first prize** at Embedded Security Challenge, Cyber Security Awareness Week, organized by IIT Kanpur, for presenting 'Eradicator: An Integrated Approach for Defense against Cyber Attacks in PLC based Industrial Control Systems'

• **Star TA Award**, from the Department of CSE, IIT Madras for contributions as a Teaching Assistant.

2015 • **"Employee of the Quarter" Award**, from Cognizant Technology Solutions in the first quarter of *2015*

Research Projects

Ongoing • **Analyzing Leakage of Side-Channel Information from Encrypted Browsing Traffic: A Passive Attack to Gain Competitive Business Intelligence**
The proposed attack technique identifies stable side channels in HTTPS communication channels and builds a lightweight framework for predicting client interests.

2018 – 2019 • **White Mirror: Leaking Sensitive Information from Interactive Netflix Movies using Encrypted Traffic Analysis**
On 28^{th} December 2018, Netflix released the first mainstream interactive movie called 'Black Mirror: Bandersnatch'. In this work, we use this movie as a case-study to show for the first time that fine-grained information (i.e., choices made by users) can be revealed from encrypted traffic.

2017 – 2018 • **Ankapala: The Account Book for Fighting Corruption in Food Security**
A blockchain-based solution for fighting fraud and corruption in Public Distribution System in India. The applicability of the study of blockchain features can be extended to developing secure network solutions based on the Blockchain platform.

2016 – 2017 • **Hastakshara: A Passive Side Channel Based Webpage Fingerprinting Attack for Uncovering Client Intent**
The proposed attack technique identifies intents of users accessing a target website from encrypted traffic traces. The applicability of the metrics quantifying the side-channel leakage can be used to craft light-weight defense techniques that prevent fingerprinting attacks in general.

CSAW 2017 • **Eradicator: An Integrated Approach for Defense against Cyber Attacks in PLC based Industrial Control Systems**
Eradicator is a comprehensive defense framework for distributed ICS (Industrial Control System) environments, that uses a holistic view of the ICS and leverages process specific parameters to detect cyber-attacks and thereby isolates the root cause of the attack, and mitigates it.

Technical Skills

- **Languages** -{Python, Java, C, C++, Linux Shell Scripting, PL/SQL}-Proficient, {Solidity, Go, T-SQL}-Competent
- **Blockchain Technologies** - Ethereum, IBM Hyperledger Fabric

- **Hardware Description Language** - Verilog
- **High Level Chip Synthesis Tool** - Bluespec
- **Database Platforms** - Oracle 10g/11.2, MS SQL Server 2008/ 2012
- **Operating Systems** - Linux, Windows XP, Windows 7
- **Tools/IDE** - LaTeX, Bro, Mininet, SQL Server Integration Services, SQL Server Reporting Services 2010/2012, IBM Infosphere Datastage 8.5, SQL Server Management Studio, SQL Developer for Oracle, NetBeans

Course Work Done during Ph.D.

Applied Cryptography, Advanced Computer Networks, Computer Architecture, CAD for VLSI systems, Digital IC Design, Digital Design Verification, Digital System Testing & Testable Design, Logic and Combinatorics in Computer Science, Introduction to Research, Special Topics in CSE (Survey on Blockchain Technology)

Positions of Responsibility

2019
- Shadow PC Member of *IEEE Symposium on Security and Privacy 2019*
- Teaching Assistant for CAD for VLSI Course
- Teaching Assistant for Introduction to Programming Course
- Teaching Assistant for Digital System Testing Course

2018
- Shadow PC Member for ACM Internet Measurement Conference 2018
- Shadow PC Member for Network Traffic Measurement and Analysis Conference 2018
- Teaching Assistant for CAD for VLSI Course
- Teaching Assistant for Introduction to Programming Course

2017
- Teaching Assistant for Digital Design Verification Course
- Teaching Assistant for the Interdisciplinary Research Committee

2016
- Teaching Assistant for Introduction to Programming Course
- Teaching Assistant for Computer Organization Course

References

Prof. V Kamakoti
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Prof. Chester Rebeiro
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