

# RAJAT TANDON

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## EDUCATION

**MS and PhD in Computer Science** (Network Security and Privacy) Aug 2016 – Aug 2022  
University of Southern California (USC), Los Angeles, USA

**Bachelor of Engineering in Computer Science & Engineering** (CSE) July 2009 – May 2013  
Manipal Institute of Technology, Manipal University, Manipal, India

## PATENTS

♦ **Extracting Episodic Memory from Unstructured Text** *Samsung R&D*  
*Lokendra Shastri, Rohini Nookala, Sohini Sengupta, Kapil Khatke, Kailash Atal, Nishu Bansal, Rajat Tandon, Udaya Kumar*

United States Patent Number: US14/626144 Issued: February 19, 2015  
A system for identifying user's episodic memory from unstructured data, which may involve casual reasoning, spatial reasoning, and temporal reasoning.

♦ **[Apparatus and method for automatically converting note to action reminders](#)** *Samsung R&D*  
*Lokendra Shastri, Rohini Nookala, Abhanshu Gupta, Kailash Atal, Rajat Tandon, Karishma Rajesh Sharma, Sohini Sengupta, Utkarsh Srivastava, Vidushi Chaudhary, Arun Yadav, Pratik Vasa, Anshuka Rangi, Ashwani Kumar, Kapil Khatke, Nishu Bansal*

United States Patent Numbers: US15/143070, US16/673,311 Issued: April 27, 2016  
A method for automatically converting note-to-self to action reminders by analyzing notes (in free form/natural language) from users using Natural Language Understanding, Common Sense Reasoning and Context Awareness

## WORK EXPERIENCE

♦ **Juniper Networks** 08/01/2022 – present  
**Software Engineer IV** [Cybersecurity R&D Team]

- Help protect network infrastructure from cyber attacks by discovering/researching new vulnerabilities in network devices such as routers and switches.
- Ensure secure development lifecycle of network devices by performing threat modelling and penetration testing to identify possible risks.

♦ **Steel Labs, Information Science Institute, USC** Los Angeles, USA  
**Research Assistant** [Advisor: Dr. Jelena Mirkovic, Research Associate Professor, USC] 08/15/2016 – 07/31/2022

- **[FRADE](#)**: Modeled human Web server interactions to mitigate cyber-attacks that flood the resources of a targeted service with legitimate looking requests generated by numerous bots.
- **[AMON-SENS](#)**: Cyber-attack detection at ISPs by identifying asymmetry and volume anomalies in the network traffic. (Collaboration: Merit Network, University of Michigan)
- **[LEADER](#)**: Low-rate attack detection and mitigation by identifying the OS level resource usage of different processes using Machine Learning.
- **[Quantifying Cloud Misbehavior](#)**: Measure the contribution of malicious traffic worldwide, that originates from clouds to secure them.
- **[Quantifying the impact of DDoS attacks over the past two decades](#)**: Measured impact of DDoS events over the past two decades, collated and analyzed reports from security technical giants.
- **[I know what you did on Venmo: Discovering privacy leaks in mobile social payments](#)**: Quantified privacy leaks from Venmo notes using BERT (e.g., drugs purchases) and reported our findings, along with security and privacy issues to Venmo. (Collaboration: University of Texas, Austin)
- **[Identifying inappropriate videos and ads for young children on YouTube](#)**: Use BERT for classifying videos as inappropriate using video subtitles. We also utilize other video information such as thumbnail, video description and title. (Collaboration: Sungkyunkwan University, South Korea)

### **Other Projects Pursued at University of Southern California:**

- **[Using Shannon's Entropy to create privacy aware architectures](#)** (Collaboration: Amazon, USA)

- *Optimizing Noise Level for Perturbing Geo-location Data* (utilizes differential privacy concepts)
- *Social Bots for Online Public Health Interventions* (Machine Learning)

### **Teaching Assistant at USC:**

- CSCI 430 Introduction to Computer and Network Security (Spring 2019, Spring 2020, Fall 2021)
- CSCI 401 Capstone: Design and Construction of Large Software Systems (Spring 2021)
  - Mentored undergraduate students on software engineering and cyber security projects from stakeholders such as *NASA JPL*.

### **◆ Merit Network (affiliated to University of Michigan, Ann Arbor, MI)**

**Ann Arbor, MI**

#### **Research Engineer Intern**

05/15/2018 – 08/18/2018

06/05/2017 – 08/17/2017

- AMON: All packet MONitoring tool, an open source tool for live multi-gigabit network monitoring.
- AMON-DIAS: Statistical Anomaly Detection Tool based on utilizing residuals of incremental Principal Component Analysis.

### **◆ Samsung R&D Institute**

**Bangalore, India**

#### **Senior Software Engineer / Researcher in Advanced Research Team**

07/12/2013 – 07/31/2016

- Alter Ego - Smart Action Reminder (SAR): Processes conversations and draws inferences using contextual awareness, performs temporal/spatial reasoning, semantic analysis and intent recognition generates reminders. (Team of 20)
- Note-to-Self (N2S) (team of 20): Processes notes, performs temporal/spatial reasoning, generates reminders.
  - ✓ Developed the Dependency Relation Manger for English and French languages.
  - ✓ Developed Semantic Frame Manager, an integral part of core NLU Engine Technology to process each sentence.
- Personalized Text to Speech (PTTS) (team of 5): Produce speech in any human voice given few speech samples, using Voice Morphing & Speaker Adaptation using Hidden Markov Model approaches.

### **◆ Schneider Electric India Pvt. Ltd.**

**Bangalore, India**

#### **Software Engineer Intern**

08/01/2013 – 05/31/2013

- Developed a Windows based Mobile Application, called Historian Mobile Client, an automated tool, which triggers events and alarms to help the Process Engineers analyze the plant performance.
- Received appreciation for the flexibility provided to Engineers to be informed about the defects, faults or equipment failures immediately irrespective of their locations. It provided option to generate custom reports too.

### **◆ IBM India Pvt. Ltd.**

**Gurgaon, India**

#### **Software Engineer Intern**

06/01/2011 – 07/31/2011

- Developed a Sales Analytics tool for the IBM Sales Managers, to generate customized MS Excel reports.
- Improved overall efficiency by 83%, by reducing the amount of work done in 6 hours to just half an hour task.
- The tool was released in production and can be used in any zone of IBM India

## **PEER REVIEWED RESEARCH/PUBLICATIONS ([Google Scholar](#))**

### **◆ [I know what you did on Venmo: Discovering privacy leaks in mobile social payments](#)**

*Rajat Tandon, Pithayuth Charnsethikul, Ishank Arora, Dhiraj Murthy, Jelena Mirkovic*

2022 Privacy Enhancing Technologies Symposium (PETS 2022)

[Acceptance Rate: 23.97% (128/524)]

### **◆ [AMON-SENS: Scalable and Accurate Detection of Volumetric DDoS Attacks at ISPs](#)**

*Rajat Tandon, Pithayuth Charnsethikul, Michalis Kallitsis, Jelena Mirkovic*

2022 IEEE Globecom Communications Conference (Globecom 2022)

### **◆ [Samba: Identifying Inappropriate Videos for Young Children on YouTube](#)**

*Binh M. Le, Rajat Tandon, Chingis Oinar, Jeffrey Liu, Uma Durairaj, Jiani Guo, Spencer Zahabizadeh, Sanjana Ilango, Jeremy Tang,*

*Fred Morstatter, Simon S. Woo, Jelena Mirkovic*

31st ACM International Conference on Information and Knowledge Management (CIKM 2022)

[Full Research Papers Acceptance Rate: 23.32% (274/1175)]

- ◆ [Did your child get disturbed by an inappropriate advertisement on YouTube?](#)

*Jeffrey Liu, Rajat Tandon, Uma Durairaj, Jiani Guo, Spencer Zahabizadeh, Sanjana Ilango, Jeremy Tang, Neelesh Gupta, Zoe Zhou, Jelena Mirkovic*

2022 SIGKDD Conference on Knowledge Discovery and Data Mining Undergraduate Consortium (KDD-UC 2022)

- ◆ [Harm-DoS: Hash Algorithm Replacement for Mitigating Denial-of-Service Vulnerabilities in Binary Executables](#)

*Nicolaas Weideman, Haoda Wang, Tyler Kann, Spencer Zahabizadeh, Wei-Cheng Wu, Rajat Tandon, Jelena Mirkovic, Christophe Hauser*

25th International Symposium on Research in Attacks, Intrusions and Defenses (RAID 2022)

[Acceptance Rate: 25.18% (35/139)]

- ◆ [Defending Web Servers Against Flash Crowd Attacks](#)

*Rajat Tandon, Abhinav Palia, Jaydeep Ramani, Brandon Paulsen, Genevieve Bartlett, Jelena Mirkovic*

2021 International Conference on Applied Cryptography and Network Security (ACNS 2021)

[Acceptance Rate: 19.89% (37/186)]

- ◆ [Quantifying Cloud Misbehavior](#)

*Rajat Tandon, Jelena Mirkovic, Pithayuth Charnsethikul*

2020 IEEE International Conference on Cloud Networking (CloudNet 2020)

- ◆ [Defending Web Servers Against Flash Crowd Attacks](#)

*Rajat Tandon, Abhinav Palia, Jaydeep Ramani, Brandon Paulsen, Genevieve Bartlett, Jelena Mirkovic*

2019 IEEE 27th International Conference on Network Protocols (ICNP 2019) - MERIT Workshop

- ◆ [Social Bots for Online Public Health Interventions](#)

*Ashok Deb, Anuja Majmundar, Sungyong Seo, Akira Matsui, Rajat Tandon, Shen Yan, Jon-Patrick Allem, Emilio Ferrara*

2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2018)

[Short Research Papers Acceptance Rate: 17.07% (50/293)]

- ◆ [Optimizing noise level for perturbing geo-location data](#)

*Abhinav Palia, Rajat Tandon*

2018 Future of Information and Communication Conference, Advances in Information and Communication Networks  
pp 63-73

- ◆ [Algorithm to Compute Cubes of 1st "N" Natural Numbers using Single Multiplication per Iteration](#)

*Rajat Tandon, Rajika Tandon*

International Journal of Computer Applications (0975 – 8887), Volume 101– No.15, September 2014

## NON-PEER REVIEWED RESEARCH/PUBLICATIONS ([Google Scholar](#))

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- ◆ [A Survey of Distributed Denial-of-Service Attacks and Defenses](#)

*Rajat Tandon*

- ◆ [Utilizing Shannon's Entropy to create Privacy Aware Architectures](#)

*Abhinav Palia, Rajat Tandon, Carl Mathis*

- ◆ [Detection of Sparse Anomalies in High-Dimensional Network Telescope Signals](#)

*Rafail Kartsioukas, **Rajat Tandon**, Zheng Gao, Jelena Mirkovic, Michalis Kallitsis, Stilian Stoev*

## RESEARCH/PUBLICATIONS under submission

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- ◆ [Leader: Defense Against Exploit-Based Denial-of-Service Attacks on Web Servers](#)

*Rajat Tandon, Haoda Wang, Nicolaas Weideman, Shushan Arakelyan, Genevieve Bartlett, Christophe Hauser, Jelena Mirkovic*

- ◆ [Quantifying the impact of DDoS attacks over the past two decades](#)

*Rajat Tandon, Arav Budhiraja, Roy Lin, Elvis Lin, Michalis Kallitsis, Jelena Mirkovic*

## PhD Thesis

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- ◆ [Protecting Online services from Sophisticated DDoS Attacks](#)

*Rajat Tandon*

## NEWS ARTICLES about my work

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- ◆ [I know what you did on Venmo: Discovering privacy leaks in mobile social payments](#)

[USC news](#), [EurekAlert](#), [FOX news](#), [MEL Magazine](#), [Western Slope Now](#), [ISI News](#), [Funancial News](#), [Study Finds](#), [Popular Mechanics](#), [WNN](#), [WFXR FOX news](#), [The Local Report](#), [Planet Concerns](#), [Techy Job](#), [Tampa Hoy](#), [Novonite](#), [YRT news](#), [Antiguaandbarbuda news](#), [LaNetaNeta](#), [Eyelash News](#), [News 10](#), [KFOR TV](#), [KRON4](#), [KTLA](#), [Spot on Oklahoma](#), [Crystal Gorham](#), [Trendradars](#), [News Channel 6 WJBF](#), [22 News WWLP](#), [Viterbi School News](#), [WNCT](#), [OZARKSFIRST](#), [WLNS](#), [Top News USA](#), [MSN](#), [Opera News](#), [My Twin Tiers](#), [Yahoo Movies](#), [CW 39](#), [I City News](#), [UpMatters](#), [Planet Circulate](#), [abc 8 news](#), [Kark news](#), [USC: Trojans Family Magazine](#), [Nutzie](#)

- ◆ [Quantifying Cloud Misbehavior](#)

[USC news](#), [ISI News](#)

## REVIEWER SERVICE

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- [ELSEVIER: Computers and Security](#) (Reviewed 15 papers since 2020)
- [Computer Science Review](#) (Reviewed 1 paper since 2021)
- PC member: [IEEE Euro Security & Privacy WTMC 2022](#)
- External Reviewer: [Privacy Enhancing Technologies Symposium \(PETS 2023\)](#)
- [IEEE Access](#) (Reviewed 7 papers since 2014)
- PC member: [IFIP Networking 2023](#)

## JUDGING EVENTS and INVITED TALKS

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- ◆ Judge at *USC Viterbi Undergrad Symposium, 2022*
- ◆ Research Mentor at [USC CURVE Fellowship Program, 2021](#)
- ◆ Gave invited technical talks at Sungkyunkwan University, Seoul, South Korea in November 2021 and May 2022.
- ◆ Presented my project's live demo to JK Shin and DJ Koh, worldwide CEOs, Samsung Electronics in 2016. (Around 20 employees from different divisions were chosen out of the 5,000+ employees of Samsung R&D Institute India, Bangalore to present their projects.)

## AWARDS

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- ◆ Received a **bug bounty award** from **PayPal** on [Hackerone](#) for discovering a security vulnerability on Venmo that could have exposed private data of millions of users.
- ◆ **At Samsung:**
  - Awarded “Employee of the Month” in *February 2015* at Samsung for exceptional performance in the project.
  - Received Spot Awards at Samsung in *May 2014* and *August 2014* for designing and implementing the Dependency Relation Manager for the Alter Ego project and helping the team meet deadlines, demonstrating multitasking skills.
  - Won the logo designing contest among 20 contestants organized by Samsung Advanced Technology Labs in 2014.
- ◆ **At Manipal Institute of Technology, Manipal University:**
  - ◆ Ranked 3 out of 254 CSE students in class, with an overall GPA of 9.56/10.0
  - Appointed **Class Representative** [2010-2011] of **Computer Science class** at Manipal University.

## INTERNATIONAL RECOGNITION outside curriculum

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- ◆ Winner of the International Essay Writing Contest 2014 by [EssayTigers](#)
- ◆ Winner of an International Poetry contest by [Poetrysoup](#) in 2014.

## TRAVEL GRANTS

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- ◆ IEEE ICNP MERIT 2019 (Los Angeles to Chicago)
- ◆ USC GSG 2018 (Los Angeles to Singapore)

## MENTORSHIP

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- ◆ At USC CURVE Fellowship Program, I mentored 6 Undergrad students for the academic year 2021-2022.
- ◆ At STEEL Lab, USC/ISI, I mentored 5 Master’s and 14 undergrad students of the Lab from 2016-2022.
- ◆ At Samsung R&D, I mentored 7 Software Engineering Interns

## TECHNICAL SKILLS & INTERESTS

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Programming	:	JAVA, Python, Bash Scripting, C++, C, Perl, ASP.Net, WCF, Socket Programming in Networks
Operating Systems	:	Linux, Windows
Database	:	MongoDB, PostgreSQL, SQL (Oracle), MS Access
Tools & IDEs	:	MS Visual Studio, Eclipse, NetBeans, Spring, MAX+2 Baseline, MS Office
Networking/DDoS	:	Tcpdump, Netflow, Nfdump, Wireshark, IP Multiplexing, Routing, Httpperf, HULK, LOIC, IXIA
AI/Statistics	:	Statistical Analysis, Machine Learning, Differential Privacy, Anomaly Detection

## REFERENCES

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Name	Title	Affiliation	E-mail
Dan Liu	Senior Security Engineering Manager	Juniper Networks, Sunnyvale, CA	danl@juniper.net
Dr. Jelena Mirkovic	Research Associate Professor	Information Sciences Institute, USC, Los Angeles, CA	mirkovic@isi.edu
Dr. Genevieve Bartlett	Research Scientist	Information Sciences Institute, USC, Los Angeles, CA	bartlett@isi.edu
Dr. Michalis Kallitsis	Research Scientist Adjunct Professor	Merit Network, Ann Arbor University of Michigan, Ann Arbor	mgkallit@merit.edu
Dr. Lokendra Shastri	Ex: Scientist (VP Level); Ex: Professor	Samsung R&D Institute, Bangalore, India ICSI, University of Berkeley, CA	lokendra_shastri@yahoo.com