

Sriharsha Etigowni

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Summary

- Post Doctoral Researcher with research in **cyber physical security, IIoT and ICS (industrial control systems)**.
- My research involves **securing embedded devices** such as PLC's, drones, and 3D printers for diverse systems such as smart grids, UAV's, intelligent production machines, and additive manufacturing.
- Vulnerability discovery on **VxWorks RTOS** using Fuzzing and fixing them using cyber physical solutions.
- **3+ years** of experience as **software developer for automotive embedded systems** with good understanding of working of automotive electronics and sensors.
- I enjoy learning new systems in various domains, assimilate new ideas quickly, and **find innovative solutions**.

Work Experience

Purdue University

POST DOCTORAL RESEARCH ASSOCIATE

Indiana, USA

Jan 2020 - Present

- Leading a research project on security of PLCs as well as working in collaboration on several other projects.
- Advising PhD's and Masters students on their research projects by identifying problems and solving them with innovative solutions.

Information Technology Security, Siemens Corporate Technology

INTERN - SOFTWARE ENGINEER FOR CYBER SECURITY

New Jersey, USA

May 2017 - Aug 2017

- Modelled and developed security aware communication between autonomous production machines.
- Implemented Automated Industrial control systems (smart plant) and dynamic security capability activation and deactivation in the context of authentication, integrity, confidentiality, and non-repudiation.

Robert Bosch Engineering and Business Solutions

SOFTWARE ENGINEER

Bangalore, India

Jul 2013 - Jul 2014, Jun 2011 - Jul 2012

- Developed base and post production software for NOx sensor control unit according to MISRA guidelines.
- Developed EEPROM drivers, EEPROM coordinator for STM8 microcontroller and SAE J1939 communication protocol drivers.

Robert Bosch GmbH

SOFTWARE ENGINEER

Stuttgart, Germany

Jul 2012 - Jun 2013

- Developed device drivers for the ASIC used in NOx sensor control unit and developed plant software (End of Line) for NOx sensor control unit.
- Developed complete software for modeswitch, which was *innovated* to change the operating state of control devices using pulse amplitude modulation.

Education

Rutgers, the State University of New Jersey

PHD IN ELECTRICAL AND COMPUTER ENGINEERING

New Jersey, USA

Sept 2014 - January 2020

- Thesis: Securing safety critical systems by using physical and control invariants approaches.
- Advisor: Saman Zonouz

Bangalore Institute of Technology

B.E IN ELECTRICAL AND COMMUNICATION ENGINEERING

Bangalore, India

Aug 2007 - June 2011

- Vehicle to vehicle and vehicle to infrastructure based communication.

Skills

- **Programming/Scripting Languages:** C, C++, Python, x86 assembly
- **Reverse Engineering Frameworks:** Ollydbg, IDA Pro, Ghidra, Wireshark
- **Communication Protocols:** CAN, J1939, LIN, SPI, I2C, LLDP, TCP/IP, UDP, Modbus
- **Soft Skills:** Problem solving, decision making, self-motivated and influential

Patent

- Andreas Dreyer, Paul Lewicki, **Sriharsha Etigowni**, Markus Schreiber "Verfahren zum Einstellen eines Steuergeräts (A method for adjusting a control device)." Under Germany Patent registration no **DE 102013217637 A1**, 5 Mar 2015 and Under China Patent registration no **CN104423290 A**, 18 Mar 2015

Publications

- Tuan Le, **Sriharsha Etigowni**, Sizhuang Liang, Mehdi Javanmard, Saman Zonouz, Raheem Beyah. "This Isn't What It Looks Like! Attacks on 3D Printed Objects using 4D Effects" In 2021 Annual Computer Security Applications Conference (ACSAC)
- **Sriharsha Etigowni**, Sizhuang Liang, Mehdi Javanmard, Saman Zonouz, Raheem Beyah. "Physics-Aware Security Monitoring against Structural Integrity Attacks in 3D Printers" In 2021 51st Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN) IEEE, 2021.
- Shamina Hossain-McKenzie, Kaushik Raghunath, Katherine Davis, **Sriharsha Etigowni**, Saman Zonouz. "Strategy for distributed controller defence: Leveraging controller roles and control support groups to maintain or regain control in cyber-adversarial power systems" In 2021 IET Cyber-Physical Systems: Theory & Applications
- Gregory Walkup, **Sriharsha Etigowni**, Dongyan Xu, Vincent Urias, Han W Lin. "Forensic Investigation of Industrial Control Systems Using Deterministic Replay" In 2020 IEEE Conference on Communications and Network Security (CNS)
- **Sriharsha Etigowni**, Shamina Hossain-McKenzie, Maryam Kazerooni, Katherine Davis, Saman Zonouz. "Crystal (ball): I Look at Physics and Predict Control Flow! Just-Ahead-Of-Time Controller Recovery" In 2018 Annual Computer Security Applications Conference (ACSAC) (acceptance rate 20.1%)
- Huang, Zhenqi, **Sriharsha Etigowni**, Luis Garcia, Sayan Mitra, and Saman Zonouz. "Algorithmic Attack Synthesis using Hybrid Dynamics of Power Grid Critical Infrastructures." In 2018 48th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN), pp. 151-162. IEEE, 2018.(acceptance rate 28.05%)
- Han, Yi, **Sriharsha Etigowni**, Hua Li, Saman Zonouz, and Athina Petropulu. "Watch Me, but Don't Touch Me! Contactless Control Flow Monitoring via Electromagnetic Emanations." In Proceedings of the 2017 ACM SIGSAC conference on Computer and communications security (acceptance rate 18.06%)
- **Sriharsha Etigowni**, Mehmet Cintuglu, Maryam Kazerooni, Shamina Hossain-McKenzie, Pengfei Sun, Katherine Davis, Osama Mohammed, Saman Zonouz. "Cyber-Air-Gapped Detection of Controller Attacks through Physical Interdependencies." In 2017 IEEE International Conference on Smart Grid Communications (SmartGridComm)
- Shamina Hossain-McKenzie, Maryam Kazerooni, Katherine Davis, **Sriharsha Etigowni**, and Saman Zonouz. "Analytic corrective control selection for online remedial action scheme design in a cyber adversarial environment." IET Cyber-Physical Systems: Theory & Applications 2, no. 4 (2017): 188-197.
- Joshua Johnson, Shamina Hossain-McKenzie, Uyen Bui, **Sriharsha Etigowni**, Katherine Davis, and Saman Zonouz. "Improving power system neural network construction using modal analysis." In Intelligent System Application to Power Systems (ISAP), 2017 19th International Conference on, pp. 1-6. IEEE, 2017.
- Shamina Hossain-McKenzie, Katherine Davis, Maryam Kazerooni, **Sriharsha Etigowni**, and Saman Zonouz. "Distributed controller role and interaction discovery." In Intelligent System Application to Power Systems (ISAP), 2017 19th International Conference on, pp. 1-6. IEEE, 2017.
- **Sriharsha Etigowni**, Tian (Dave) Jing, Saman Zonouz, Kevin Butler. "CPAC: Securing Critical Infrastructure with Cyber-Physical Access Control" In 2016 Annual Computer Security Applications Conference (ACSAC) (acceptance rate 22.85%)
- Shamina Hossain-McKenzie, **Sriharsha Etigowni**, Katherine Davis, and Saman Zonouz. "Augmented DC Power Flow Method with Real-Time Measurements." In 19th Power Systems Computation Conference 2016
- Shamina Hossain, **Sriharsha Etigowni**, Kate Davis, and Saman Zonouz. "Towards cyber-physical intrusion tolerance." In 2015 IEEE International Conference on Smart Grid Communications (SmartGridComm), pp. 139-144. IEEE, 2015 - **Top-3 Student Demonstration**

Proposal Contribution

- Srch3D: Efficient 3D Model Search via Online Manufacturing-specific Object Recognition and Automated Deep Learning-Based Design Classification
My contribution: Technical lead
Amount: \$1,200,000
Duration: September 1 2019 – August 31 2022
Investigators: Saman Zonouz [PI], Mehdi Javanmard, Raheem Beyah, Jerry Qi
Sponsor: National Science Foundation (NSF)
- Trustworthy Cyber-Physical Additive Manufacturing with Untrusted Controllers
My contribution: Technical contribution
Amount: \$1,000,000
Duration: August 1 2017 – July 31 2020
Investigators: Saman Zonouz [Lead PI], Mehdi Javanmard, Athina Petropulu, Raheem Beyah
Sponsor: National Science Foundation (NSF)

Invited Talks

2019	Runtime Monitoring of PLCs to Detect Attacks against Industrial Control Systems , Accenture Research Labs	<i>Washington DC, USA</i>
2019	Securing safety critical systems using domain specific properties , Siemens Corporate Research	<i>Charlotte, USA</i>
2018	I Look at Physics and Predict Control Flow! Just-Ahead-Of-Time Controller Recovery , CMU CPS V&V I&F Workshop 2018	<i>Pittsburgh, USA</i>
2015	Dynamic Software Verification of Industrial Critical Control Systems , Trustworthy Cyber Infrastructure for the Power Grid (TCIPG) summer school	<i>Illinois, USA</i>

Honors & Awards

2018	ECE Research Excellence Award , Fall 2018	<i>Rutgers University Luxembourg city, Luxembourg</i>
2018	Student Travel Grant , DSN 2018	<i>Los Angeles, U.S.A</i>
2016	Student conferencship award , ACSAC 2016	<i>Vienna, Austria</i>
2016	Student Travel Grant , ACM CCS 2016	<i>Illinois, U.S.A</i>
2015	TCIPG summer school scholarship , Trustworthy Cyber Infrastructure for the Power Grid (TCIPG)	<i>Florida, U.S.A</i>
2015	Top-3 Demo on "Potential Malware for PLC" , IEEE SmartGridComm	<i>Stuttgart, Germany</i>
2013	Incentive programme award , Innovation of "Verfahren zum Einstellen eines Steuergeräts (A method for adjusting a control device)." awarded by Robert Bosch GmbH innovation	

Outreach and Services

Academic Services

PROGRAM COMMITTEE

- SafeThings 2021 IEEE Workshop on the Internet of Safe Things Co-located with S&P Oakland
- Automotive and Autonomous Vehicle Security (AutoSec) Workshop Co-located with NDSS 2021

Indiana, USA

2021

Teaching high school students as part of outreach program

TUTORIALS ON DRONES AND NEURAL NETWORKS

- Introduced the dynamics and control of drones.
- Introduced neural network for sensor data prediction.

New Jersey, USA

Aug 2019

creaTECH: Drone Edition at The Society of Women Engineers Rutgers University

PRESENTED AND CONDUCTED TUTORIALS ON DRONES AND NEURAL NETWORKS WORKSHOP

- Introduced the dynamics and control of drones.
- Introduced neural network for sensor data prediction.

New Jersey, USA

Mar 2017