

Seema Kumar

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Research Interests

Security in IoT, IoT communication protocols, deep learning for embedded device security, embedded programming

Education

- 01/2017 - present **Ph.D Candidate**, Computer Science, Technical University of Darmstadt,
Advisor: Prof. Dr. Patrick Eugster
Expected graduation: Dec 2021
- 10/2013 - 01/2016 **Master of Science**, Distributed Software Systems, Technical University of Darmstadt
Grade: 1.87 ECTS
- 2006–2009 **Bachelor of Engineering**, Computer Science, Visveswaraya Technological University,
Grade: 76% (*First Class with Distinction*)

Work Experience

- 01/2017– present **Research Assistant (Wissenschaftlicher Mitarbeiterin)**, TU DARMSTADT
 - Designed a software-based remote network attestation protocol
 - Implemented a program-anomaly detection technique for lightweight embedded devices (ARM Cortex-M using TrustZone).
 - A neural network (LSTM/GRU) based model was generated to study the behaviour of a program and detect control flow anomalies.
- 10/2016 – 01/2017 **Research Assistant**, SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN, Singapore
Worked on detection mechanism for IoT malware (Mirai)
- 03/2016 – 08/2016 **Project Assistant**, INDIAN INSTITUTE OF SCIENCE, India
Developed a distributed scheduling algorithm for 6TiSCH networks. Worked on IoT communication protocols: RPL, 6LoWPAN, 6TiSCH
- 08/2015 – 12/2015 **Werkstudent**, AGT INTERNATIONAL, Darmstadt
Setting up an IoT network which can remotely fetch machinery data - used Raspberry Pi.
Developed a Prototype for Indoor Localization using bluetooth beacons.
- 01/2014 – 07/2014 **HiWi**, TECHNICAL UNIVERSITY OF DARMSTADT, Darmstadt
Fine-grained churn modeling for TUDμNet, a WSN testbed. Users can achieve the scenario of single or multiple simultaneous node failures and evaluate the behavior of their system
- 01/2013 – 08/2013 **Software Engineer**, SAVARI NETWORKS, India
Developed safety application for Vehicle to Vehicle (V2V) and Vehicle to Infrastructure (V2I) communications. Embedded programming on an operating system based on OpenWRT
- 12/2009 – 08/2012 **Project Assistant**, INDIAN INSTITUTE OF SCIENCE, India
Design and development of a fuzzy logic algorithm for seamless vertical handover across 3G and WLAN
6PANview - Worked on analyzing network performance based on link quality between the nodes

Technical Skills

- Languages C, PYTHON
- Development LINUX, CONTIKI (OS for embedded devices)
- Protocols IEEE802.11, IEEE802.15.4, UDP/TCP, IPv6, RPL, TSCH
- Software MATLAB, WIRESHARK

Languages

- English Proficient
- German Basic (Level B1)

Grants and Activities

- 01/2020 Received a two-years Software Campus grant of almost 100k€
- 2020 Trainings on topics: innovation management, creating high performance teams, insights discovery, scrum, getKanban.
- 02/2019 Embedded World Conference, Nuremberg
- 05/2017 Spring school on Security & Correctness in IoT, TU Graz
- 2017-2021 Supervised master theses, project seminars
- 2017-2021 Reviewed conference papers

Publications

Journal Articles

- [J1] Savvas Savvides, Seema Kumar, Julian Stephen, and Patrick Eugster, C3PO: Cloud-based Confidentiality-preserving Continuous Query Processing, in ACM Transactions on Privacy and Security (TOPS) 2021
- [J2] Seema Kumar, Patrick Eugster and Silvia Santini, Software-based Remote Network Attestation, in IEEE Transactions on Dependable and Secure Computing (TDSC) 2021

Magazine Articles

- [M1] Patrick Eugster, Seema Kumar, Savvas Savvides, Julian Stephen, Ensuring Confidentiality in the Cloud of Things in IEEE Pervasive Computing 2019

Conference Articles

- [C1] G B Prasad, Seema Kumar, UH Shrikant, Gopi Krishna Garge, SVR Anand, Malati Hegde, SeaMo+: A Virtual real-time multimedia service framework on handhelds to enable remote real-time patient monitoring for mobile doctors in IEEE International Conference on Communication Systems and Networks (COMSNETS) 2013
- [C2] M Rafiq, Seema Kumar, Nagaraj Kammar, Guru Prasad, Gopi Krishna S Garge, SVR Anand, Malati Hegde, A vertical handoff decision scheme for end-to-end QoS in heterogeneous networks: an implementation on a mobile IP testbed in IEEE National Conference on Communications (NCC) 2011
- [C3] Seema Kumar, Gopi Krishna S Garge, SVR Anand, Malati Hegde, Experiences with SeaMo: A vertical handoff implementation for heterogeneous wireless networks in Asia-Pacific Advanced Network (APAN) 2011 (Best student paper)