Shankar Karuppayah

Curiculum vitae

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Generated on December 4, 2023

Employment History

2023–Now	**Deputy Director**, *National Advanced IPv6 Centre (NAv6)*, Universiti Sains Malaysia, Malaysia `www.nav6.usm.my`
2016–2023	**Senior Lecturer**, *National Advanced IPv6 Centre (NAv6)*, Universiti Sains Malaysia, Malaysia `www.nav6.usm.my`
2020–2021	**Area Head**, *Telecooperation Lab (TK)*, Technische Universität Darmstadt, Germany `www.tk.tu-darmstadt.de`
2019–2021	**Postdoctoral Researcher**, *Telecooperation Lab (TK)*, Technische Universität Darmstadt, Germany `www.tk.tu-darmstadt.de`

Education

2012–2016	**PhD, Cyber Security**, *Technische Universität Darmstadt*, Darmstadt, Germany **Thesis title**: Advanced Monitoring of P2P Botnets **Supervisor**: Prof. Dr. Max Mühlhäuser
2009–2011	**MSc, Software Systems Engineering**, *King Mongkut's Univ. of Tech. North Bangkok*, Bangkok, Thailand *Curriculum based on the syllabus of RWTH Aachen, Germany*
2006–2009	**BSc (Hons), Computer Science**, *Universiti Sains Malaysia*, Penang, Malaysia **Major**: Networking **Minor**: Management

Membership and Professional Activities

Membership

- Institute of Electrical and Electronics Engineers (IEEE)
  Member

- ○ Malaysian Research and Education Network (MyREN)
  Internet Security Working Group Deputy Head
- ○ Malaysian Board of Technologists (MBOT)
  Professional Technologist
- ○ MRANTI Autonomous Vehicle XL - Technical Advisory Panel

Journal Reviewer

- ○ ACM Computing Surveys (CSUR)
- ○ IEEE Transactions on Information Forensics & Security (T-IFS)
- ○ IEEE Journal on Selected Areas in Communications(JSAC)
- ○ PeerJ Computer Science
- ○ Journal of Information Security and Applications (JISA)
- ○ Computers and Electrical Engineering

Committees

- ○ USM Mobile Access Coordinator (COVID-19)
- ○ USM Industry Liaison Fellow
- ○ USM Cyber Security Awareness Program - Subject Matter Expert

Teaching Experiences

Universiti Sains Malaysia

- ○ Information Security Management and Assurance - [*2021*]
- ○ Internet Security - [*2019*]
- ○ Internet Governance - [*2019*]
- ○ Introduction To Real Time Operating Systems & Applications - [*2018 - 2019*]
- ○ Special Topics in Next Generation Internet - [*2017 - 2018*]
- ○ Internet Communications Protocol - [*2016 - 2018*]

Technische Universität Darmstadt

- ○ Protection in Networked Systems (PNS) - [*2020 - 2021*]
- ○ Simulation and Evaluation of Computer Networks (SECoN) - [*2013 - 2014*]

(Selected) Consultancy Projects

2021 **IT Consultant to Malaysian Red Crescent Society - Penang State Committee**
Provide IT consultation to the Penang MRCS committee
Honorary Position (Consultant)

2021 **Cyber-Physical Security Design for Energy Aggregation: Applicability In The Malaysian Landscape**
A study and design on cyber-physical security design for energy aggregation domains and its application on the Malaysian market
International Grant (Co-Researcher)

2021 **Joint Solution Design To The Technical Problems Faced By TF-AMD**
A project to study and propose designs as solution to the technical problems faced by TF-AMD
Industry Grant (Co-Researcher)

2017 **IoT-Based Recipe Management System**
Design and development of a in-house system to interconnect various equipment in a shop floor with recipe management and data analytics capabilities
Industry Grant (Co-Researcher)

(Selected) Talks and Trainings

2022 **Introduction to Cyber Hygiene**
An invited talk given to employees of Intel Malaysia on the importance of Cyber Hygiene and how to identify/detect social engineering attacks
Intel Security Conference 2022 (Invited Talk)

2019 **The Importance of Data Analytics in the Era of Industry 4.0**
An invited talk given to vocational students of Universitas Brawijaya, Indonesia on the importance of big data and the associated analysis for Industry 4.0 as part of their (International) 3-in-1 lecture series
International Talk (Visiting Lecturer)

2019 **Data Analytics with Python**
A hands-on training workshop for selected vocational students of Universitas Brawijaya on the topics of Data Analytics with Python
International Workshop (Instructor)

2018 **Data Analytics with Python**
A hands-on training workshop for selected postgraduate students and faculty members of Nehru Arts & Science College, India on the topics of Data Analytics with Python
International Workshop (Instructor)

2018 **SecureAsi@ V2.0: Advanced Security Training Workshop**
follow-up capacity building grant focused on training technical cybersecurity experts on the topics of advanced penetration testing and network monitoring for Network Operation Centre (NOC) of National Research Education Networks (NRENs) within the APAC region (Asi@Connect economies)
International Grant (Project Leader)

2017 **SecureAsi@: Asi@Connect Security Training Workshop**
A capacity building grant focused on training technical cybersecurity experts on the topics of penetration testing and network monitoring for Network Operation Centre (NOC) of National Research Education Networks (NRENs) within the APAC region (Asi@Connect economies)
International Grant (Project Leader)

2017 **Industry 4.0 and the Future Education**
A knowledge sharing session with the staffs of Inari Technology Sdn. Bhd.
Industry Talk (Invited Speaker)

2016 **Advanced Monitoring in P2P Botnets**
A brief recap of the latest advancements on the topic of advanced monitoring in P2P botnets with the audience of MyREN Futurescape 2016
National Conference (Invited Speaker)

2016 **Ethical Hacking using Kali Linux Introductory Workshop**
A two-day hands-on workshop organized by MyREN's Internet Security Working Group for students and faculty staff of Malaysian Universities.
National Workshop (Instructor)

(Selected) Research Projects

2022   **User-mobility optimized routing protocol for enabling autonomous and self-managing disaster communication network.**
An TRGS research grant to study and propose a user-mobility routing protocol for disaster management communication network. This grant is a transdiciplinary grant with three other investigators from other faculties in Universiti Sains Malaysia.
National Grant (Project Leader)

2022   **WatchTower: A Black Box-Based Cyber Security Monitoring Agent Device**
An innovation grant to develop a prototype that can assist small organizations to be monitored remotely by a full-fledged Security Operations Center (SOC). The end goal of this prototype is to establish a SOC-as-a-service business model.
USM Product Innovation & Development Grant (Project Leader)

2021   **A periodicity-agnostic method for detecting parasitic botnets in Distributed Hash Table-based peer-to-peer networks**
An FRGS research grant to study and propose methods to detect parasitic botnets in DHT-based P2P network
National Grant (Project Leader)

2020   **NAHRIM Enviromental Sensor System**
A study and deployment of IoT-based sensors and system funded by NAHRIM to continuously monitor water-quality
National Grant (Co-Researcher)

2019   **Novel P2P Botnet Detection and Endpoint Mobilization**
A Royal Bank of Canada (RBC) funded project aimed at carrying out research on advanced P2P botnet detection and countermeasures
International Industry Grant (Associate Researcher - TU Darmstadt)

(Selected) Publications

Federated Learning   Aidmar Wainakh, Zimmer E., Subedi Sandeep, Jens Keim, Tim Grube, **Shankar Karuppayah**, Alejandro Sanchez Guinea, Max Muhlhauser, Federated Learning Attacks Revisited: A Critical Discussion of Gaps, Assumptions, and Evaluation Setups, SENSORS, **23**, 1–33 (2023). 🌐 doi:10.3390/s23010031

Botnets   Arkan Hammoodi Hasan Kabla, Mohammed F.R. Anbar, Selvakumar A/L Manickam, Alwan Abdullah Abdulrahman Alwan, **Shankar Karuppayah**, Monitoring Peer-to-Peer Botnets: Requirements, Challenges, and Future Works, Computers, Materials, and Continua, **75**, (2023). 🌐 doi:10.32604/cmc.2023.036587

SECS/GEM   Ashish Jaisan, Selvakumar Manickam, Shams A. Laghari, Shafiq Ul Rehman, **Shankar Karuppayah**, Secured SECS/GEM: A Security Mechanism for M2M Communication in Industry 4.0 Ecosystem, International Journal of Advanced Computer Science and Applications, **12/8**, 241–250 (2021). 🌐 doi:10.14569/IJACSA.2021.0120828

SECS/GEM   Shams A. Laghari, Selvakumar Manickam, **Shankar Karuppayah**, Ayman Al-ani, Shafiq Ul Rehman, Cyberattacks and Vociferous Implications on SECS/GEM Communications in Industry 4.0 Ecosystem, International Journal of Advanced Computer Science and Applications, **12/7**, 329–336 (2021). 🌐 doi:10.14569/IJACSA.2021.0120737

SECS/GEM   Shams A. Laghari, Selvakumar Manickam, and **Shankar Karuppayah**, A Review on SECS/GEM: A Machine-to-Machine (M2M) Communication Protocol for Industry 4.0, International Journal of Electrical and Electronic Engineering and Telecommunications, **10/2**, 105–114 (2021). 🌐 doi:10.18178/ijeetc.10.2.105-114

MQTT   Ahmed J. Hintaw and Selvakumar Manickam and **Shankar Karuppayah** , Mohammed Faiz Aboalmaaly, A Brief Review on MQTT's Security Issues within the Internet of Things (IoT), *Journal of Communications* **6**, 463–469 (2019). 🌐 doi:10.12720/jcm.14.6.463469

P2P Botnets   **Shankar Karuppayah**, Advanced Monitoring in P2P Botnets: A Dual Perspective, *Springer*, (2018) 🌐 doi:10.1007/9789811090509

P2P Botnets   Leon Böck, Emmanouil Vasilomanolakis, Max Mühlhäuser, **Shankar Karuppayah**, Next Generation P2P Botnets: Monitoring Under Adverse Conditions, *Research in Attacks, Intrusions, and Defenses - 21st International Symposium (RAID)*, (2018) 🌐 doi:10.1007/9783030004705_24

IDS   Emmanouil Vasilomanolakis, **Shankar Karuppayah**, Max Mühlhäuser, Mathias Fischer, Taxonomy and Survey of Collaborative Intrusion Detection, *ACM Computing Surveys*, (2015) 🌐 doi:10.1145/2716260

h-index   🌐 (Google Scholar): **17**   🌐 (Scopus): **12**   🌐 (Web of Science): **8**

Language Skills

English	Proficient	*IELTS Band 8.0*
Malay	Proficient	*Native*
Deutsch	Beginner	*EU-CEFR Level A2*
Tamil	Conversational	*Mother Tongue*

References

Will be made available upon request.