Shankar Karuppayah

Curiculum vitae

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Biography

Shankar Karuppayah is an Associate Professor and Deputy Director at the Cybersecurity Research Centre (CYRES), Universiti Sains Malaysia, which he joined as Senior Lecturer in 2016. He is also the Founder & CEO of BitRanger Sdn. Bhd., a USM cybersecurity spin-off that translates research and innovation into operational cybersecurity capabilities, including OwlSight, an outsourced Security Operations Centre platform. He obtained his PhD (Dr. rer. nat.) from Technische Universität Darmstadt in 2016, where his research on advanced techniques for monitoring peer-to-peer botnets later formed the basis of his Springer book, *Advanced Monitoring in P2P Botnets: A Dual Perspective*. His research has since expanded into intrusion detection, cyber threat intelligence, machine learning for cybersecurity, IoT and cyber-physical security, and the translation of cybersecurity research into deployable, operational technologies.

Employment History

Oct'24–present **Associate Professor**,
Cybersecurity Research Centre (CYRES),
Universiti Sains Malaysia, Malaysia
`www.cyres.usm.my`

2023–present **Deputy Director**,
Cybersecurity Research Centre (CYRES),
Universiti Sains Malaysia, Malaysia
`www.cyres.usm.my`

Oct'23–present **CEO & Founder**,
BitRanger Sdn Bhd,
USM Cybersecurity Spinoff, Malaysia
`www.bitranger.io`

2016–Sept'24 **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

Membership and Professional Activities

Membership

- Asia Pacific Advanced Network (APAN) - Security Working Group
  Chair (2026–2028); Co-Chair (2024–2026)
- Malaysian Research and Education Network (MyREN)
  Internet Security Working Group Deputy Head
- Malaysian Board of Technologists (MBOT)
  Professional Technologist
- Cyber Security Academia Malaysia
  Member
- Institute of Electrical and Electronics Engineers (IEEE)
  Member (2013–2017)

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

- MRANTI Cybersecurity Technical Advisory Panel, AV Living Lab
- MDEC Project Monitoring Assessor / Grant Recommendation Committee
- USM Mobile Access Coordinator (COVID-19)
- USM Industry Liaison Fellow
- USM Cyber Security Awareness Program - Subject Matter Expert
- HRD Corp Accredited Trainer, Human Resource Development Corporation

(Selected) Awards and Recognition

2026 **ITEX 2026 Gold Medal** — Malaysian Invention and Design Society, International Invention, Innovation & Technology Competition 2026, for OwlSight (Outsourced Security Operation Centre for SMEs)

2026 **ITEX 2026 Special Award** — Japan Intellectual Property Association, International Invention, Innovation & Technology Competition 2026, for OwlSight

2025 **Pingat Jasa Kebaktian (PJK)** — Penang State Government; a Malaysian state honour awarded for meritorious service

2024 **International Innovation Award** — Malaysia Technology Expo 2024

2024 **MTE 2024 Silver Medal** — Malaysia Technology Expo 2024, for OwlSight

2023 **APAN Fellowship** — Asia Pacific Advanced Network, held in Sri Lanka

(Selected) Consultancy Projects

2025 **OpenSOC SEA-NREN Initiative: Empowering Research Networks Against Cyber Threats**
This APNIC ISIF project aims to support emerging National Research and Education Networks (NRENs) in establishing Security Operations Centre (SOC) capabilities using open-source technologies. The project focuses on building a collaborative framework that enables participating networks to monitor threats, share threat intelligence, and strengthen cybersecurity resilience across regional research and education infrastructures.
Consultancy Project (Principal Consultant)

2024 **Cybersecurity Awareness Training**
A full-day awareness training program crafted to upskill members of an academic institution's in Kuala Lumpur, Malaysia.
Consultancy Project (Trainer)

2023 **Embedded Systems Upskilling Program For Computer Science/Engineering Graduates**
A three-months program crafted to upskill existing industry engineers with knowledge on embedded systems that is highly in demand within the manufacturing industries in Penang, Malaysia.
Industry Grant (Trainer)

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)

2018 **Development of Laboratory Information Management System**
Design and development of a customized web-based LIMS system to facilitate the day-to-day operations of a service-based research centre within USM
Internal Project (Project Leader)

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) Research Projects

2025 **Research on Cyber and Physical System Security with the ERIA CPSF-ERAB Initiative in Malaysia**
An international research collaboration under the ERIA Cyber and Physical System Security Framework - Energy Research and Analysis Bureau (CPSF-ERAB) initiative, addressing cyber and physical system security challenges relevant to Malaysia's energy infrastructure.
International Grant (Co-Researcher)

2025 **Research Into Security Layer and Communication for i-Connect Industry 4.0 in Manufacturing Modular Model Industry 4.0 Digital Twin Factory With Intelligence System on Systems and IOT Connectivity for Industry 4.0**
An industrial research project to design and propose a lightweight AI-powered IDS mechanism for Manufacturing Industry 4.0 environment
Industry Grant (Co-Researcher)

2023 **Implementation and Experiment of the Research Platform in Malaysia For Real-Time Malicious TLS Traffic Detection Using Machine Learning Classifier**
An international collaborative research project to design a research platform to detect TLS-based malware communication using machine learning classifiers
International Grant (Project Leader)

2023 **Designing and Developing A Security Operations Center As A Service Sensor Prototype**
An industry project to design and develop a sensor to be leveraged for offering a Security Operation Center as a service (SOCaaS)
Industry (Project Leader)

2022 **User-mobility Optimized Routing Protocol For Enabling Autonomous And Self-managing Disaster Communication Network**
An TRGS research grant to design and implement a user-mobility optimized routing protocol specific for disaster management scenarios.
National 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)

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

Phishing/LLM Wenhao Li, Selvakumar Manickam, Yung-Wey Chong, **Shankar Karuppayah**, Talking Like a Phisher: LLM-Based Attacks on Voice Phishing Classifiers, Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, 503–521 (2026), doi:10.1007/978-3-032-22542-9_30

Phishing/LLM Wenhao Li, Selvakumar Manickam, Yung-Wey Chong, **Shankar Karuppayah**, PhishIntentionLLM: Uncovering Phishing Website Intentions Through Multi-agent Retrieval-Augmented Generation, Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, 88–106 (2026), doi:10.1007/978-3-032-22545-0_6

Phishing/SSL Wenhao Li, Selvakumar Manickam, Yung-Wey Chong, **Shankar Karuppayah**, Priyadarsi Nanda, Binyong Li, PhishSSL: Self-supervised Contrastive Learning for Phishing Website Detection, Lecture Notes in Computer Science, 425–440 (2026), doi:10.1007/978-981-95-7394-3_29

IOT Devamekalai Nagasundaram, Erum Ashraf, Selvakumar Manickam, Shams Ul Arfeen Laghari, **Shankar Karuppayah**, Semantic Interoperability in IoT for Industry 4.0: Review, Taxonomy, Challenges, and Future Research, International Journal of Informatics and Communication Technology (IJ-ICT), **15/2**, 909 (2026), doi:10.11591/ijict.v15i2.pp909-924

Federated Learning/IDS Tasneem Al-Ghadi, Selvakumar Minickam, I Dewa Made Widia, Eka Ratri Noor Wulandari, **Shankar Karuppayah**, Leveraging Federated Learning for DoS Attack Detection in IoT Networks Based on Ensemble Feature Selection and Deep Learning Models, Cyber Security and Applications, 2025, doi:10.1016/j.csa.2025.100098

Privacy August See, Mathias Fischer, Maximilian Gehring, **Shankar Karuppayah**, Binary Sight-Seeing: Accelerating Reverse Engineering via Point-of-Interest-Beacons, ACSAC 2023, doi:10.1016/j.clsr.2021.105652

Malware Leon Böck, Martin Fejrskov, Katerina Demetzou, **Shankar Karuppayah**, Max Mühlhäuser, Emmanouil Vasilomanolakis, Processing of botnet tracking data under the GDPR, Computer Law & Security Review, 2022, doi:10.1145/3627106.3627139

SDN Abdijalil Abdullahi, Selvakumar Manickam, **Shankar Karuppayah**, A Review of Scalability Issues in SoftwareDefined Exchange Point (SDX) Approaches: State-of-the-Art, IEEE Access, **9**, 74499–74509 (2021). doi:10.1109/ACCESS.2021.3069808

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

IOT 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

IOT/IDS Kandhro I.A., Alanazi S.M., Ali F., Kehar A., Fatima K., Uddin M., **Shankar Karuppayah**, Detection of Real-Time Malicious Intrusions and Attacks in IoT Empowered Cybersecurity Infrastructures, *IEEE Access*, (2023) doi:10.1109/ACCESS.2023.3238664

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

P2P Botnets Kabla A.H.H., Thamrin A.H., Mohammed F.R. Anbar, Selvakumar A/L Manickam, **Shankar Karuppayah**, PeerAmbush: Multi-Layer Perceptron to Detect Peer-to-Peer Botnet, *SYMMETRY*, (2022) doi:10.3390/sym14122483

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

h-index (Google Scholar): 25 (Scopus): 20 (Web of Science): 13

Language Skills

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