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I. Mavromatis Scholar

Dr Ioannis MAVROMATIS

Lead Research Engineer

In a Nutshell

- I have extensive experience in architecting, designing and developing R&D solutions across various areas: Cloud-native platforms, Cybersecurity, AI/ML, 5G and Future Networking, IoT, and Smart Cities.
- I am the solution architect and main developer behind the Cloud-native backend/edge platform for the UMBRELLA IoT ecosystem, supporting 250+ IoT nodes across three testbeds.
- I have led the development and delivery of a large-scale cloud-native orchestration framework (ANEMOS/CAMINO) and demonstrated over multiple sites across the entire UK.
- I have developed and contributed to various open-source tools. I have implemented an AI-assisted 5G simulation framework (DRIVE framework), a monitoring framework for energy-efficient ML pipelines, a large-scale, open-source, low-latency platform for vehicular communications, and more.
- I have always worked in both development and research, delivering ideas end-to-end from the inception to the validation at large-scale environments.
- I have been actively involved in several large-scale experimental campaigns on IoT and Wireless Networking, integrating state-of-the-art algorithms to improve the robustness, availability, security, operation, and more.
- I have undertaken various technical leadership roles across many projects, overseeing the timely and successful delivery of goals and objectives.

Core Skills

- Real-world testbeds: Design & deployment
- Cloud-Native: Architectures, tools & application design
- Large-scale trials: Prototyping, deployment & evaluation
- Networking: OSI Layers 2-7 & wireless standards
- AI/ML: ML/FL/GenAI, MLOps, Predictive Analytics
- Software: Life-cycle, engineering & development
- Simulators: Link/system-level & build/test use-cases
- Infrastructure: Automation, provisioning, management
- 5G & Beyond, V2X & IoT systems and standards
- R&D: Experience on both Research & Development
- Bid Writing (Horizon & UK National)
- Technical Leadership & Team Management

Professional Experience

Research & Industrial Positions

11/2023 - now **Lead Research Engineer**, *Future Networks Team, Digital Catapult*, London, UK.

- **REASON** - Leading the **software architecture and development** of an **intelligent orchestration platform**.
  - Engineering **energy-efficient ML/FL** for cloud-native infrastructures and next-gen networks.
  - Using LLMs for **self-healing and observability**.
- **guarDian** - Extending REASON's orchestration platform for federated deployments.
  - Delivering **intelligent service orchestration & automation** solutions for cross-domain deployments.
- **SONIC Lab** - Building an **AI Verification & Testing Framework** for Telecom networks.
- **N-CONNECT** - Investigated the feasibility of **deployment of 4G/5G Nomadic Nodes** (in Nepal).
- **Other** - Authoring **bid proposals** in: Wireless Comms., 5G and Beyond, Future Networks, Digital Twins, ML.
  - Generating **IP** and **technical publications** in: Wireless Comms., IoT, ML, Sustainability.
  - Actively contributing to **strategic discussions** and **technology roadmaps** planning, shaping future initiatives.
  - Managing stakeholders and engaging with internal and external partners.
  - **Managing a team of 4 direct reports**, overseeing their career development and technical contributions.

10/2021 - 11/2023 **Principal Research Engineer**, *Bristol Research & Innovation Laboratory, Toshiba Europe Ltd.*, Bristol, UK.

- **GreenML** - Developed **energy-efficient ML** / **FL** solutions, reducing consumption for IoT and O-RAN deployments.
  - Investigated **power capping optimisation** for MLOps deployments, balancing energy / performance.
  - Implemented **ML quantisation optimisations**, reducing operational power requirements.
- **SYNERGIA** - Developed a **secure IoT Cloud-native platform**, enabling scalable and secure IoT solutions.
  - Implemented a **federated identity** and **access management framework** for IoT nodes.
  - Built a **Data Drift Detection Framework** to monitor abnormal data patterns.
- **UMBRELLA** - Provided ongoing support and extensions on backend / infrastructure components.
  - **Directed a team of software engineers** developing frontend/backend microservices.
  - Provided **technical consultation** for external partners.
  - Participated in **techno-commercial** discussions.
- **BEACON-5G** - Implemented an IoT **API / application marketplace** for a 5G-enabled Cloud-native platform.
  - Integration with the UMBRELLA platform and network.
- **U-CARE** - Designed and implemented an **air quality monitoring solution** for care homes.
- **Other** - Built a **Concept Drift detection and mitigation** for large-scale Federated Learning environments.
  - Investigated **Intrusion Detection and Prevention** solutions for IIoT.
  - Authored **bid proposals** in: Cybersecurity, Cloud-Edge Continuum, ML.
  - Generated **IP** and **technical publications** in: Cybersecurity, Wireless Comms., Digital Twins, ML.

08/2019 - 09/2023 **Honorary Research Associate**, *University of Bristol*, Bristol, UK.

- Migrated AI-assisted Intelligent Transportation Solutions to Cloud-native and Mobile Edge Infrastructures.
- Developed a Cloud-Native platform for Reinforcement Learning agents.
- Supervised undergraduate and postgraduate student projects.

10/2020 - 10/2021 **Senior Research Engineer**, *Bristol Research & Innovation Laboratory, Toshiba Europe Ltd.*, Bristol, UK.

- **UMBRELLA** - **Directed a team of software engineers** developing frontend/backend microservices.
  - Further developed UMBRELLA's highly-available **IoT Cloud-Native Backend platform**.
  - Further developed the **IoT testbed components** (IoT node software, communication buses, etc.).
  - Implemented the **software for various use-cases** (street light monitoring, air quality sensing, etc.).
- **SYNERGIA** - Developed a **secure IoT Cloud-native platform**, enabling scalable and secure IoT solutions.
- **CYTHEMIS** - Improved implemented **Intrusion Prevention** algorithms.
  - Identified flaws in CYTHEMIS operation and reported findings to Toshiba Japan.
- **Other** - Generated **IP** and **technical publications** in: Cybersecurity, Intelligent Transport Systems, Intrusion Detection and Prevention solutions for IIoT, 5G Mobile Edge Computing Caching.
  - Authored **bid proposals** in: Cybersecurity, Cloud-Edge Continuum, ML

08/2019 - 09/2020 **Research Engineer**, *Bristol Research & Innovation Laboratory, Toshiba Europe Ltd.*, Bristol, UK.

- **UMBRELLA** - Architected and implemented a highly-available **IoT Cloud-Native Backend platform**.
  - Developed components of the **IoT testbed infrastructure** (networking, IoT node software).
- **CAVShield** - **Led Work Package 2** - Presented findings to funding body and government representatives.
  - Architected a **Cyber Secure Platform** for Cooperative Intelligent Transportation Systems.
- **CYTHEMIS** - Improved/demonstrated an **end-to-end Intrusion Prevention System**.
- **Other** - Developed an open-source **AI-assisted 5G simulator** for C-ITSs (DRIVE framework).
  - Generated **IP** and **technical publications** in: Cybersecurity, Intelligent Transport Systems, Intrusion. Detection and Prevention solutions for IIoT, 5G Mobile Edge Computing Caching.
  - Authored **bid proposals** in: Cybersecurity.

10/2018 - 08/2019 **Research Associate**, *University of Bristol*, Bristol, UK.

- **NG-CDI** - Developed an open-source **AI-assisted 5G simulator** for C-ITSs (DRIVE framework).
- **FLOURISH** - Developed a **Fog Computing platform** for large-scale connected vehicles experimentation.
  - Implemented/deployed a **prototyped ITS-G5 testbed**. Involved in large vehicular trial campaigns.
  - Conducted several **large-scale city-wide vehicular trials** campaigns.
  - Designed an **active jammer** - tested performance/disruptions on prototyped ITS-G5 testbed.

02/2016 - 09/2018 **Research Assistant**, *University of Bristol*, Bristol, UK.

- **FLOURISH** - **Deployed a large-scale** ITS-G5 vehicular communications platform.
  - Conducted city-wide **connected vehicle trials** and analysed the experimental data.
  - Developed a **parallelised** (multi-core compatible) **version of the OMNeT++ INET** framework.
- **VENTURER** - "Virtual Driving Testbed" - developed an **in-lab testbed** for vehicular communications.
  - Designed a **Fog Computing framework** for C-ITSs.

04-09/2012 **Network Research Assistant (intern)**, *University Carlos III of Madrid (UC3M)*, Madrid, Spain.
- **FLAVIA** - Implemented **Energy Efficiency** improvements for **WLAN networks** (focus on IEEE 802.11b/g/n/u).
  - **Modified IEEE 802.11b/g driver** and firmware (within OpenWRT) for improved power consumption.
  - **Prototyped a testbed** to evaluate the performance of the system.

Networking and IT Positions

05-08/2013 **IT and Network Support and Consultant**, *"Unifast" Kiriakoulis Georgios*, Thessaloniki, Greece.
07-10/2008
- Planned, provisioned and deployed **IT and networking infrastructure solutions** (wired/wireless) for local businesses.
- Consultation on Enterprise Resource Planning (ERP) systems.
- IT support on Windows- and Unix-based OSs.
- Installed/configured satellite antenna systems and services.

07-08/2007 **IT and Network Support and Consultant**, *TITAN Cement*, Thessaloniki, Greece.
- Planned, provisioned and deployed **IT and networking infrastructure solutions** for industrial environments.
- Programmed/tested PLC and SCADA automation systems.
- IT support on Windows- and Unix-based OSs.

Teaching Assistant / Lab Demonstrator

2017/2018 **"Mathematical Methods for Computer Scientists"** , University of Bristol, *BSc 1st year (80h)*.
"Networking Protocol Principles" , University of Bristol, *BSc 3rd year / MSc (20h)*.
"Programming in C", University of Bristol, *MSc (70h)*.
"Object Oriented Programming" , University of Bristol, *BSc 2nd year (45h)*.

2016/2017 **"Mathematical Methods for Computer Scientists"**, University of Bristol, *BSc 1st year (80h)*.
"Programming and Algorithms 2", University of Bristol, *BSc 1st year (45h)*.

2015/2016 **"Digital Signal Processing Systems"**, University of Bristol, *MSc (21h)*.

2014/2015 **"Digital Signal Processing Systems"**, University of Bristol, *MSc (21h)*.

Other

01/2009 - 04/2012 **Illustrator and Graphics Designer (Images, Videos, Animations)**, *Freelancer*, Thessaloniki, Greece.
- Designed marketing material for small local companies.

06/2010 - 04/2011 **Public Relationship (PR) Specialist**, Thessaloniki, Greece.
- Promotion services on targeted audience for local pubs and bars.

Education

10/2015 - 10/2018 **PhD in Communications (Research Phase)**, *Dept. of Electr. & Electron. Engineering, University of Bristol*, Bristol, UK.
- **PhD Title:** "5G Communication Framework for Smarter Autonomous Vehicles".

Supervisors: Prof Robert Piechocki, Prof Andrew Nix.
Key achievements - Developed a **discrete-time system-level simulation framework** for C-ITS research.
- Deployed a **real-world ITS-G5 testbed** - large-scale car trials were conducted later.
- Developed various novel **solutions** for the integration of **MmWaves in the future C-ITSs**.

10/2014 - 09/2015 **PhD in Communications (Taught Phase)**, *Dept. of Electr. & Electron. Engineering,* University of Bristol, Bristol, UK.
One-year taught element (10 taught modules and a research group project).
- **1st Year's Research Group Project:** "Localisation Of Strayed Targets (LOST)" (taught phase).

Supervisor: Prof Kevin Morris.
Design and development of a **localisation system**, over the White Space frequency band (implemented in LabView).

09/2013 - 09/2014 **MSc in "Wireless Communications and Signal Processing"**, *Dept. of Electr. & Electron. Engineering, University of Bristol*, Bristol, UK, *Grade: 68% - Pass with Merit*.

Advanced topics on wireless communications and communications-related signal processing.

- **MSc Thesis:** "Propagation Modelling using Iterative Physical Optics".

Supervisor: Prof Christopher Railton.

Design and development of a simulation framework, able to predict the **performance of indoor communication links** using **Iterative Physical Optics** (IPO) algorithms.

05/2007 - 11/2012 **BSc in "Information Technology Engineering"**, *Dept. of Information Technology, ATEI of Thessaloniki*, Thessaloniki, Greece, *Grade: 7.22/10*.

Scientific and technological knowledge in "Computer Science and Engineering" and "Information and Communication Systems".

- **BSc Thesis:** "Studying Quality of Experience (QoE) over Wireless Networks".

Supervisor: Prof Periklis Chatzimisios.

Investigate the **impact of different wireless technologies** (IEEE 802.11, IEEE 802.16, 3GPP LTE) on various **data streams, using QoE metrics**.

Patents

03/2022 **U.S. Patent**, *US449398*, System and Method for Detecting and Rectifying Concept Drift in Federated Learning.

Proposals & Grants Bidding

Ongoing Research

12/2024 **REASON-6G+ Project**, ***Amount Awarded: £1,500,000***, Department for Science, Innovation and Technology (DSIT),

Period: 01/04/2025 - 31/12/2025.

- **Bid Writer.**

REASON-6G develops a roadmap for open 6G network architectures. *Project is led by Smart Internet Lab - University of Bristol*

Completed Research

07/2020 **SYNERGIA Project**, ***Amount Awarded: £2,177,375***, Innovate UK, Project no. 53707,

Period: 01/10/2020 - 30/09/2022.

- **Bid Writer.**

SYNERGIA will devise, develop and demonstrate a novel secure-by-design, endpoint-to-core IoT platform for large-scale networks of low-power resource-constrained devices. *Project is led by BRIL - Toshiba Europe Ltd.*

12/2019 **CAVShield Project**, ***Amount Awarded: £427,480***, Innovate UK, Project no. 133898,

Period: 02/01/2020 - 31/03/2020.

- **Bid Writer, Technical Work Package Lead, Lead Role within Toshiba's BRIL.**

The CAVShield project addressed the urgent global need for robust methods and techniques to identify and measure cyber-vulnerabilities in fleets of connected vehicles. *Project was led by Honda R&D Europe (U.K.) Ltd.*

Awards

09/2024 **AI Award for High Tech & Telecom**, *National AI Awards*, REASON, Software/Network Architect.

The National AI Awards was launched to spotlight the remarkable advances and contributions in the field of artificial intelligence.

09/2022 **Industrial Innovation Award**, *Connected Britain*, UMBRELLA Project, Lead Backend Architect / Developer.

Industrial Innovation Award is given to projects making an important contribution in stimulating technology development, business start-ups and growth.

05/2019 **IEEE Best Paper Award**, *IEEE Vehicular Technology Conference (IEEE VTC-Spring)*, Kuala Lumpur, Malaysia, 2019.

Best Paper award for my work "Agile Data Offloading over Novel Fog Computing Infrastructure for CAVs".

12/2018 **IEEE Popularity Award**, *IEEE Vehicular Networking Conference (VNC)*, Taipei, Taiwan, 2018.

Popularity award for my work "Parallel Implementation of the OMNeT++ INET Framework for V2X Communications".

Invited Talks & Panel Discussions

07/2024 **"6G Technologies Roadmap"**, Organised by: *IEEE 6G Summit*, Panel Discussion.

01/2023 **"Role of Machine Learning in Next Generation Wireless Networks"**, Organised by: *IEEE Consumer Communications & Networking Conference*, Panel Discussion.

03/2022 **"Industrial R&D: Career and Opportunity Perspectives"**, Organised by: *School of Computer Science and Informatics, Cardiff University*, Invited Talk.

Scholarships

9/2014 **Full EPSRC Studentship Funding**.
Studentship to support my PhD research for a 4-year term.

4/2012 **Erasmus Mundus Scholarship**.
Scholarship for my internship in UC3M for a 6-month period.

Personal Development

Training and Certifications

08/2020 **"Kubernetes MasterClass : Kubernetes & Docker Swarm for DevOps"**, Udemy.
Course on Kubernetes, Docker, and Docker Swarm for DevOps, Image Creation & Deployment on Kubernetes, Docker Compose, HELM & HELM Charts.

08/2020 **"Machine Learning"**, Coursera, organised by Stanford University.
Course providing a broad introduction to machine learning, data mining, and statistical pattern recognition. Topics: i) Supervised Learning, ii) Unsupervised Learning, iii) Best practices in machine learning, etc.

02/2011 **Cisco Certified Network Association (CCNA)**, *Dept. of Information Technology,* ATEI of Thessaloniki, Thessaloniki, Greece.
Advanced Network Knowledge (Installation, configuration, operation and troubleshooting of medium-size routed and switched networks).

08/2008 **Network Administration Professional Certificate**, *Vellum Global Educational Services,* University of Cambridge, Thessaloniki, Greece.
Basic Network Administration Knowledge (Routing Protocols, TCP/IP, Network Architectures, etc.).

Summer Schools

06/2018 **"5G V2X Communications Summer School"**, Organised by: King's College London, London, UK..
Topics on 5G Vehicle-to-Everything (V2X) communications, as pertained to connected and autonomous driving.

07/2016 **"Car as a Service - creating tomorrow's smart mobility service platform"**, Organised by: BMW, EURECOM, and Technische Universität München, Tegernsee, Germany..
Topics on autonomous vehicles and next-generation vehicular applications.

Publications & Datasets

Journals & Magazines

[J10] A. Sanchez-Mompo, **I. Mavromatis**, P. Li, K. Katsaros, and A. Khan, "*Green MLOps to Green GenOps: An Empirical Study of Energy Consumption in Discriminative and Generative AI Operations*", Information MDPI, 2025.

[J9] K. Katsaros, K., **I. Mavromatis**, K.Antonakoglou, S. Ghosh, D. Kaleshi, T. Mahmoodi, H. Asgari, A. Karousos, I. Tavakkolnia, H. Safi, H. Hass, C. Vrontos, A. Emami, J. Parra Ullauri, S. Moazzeni, and D. Simeonidou, D., "*AI-Native Multi-Access Future Networks - The REASON Architecture*", IEEE Access, 2024.

[J8] **I. Mavromatis**, Y. Jin, A. Stanoev, A. Portelli, I. Weeks, B. Holden, E. Glasspole, T. Farnham, A. Khan, U. Raza, A. Aijaz, T. Bietron, I. Seto, N. Patel, and M. Sooriyabandara, "*UMBRELLA: A One-stop Shop Bridging the Gap from Lab to Real-World IoT Experimentation*", IEEE Access, 2024.

[J7] **I. Mavromatis**, T. Spyridopoulos, P. Carnelli, W. H. Chin, A. Khalil, J. Chakravarty, L. Cipolina Kun, R. J. Piechocki, C. Robbins, D. Cunnington, L. Chase, L. Chiazor, C. Preston, Rahul, and A. Khan, "*Cybersecurity in Motion: A Survey of Challenges and Requirements for Future Test Facilities of CAVs*", EAI Endorsed Transactions on Industrial Networks and Intelligent Systems, 2023.

[J6] U. Erol, F. Raimondo, J. Pope, S. Gunner, V. Kumar, **I. Mavromatis**, P. Carnelli, T. Spyridopoulos, A. Khan, and G. Oikonomou, "*Multi-sensor, Multi-device Smart Building Indoor Environmental Dataset*", Elsevier Data-in-Brief Journal, 2023.

[J5] C. Posner, A. Sanchez-Mompo, **I. Mavromatis**, and M. Al-Ani, "*A Dataset of Human Body Tracking of Walking Actions Captured using two Azure Kinect Sensors*", Elsevier Data-in-Brief Journal, 2023.

[J4] J. Pope, J. Liang, V. Kumar, F. Raimondo, R. McConville, T. Pasquier, R. Piechocki, G. Oikonomou, B. Luo, D. Howarth, **I. Mavromatis**, A. Sanchez-Mompo, P. Carnelli, T. Spyridopoulos, and A. Khan, "*Resource-Interaction Graph: Efficient Graph Representation for Anomaly Detection*", Arxiv, 2022.

[J3] **I. Mavromatis**, A. Stanoev, P. Carnelli, Y. Jin, M. Sooriyabandara, and A. Khan, "*A Dataset of Images of Public Streetlights with Operational Monitoring using Computer Vision Techniques*", Elsevier Data-in-Brief Journal, 2022.

[J2] A. Tassi, **I. Mavromatis**, and R. J. Piechocki, "*A Dataset of Full-Stack ITS-G5 DSRC Communications over Licensed and Unlicensed Bands Using a Large-Scale Urban Testbed*", Elsevier Data-in-Brief Journal, 2019.

[J1] **I. Mavromatis**, A. Tassi, G. Rigazzi, R. J. Piechocki, and A. Nix, "*Multi-Radio 5G Architecture for Connected and Autonomous Vehicles: Application and Design Insights*", EAI Industrial Networks and Intelligent Systems, 2018. **(Invited Paper)**

Datasets

[D6] U. Erol, F. Raimondo, J. Pope, S. Gunner, G. Oikonomou, V. Kumar, **I. Mavromatis**, P. Carnelli, A. Khan, "*Multi-sensor, Multi-device Smart Building Indoor Environmental Dataset*", 2023, University of Bristol RDF Archive.

[D5] C. Posner, A. Sanchez-Mompo, **I. Mavromatis**, M. Al-Ani., "*A Dataset of Human Body Tracking of Walking Actions Captured Using Two Azure Kinect Sensors*", 2023, Zenodo.

[D4] **I. Mavromatis**, A. Stanoev, P. Carnelli, Y. Jin, M. Sooriyabandara, and A. Khan, "*Public Streetlight Images Dataset*", 2022, Zenodo.

[D3] J. Pope, F. Raimondo, V. Kumar, R. McConville R. Piechocki, G. Oikonomou, T. Pasquier, B. Luo, D. Howarth, **I. Mavromatis**, P. Carnelli, A. Sanchez-Mompo, T. Spyridopoulos, and A. Khan, "*Container Escape Detection*", 2021, GitHub.

[D2] R. Piechocki, **I. Mavromatis**, A. Tassi, "*FLOURISH Car Trials Dataset 2*", 2019, University of Bristol RDF Archive.

[D1] **I. Mavromatis**, R. Piechocki, A. Tassi, "*FLOURISH Car Trials Dataset 1*", 2017, Online Website.

Conferences & Workshops

[C34] K. Antonakoglou, **I. Mavromatis**, S. Ghosh, and K. Katsaros, "*CAMINO: Cloud-native Autonomous Management and Intent-based Orchestrator*", In Proc. of EuCNC & 6G Summit, June 2025.

[C33] M.M.H. Mahmud, R. Baby, S. Moazzeni, J. Parra-Ullauri, X. Zhou, Y. Wu, K. Katsaros, **I. Mavromatis**, S. Zeb, R. Hussain and D. Simeonidou, "*A Technical Framework For Formally Verifying AI Models Supporting 6G Network Functions*", In Proc. of IEEE INFOCOM - Workshop on Shaping the Future of Telecoms - Networks for Joint Intelligence, January 2025.

[C32] **I. Mavromatis**, A. Katsenou, K. Bardhi, E. Xenos and D. Simeonidou, "*Connecting the Unconnected: A DT Case Study of Nomadic Nodes Deployment in Nepal*", In Proc. of IEEE Consumer Communications & Networking Conference (IEEE CCNC 2025), January 2025.

[C31] **I. Mavromatis**, S. De Feo, and A. Khan "*FLAME: Adaptive and Reactive Concept Drift Mitigation for Federated Learning Deployments*", In Proc. of International Conference on Embedded Wireless Systems and Networks (EWSN 2024) - Workshop on Enabling Machine Learning Operations for next-Gen Embedded Wireless Networked Devices (EMERGE), December 2024.

[C30] **I. Mavromatis**, K. Katsaros, and A. Khan, "*Computing Within Limits: An Empirical Study of Energy Consumption in ML Training and Inference*", In Proc. of International Scientific Conference on Information, Communication and Energy Systems and Technologies (ICEST 2024) - Workshop on Artificial Intelligence for Sustainable Development, July 2024.

[C29] S. Ghosh, K. Antonakoglou, **I. Mavromatis**, and K. Katsaros, "*Intelligent Routing as a Service (iRaaS): A Flexible Routing Framework for Knowledge-Defined Networks*", In Proc. of International Federation for Information Processing (IFIP) Networking 2024, June 2024.

[C28] J. Gao, **I. Mavromatis**, P. Li, P. Carnelli, and A. Khan, "*Mitigating System Bias in Resource Constrained Asynchronous Federated Learning Systems*", In Proc. of IEEE PerCom Workshop on Pervasive and Resource-constrained AI (PeRConAI), March 2024.

[C27] P. Li, **I. Mavromatis**, and A. Khan, "*Past, Present, Future: A Comprehensive Exploration of AI Use Cases in the UMBRELLA IoT Testbed*", In Proc. of IEEE PerCom Workshop on Pervasive Computing Challenges in Trustable Crowdsensing Systems (TrustSense), March 2024. **(Invited Paper)**

[C26] **I. Mavromatis**, S. De Feo, P. Carnelli, R. J. Piechocki, and A. Khan, "*FROST: Towards Energy-efficient AI-on-5G Platforms - A GPU Power Capping Evaluation*", In Proc. of IEEE Conference on Standards for Communications and Networking (CSCN), November 2023.

[C25] H. Friji, **I. Mavromatis**, A. Sanchez-Mompo, P. Carnelli, A. Olivereau, and A. Khan, "*Multi-stage Attack Detection and Prediction Using Graph Neural Networks: An IoT Feasibility Study*", In Proc. of IEEE International Conference on Trust, Security and Privacy in Computing and Communications (TrustCom), November 2023.

[C24] O. Belarbi, T. Spyridopoulos, E. Anthi, **I. Mavromatis**, P. Carnelli and A. Khan, "*Federated Deep Learning for Intrusion Detection in IoT Networks*", in IEEE GLOBECOM 2023, Kuala Lumpur, Malaysia, November 2023.

[C23] U. Erol, F. Raimondo, J. Pope, S. Gunner, V. Kumar, **I. Mavromatis**, P. Carnelli, T. Spyridopoulos, A. Khan and G. Oikonomou, "*Evaluating Concept Drift Detectors on Real-World Data*", in ACM EWSN '23, Calabria, Italy, September 2023.

[C22] T. Chow, U. Raza, **I. Mavromatis**, and A. Khan, "*FLARE: Detection and Mitigation of Concept Drift for Federated Learning based IoT Deployments*", in IEEE IWCMC 2023, Marrakesh, Morocco, June 2023.

[C21] **I. Mavromatis**, and A. Khan, "*Demo: LE3D: A Privacy-preserving Lightweight Data Drift Detection Framework*", in IEEE CCNC 2023, Las Vegas, USA, January 2023.

[C20] **I. Mavromatis**, A. Sanchez-Mompo, F. Raimondo, J. Pope, M. Bullo, I. Weeks, V. Kumar, P. Carnelli, G. Oikonomou, T. Spyridopoulos, and A. Khan, "*LE3D: A Lightweight Ensemble Framework of Data Drift Detectors for Resource-Constrained Devices*", in IEEE CCNC 2023, Las Vegas, USA, January 2023.

[C19] A. V. Katsenou, J. Mao, and **I. Mavromatis**, "*Energy-Rate-Quality Tradeoffs of State-of-the-Art Video Codecs*", in PCS 2022, San Francisco, USA, December 2022.

[C18] D. Anand, **I. Mavromatis**, P. Carnelli, and A. Khan, "*A Federated Learning-enabled Smart Street Light Monitoring Application: Benefits and Future Challenges.*", in ACM MobiCom 2022: MORSE Workshop, Sydney, Australia, October 2022.

[C17] C. Lockie, **I. Mavromatis**, A. Stanoev, Y. Jin, and G. Oikonomou "*Securing Synchronous Flooding Communications: An Atomic-SDN Implementation*", in ACM EWSN '22, Linz, Austria, October 2022.

[C16] **I. Mavromatis**, A. Stanoev, A. J. Portelli, C. Lockie, M. Ammann, Y. Jin, and M. Sooriyabandara "*Reliable IoT Firmware Updates: A Large-scale Mesh Network Performance Investigation*", in IEEE WCNC '22, Austin, Texas, April 2022.

[C15] J. Pope, F. Raimondo, V. Kumar, R. McConville R. Piechocki, G. Oikonomou, T. Pasquier, B. Luo, D. Howarth, **I. Mavromatis**, P. Carnelli, A. Sanchez-Mompo, T. Spyridopoulos, and A. Khan "*Container Escape Detection for Edge Devices*", in ACM SenSys '21, Coimbra, Portugal, November 2021.

[C14] T. Farnham, S. Jones, A. Aijaz, Y. Jin, **I. Mavromatis**, U. Raza, A. Portelli, A. Stanoev, and M. Sooriyabandara, "*UMBRELLA Collaborative Robotics Testbed and IoT Platform*", in IEEE CCNC 2021: RoboCom 2021 Workshop, Virtual, January 2020.

[C13] **I. Mavromatis**, R. J. Piechocki, M. Sooriyabandara, and Arjun Parekh "*DRIVE: A Digital Network Oracle for Cooperative Intelligent Transportation Systems*", in IEEE ISCC 2020, Rennes, France, July 2020.

[C12] **I. Mavromatis**, A. Tassi, R. J. Piechocki, and M. Sooriyabandara, "*On Urban Traffic Flow Benefits of Connected and Automated Vehicles*", in IEEE VTC-Spring 2020, Antwerp, Belgium, May 2020.

[C11] X. Wang, **I. Mavromatis**, A. Tassi, R. Santos-Rodriguez, and R. J. Piechocki, "*Location Anomalies Detection for Connected and Autonomous Vehicles*", in IEEE CAVS 2019, Honolulu, Hawaii, September 2019.

[C10] **I. Mavromatis**, A. Tassi, and R. J. Piechocki, "*Operating ITS-G5 DSRC over Unlicensed Bands: A City-Scale Performance Evaluation*", in IEEE PIMRC 2019, Istanbul, Turkey, September 2019.

[C9] **I. Mavromatis**, A. Tassi, R. J. Piechocki, and A. Nix, "*Efficient Millimeter-Wave Infrastructure Placement for City-Scale ITS*", in IEEE VTC-Spring 2019, Kuala Lumpur, Malaysia, May 2019.

[C8] A. Tassi, **I. Mavromatis**, R. J. Piechocki, A. Nix, C. Compton, T. Poole, and W. Schuster, "*Agile Data Offloading over Novel Fog Computing Infrastructure for CAVs*", in IEEE VTC-Spring 2019, Kuala Lumpur, Malaysia, May 2019. **(IEEE Best Paper Award)**

[C7] A. Tassi, **I. Mavromatis**, R. J. Piechocki, and A. Nix, "*Secure Data Offloading Strategy for Connected and Autonomous Vehicles*", in IEEE VTC-Spring 2019, Kuala Lumpur, Malaysia, May 2019.

[C6] **I. Mavromatis**, A. Tassi, R. J. Piechocki, and A. Nix, "*Parallel Implementation of the OMNeT++ INET Framework for V2X Communications*", in IEEE VNC 2018, Taipei, Taiwan, December 2018. **(IEEE Popularity Award)**

[C5] **I. Mavromatis**, A. Tassi, R. J. Piechocki, and A. Nix, "*A City-Scale ITS-G5 Network for Next-Generation Intelligent Transportation Systems: Design Insights and Challenges*", in Ad-Hoc Now 2018.

[C4] **I. Mavromatis**, A. Tassi, R. J. Piechocki, and A. Nix, "*Efficient V2V Communication Scheme for 5G MmWave Hyper-Connected CAVs*", in IEEE ICC 2018 Workshop - 5G and Cooperative Autonomous Driving, Kansas, USA, May 2018.

[C3] **I. Mavromatis**, A. Tassi, R. J. Piechocki, and A. Nix, "*Agile Calibration Process of Full-Stack Simulation Frameworks for V2X Communications*", in IEEE VNC 2017, Torino, IT, November 2017.

[C2] **I. Mavromatis**, A. Tassi, R. J. Piechocki, and A. Nix, "*MmWave System for Future ITS: A MAC-layer Approach for V2X Beam Steering*", in IEEE VTC 2017-Fall, Toronto, CA, September 2017.

[C1] **I. Mavromatis**, A. Tassi, R. J. Piechocki, and A. Nix, "*Beam Alignment for Millimetre Wave Links with Motion Prediction of Autonomous Vehicles*", in IET Colloquium on Antennas, Propagation and RF Technology for Transport and Autonomous Platforms, Birmingham, UK, February 2017. **(Invited Paper)**

Posters

[P1] **I. Mavromatis**, A. Tassi, R. J. Piechocki, and A. Nix, "*Smart Communication Plane for Self-Driving Vehicles*", BMW Summer School: Car as a Service, July 2016.

Book Chapters

[B2] J. Pope, T. Spyridopoulos, V. Kumar, F. Raimondo, S. Gunner, G. Oikonomou, B. Luo, D. Howarth, T. Pasquier, R. McConville, P. Carnelli, A. Sanchez-Mompo, **I. Mavromatis**, and A. Khan, "*Intrusion Detection at the IoT Edge using Federated Learning*", Security and Privacy in Smart Environments, Springer, Jan. 2024. **(Invited Paper)**

[B1] **I. Mavromatis**, and P. Chatzimisios, "*Studying Quality of Experience (QoE) over Wireless Networks*", Encyclopaedia of Information Science and Technology, 3rd Edition, IGI Global, August 2014.

Working / Under submission

[W2] P. Li, **I. Mavromatis**, T. Farnham, A. Aijaz, and A. Khan, "*Adapting MLOps for Diverse In-Network Intelligence: Challenges and Solutions*", to be submitted to IEEE Wireless Communications Magazine.

[W1] A. Herzog, R. Southam, **I. Mavromatis**, and A. Khan, "*FedMap: Iterative Magnitude-Based Pruning for Communication-Efficient Federated Learning*", to be submitted to IEEE Transactions on Neural Networks and Learning Systems.

Technical Skills

Virtualisation: Docker, Proxmox, OpenStack, Google Cloud Platform (GCP), Amazon Web Services (AWS).
Automation: Kubernetes (K8s, K3s, MicroK8s), Docker Compose, Serverless (OpenFaas), Vagrant, Ansible.
Programming: C, C++, MATLAB, Bash, GoLang, Python, HTML, CSS, Javascript, PHP, Java.
Databases: MySQL, PostgreSQL, InfluxDB, IBM DB2, Redis.
Networking: HAProxy, NginX, Wireshark/Tcpdump, Iperf3, OpenVPN, DHCP, DNS, FTP, LDAP, Nmap.
Monitoring: Grafana, Prometheus, Elastic, Kibana, Fluentd/FluentBit.
Productivity: Git, Jira (Scrum, Kanban), Trello, LaTex, MS Office, CI/CD pipelines (TravisCI, Jenkins).
SDRs: National Instrument's LabVIEW, GNU Radio.
Simulators: OMNeT++ (including Veins), SUMO, NS-2, NS-3, OPNET.
OSs: Linux-based Distributions (including kernel and driver programming), OS X, MS Windows.
Video/Image: Adobe software suite (After Effects, Photoshop and Premiere), GIMP, OmniGraffle.

Scientific Activities - Involvement

Conferences / Workshops Organisation

2025 2nd Workshop on Enabling Machine Learning Operations for next-Gen Embedded Wireless Networked Devices (EMERGE) - at *International Conference on Embedded Wireless Systems and Networks (EWSN)*

2024 1st Workshop on Enabling Machine Learning Operations for next-Gen Embedded Wireless Networked Devices (EMERGE) - at *International Conference on Embedded Wireless Systems and Networks (EWSN)*

TPC Member

2016 - 2025 IEE ICC, IEEE PIMRC, IEEE VTC, IEEE IFIP, IEEE CSCN, IEEE VNC, IEEE DIPI, ACM EWSN, CPS-IoTBench, Ad-Hoc Now, IARIA VEHICULAR, and more.

External Reviewer

Journal IEEE Communications Magazine, IEEE Transactions on Vehicular Technology, IEEE Wireless Communications Magazine, IEEE Journal On Selected Areas in Communications, Springer Wireless Networks, Elsevier Vehicular Communications, Elsevier Computer Networks, MDPI Sensors, MDPI Applied Sciences, Data in Brief, and more

Conf. IEEE ICC, IEEE GLOBECOM, IEEE CSCN, IEEE VTC, IEEE VNC, IEEE PIMRC, IEEE IFIP, ACM EWSN, IARIA VEHICULAR, Ad-Hoc Now and more.

External Judge – Competitions

2019 Google Science Fair - Preliminary Judge & Scientific Accuracy Judge

2016 Google Science Fair - Preliminary Judge

Supervision/Mentoring

PhD Students

2022 - 2023 (12 Months) **Graham Peden**, *PhD Research Project*, PhD in Cybersecurity, University of Bristol.
- **Subject:** "Malicious Firmware Binary Code Vulnerability Detection."

Co-Advisors: Prof Awais Rashid, Dr Aftab Khan.

2022 - 2023 (12 Months) **Othmane Belarbi**, *PhD Research Project*, PhD in Cybersecurity, University of Cardiff.
- **Subject:** "Concept Drift Detection and Mitigation using Serverless Computing."

Co-Advisors: Dr Theo Spyridopoulos, Dr Eirini Anthi, Dr Aftab Khan, Dr Pietro Carnelli.

2022 - 2023 (12 Months) **Vasilis Ieropoulos**, *PhD Research Project*, PhD in Cybersecurity, University of Cardiff.
- **Subject:** "Machine Learning Threat Detection for Low Complexity Edge Deployment: Threats, Risks and Mitigations."

Co-Advisors: Dr Theo Spyridopoulos, Dr Eirini Anthi, Dr Aftab Khan, Dr Pietro Carnelli.

2023 - 2023 (6 Months) **Hamdi Friji**, *PhD Research Secondment*, PhD in Green Cybersecurity, French Alternative Energies and Atomic Energy Commission (CEA).
- **Subject:** "ML-based Intrusion Detection System: A Graph Neural Network Approach."

Co-Advisors: Dr Pietro Carnelli, Mr Adrian Sanchez Mompo, Dr Aftab Khan.

2018 - 2019 (11 Months) **Jonathan Thomas**, *PhD Research Project*, PhD in Communications, University of Bristol.
- **Subject:** "AI-assisted Communication Framework for Self-Driving Vehicles."

Co-Advisors: Prof Robert Piechocki, Dr Raul Santos-Rodriguez.

Interns

2023 (6 Months) **Stefano De Feo**, *Industrial Internship*, BSc in Computer Engineering, Toshiba Europe Ltd.
- **Subject:** "Federated Learning Concept Drift Detection and Mitigation: A Large Scale Evaluation."

Co-Advisors: Dr Pietro Carnelli, Dr Aftab Khan.

2021 (3 Months) **Charles Lockie**, *Industrial Internship*, BSc in Computer Engineering, Toshiba Europe Ltd.
- **Subject:** "Reliable IoT Firmware Updates: A Large-scale Mesh Network Performance Investigation."

Co-Advisors: Mr Aleksandar Stanoev, Dr Yichao Jin.

2020 (3 Months) **Jonathan Hebditch**, *Research Internship*, Toshiba Europe Ltd.
- **Subject:** "Privacy and anonymity of an Industrial IoT platform: A VPN approach."

2020 (6 Months) **Iosif Koen**, *Erasmus+ Research Internship*, Department of Information Technology, International Hellenic University.
- **Subject:** "Enabling a Smart Edge Computing Plane for CAVs with Kubernetes."

Co-Advisors: Prof Robert Piechocki, Prof Periklis Chatzimisios.

2019 (6 Months) **Samual Taylor**, Undergraduate Research Internship, University of Bristol.
- **Subject:** "A PiCar-based collision avoidance scenario: Design Insights and Experimental Testbed."

Co-Advisors: Prof Robert Piechocki, Dr Andrea Tassi.

2018 (6 Months) **Panagis Artoumas**, *Erasmus+ Research Internship*, Department of Information Technology, International Hellenic University.
- **Subject:** "Enabling Full-Stack City-Scale Simulations for Connected and Autonomous Vehicles."

Co-Advisors: Prof Robert Piechocki, Prof Periklis Chatzimisios.

MEng/MSc Students

2023 (6 Months) **Hanyue Zhang**, *Industrial MSc Project*, MSc in Communication Networks, Toshiba Europe Ltd.
- **Subject:** "Drift Detection Framework for Multi-dimension Data Streams."

Co-Advisors: Dr Aftab Khan, Dr Pietro Carnelli, Dr Peizheng Li.

2023 (6 Months) **Jikun Gao**, *Industrial MSc Project*, MSc in Communication Networks, Toshiba Europe Ltd.
- **Subject:** "Towards Federated Learning at Scale: A System Bias Investigation."

Co-Advisors: Dr Aftab Khan, Dr Pietro Carnelli, Dr Peizheng Li.

2023 (6 Months) **Shengzhe Huang**, *Industrial MSc Project*, MSc in Communication Networks, Toshiba Europe Ltd.
- **Subject:** "Deep Reinforcement Learning Based Efficient Task Allocation in Federated Learning."

Co-Advisors: Dr Aftab Khan, Dr Pietro Carnelli, Dr Peizheng Li.

2023 (6 Months) **Vincent Wong**, *Industrial MEng Project*, BSc in Computer Engineering, Toshiba Europe Ltd.
- **Subject:** "Quantisation and FL: Improving Sustainability through Energy Reduction."
Co-Advisors: Dr Aftab Khan, Dr Pietro Carnelli.

2023 (6 Months) **Stefano De Feo**, *Industrial MEng Project*, BSc in Computer Engineering, Toshiba Europe Ltd.
- **Subject:** "GreenML: A Smart Way forward for Sustainable Machine Learning."
Co-Advisors: Dr Aftab Khan, Dr Pietro Carnelli.

2022 (6 Months) **Charles Lockie**, *Industrial MEng Project*, BSc in Computer Engineering, Toshiba Europe Ltd.
- **Subject:** "Cybersecurity over Large-Scale Mesh Networks with Syncrhonous Flooding."
Co-Advisors: Mr Aleksandar Stanoev, Dr Yichao Jin.

2021 (6 Months) **Marius Ammann**, *Industrial MEng Project*, BSc in Computer Engineering, Toshiba Europe Ltd.
- **Subject:** "Everything under one UMBRELLA: Large-Scale Experimentation with a Multi-Radio IoT Testbed."
Co-Advisors: Mr Aleksandar Stanoev, Dr Anthony Portelli.

2021 (6 Months) **Prithvi Jaisingh**, *Industrial MEng Project*, BSc in Computer Engineering, Toshiba Europe Ltd.
- **Subject:** "Distributed Intrusion Detection using Novel Federated Learning Approaches."
Co-Advisors: Dr Pietro Carnelli, Dr Theo Spyridopoulos, Dr Aftab Khan.

2020 (6 Months) **Jianwen Zhu**, *Industrial MSc Project*, MSc in Wireless Communications, Toshiba Europe Ltd.
- **Subject:** "A Low Latency MEC Solution for 5G Network Slicing."
Co-Advisors: Dr Jaya Thota, Mr Ben Holden.

2020 (6 Months) **Sanyam Vays**, *Industrial MEng Project*, BSc in Computer Engineering, Toshiba Europe Ltd.
- **Subject:** "AI-Based Intrusion Detection System for Industrial IoT."
Co-Advisors: Dr Theo Spyridopoulos, Dr Aftab Khan, Dr Pietro Carnelli.

2020 (6 Months) **Philip Masters**, *Industrial MEng Project*, BSc in Computer Engineering, Toshiba Europe Ltd.
- **Subject:** "Wireless Coordination of F1/10 Autonomous Vehicles."
Co-Advisors: Dr Anthony Portelli, Dr Michael Baddeley.

2019 (5 Months) **Marie Aylward**, *BSc Project*, BSc in Electr. & Electron. Engineering, University of Bristol.
- **Subject:** "Benefits of Connected and Automated Vehicles on Large-Scale Urban Traffic Flow Use-cases."
Co-Advisor: Prof Robert Piechocki.

2019 (5 Months) **Maria Fernanda Espino Gonzalez**, *MSc Project*, MSc in Communication Networks, University of Bristol.
- **Subject:** "Spectrum Sharing Strategies for WiFi and Intelligent Transport Systems (ITS)."
Co-Advisor: Prof Robert Piechocki.

2019 (5 Months) **Xinluan Bai**, *MSc Project*, MSc in Wireless Communication, University of Bristol.
- **Subject:** "Semi-persistent Scheduling for C-V2X Vehicle-to-Vehicle communication."
Co-Advisor: Prof Robert Piechocki

2019 (5 Months) **Yuanri (Blues) Xing**, *MSc Project*, MSc in Wireless Communication, University of Bristol.
- **Subject:** "Design Practices on an Agile Communication Infrastructure for Autonomous PiCars."
Co-Advisor: Prof Robert Piechocki

2019 (5 Months) **Yudi Fan**, *MSc Project*, MSc in Wireless Communication, University of Bristol.
- **Subject:** "A PiCar-based Collision Avoidance Scenario: Sensor Data Acquisition and a Simulated Approach."
Co-Advisors: Prof Robert Piechocki, Dr Andrea Tassi.

2019 (5 Months) **Zhe (Anton) Zhao**, *MSc Project*, MSc in Communication Networks, University of Bristol.
- **Subject:** "On the Enhancement of Traffic Flows Sharing CAVs Trajectory Intention."
Co-Advisors: Prof Robert Piechocki, Dr Andrea Tassi.

2018 (6 Months) **Matthew Uppington**, *Final Year Project*, BSc in Engineering Mathematics, University of Bristol.
- **Subject:** "Anomaly Detection Mechanisms for Cooperative Autonomous Vehicles."
Co-Advisors: Prof Robert Piechocki.

2016 (5 Months) **Yu (Teresa) Bi**, *MSc Project*, MSc in Communication Networks, University of Bristol.
- **Subject:** "Acquisition and Broadcasting of Enhanced Vehicle Positioning Information via a Linux-Based System."
Co-Advisors: Prof Robert Piechocki, Dr Andrea Tassi.

2016 (5 Months) **Xiaoyu Ye**, *MSc Project*, MSc in Communication Networks, University of Bristol.
- **Subject:** "Reducing the Interference of Vehicular Communications."
Co-Advisors: Prof Robert Piechocki, Dr Andrea Tassi.

Languages

English: Fluent, **Greek**: Native Speaker, **German**: Conversational, **Spanish**: Basic Level

Volunteering

- Technical Program Committee member and reviewer - several conferences and journals (2017 - now).
- Industrial Mentoring Scheme, Faculty of Engineering, University of Bristol (2019 - 2022).
- Organisation of the annual "CDT in Communications" conferences (2017).
- Organisation of outreach activities of the University of Bristol for post-16 year old pupils (2016).
- Organisation of Media Days and Public Events for FLOURISH and VENTURER projects (2017 - 2018).
- SYMβIOSIS - Journalist/event organiser: Anti-racism, multi-cultural environments for the diversity of humans (2013).

Interests & Hobbies

Basketball, Cycling, Video and Photo Editing, Travelling, Sketching, Chess.

References

*May be pleasantly given upon request...