



## **School of Computing, Engineering, and the Built Environment Edinburgh Napier University**

### **PHD STUDENT PROJECT**

#### **Funding and application details**

**Funding status:** Self-funded students only

**Application instructions:**

Detailed instructions are available at <https://www.napier.ac.uk/research-and-innovation/research-degrees/how-to-apply>

*Prospective candidates are encouraged to contact the Director of Studies (see details below) to discuss the project and their suitability for it.*

#### **Project details**

**Supervisory Team:**

- DIRECTOR OF STUDY: Leandros Maglaras (Email: [L.Maglaras@napier.ac.uk](mailto:L.Maglaras@napier.ac.uk))
- 2<sup>ND</sup> SUPERVISOR: Bill Buchanan

**Subject Group:** Cyber-security and system engineering

**Research Areas:** Cyber Security

**Project Title:** Secure V2V Communication for self-driving NETWORKS

**Project description:**

The project aims at designing an integrated end-to-end VANET (+ UAV) Simulation Framework which gets feedback from relevant traffic applications that actually simulate a realistic VANET environment. The proposed framework is designed to emulate complex V2X scenarios by incorporating real hardware. Physical On-Board Units (OBUs) and RSUs are connected to a computer that is running the proposed simulation framework. For each physical device connected to the computer, there is a corresponding virtual OBU or RSU in the simulation.

The project objectives are:

- Simulation of a hybridic network with the integration of Dedicated Short Range Communication (DSRC) with the V2X-LTE technology.
- Reproduction of Denial of Service (Dos) and Distributed Denial of Service (DDoS) attacks in the proposed simulator.
- Utilize a probabilistic cross-layer IDSs for DoS/DDoS attack detection in the overall simulation framework stack.
- Create novel anti-jamming techniques.

#### References:

- [1] D. Kosmanos et al., "Intrusion Detection System for Platooning Connected Autonomous Vehicles," 2019 4th South-East Europe Design Automation, Computer Engineering, Computer Networks and Social Media Conference (SEEDA-CECNSM), Piraeus, Greece, 2019, pp. 1-9
- [2] Iman Almomani, Mohammed Ahmad, Dimitrios Kosmanos, Aala Alkhayer, Leandros Maglaras, "An Efficient Localization and Avoidance Method of Jammers in Vehicular Ad hoc Networks", IEEE Access, December 2022, DOI: 10.1109/ACCESS.2022.3229623
- [3] Dimitrios Kosmanos, Dimitrios Karagiannis, Antonios Argyriou, Spyros Lalis, Leandros Maglaras, "RF Jamming Classification using Relative Speed Estimation in Vehicular Wireless Networks", Security and Communication Networks (Hindawi, Wiley), August 2021, DOI: 10.1155/2021/9959310
- [4] Dimitrios Kosmanos, Apostolos Pappas, Leandros Maglaras, Sotiris Moschoyiannis, Francisco J. Navarro, Antonios Argyriou and Helge Janicke, "A Novel Intrusion Detection System Against Spoofing Attacks in Connected Electric Vehicles", Elsevier Array, Vol. 5, March 2020, DOI: 10.1016/j.array.2019.100013

## Candidate characteristics

#### Education:

A second class honour degree or equivalent qualification in Electrical / Electronic / Communications Engineering, Computer Science/Engineering, Mathematics with a good fundamental knowledge of Network Communication Principles, Digital Communications, software engineering

#### Subject knowledge:

- Wireless communications, OMNET++, communication protocols, Jamming and DDOS attacks

#### Essential attributes:

- Experience of cybersecurity attacks and defenses
- Competent in software development
- Knowledge of wireless communication principles, protocols, algorithms
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

#### Desirable attributes:

- Team player, eager to learn new technologies, flexible and knowledge of Python, R or Matlab.