

# Fog and Blockchain-based Solutions for IoT Security

Contact: Dr. Zouheir Trabelsi, [Trabelsi@uaeu.ac.ae](mailto:Trabelsi@uaeu.ac.ae)

## Description:

These days, IoT devices are deployed at a massive scale, with Cisco predicting 20 billion devices by the year 2020. As opposed to endpoint devices, IoT devices are resource-constrained devices, and are incapable of securing and defending themselves, and can be easily hacked and compromised. As opposed to cloud computing, fog computing has emerged as a new computing paradigm that has the ability to do localized processing, storage, and analytics for a group of IoT devices. The major aim of this PhD project is to propose, design, and implement solutions to leverage the capabilities and features of fog computing, and to show how such newly emerging computing paradigm can be harnessed and utilized to provide localized security functionalities and operations for IoT devices that will include firewalling, intrusion detection, and detection of malicious or hacked IoT devices. Furthermore, the aim is to harness the powerful capabilities and features of Blockchain, which is one of the most hyped technologies, and to provide secure management, authentication and access to IoT devices and their data. It is expected that Blockchain can provide solutions in a highly efficient, robust, verifiable, trusted, and decentralized manner, with high visibility, traceability, transparency, integrity, and credibility. The expected proposed solutions, techniques, and schemes will be backed by a proof of concept implementation with realistic IoT use cases and scenarios of high relevance to government and industry, specifically focusing on securing devices deployed to facilitate and support smart governments, smart buildings, smart cities, as well as healthcare, manufacturing, and oil and gas industries.

## Keywords:

Cybersecurity, Network Security, IoT, Cloud, Fog, Blockchain

## Recommended Reading:

- [1] Khan, M. and Salah, K., “*IoT Security: Review, Blockchain Solutions, and Open Challenges*,” Journal of Future Generation Computer Systems, Elsevier, Vol. 82, May 2018, pp. 395-411.
- [2] Bonomi, F., Milito, R., Zhu, J., and Addepalli, S., “*Fog computing and its role in the Internet of things*,” Proceedings of the first edition of the MCC workshop on Mobile cloud computing, New York, NY, USA: ACM, 2012, pp. 13-16.
- [3] Dastjerdi, A. V., and Buyya, R., “*Fog Computing: Helping the Internet of Things Realize Its Potential*,” Computer, vol. 49, no. 8, 2016, pp.112-116.

## PhD Student Profile:

- Master degree in information Technology, Computer Science, Computer Engineering or related areas with focus on information security, networking security, and cyber security.
- In addition, having a strong background in Blockchain, AI, Big data, and Data Science would be a considerable advantage.
- The applicant must have a very strong command of English with very evident proficiency in scientific writing,
- Publication record of at least one indexed journal or conference paper in areas related to this PhD project.