

Job Title	<i>Postdoc: A platform for the simulation and generation of reconfigurable and secure IoT networks for smart-cities</i>
Main Research Field	<i>Information Science and Engineering (ENG)</i>
Sub Research Field	<i>Simulation, Internet of Things (IoT) and Wireless Sensor Networks</i>
Key words	<i>Simulation, Emulation, IoT, WSN, Security, Smart-city</i>
Job Description	<p>IoT and its applications are one of the fundamental research areas of at Lab-STICC and the MMU IoT Lab of the Manchester Metropolitan University (MMU). Lab-STICC have solid theoretical knowledge base in modelling and multidimensional mathematical and statistical optimization, simulation and software development. This expertise has been applied to the development of a simulator, called CupCarbon¹, which provides accurate simulations of communication protocols, in radio terms and application performance. MMU IoT Lab is well resourced and supported with various hardware and software platforms. The lab has a reputation of applied research with current externally funded project totaling €431,432.</p> <p>MMU's IoT Lab close links with the industry would greatly assist in translating theoretical research into high impact applications. Research with industrial partners will not only give it credibility, but will also open doors to new collaborations and industry-driven research. MMU IoT Lab has set up a small-scale hardware platform consisting of IoT devices installed in an industrial building in their campus. Access to this test bed will allow the recovery of environmental data for processing and analysis, and especially to model the behavior of a real network in order to draw realistic conclusions on energy consumption, reliability, connectivity, etc.</p> <p>The aim of this project is to develop CupCarbon's capabilities to support simulating smart city IoT networks and applications, making it the first comprehensive, open-source, mix-mode (combining both real and virtual IoT nodes) smart city simulator. The ability to verify simulation results using data from real networks will make CupCarbon a valuable tool for researchers as well as practitioners. The advantage of rapid application development offered by CupCarbon is expected to accelerate the implementation of IoT-enabled smart cities at a much lower cost and higher</p>

¹ www.cupcarbon.com

	<p>efficiency.</p> <p>This addition of these new features to CupCarbon will allow testing security protocols and algorithms for smart cities. Overcome user's security and privacy concerns is another expertise, which is a top priority of the H2020 framework. There are currently many research projects and smart cities pilots H2020 projects that would greatly benefit from the proposed extension of CupCarbon, e.g., (cf. ICT-27-2018-2020: Internet of Things - page 57).</p> <p>Additionally, in this post-doc program, we plan to develop utility, which allows translating simulation code into one that can be executed directly on real-hardware platform with minimal or no modification. This allows the rapid deployment of simulated algorithms on real hardware/software platforms at lower cost. Such utility will provide data analytics features to study the network performance and anomaly detection. The security package will allow the integration or injection of malicious or compromised nodes in order to assess the quality of cyber defense algorithms. Currently, such a tool is totally absent from the literature.</p> <p>The aim of this project is two folds: (1) to develop the capabilities of CupCarbon to perform large-sale, mix-mode and accurate IoT-enabled smart city networks and applications; and (2) to develop a security utility for control traffic analytics and evaluation of security protocols and algorithms. The outputs of this project are: (1) a network and security smart cities simulation framework; (2) 2 research papers in high impact international journals; (3) the development of a H2020 proposal.</p>
Supervisor(s)	<p>Dr Ahcene Bounceur is an associate professor of Computer Science at the university of Brest (UBO). He is a member of the Lab-STICC Laboratory (MOCS Group). He received a Ph.D. in Micro and nano electronics at Grenoble INP, France in 2007. He received the M.S. degrees from ENSIMAG, Grenoble, France in 2003. From April 2007 to August 2008, he was a postdoctoral fellow at TIMA Laboratory. From September 2007 to August 2008, he was with Grenoble INP, France where he was a temporary professor. He has obtained the 3rd place of the Annual IEEE Test Technology Technical Council (TTTC-IEEE) Doctoral Thesis Contest, VLSI Test Symposium, Berkeley, USA, May 2007. His current research activities are focused in: Tools for physical simulation of Wireless Sensor Networks (WSN), parallel models for accelerating simulations and predicting parameters in WSN, sampling methods for data mining, development of CAT (Computer Aided Test) tools for</p>

	<p>analog, mixed-signal and RF circuits and statistical modeling of analog, mixed-signal and RF circuits. He is the coordinator of the project ANR PERSEPTEUR and a partner of the project Suidia.</p> <p>Dr Mohammad Hammoudeh is the head of MMU IoT Lab and a Senior Lecturer in Computer Networks and Security. His research interests are in highly decentralised algorithms, communication, and cross-layered solutions to wireless sensor networks. All his research projects are interdisciplinary, applied to real life problems. Latterly, his research focus is on the system design of distributed intelligent systems and their application within large-scale Internet of Things.</p> <p><i>http://pagesperso.univ-brest.fr/~bounceur</i></p> <p><i>https://sites.google.com/site/hammoudehmf/home</i></p>
<p>Department/Research:</p>	<p><i>Lab-STICC CNRS 6285</i></p> <p><i>https://www.labsticc.fr/en/index/</i></p> <p><i>CupCarbon platform</i></p> <p><i>http://cupcarbon.com</i></p>
<p>Suggestion for interdisciplinary / intersectoral secondments</p>	<p><i>International collaboration:</i></p> <p><i>Université de Bretagne Occidentale, Brest, France</i></p> <p><i>MOCS Team</i></p> <p><i>IoT Lab of MMU</i></p>
<p>Skills Requirements (optional) :</p>	<p><i>Fluent in English</i></p> <p><i>Publications: at least 1 per year since the Ph.D. completion, as 1st author.</i></p>