Developing Physical-Layer Security Schemes for Internet of Things Networks

physec

Newsletter #1
February 2021

What is PHYSEC?

Internet of Things (IoT) networks have a wide range of **applications** including **military and security** applications. Distributed nodes in IoT networks are usually constrained by limited energy and processing capabilities. As such, employing conventional complex data security mechanisms represents a challenge to IoT nodes due to the induced complexity and high energy consumption. This project will **propose lightweight security mechanisms tailored for IoT networks** considering the **physical-layer security** approaches. The project includes scientific experts from three different partners in Portugal, Qatar and Jordan, and lasts for three years.

The consortium

Instituto de Telecomunicações is a private, not-for-profit organization, of public interest, with the mission to create and disseminate scientific knowledge in the field of telecommunications.
IT is actively involved in fundamental and applied research both at national and international levels. Simultaneously it is committed to foster higher education and training, while also playing a role towards public society with public awareness initiatives, knowledge transfer to industry, and by providing consulting services on a non-competing basis.
The research group leading the NATO-SPS PHYSEC project is the Mobile Systems Group, located in Aveiro and headed by Prof. Jonathan Rodriguez, who acts as PHYSEC coordinator.

Hamad Bin Khalifa University (HBKU), a member of Qatar Foundation for Education, Science, and Community Development (QF), was founded in 2010 to continue fulfilling QF's vision of unlocking human potential. HBKU is a homegrown research and graduate studies University that acts as a catalyst for positive transformation in Qatar and the region while having a global impact.
Located within Education City, HBKU seeks to provide unparalleled opportunities where inquiry and discovery are integral to teaching and learning at all levels utilizing a multidisciplinary approach across all focus areas.
HBKU is committed to actively contribute to achieving the Qatar National Vision 2030 by building and cultivating human capacity through an enriching academic experience and an innovative research ecosystem.
HBKU participation in the PHYSEC project is led by Prof. Marwa Qaraqe, Assistant Professor at the College of Science and Engineering.

Al-Hussein Bin Talal University (AHU) was founded in 1999 and was the first higher educational institute established during the reign of H.M. King Abdullah II.
AHU is a public coeducational university located in the heart of the southern region, in a self-contained campus 9 Km North West of the city of Ma'an and 210 Km from the Capital Amman. AHU has a student population representing nearly every Governorate in Jordan.
Over the past few years, AHU has grown to include eight colleges and nine scientific centres that are heavily engaged in research and development projects. The ultimate goal of these centres is to serve local and national communities, improve students' life quality and knowledge delivery in various study programs.
AHU participation in the PHYSEC project is led by Prof. Saud Althunibat, Associate Professor at the Department of Communications Engineering.

PHYSEC Publications

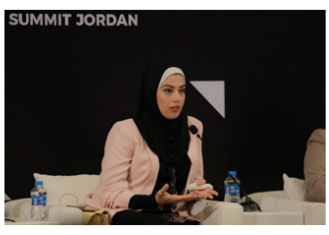
Book Chapters:

- Marcus de Ree et al, "Security for UDNs: A Step Towards 6G", Enabling 6G Mobile Networks, Springer 2021.

Project Events and Outreach

Kick-off meeting of the PHYSEC project took place online, on 20th November 2020, with the attendance of all the partners and the NATO SPS Officer.

Dr. Marwa Qaraqe featured in the *Women in Science Day* highlights by NATO.



Dr Marwa Qarage is an Assistant Professor at Hamad Bin Khalifa University in Qatar.

Working in a male-dominated field, she encountered *"an overwhelming pressure to thrive, not only for my own development, but because I served as a role model to other young women, also in the region."* To cope with this pressure, she partnered with the only other woman on the faculty, and together they develop complementary research ideas. "*I strongly believe that being knowledgeable, well-equipped, and having support groups and a collaborative network of women scientists are key to helping women to succeed in science-related fields,*" Dr Qarage stated.

"I think women often feel conflicted when it comes to pursuing their careers or starting a family simply because they do not see many women who have succeeded in both areas" remarked Dr Qarage. *"It is important that young girls see women scientists and learn from their success stories. This visibility of women in a male-dominated field will encourage more women to pursue such careers,"* she added.

Dr Qarage is working with her counterparts in Jordan and Portugal on an SPS multi-year project aiming to develop systems to enhance the security of Internet of Things networks, which include interconnected computing devices, digital machines and sensors.

NATO OTAN

This project is supported by: The NATO Science for Peace and Security Programme

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