Istituto di Elettronica
e di Ingegneria
dell'Informazione e
delle Telecomunicazioni

# Thursday seminars

*Taking a Look at the Future:*
*a cocktail hour event!*

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## Ing. Danilo Pau
## (STMicroelectronics)

# Design and deployment of interoperable deeply quantized neural networks for in-sensor and micro-controller computing

Balancing storage, efficient computing, accuracy, mapping to silicon and power consumption is a challenge when trying to use low bit-depth neural network. Case studies encompassing anomaly detector and classifier model design are complex tasks if neural networks are investigated targeting ultra-low power devices such as sensors and microcontrollers. Deeply Quantized Neural Networks (DQNNs) offer the most interesting approach to these tasks. The design and the training of DQNN also is not a trivial task. Unfortunately, current off the shelf microcontrollers are not yet able to exploit their potentialities. Realization of custom energy efficient hardware accelerators sometime may represent a viable alternative in terms of energy efficiency, especially applied to a raising field such as in-sensing neural computing. Hybrid Neural Networks variants developed with experimental deep learning tools, can achieve interesting accuracies compared to more traditional design approaches. In this talk all those aspects will be discussed with reference to latest efforts of ST including a) tools for efficient deployment on micro controllers for image processing b) custom ultra-low power hardware circuitry for real-time execution of the Hybrid Neural Network with traditional CMOS technologies and implemented with field-programmable gate array, c) latest ST solutions for in sensor deep learning computing. Part of the talk will include associated demo and code inspection.

*Registration form*

*Teams Webinar • 21 April 2022 – 17:30*

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