Title: Recent Innovations from the Institute of Embedded Systems

Abstract: We present three themes, in four short presentations, that have seen recent innovation at the Institute. In the first presentation, we discuss the interoperation of secure microcontrollers and secure elements on energy-efficient IoT sensors. In the second, we discuss issues around explainable, dependable and safe machine learning. In the third presentation, we discuss a framework for optimised configuration of stand-alone, FPGA based neural networks. We conclude with a discussion of performance of different frameworks for porting neural networks onto microcontroller platforms.

Presentations:

Prof. Andreas Rüst: Embedded Security for IoT Devices

We discuss energy-efficient cryptographic processing on constrained IoT sensors using Secure Microcontrollers with Trusted Execution Environments (TEE) and Secure Elements.

Prof. Hans Dermot Doran: The challenges of machine learning and artificial intelligence in safety critical systems and applications.

We discuss the challenges and some promising suggestions for industry interested in using machine learning in systems with dependable or safe characteristics.

Tobias Welti: Framework für die Portierung von neuronalen Netzwerken auf FPGA

We discuss a framework for the generation, configuration, verification and validation of stand-alone neural networks for synthesis on an FPGA.

Raphael Zingg: Artificial Intelligence on Microcontrollers

We discuss the efficacy of four well-known frameworks for implementing neural networks on embedded microcontrollers.