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When

Wednesday 18 November 2020 from 11am-12pm EST (4-5pm UTC)

Topic

ISE&PPOOA an MBSE Methodology from System to Software Architecture

Speaker

Dr. Jose L. Fernandez and Dr. Carlos Hernandez

Abstract

The use of software for the systems of today is increasing, meaning that more of the systems functionalities are performed by software. This situation has changed the design paradigm from a functional to an object or component-oriented approach.
This webinar presents an integrated systems and software engineering process named ISE&PPOOA (Integrated Systems Engineering and Pipelines of Processes in Object Oriented Architectures) where traditional functional based systems engineering is combined with Model-Based Systems Engineering (MBSE) using the functional paradigm to represent behavior. The systems engineering part of the process is integrated with component-based software development based on the PPOOA architecting process.
This process applies the functional paradigm all over the systems development lifecycle, allowing the component-based development based on the object-oriented paradigm for the software subsystems and using standard notations such as SysML for the system and UML for the software intensive subsystems.
The crucial step for bridging system and software architectures is the creation of the domain model of the software subsystem. A domain model describes a software intensive subsystem using more formalism than merely textual requirements, for example UML class diagrams, and one can use it to reason about the internal workings of the software subsystem.

As an example of the application of the ISE&PPOOA process to software intensive systems, we present the case of a collaborative robotic application. New robotic systems must be flexible to adapt to different tasks and environments, and to work in collaboration with humans. To meet these demands, engineers are introducing advanced Artificial Intelligent methods in robotics, and the development of the resulting software-intensive systems is a pressing challenge. We present how MBSE and particularly ISE&PPOOA provides a practical way of thinking for robotic engineers that bridges the system and software architectures to develop an integrated solution.

Biography

Jose L. Fernandez has a PhD in Computer Science, and an Engineering Degree in Aeronautical Engineering, both by the Universidad Politecnica de Madrid.

He has over 30 years of experience in industry as systems engineer, project leader, researcher, department manager, and consultant. He was involved in projects dealing with software development and maintenance of large systems, specifically real-time systems for air traffic control, power plants Supervisory Control and Data Acquisition (SCADA), avionics, and cellular phone applications. He was associate professor at the E.T.S. Ingenieros Industriales, Universidad Politecnica de Madrid (UPM).

He is senior member of the IEEE (Institute of Electric and Electronics Engineering) and member of INCOSE (International Council on Systems Engineering), participating in the software engineering body of knowledge, systems engineering body of knowledge and requirements engineering working groups of these associations. He is a member of the PMI (Project Management Institute) participating as reviewer of the PMBoK 6th Edition, 2017, and the Requirements management, Practice Guide, 2016.

Carlos Hernandez has a PhD in AI and Robotics, and MSc degrees in Industrial Engineering and Automation and Robotics, both by the Universidad Politecnica de Madrid.

He is an assistant professor at the Cognitive Robotics Department of TU Delft since May 2019, and principal investigator in the AIRLab Delft, a research lab on AI and robotics for retails sponsored by Ahold Delhaize. In 2016, Carlos led Team Delft to win the Amazon Robotics Challenge. He is currently coordinator of the ROSIN and the MROS European projects on robot software, and he has previously participated in projects related to cognitive robotics and factories of the future.

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Regards,

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