PBCS: PLC based control systems Workshop

Report of Contributions

Contribution ID: **2**   Type: **not specified**

IEC61499 standard and an industry implementation: 4DIAC

Friday 15 October 2021 14:10 (50 minutes)

As in many other areas, software is the function and innovation driver in industrial automation. The discussions around Industry 4.0 with the goal of networked and adaptable production have reinforced this. This leads to the fact that control software development is the main cost driver in industrial automation. In order to keep the complexity and the human effort manageable, a domain-specific modeling language was designed and defined in the IEC 61499 standard.

This language takes into account the requirements of the domain with respect to real-time capability & determinism, specification of sequences, synchronization, networked devices & decentralized intelligence as well nas dynamic reconfiguration. The aim of this presentation is to give an overview of the main elements of the language, how to apply it and the current industrial adoption.

Presenter: Dr ZOITL, Alois (JOHANNES KEPLER University (LINZ-AUSTRIA))

Session Classification: Technology trends

Track Classification: (2) Project development

Contribution ID: **3**   Type: **not specified**

CI/CD techniques for quality assurance

Friday 15 October 2021 16:20 (20 minutes)

Continuous Integration and Continuous Deployment (CI/CD) are concepts that have been widely adopted in the sphere of software engineering. Continuous Integration heavily emphasises frequent, small commits to a central version control system, after which a sequence of automated build and test steps are performed. Continuous Delivery focuses on the automation of the release procedures. Together, the techniques aim to reduce the burden on the developers, and to facilitate a smooth, consistent and error-free workflow. In this presentation, a set of tools aimed at enabling CI/CD for PLC-based controls are presented, along with a short demonstration of their use in a production project at CERN.

Presenter: SCHOFIELD, Brad (CERN)

Session Classification: Testing & verification

Track Classification: (3) Testing and verification

Contribution ID: 4   Type: **not specified**

Formal verification of PLC programs with PLCVerif

Friday 15 October 2021 16:40 (20 minutes)

Formal verification techniques, in particular Model Checking, are powerful methods that can be used to guarantee that a PLC program is compliant with its specifications.

They are a good complement to the traditional testing techniques and they are recommended by the Functional Safety standards (e.g. IEC 61508 and IEC 61511).

The main advantage of Model Checking is that it checks all combinations in the PLC program trying to find a violation of the requirement specification.

The main disadvantages are 2: (1) using formal methods is a complex and time consuming task; (2) the so-called "state space explosion" problem, when the number of combinations to be checked is huge.

PLCverif hides the complexity of using formal methods from the user of the tool. In addition, it uses advanced model checking algorithms to deal with the "state space explosion" to a certain extend.

Presenter: FERNANDEZ ADIEGO, Borja (CERN)

Session Classification: Testing & verification

Track Classification: (3) Testing and verification

Contribution ID: **5** Type: **not specified**

PLC hardware upgrades: basics concepts

Friday 15 October 2021 16:00 (20 minutes)

Concepts and factors to take into account in an obsolescence study and a successful migration strategy

Presenter: ORTOLA VIDAL, Jeronimo (CERN)

Session Classification: Upgrades strategies

Contribution ID: 6   Type: **not specified**

ELETTRA, Trieste, Italy

Friday 15 October 2021 15:00 (5 minutes)

Presenter: TREVI, Massimo (Elettra - Sincrotone Trieste)

Session Classification: Institutes presentations

Contribution ID: **7** Type: **not specified**

ALBA - Barcelona, Spain

Friday 15 October 2021 15:20 (5 minutes)

Presenter: VILLANUEVA, Jorge (ALBA)

Session Classification: Institutes presentations

Contribution ID: **8** Type: **not specified**

CAS - Beijing, China

Friday 15 October 2021 15:05 (5 minutes)

Presenter: HE, Yongcheng (CAS)

Session Classification: Institutes presentations

Contribution ID: **9** Type: **not specified**

NCBJ - Poland

Friday 15 October 2021 15:10 (5 minutes)

Presenter: SZEWINSKI, Jaroslaw (NCBJ Swierk)

Session Classification: Institutes presentations

Contribution ID: **10**   Type: **not specified**

Workshop introduction

Friday 15 October 2021 14:00 (10 minutes)

Presenter: Dr BLANCO VINUELA, Enrique (CERN)

Session Classification: Introduction

Contribution ID: **11** Type: **not specified**

SNS (ORNL), Tennessee, USA

Friday 15 October 2021 15:15 (5 minutes)

Presenter: WHITE, Karen (ORNL)

Session Classification: Institutes presentations