Introduction WS10

IEEE ETFA 2022 – WS10
"Enabling robust, converged networks for Industry 4.0"
06/09/2022 – Stuttgart (Germany)

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Most recent version of the presentation

Outline

- **The CINI4.0 CORNET project**
- Workshop 10 @ IEEE ETFA 2022 in Stuttgart
- Program of WS10

The CINI4.0 CORNET project

CINI4.0: Converging Industrial Networks for Industry 4.0

New challenges for wired Ethernet

Main goal: The main goal of the CINI4.0 project is to thoroughly investigate the applicability of technologies such as:

- OPC UA (Open Platform Communication Unified Architecture),
- Time Sensitive Networking (TSN),
- Single Pair Ethernet (SPE)

for industrial applications with the focus on seamless integration in both greenfield and brownfield installations.

There is still a (huge) lack of understanding the potentials and performance limits – also while combining these technologies – and little or no experience in implementing them. The (upcoming) convergence of IT and OT networks may emphasize the need for understanding these technologies even more.

The CINI4.0 CORNET project

- **A joint German-Belgian project**
- **Project Partners:**
  - KU Leuven, Technologiecampus Gent (C, "coordinating association")
  - UGent, campus Kortrijk (R, "research performing organization")
  - TH-OWL / inIT (Lemgo) (R)
  - Fraunhofer IOSB-INA (Lemgo) (R)
  - FE ZVEI (A, "Association")
- **Funding organizations:**
  - AiF (Germany)
  - Vlaio (Flanders)

The CINI4.0 CORNET project – User Committee

- **German members:**
  - Endress+Hauser SE+Co. KG (Maulburg)
  - Hilscher Gesellschaft für Systemautomation GmbH (Hattersheim am Main)
  - Indu-Sol GmbH (Schmölin)
  - Perinet Gmbh (Berlin)
  - rt-solutions.de GmbH (Köln)
  - ZVEI e.V (Frankfurt am Main)
  - R. STAHL Schaltgeräte GmbH (Waldenburg)
  - TOSIBOX Gmbh (Lemgo)
  - ESR Pollmeier GmbH Servo-Antriebstechnik (Ober-Ramstadt)
  - InnoRoute Gmbh (München)
  - Lenze SE (Aerzen)

The CINI4.0 CORNET project – User Committee

- **Belgian members:**
  - Phoenix Contact NV/SA (Zaventem)
  - Prokorment VOF (Delft, The Netherlands)
  - Bintz NV/SA (Zaventem)
  - Prolink Engineering BV (Deinze)
  - ArcelorMittal Belgium NV/SA (Zelzate/Gent)
  - DSP Valley vzw (Leuven)
  - Linkworx BVBA (Aalter)
  - Volvo Cars Gent (Oostakker/Gent)
  - iBA Benelux BVBA (Gent)
  - VMA NV/SA (Sint-Martens-Latem)
  - Agoria vzw (Brussel)
  - Siemens NV/SA (Huizingen)

The CINI4.0 CORNET project – Outputs & KPIs

Planned outputs from CINI4.0:

- Best practices, guidelines, scientific publications, … that provide an objective study of the potential of these technologies for industrially relevant use-cases.
- Measuring technologies, technology demonstrators and larger industrially relevant use-cases.
- The project puts one of its accents on lifelong learning by means of workshops, hands-on courses, and conferences aimed at industry.

General KPIs of the project:

- KPI 1 – Companies (users) reached, 77 in total show a lot of interest. (Outreach)
- KPI 2 – Validation using large lab set-ups or industrial use cases, 4 in total. (Innovativeness)
- KPI 3 – Number of FTE days of high-end training for industry people: 325. (Knowledge transfer, outreach)
- KPI 4 – Scientific papers (4), seminar on scientific conference (1), stand on (external) fairs (1), own fairs & study days (5), articles in dedicated press (6), etc. (Outreach, knowledge transfer, dissemination)

The CINI4.0 CORNET project – Workpackages & Timing

Organization in workpackages - Timing:

WP1 – Literature study (Aug 21 – Oct 21)

WP2 – Measuring concepts and experimental quantification on component level: PHY & DLL (Aug 21 – Oct 22)

- Design of measuring methods / Experimental quantification of operational properties / Verification of robustness at component level / Intensive technical exchange days

WP3 – From data to information: OPC UA as middleware (Aug 21 – Oct 22)

- Operational aspects of OPC UA and information modelling / Assessment of the built-in security aspects of PN/TSN/OPC UA

WP4 – Experimental quantification at system level (Apr 22 – Apr 23)

- Integration of components into systems / Measuring operational properties / Designing for robustness at system level / Intensive technical exchange days

WP5 – Validation using large lab setups or industrial use cases (Apr 22 – May 23)

- Validation of design methods on industrial grade use cases / Migration and implementation aspects in brownfield installations

WP6 – Knowledge transfer (Aug 21 – Jul 23)

- Website design / Promotional activities / Technology radar / Hands-on training and workshops + Conferences/fairs/seminars / Closing event

WP7 – Project management

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WS10 – Introduction

- A workshop a bit different from other ones?
- 50% theoretical background information, 50% measurements and interpretation
- We moved a lot of equipment!
- We value your input and questions!
- SPE – EMI & robustness – TSN – OPC UA Pub/Sub …
- … Topics that are at this very moment relevant in industry!

Outline

27th INTERNATIONAL CONFERENCE ON EMERGING TECHNOLOGIES AND FACTORY AUTOMATION
ETFA 2022 STUTTGART, GERMANY SEPTEMBER 6th-9th 2022

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- **Program of WS10**

WS10 - Program

Time-Sensitive Networking (TSN)

- TSN part 1: Ethernet TSN fundamentals
- TSN part 2: Converged OT and IT traffic in TSN networks with brownfield PROFINET RT devices
- Q&A
- 1a Demo: Ethernet TSN-preemption live demonstration
- 1b Demo: OT/IT traffic in brownfield TSN vs. PROFINET RT, including measurement methods
- Interactive discussion

Single Pair Ethernet - Robustness of industrial networks against EMI

OPC UA PubSub

WS10 - Program

Time-Sensitive Networking (TSN)

Single Pair Ethernet - Robustness of industrial networks against EMI

- Robustness against EMI: narrowband and wideband testing versus real life interference
- Redundancy for robustness: TSN.1CB
- Single Pair Ethernet: Fundamentals - Some measurement methods
- Q&A + break (?)
- 2a Demo: Ethernet, RS485 and SPE under EMI ...
- 2c Demo: TSN.1CB (plus HSR & MRP)
- 2b Demo: SPE measurements

OPC UA PubSub

WS10 - Program

Time-Sensitive Networking (TSN)

Single Pair Ethernet - Robustness of industrial networks against EMI

OPC UA PubSub

- OPC UA PubSub in TSN networks
- 3a Demo: OPC UA TSN on field level devices
- Interactive discussion