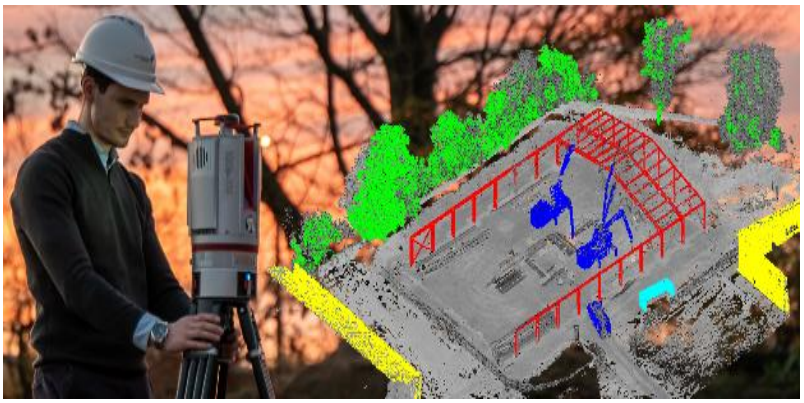
3D-Punktwolken - Scannen und interaktive Verarbeitung zur Gewinnung von Prozessinformationen

CONSTRUCTION ROBOTICS

Der praxisorientierte Zertifikatkurs vermittelt und demonstriert Verfahren zur interaktiven und automatisierten Punktwolkenverarbeitung im Bauwesen und in der Produktion. Dazu lernen Sie im Zertifikatkurs die Grundlagen der Punktwolkengenerierung sowie Ansätze zur Punktwolkenverarbeitung kennen. Die Einsatzmöglichkeiten verschiedener KI-Modelle zur Extraktion semantischer Informationen aus 3D-Punktwolken werden vorgestellt.



Workshop für:

Fach- und Führungskräfte aus den Bereichen Produktion, Bau, Entwicklung und Forschung, die sich mit der semantischen Verarbeitung von Punktwolken zur Erfassung des Ist-Zustandes von Baustellen oder Prozessen befassen.

Dauer: 10:00 – 16:00 Uhr

Sprache: Deutsch

Kursleiter:

Jan Luca Fahrendholz-Heiermann

Teilnahmegebühr:

Frühbucherpreis – 380 €* (bis 31.07.2025)
Regulärer Preis – 450 €*

Anmeldung: https://construction-robotics.de/veranstaltungen/

*zzgl. USt.

Inhalt:

Neben aktuellen Trends in der 3D-Punktwolkenerfassung bietet der Kurs innovative Lösungen aus Wissenschaft und Praxis. Es werden Methoden und Werkzeuge zur semantischen Verarbeitung von 3D-Punktwolken einzelner Objekte sowie ganzer Szenen vorgestellt. Dazu werden unter anderem Ansätze zur Transformation von 3D-Punktwolken in andere Datenmodalitäten sowie ein Überblick über einsetzbare KI-Architekturen und vortrainierte KI-Modelle für verschiedene Anwendungsbereiche vorgestellt.

Themen:

- Interaktives Scannen
- Einführung in die Projektionsverfahren (3D → 2D, 2D → 3D)
- Einführung in die Möglichkeiten der semantischen Verarbeitung von 3D-Punktwolken
- Einführung von Einsatzmöglichkeiten verschiedener KI-Modelle
- Diskussion zu möglichen Anwendungsfällen im eigenen Bereich

Zielsetzung:

Ziel des Kurs ist es, Fach- und Führungskräften aus Innovations- und Entwicklungsbereichen gezielt Schlüsselkompetenzen im Bereich 3D-Punktwolken zu vermitteln. Anerkannte Experten aus Industrie und Forschung präsentieren aktuelle Trends und Entwicklungen in der Punktwolkenverarbeitung zur Extraktion semantischer Informationen als Unterstützung bei der Umsetzung von Prozessen. Als F&E-Verantwortlicher erhalten Sie die neuesten Methoden und das notwendige Wissen für eine effiziente und anpassungsfähige Verarbeitung von Punktwolken, die Sie in Ihre Prozessabläufe integrieren können.

Vorraussetzungen:

- Vorkenntnisse im Bereich 3D-Scanning und 3D-Punktwolken sind von Vorteil, aber nicht zwingend erforderlich.
- Laptop mitbringen mit Admin Rechten / Entwickler Laptop

AI-Querying for Knowlegdegraphs in AEC

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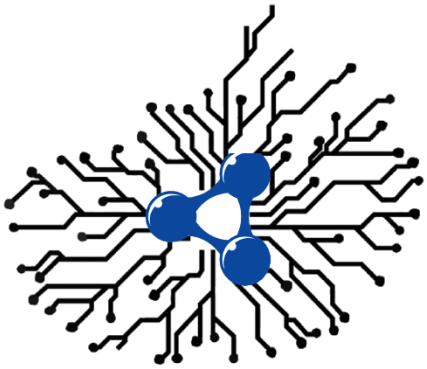
The practice-oriented workshop teaches and demonstrates how Large Language Models can be used to retrieve information from the semantic web in the construction value chain. In the workshop, you will learn the basics of knowledge modelling with the help of ontologies and the practical use of graph databases as the single source of truth.



Workshop for:

Experts and executives from the areas of construction and development as well as scientists, who deal with issues relating to data exchange and knowledge modeling

Duration: 10:00 a.m. – 4:00 p.m.

Language: English

Tutor: Dr. -Ing. Jyrki Oraskari

Participation Fee:

Early Bird Price – 380 €* (bis 31.07.2025)
Regular Price – 450 €*

Registration: https://construction-robotics.de/en/events/

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Content:

The seminar covers linked data and the semantic web, presenting practical and research-based solutions. It introduces tools for modeling construction processes, extracting data from knowledge graphs, and applying large language models for enhanced automation and analysis.

Topics:

- Turn engineering data into structured, interoperable formats
- Understanding and Applying Ontologies
- Unlocking BIM Data with Semantic Web Technologies
- Query graph data with semantic similarity techniques ans large language models
- Build smart visualizations

Objective:

The goal is to impart the key skills for knowledge management to promote the benefits of the technology stack to experts from the industry and research. You will be introduced to state-of-the-art methods and the knowledge you need to model your functional process sequences using linked data approaches.

Prerequisites:

- Laptop with admin rights (ability to install software-packages needed)
- Basic programming skills (Python preferred)
- Optional: Bring your own IFC model (max 100MB)

IoT for Construction automation

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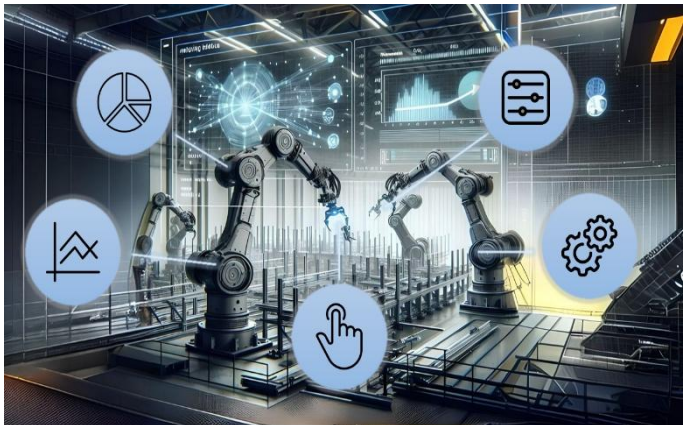
In the workshop you will learn the basics of publisher-subscriber based communication protocol as well as JSON payload structure to be able to interface control of the manufacturing IoT devices and visualize incoming state of them through varying dashboard tools.



Workshop for:

Experts and executives from the areas of construction automation and solution development as well as scientists, who deal with M2M orchestration, communication framework adaptation, and HMI user interface design.

Content:

This workshop provides a comprehensive introduction to Internet of Things (IoT) enabled devices for construction automation. The course focuses on practical applications, demonstrating how to integrate industrial assets into network-based communication protocols. The aim is to facilitate easier integration of devices into automation processes. Through Node-RED dashboard, an intricate data visualization and device control interface is to be designed. In addition, the concept of "virtual services" is introduced, which are provided in Docker containers and have the same command structures as physical IoT devices, so that orchestration can be seamlessly integrated by a central control unit.

Duration: 10:00 a.m. – 4:00 p.m.

Language: English

Tutor: Emre Ergin

Topics:

- Comprehensive Understanding of MQTT & Node-RED Data structure (topic-payload-msg&flow variables)
- Publish and subscribe data structure for virtual device integration
- Simplified UI design through buttons/sliders/text input for IoT device control
- Data visualization for device states

Objective:

This immersive workshop equips participants to leverage the MQTT protocol for rapid prototyping of user interfaces designed for seamless interaction with Internet of Things (IoT) devices. Through hands-on exercises, participants will gain a comprehensive understanding of MQTT's publisher-subscriber communication and JSON data structures, enabling them to control and visualize real-time sensor data from IoT devices, such as a robot, magnetic grippers, a welder, and a thermal camera using various web-based dashboard tools.

Participatin Fee:

Early Bird Price – 380 €* (bis 31.07.2025)
Regular Price – 450 €*

Prerequisites:

- Skills: Basic programming experience (Node-RED works through JS but not a requirement)
- Personal Computer

Registration: https://construction-robotics.de/en/events/

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Machine Learning for Construction Machines

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Machine learning is a branch of artificial intelligence that is used to solve complex tasks and technical applications. The basic concept is to design models based on data and information in such a way that predictions can be made using a model. In machine learning, algorithms are trained to classify information, recognize patterns in data sets and make well-founded decisions. Applications for machine learning can be found in various areas, but the use of machine learning in the construction industry is a relatively new topic.

Workshop for:

Specialists and managers from the fields of construction, development and research who deal or would like to deal with the potential of applied Machine Learning in real applications.

Duration: 10:00 a.m. – 4:00 p.m.

Language: English

Tutor: Davide Picchi

Participation Fee:

Early Bird Price – 380 €* (bis 31.07.2025)
Regular Price – 450 €*

Registration: https://construction-robotics.de/en/events/

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Content:

In this workshop, the basics of machine learning will be discussed and explained using various examples. The examples range from simple regression models to complex neural networks approaches for the realization and implementation of filters, controllers, etc.

Topics:

- Machine Learning basics, underlying concept, introduction to neural networks
- Reinforcement Learning paradigms and its potential
- The potential of AI (Machine Learning) in construction machine applications
- Simple exercises, introduction to the framework PyTorch, basic understanding of an AI approach to engineering

Objective:

The aim of this workshop is to teach the basic principles of machine learning for use in real applications. The workshop provides the basis for deepening further A.I. paradigms (deep learning, reinforcement learning). In addition, the workshop teaches the basics of data analysis and the machine learning mindset: data collection, pre-processing, model design, loss function, etc.

Prerequisites:

- A solid grounding in higher mathematics is not a prerequisite, but it is nevertheless advantageous.
- Programming in Python or another OOP is strongly recommended.