Mainak Majumder, M. Sc.

mainak.9042@gmail.com
Linz, Austria

Work Experiences

02/2026 – present	**Scientific Research Assistant,** LIT Cyber-Physical Systems Lab Johannes Kepler Universität Linz, Austria
02/2022 – 01/2026	**University Assistant,** LIT Cyber-Physical Systems Lab Johannes Kepler Universität Linz, Austria
04/2021 – 01/2022	**Project Assistant,** LIT Cyber-Physical Systems Lab Johannes Kepler Universität Linz, Austria
10/2018 – 02/2021	**Research Assistant,** Institute for Industrial IT (inIT) Technische Hochschule Ostwestfalen-Lippe, Lemgo, Germany
03/2018 – 08/2018	**Student Intern,** ABB AG Forschungszentrum, Ladenburg, Germany

Education

03/2022 – 03/2026	**PhD, Computer Science** Johannes Kepler Universität Linz, Austria Topics: *AAS, CPPS, Information Modelling, OPC UA, RAMi 4.0*
10/2014 – 07/2018	**M. Sc, Electrical Engineering and Information Technology** Otto von Guericke Universität (OVGU), Magdeburg, Germany Topics: *Information Modelling, OPC UA, RDF, Semantic Web* Grade: 2.1
08/2009 – 08/2013	**B. Tech, Electrical Engineering** West Bengal University of Technology (WBUT), Kolkata, India Grade: 1.8

IT Competencies

Programming	C, Java, Python, Node-RED
Modelling	UML, EMF, RDF
Paradigm	MDA, DDD
Framework	SpringBoot, FastAPI
Database	Sqlite, MongoDB
IDE	Eclipse, IntelliJ IDEA, Visual Studio Code
Protocols	TCP/IP, HTTP(S), MQTT, Kafka, Wireshark
Data Models	JSON, XML, YAML
Tools	Maven, CMake, Git

OT Competencies

Programming	Structured Text, Function Block Diagram (IEC 61131-3), IEC 61499 FB
Modelling	UaModeler (OPC UA), AutomationML, Asset Administration Shell
IDE	Eclipse 4diac, CODESYS
Protocols	OPC UA, Modbus/TCP
Standards	RAMI 4.0, DINSPEC 91345, ISA 95, ISO 23247, IEC 61360

Research

Doctoral Thesis

- **A Domain-Driven Model Generation Framework for Cyber-Physical Production Systems**
  Topic: *OPC UA, Model-Driven Architecture, Domain-Driven Design, Domain-Specific Language, Eclipse Modeling Framework*

Master Thesis

- **Semantic Data Space for Industrial Internet of Things Applications Supporting Highly Dynamic Data Traffic**
  Topic: *OPC UA, Resource Description Framework (RDF), Web Ontology Language (OWL), SPARQL*

Reviewer

- **ETFA 22, 23, 24**
  Track 1: Information Technology in Automation
  WIP01: Information Technology in Automation
  SS04: Capability- and Skill-based Engineering of Manufacturing Systems
- **IECON 22**
  Track: Intelligent Factory Automation
- **EDTConf 23**
  General Track
- **IFAC IMS 25**
  Invited Session Track

Teaching

Lecture

- **Production Automation Systems Lecture**, JKU
  Topic: *OPC UA*

Practical

- **Network Embedded Systems**, JKU
  Topics: *ELITeBoard, STM32, GPIO, Timer, I2C, SPI, UART*
- **Production Automation Systems**, JKU
  Topics: *IEC 61131-3, CODESYS, IEC 61499, Eclipse 4diac, FactoryIO*
- **Systems Programming**, JKU
  Topics: *C*
- **Computer Networks**, TH OWL
  Topics: *OSI Model, TCIP/IP, Ethernet*

Project

- **Projects in Network Embedded Systems**, JKU
  Topics: *Arduino, Raspberry PI, MQTT*

Bachelor Theses

- Evaluation of a PLC4X-Based Data Collection Architecture

Teaching (continued)

- Visualization of OPC UA Information Model
- Integrating OPC UA with Apache Kafka
- Implementing Control Application Based on Model-Driven Design
- AI-driven energy consumption optimization of a wooden pallet production unit

Projects

FIND — Future Industrial Network Architecture
Topic: *Software-defined Network, OpenFlow, SNMP, LLDP, YANG*

iAP — Industrial Automation Platform for Big Data
Topic: *OPC UA, MQTT, Docker, Modbus*

BrAIN — Brownfield Artificial Intelligence Network for Forging of High-Quality Aerospace Components
Topic: *OPC UA, Asset Administration Shell*

Miscellaneous

Attendee — **EIT Digital Summer School Programme 2022**
TU Munich, Germany
Topic: *IoT Platforms for Industry 4.0*

Speaker — **1st 4 days of Eclipse 4diac Winter School**
JKU Linz, Austria
Topic: *Unlocking the IT/OT Convergence with OPC UA*

WG Member — **Universal Automation OPC UA Working Group**

Publications

Conference Proceedings

1. **M. Majumder**, B. Wiesmayr, and A. Zoitl, "Digital Twin Architecture Patterns for Real-Time Control Systems," in *8th IEEE International Conference on Industrial Cyber-Physical Systems (ICPS)*, IEEE, 2025. DOI: 10.1109/ICPS65515.2025.11087873.
2. **M. Majumder** and A. Zoitl, "A Conceptual Modelling Language for CPPS," in *30th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)*, IEEE, 2025. DOI: 10.1109/ETFA65518.2025.11205675.
3. **M. Majumder** and A. Zoitl, "Model-as-a-Middleware: Information Model as an Integrator for Cyber-Physical Production Systems," in *23rd International Conference on Industrial Informatics (INDIN)*, In Press, IEEE, 2025.
4. **M. Majumder** and A. Zoitl, "Behaviour-oriented opc ua information model development for cpps," in *Model-Driven Engineering and Software Development*, F. J. Domínguez Mayo, L. F. Pires, and E. Seidewitz, Eds., Cham: Springer Nature Switzerland, 2024, pp. 54–74, ISBN: 978-3-031-66339-0.

5 **M. Majumder**, "A Domain-Driven Model Generation Framework for Cyber-Physical Production Systems," in *ACM/IEEE International Conference on Model Driven Engineering Languages and Systems Companion (MODELS-C)*, 2023, pp. 172–178. DOI: 10.1109/MODELS-C59198.2023.00044.

6 **M. Majumder**, B. Wiesmayr, and A. Zoitl, "Extending the OPC UA Companion Specification for an IEC 61499-based Control System," in *27th International Conference on Emerging Technologies and Factory Automation (ETFA)*, IEEE, 2023, pp. 1–4. DOI: 10.1109/ETFA54631.2023.10275677.

7 **M. Majumder** and A. Zoitl, "A Domain-Driven Design Oriented OPC UA Server Development Methodology for CPPS," in *27th International Conference on Emerging Technologies and Factory Automation (ETFA)*, IEEE, 2023, pp. 1–8. DOI: 10.1109/ETFA54631.2023.10275496.

8 **M. Majumder** and A. Zoitl, "A Modelling Methodology for Developing an Information Model for Cyber-Physical Production Systems using OPC UA," in *11th International Conference on Model-Based Software and Systems Engineering (MODELSWARD)*, INSTICC, SciTePress, 2023, pp. 152–159. DOI: 10.5220/0011684900003402.

9 **M. Majumder** and A. Zoitl, "A Proposal for OPC UA Companion Specification for IEC 61499 Based Control Application," in *19th International Conference on Factory Communication Systems (WFCS)*, IEEE, 2023, pp. 1–8. DOI: 10.1109/WFCS57264.2023.10144247.

10 **M. Majumder** and A. Zoitl, "Run-time Configuration of the IEC 61499-based PLC-Service Bus via OPC UA," in *27th International Conference on Emerging Technologies and Factory Automation (ETFA)*, IEEE, 2023, pp. 1–4. DOI: 10.1109/ETFA54631.2023.10275697.

11 V. Ashiwal, **M. Majumder**, and A. Zoitl, "Evaluation of Middleware Technologies for the PLC-Service bus in IEC 61499," in *IEEE 27th International Conference on Emerging Technologies and Factory Automation (ETFA)*, IEEE, 2022, pp. 1–4. DOI: 10.1109/ETFA52439.2022.9921536.

12 **M. Majumder**, M. Shakil, and A. Zoitl, "Evaluation of PLC4X based Middleware as Integrator of Brownfield systems into Industrial Cyber-Physical Systems," 14th IFAC Workshop on Intelligent Manufacturing Systems IMS 2022, 2022, pp. 427–432. DOI: https://doi.org/10.1016/j.ifacol.2022.04.231.

13 S. S. P. Olaya, A. Winkel, M. Ehrlich, **M. Majumder**, A. Schupp, and M. Wollschlaeger, "CANopen Flying Master Over TSN," in *Kommunikation und Bildverarbeitung in der Automation*, J. Jasperneite and V. Lohweg, Eds., Berlin, Heidelberg: Springer Berlin Heidelberg, 2022, pp. 245–256, ISBN: 978-3-662-64283-2.

14 **M. Majumder**, S. S. P. Olaya, M. Ehrlich, L. Wisniewski, J. Jasperneite, and M. Wollschlaeger, "Work-in-Progress: Semantic Knowledge Base as a Solution for Heterogeneous Industrial Network Management," in *16th IEEE International Conference on Factory Communication Systems (WFCS)*, 2020, pp. 1–4. DOI: 10.1109/WFCS47810.2020.9114450.

15 S. K. Panda, **M. Majumder**, L. Wisniewski, and J. Jasperneite, "Real-time Industrial Communication by using OPC UA Field Level Communication," in *25th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)*, 2020, pp. 1143–1146. DOI: 10.1109/ETFA46521.2020.9211998.

16 S. K. Panda, L. Wisniewski, M. Ehrlich, **M. Majumder**, and J. Jasperneite, "Plug & Play Retrofitting Approach for Data Integration to the Cloud," in *16th IEEE International Conference on Factory Communication Systems (WFCS)*, 2020, pp. 1–8. DOI: 10.1109/WFCS47810.2020.9114523.

17 F. Ansah, **M. Majumder**, H. de Meer, and J. Jasperneite, "Network Slicing : An Industry Perspective," in *24th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)*, 2019, pp. 1367–1370. DOI: 10.1109/ETFA.2019.8869073.

18 **M. Majumder**, L. Wisniewski, and C. Diedrich, "A Comparison of OPC UA & Semantic Web Languages for the purpose of Industrial Automation Applications," in *24th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA)*, 2019, pp. 1297–1300. DOI: 10.1109/ETFA.2019.8869113.

19 S. K. Panda, **M. Majumder**, M. Ehrlich, A. Neumann, L. Wisniewski, and J. Jasperneite, "Topology Detection as a Base for Efficient Management of Heterogeneous Industrial Network Systems Using Software-Defined Networking," in *15th IEEE International Workshop on Factory Communication Systems (WFCS)*, 2019, pp. 1–8. DOI: 10.1109/WFCS.2019.8757933.