

## Workshop Proposal Outline

**Workshop Title:** Digital Tools and Cloud-Based IoT Platforms for Energy Management Control & Optimization

**Venue:** Halden Campus, D1-058, **Time:** 16.00-19.00, 24<sup>th</sup> of November 2025

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### Workshop Description & Relevance to NIKT

The workshops at NIKT focus on advancing knowledge, skills, and innovation within the ICT community in Norway and beyond. The workshop addresses a key area of technology and research—ranging from artificial intelligence, software engineering, digital education, and data-driven innovation to emerging technologies such as cloud computing and green ICT.

Our workshop focuses on how emerging digital tools and intelligent algorithms, grounded in artificial intelligence (AI) and machine learning (ML), can be harnessed to enhance research processes across disciplines. With the rapid growth of data and computational power, AI- and ML-driven solutions are becoming indispensable for data analysis, pattern recognition, prediction, optimization, and decision support in research.

The importance of these workshops lies in their role as collaborative arenas where researchers, practitioners, and students can share insights, test new ideas, and build networks. By tackling both theoretical advances and practical applications, our workshops contribute directly to the overarching goals of NIKT: fostering interdisciplinary collaboration, strengthening Norway's ICT research landscape, and preparing society for rapid digital transformation.

The relevance of this topic to **NIKT** is twofold. First, it strengthens the ICT research community by providing a platform for discussing state-of-the-art methods, tools, and frameworks that can improve the quality, efficiency, and reproducibility of research. Second, it bridges the gap between theory and practice by highlighting concrete applications—ranging from healthcare, climate science, and engineering to the humanities—showing how AI and ML can accelerate discovery and innovation.

By bringing together researchers, practitioners, and students, the workshop fosters interdisciplinary collaboration, encourages knowledge transfer, and equips participants with insights into deploying smart algorithms and digital tools responsibly and effectively. Ultimately, this aligns with NIKT's mission of advancing ICT research and ensuring that Norway remains at the forefront of digital transformation and innovation.

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### Objectives

- **Explore state-of-the-art IoT Platforms-based Cloud Computing, AI/ML/RL methods** and their potential to enhance research across diverse scientific disciplines.
- **Increase knowledge and competencies in AI and Machine Learning** for students and early-career researchers by **demonstrating practical digital tools and frameworks** that support data collection, analysis, visualization, and interpretation in research workflows.

- Introduce participants to the development of AI agents for energy optimization.
  - **Provide hands-on training** in building AI-driven research tools.
  - Encourage collaboration and knowledge exchange across disciplines in electrical and electronics engineering, computer science, data science, and IT.
  - **Create synergy with research projects and industry** network partners
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### Workshop Activities

- **Introductory presentations** on IoT platforms-based cloud computing, digital tools, smart algorithms, and AI applications in research projects.
- **Hands-on training session:** Guided exercises on building AI agents using Python.
- **AI agents Development using Large Language Models (LLM) for energy optimization problems and comparison with traditional optimization agents in Reinforcement Learning**
- **Collaborative discussions and knowledge sharing** to reinforcement learning-RL and explore research applications.
- **Closing session** to summarize key learnings and outline next steps for participants’ research journeys.

### Key Learning Outcomes

At the end of the workshop, participants will be able to:

1. Recognize how AI/ML tools and algorithms can enhance research workflows and outcomes across disciplines.
  2. How to connect and control smart devices and appliances in a smart building via IoT platforms-based cloud computing.
  3. Apply practical digital tools for data collection, analysis, and visualization in their own research.
  4. Critically assess challenges such as bias, interpretability, and reproducibility in AI/ML-driven research.
  5. Identify opportunities for interdisciplinary collaboration and future directions for AI/ML applications in research.
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### Proposed Schedule

| Time          | Program                                     |
|---------------|---------------------------------------------|
| 16:00 – 16:15 | Introduction and Objectives of the Workshop |

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|--------------------------------------------------|---------------------------------------------------------------------------|
| <b>16:15 – 16:50</b>                             | Presentations: Digital Tools, Smart Algorithms, and AI in Research.       |
| <b>10 min coffee break</b>                       |                                                                           |
| <b>17:00 – 18:20</b>                             | Hands-on workshop sessions                                                |
| <b>10 min break</b>                              |                                                                           |
| Development of Cloud-Based IoT Platform for BEMS | Hands-on Training: AI Agent Development for Energy Optimization using LLM |
| <b>18:30 – 19:00</b>                             | Round table discussion: Conclusion, Reflections, and Closing Remarks      |

## Organizers

- **Professor Lucian Mihet** – Department of Engineering-HIOF, expert in Smart Grids, digital tools and AI applications for sustainable research.
  - **Researcher: Fayzul Islam** – Department of Engineering-HIOF, Background in Green Energy Technology, Data Analysis, and IoT platforms, with expertise in Python, automation, and applied AI.
  - **PhD student: Ibrahim Ahmed** – Department of Engineering-HIOF, specializing in AI-driven research and computational tools for Green Energy Technology.
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## Participants

- **Maximum number:** 20
  - **Target group:** Students and young researchers with backgrounds in Electrical and Electronics Engineering, Computer Science, Data Science, Information Technology, or related fields.
  - **Recruitment procedure:** Open application, with priority given to candidates whose research interests align with Smart Buildings, AI/ML and digital tools.
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## Equipment & Supplies

- Participants are required to bring their own laptops with **Python pre-installed** (preferably with Jupyter Notebooks or VS Code).
- Internet connection and projector for presentations.
- Example datasets and code templates will be provided during the workshop.