Federated Learning on Edge Devices for Intelligent Energy Systems

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Motivation

**Almost done with your studies but need a student job?
Or you also want to do your Master thesis or project?
Are you interested in Machine Learning,
but you have data privacy concerns?!**

Intelligent energy systems (e.g., smart meters) and their backend services (e.g., grid load predictors) are sold as "the solution" to the energy crisis. How about energy-data privacy of these services?

Federated Learning allows for smarter models, lower latency, and less power consumption, all while ensuring privacy.
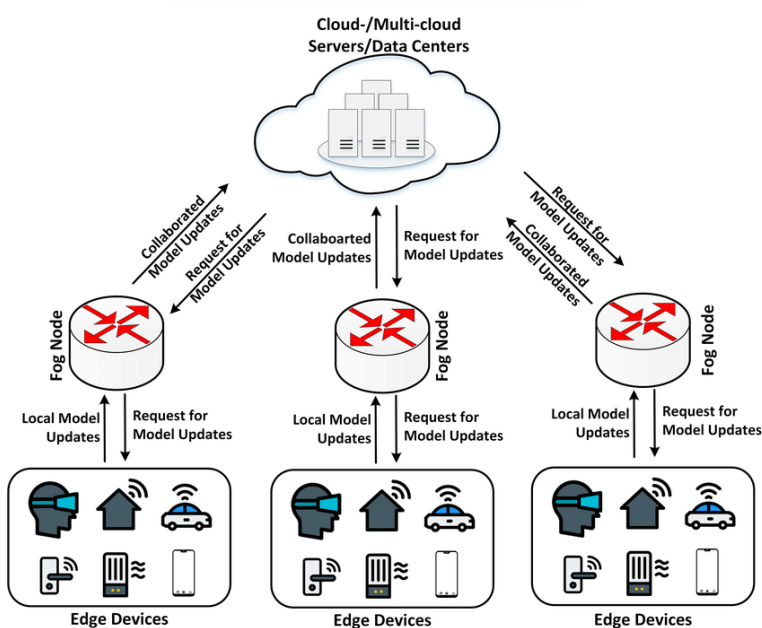
The goal is for you to learn, understand, plan, and successfully implement a Federated Learning framework on Edge Devices for Energy use-cases; e.g., Energy Consumption Prediction.

Goals and Tasks

- ✂ Neural Architectural Search (NAS) for Prediction Networks
- ✂ Quantizing and Deploying NNs on Edge (e.g., RPi, Jetson)
- ✂ Implementing TinyML on microControllers (e.g., MCUNet)
- ✂ Implementing a Federated Learning framework
- 🗐 Continuous Progress Documentation and Reports
- 💡 Collaboration with Colleague Students and Industry

Contract

- ☑ **Position:** Studentische Mitarbeiter-in
- ☑ **Monthly salary:** €1105 Brutto
- ☑ **Commitment:** 6 to 12 months
- ☑ **Weekly hours:** 20

Schedule

- › Reading related work and first steps
- › Intermediate presentation or poster
- › Implementing, experiments, …
- › Writing Thesis/Report
- › Final presentation

Courses & Deliverables

- ☑ **Master Project**
  Project code (Git)
  Report (LaTeX)
  Presentation (pptx)
  Poster (LaTeX)

  – AND/OR –

- ☑ **Master's Thesis
  + DiplomandInnenseminar (CS)**
  Initial presentation (pptx)
  Project code (Git)
  60+ Pages Thesis (LaTeX)
  Final presentation (pptx)
  Poster (LaTeX)

Recommended if you're studying

☑ CS   ☑ ICE   ☑ SEM

Prerequisites

- › Deep Learning Course
- › Signal Processing Course
- › Regression, Prediction, Forecasting
- › Tensorflow, PyTorch, Scikit-learn, Numpy
- › Willing to Learn MLOps on Edge Devices

Advisor Contact

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