



Institute for Automation and Applied Informatics (IAI)



Student work (HiWi)

Software Development (TypeScript, Python)

Modern energy system research increasingly relies on interactive, web-based tools to explore, analyze, and communicate complex spatial data (e.g. energy infrastructure, grids, buildings, sensors, simulations).

Existing tools are often hard to use, outdated, or not optimized for modern browsers.

The goal of this work is to design and implement modern web applications based on TypeScript and Next.js that enable map-based visualization and interaction with scientific and technical data.

The project is part of the research context of the ESA group and supports internal tools and prototypes used in energy system analysis.

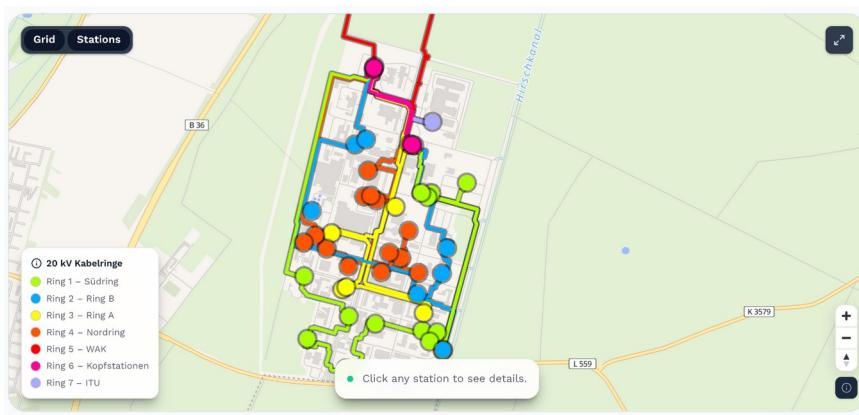


Bild: esa-epowweb-smdt, Mostafa Mekky (IAI-KIT)

The student will:

- Design and implement a Next.js application using TypeScript
- Integrate interactive maps (e.g. Leaflet, Mapbox GL, OpenLayers)
- Visualize spatial and time-dependent data (e.g. layers, markers, heatmaps)
- Connect the frontend to existing APIs or data services
- Apply best practices in frontend/backend architecture, state management, and UI design

Depending on interest and progress, the work can be extended towards:

- Performance optimization for large datasets
- Reusable UI components
- Data filtering, search, and interaction patterns
- Deployment using Docker or Kubernetes

We are happy to answer any questions you might have. Feel free to ask for an appointment or write an E-Mail!

Advisor:

Mostafa Mekky

Programming language:

TypeScript, Python

System, Framework(s):

Next.js, React.js, Web mapping libraries (Leaflet / Mapbox GL / OpenLayers)

Required skills:

- Advanced knowledge of TypeScript and Python
- Interest in web development and modern frontend frameworks
- Good understanding of HTTP / APIs
- Motivation to work independently and learn new technologies

Language(s):

German, English

Starting date:

As soon as possible

For more information, please contact:

Mekky, Mostafa

E-Mail:

mostafa.mekky@kit.edu

Institute for Automation and Applied Informatics (IAI)
 Karlsruhe Institute of Technology,
 Campus North
 Hermann-von-Helmholtz-Platz 1
 76344 Eggenstein-Leopoldshafen