Intelligent software solutions for a sustainable and efficient energy world

fortiss develops solutions for the energy sector in order to master the increasing complexity and high demands on system architectures and interfaces. This includes the coupling of sectors such as heat, electricity, water and mobility, the integration of renewable energies and the flexibilization of energy systems.

A particular focus is on the use of AI to model, analyse and optimize energy systems in order to both reduce energy consumption and achieve cost savings through flexible energy management.

As an innovation hub for the energy sector, fortiss offers efficient and well-founded solutions that meet the current requirements of software development in particular.

Through specialized research expertise and the use of state-of-the-art technologies and algorithms, fortiss promotes the integration of AI and machine learning to create innovative and sustainable solutions for the future of the energy industry.

Why fortiss should be your first choice:

- **The latest scientific findings:** Access to the latest research results in software technology.

- **Reliable engineering competence:** Expertise in the development of complex systems.

- **Agile project methods:** Flexible adaptation to market requirements and rapid project implementation.

- **State-of-the-art research:** Use of the latest technologies for innovative developments.

- **Specialized expertise:** Implementation of industrial prototypes and tailor-made solutions for the specific requirements of energy sector.

- **Long-term partnerships:** Development of sustainable solutions for a successful future.

Use cases

Intelligent solutions for grid stability

Integration and optimisation of energy management systems

Data infrastructure for the energy sector

Artificial Intelligence in the energy sector

Detailed information on the use cases can be found in the inner section ⟶

Services

The fortiss services for the energy industry can be found on the back page ⟶

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Intelligent solutions for grid stability

The use of modern technologies such as artificial intelligence and digital twins sustainably improves grid stability. With the help of precise data analysis, faults are localised quickly and grid disruptions are detected at an early stage.

Decentralised grid control enables flexible adaptation to changing conditions and optimises the energy supply. These innovative approaches promote the integration of renewable energies and contribute to increased efficiency and better load control.

Competencies

- **Efficient data analysis for accurate fault localisation**
- **Transparency and detailed information about grid systems**
- **Real-time monitoring and decentralised grid control**
- **Robustness thanks to diverse data sources**
- **Flexibilisation and intelligent infrastructure**
- **Scalable flexibility management and integration of flexible loads**

Integration and optimisation of energy management systems

The development and implementation of efficient energy management systems (EMS) enables the flexible control of energy flows and supports the integration of renewable energies.

The combination of flexibility management, sector coupling and innovative memory solutions optimizes the use of resources, promotes grid stability and improves the carbon footprint. These systems help to reduce operating costs and support companies on their way to a climate-neutral future.

Competencies

- **Efficient development of energy management systems**
- **Energy monitoring and flexibility management**
- **Sector coupling**
- **Integration of renewable energy sources**
- **CO_2 balancing and sustainability**
- **Sustainable urban energy management**
- **Data security for critical infrastructures**
- **Dynamic adaptation to variable electricity prices**

Data infrastructure for the energy sector

The use of advanced data infrastructures and digital twins enables more precise planning and optimisation of energy data. The use of structured data organisation and modern platforms ensures efficient management.

AI-supported integration of diverse data sources and secure data exchange increase planning and efficiency, while better networking drives the energy transition and future-proofs the energy supply.

Competencies

- **Knowledge-based and future-orientated data infrastructures**
- **Efficient data exchange**
- **Integration of diverse data sources**
- **Development of data platforms**
- **Automated planning processes**
- **Digital twins for energy infrastructures**

Artificial Intelligence in the energy sector

AI has the potential to fundamentally transform the energy sector. By using advanced algorithms and machine learning, energy providers and grid operators can make more precise predictions, carry out systematic optimisations and achieve greater efficiency in the operation of their energy systems.

In the field of energy management in particular, AI-based solutions are opening up new possibilities that go beyond traditional approaches to system integration. With these innovative approaches, AI increases the flexibility, stability and sustainability of energy infrastructures and thus makes a decisive contribution to modernizing and stabilizing the energy supply.

Precise prediction

AI makes it possible to predict the generation of renewable energy, consumption and potential faults in the electricity grid. In this way, bottlenecks can be avoided, grid control optimised and reliability guaranteed.

Dynamic energy flows

Machine learning flexibly adapts energy flows to demand, which supports the integration of renewable energies and optimises the use of resources.

Detection of decentralized resources

AI analyses aerial images to automatically identify photovoltaic systems and other decentralised energy resources. This improves the evaluation of support measures and increases the efficiency of the energy supply.

Digital twin

AI-supported simulations optimise complex energy systems such as memory solutions or hydrogen production and ensure forward-looking planning.

Assistance systems

AI applications based on large language models (LLMs) support distribution system operators in complying with legal requirements and implementing regulations.

fortiss services for the energy industry

Industry-related studies and potential analyses

fortiss provides scientifically prepared potential analyses and specialist studies in the fields of AI, machine learning and software architectures - specially tailored to the requirements of the energy sector.

In company-specific workshops, we work out your individual requirements, analyse the problems, identify possible causes and solutions and develop optimization options to tap into the untapped potential of your organizations.

The results can serve as a basis for the development development of concrete prototypes or for the initiation of cooperation projects.

Industry contract research

fortiss is a reliable technological and manufacturer-independent partner for companies in the energy industry that want to implement innovative digital processes, products or services in pilot projects. Depending on the scope of the project, the institute develops initial concepts through to pre-competitive software solutions (TR level 6), which are evaluated in industrial environments.

fortiss designs projects with industrial partners within the framework of public funding, whether in bilateral cooperations or larger consortia. In introductory workshops, we identify suitable cooperation and funding opportunities, support the submission of project proposals and offer first-class research in the field of software and AI.

Customized prototyping

fortiss takes on software engineering based on specific simulation environments and offers numerous opportunities for exploring, testing and evaluating new solutions for software-intensive systems. You benefit from the know-how of experienced experts who jointly develop solutions for challenges in the energy environment.

Our offer includes prototyping workshops to develop ideas and test innovative methods, the uncomplicated initiation of proof-of-concept projects and rapid prototype developments. As well as the scientific evaluation of customized approaches and the development of a software prototype in a pilot project lasting several months.

fortiss Labs

The fortiss Labs offer companies spaces in which partners from research and industry can interact using existing or newly developed demonstrators. Platforms, simulation environments and software tools are available here.

In the Energy Lab, various prototypes are evaluated in field tests so that real problems and challenges in the energy sector can be addressed.

Through the use cases and the transfer of data into models and the analysis of different scenarios and system variations, challenges such as increasing complexity, for example due to sector coupling, can be solved.

Qualification programs for the energy industry

fortiss offers customized training and further education courses for companies in the energy industry. These include application-oriented training courses, workshops and lectures in which experts impart both theoretical knowledge and practical skills. This combination is crucial for the successful implementation of innovative software solutions.

Our training courses cover specific methods and tools, highlighting the potential of new software technologies and their application in the energy sector. In addition, we offer customized training to provide teams with the necessary knowledge for specific challenges, including model-based systems engineering, machine learning, artificial intelligence in the energy sector.

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Further information on the focus topic energy can be found on our website.

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