



### **Student Worker (SHK) Position**

We are seeking motivated and talented students to join our team in building a testbed and simulator for smart energy management systems. As part of this role, you will have the opportunity to work on cutting-edge technology and contribute to a project that has the potential to shape the future of smart energy management systems.



### **Topic: Simulator / Testbed Development for Smart Energy Management Systems**

#### **Description:**

The conventional power grid uses a centralized distribution architecture in which the power provider is responsible for generating and distributing electricity. However, driven by the environmental, social, and economic interests, increasing numbers of people are choosing to purchase renewable energy generators, such as solar panels, for their homes. A micro grid that includes multiple households with renewable energy sources can operate independently of electricity providers and even sell excess energy back to the main grid. In the future, battery electrical vehicles (BEVs) should support bi-directional charging, which brings further flexibility and complexity to the local energy system. Given this situation, a smart energy management system is needed to control all these entities in the microgrid. In addition, it is not yet possible to connect multiple microgrids to achieve low latency energy grid optimization using 5G technologies and artificial intelligence. These two points still face significant challenges that need to be addressed.

#### **Tasks:**

The student will build a scaled-down version of a testbed consisting of entities representing BEVs, charging stations, solar panels, battery storage, and household appliances. You will develop software to simulate the behavior of the testbed entities, collaborate with the team to implement different energy

management algorithms. Testing the performance of the testbed under different scenarios and conditions.

**Requirements:**

1. Currently enrolled in a degree program in Electrical and Computer Engineering or a related field.
2. Experience in one of the following programming languages: Python, Java, or C++.
3. Fluent in English or German.
4. Experience in working with Raspberry Pi or Arduino boards is a plus.
5. Knowledge of optimization algorithms and AI is a plus.

**Starting date:** As soon as possible.

**Working hour:** Flexible.

**Keywords:** Smart grid, digital twin, bi-directional charging, multi-objective optimization.

If you are interested in this, please contact: [shiwei.shen@tu-dresden.de](mailto:shiwei.shen@tu-dresden.de)