**Project title**:

**Number of students (minimum 2):** 5

**Project duration (1-6 months):** 4

**Project frame (Bachelor/Master, small project):** All

**Background:**

The Dutch government has committed itself to the global climate change limitation targets. Besides implementation schemes for increasing the share of renewable energy, the “energy agreement” that the government signed with industry and other organizations contains targets for improving energy efficiency of buildings (houses, offices) and industrial processes.

The built environment will make steps the coming years to decrease building energy consumption, e.g. electric consumption and thermal consumption for heating and cooling. Partly by building or renovating towards more efficient buildings, partly by smarter control methods which avoid unnecessary energy consumption but maintain sufficient levels of comfort for people. Such control methods can also be coupled to other optimization targets such as demand response and self-consumption of renewable energy generated by the building through solar PV panels and energy storage facilities.

Saxion plays an important role within the energy transition of the Eastern part of the Netherlands. There are a number of projects aiming at decreasing energy consumption, smart control and integration of renewable energy in which Saxion research chairs are taking part. The project Clean Tech Energy Crossing is a large project sponsored by the Kiem Smart Industry program. Saxion is a partner in this project and works on the analysis of energy production and usage in the building area “Leesten-Oost in Zutphen, where residents live in energy neutral homes.

**The challenge:**

The project of Semester 2 2017-2018 will include the following scope:

* - Design and implementation of an “Energy Dashboard” including a web interface, database, mobile app
* - Integration of thermal sensors and heat-pump energy meter into existing Zipato environment
* - Discussion with researchers and residents into what the requirements of the Energy Dashboard are
* - Analysis into behaviour of residents and system (including energy usage, PV production, functioning of Smart Home).

**Attached companies:**

* Saxion research chair, Sustainable Energy Systems
* Attica Architects:
* Kimenai Installations
* Hello Niles Smart Homes Systems
* What the company provides to the students?

**Supervisor:**

* Cees van Keulen

Cees is an enthusiastic and passionate lecturer at the department of Mechanical Engineering at Saxion. He received his master degree in Mechanical Engineering in 2015 with as specializations engineering fluid dynamics and mechanical automation and mechatronics at the University of Twente. Besides his study he was also very passionate about lecturing and supervising students. Therefore he participated as supervisor and lecturer of students during lectures and practical assignments for several bachelor courses.

At Saxion he continued working on his passion as a teacher. He mainly gives courses in the field of fluid dynamics, energy technology and mechanical automation and robotics. Within his modules he applies blended learning to activate and challenge the students. As project leader of the e-learning group he also motivates and challenges other Saxion colleagues to apply blended learning in their modules.

Moreover he is very experienced in supervising multidisciplinary student project groups for example student projects within Smart Solution Semester. He also has experience in coaching of students who are working on their final bachelor thesis.

A complete CV of Cees van Keulen is placed on LinkedIn:

<https://www.linkedin.com/in/ceesvankeulen/>

**Candidate background:**

* *Description of the desired skills of the students*

Students should have the following skills:

We are looking for enthusiastic students with a background in one of the following areas:

* Embedded systems
* Applied computer sciences
* Mechanical engineering
* Electrical engineering
* Software engineering

 Students should have knowledge about one of the following subjects:

* ICT (creating dashboard, webinterface, etc.)
* Embedded systems
* Energy technology (like PV technology or heat pumps)
* Sensoring technology
* Data analysis

Competences:

* Strong analytical skills
* Strong communicative skills
* Knowledge of English