Siemens Global University Challenge – Automation meets Edge
Fact Sheet | April 2018

Goals of the Global University Challenge

The goals of the Global University Challenge 2018 are:

- To develop new Edge Computing App concepts for solving real-world tasks in an industrial automation environment.
- To increase collaborations with strategic universities and Siemens whilst also raising awareness on campus.
- To rasie awareness of Siemens Employer branding & talent engagement.

The outline of the Global University Challenge

The "Global University Challenge" is an open innovation competition organized by Siemens Digital Factory and Corporate Technology.

Students from Siemens strategic partner universities worldwide are invited to participate in the "Global University Challenge" to develop innovative ideas and prototypes for the upcoming Siemens Edge ecosystem for factory automation. Students are encouraged to form cross disciplined teams in groups upto a maximum of 3 in order to support creativity and innovation amongst the participants.

The universities are: Newcastle University (UK), University of Manchester (UK), University of Oxford (UK), University of Cambridge (UK), University of Southampton (UK), TU of Denmark (Denmark), Tsinghua Beijing (China), Shanghai Jiao Tong University (China), Tongji University (China), Soochow University (China), HUST University (China), TU Munich (Germany), Ludwig Maximilian University (Germany), RWTH Aachen (Germany), TU Berlin (Germany), FAU Erlangen-Nuremberg (Germany), KIT (Germany), TU Darmstadt (Germany), TU Dresden (Germany), University of Duisburg-Essen (Germany), TU Budapest (Hungary), TU Vienna (Austria), TU Graz (Austria), JKU Linz (Austria), ETH Zurich (Switzerland), Vanderbilt University (USA), Virginia Tech (USA).

The topic of the Global University Challenge is "**Automation meets Edge**". The challenge is designed to develop new use cases and solutions for the industrial automation. Teams with the most promising concepts (maximum 10 teams) will be invited to a 5 day event with Siemens in Nuremberg, Germany, where they will be invited to take part in a Hackathon realising their concepts into working prototypes.

Background of students:

Any student from the Siemens' worldwide partner universities (listed above) can participate. We assume students from the following faculties might be interested to join the Challenge and enter ideas:

- Computer Science
- IT / Informatics
- Data Science
- Mechatronic
- Automation Technology
- Mechanical/Electrical Engineering

Competition Timeline for the Global University Challenge

The Global University Challenge consists of three phases:

1. **Idea generation** - online idea contest on a virtual co-ideation platform

   http://www.siemens.com/automation-meets-edge-challenge

   - 02nd May 2018: Students start entering ideas on the platform and further develop their ideas based on feedback from Siemens experts.
   - 05th June 2018: Final day to upload studends' ideas. Consider: the earlier students enter ideas, the better chances they have!
   - 08th June 2018: Announcement of 30 finalist teams.

2. **Idea progression** - finalists refine and visualize their ideas

   - 08th June 2018: Finalists develop their idea further; participate in webinars with Siemens Industrial Edge experts and produce a video.
   - 24th June 2018: Final day to upload video. Siemens experts select 10 winning teams.
   - 29th June 2018: Announcement of the winning teams, who will be invited to the Hackathon.

3. **Hackathon** with Siemens experts in Nuremberg (Germany)

   - 8th -12th October 2018: Rapid Prototyping Hackathon in a start-up like environment. Travel expenses, accommodation and catering costs of students are carried by Siemens.

Technical question of the Global University Challenge

Cloud Computing is at the heart of the Big Data revolution but not all information from IoT devices can be transferred into the cloud. Restrictions can be:

- low-bandwidth network links,
- battery-powered sensors which need to be energy efficient,
- high-security regulations where only aggregated data should leave the factory.

Siemens' Edge Computing Platform will enable the solution: Intelligent Apps on the field devices themselves, which can now utilise machine learning and data analysis to enhance the functionality of automation systems and machines. Our expectation is that Users of automation system would like to benefit from future improvements to efficiency, availability and production quality of their machine, delivered in a flexible way with a speed of innovation typical for IT system.
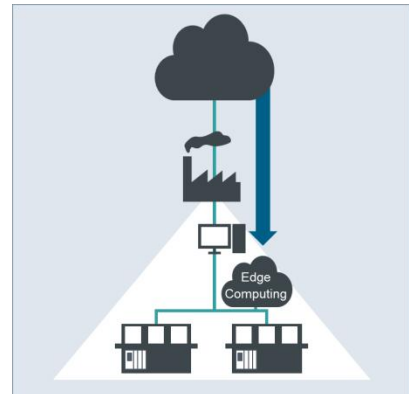
We are looking for new potential applications that could be enabled by the upcoming Edge ecosystem. Students will be asked to gather new ideas/concepts on future business models.

These Ideas should focus on at least one of the -potential benefits of Edge Computing listed below:
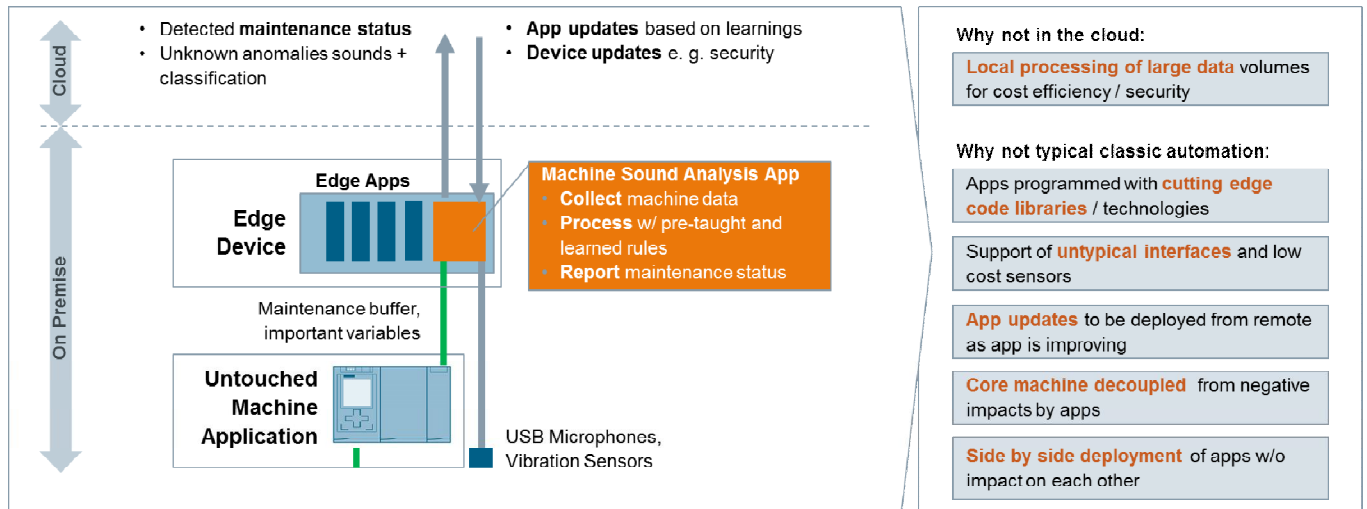
- **Usage of open standards**: High-level programming languages with web communities and standard interfaces required
- **Machine learning**: Model based machine learning and artificial intelligence
- **Connecting Automation & IT**: Usage of various physics & protocols and Connecting brown-field applications to the cloud via retrofitting
- **Increasing data volumes**: Capturing and monitoring high-frequent and high-volume data directly next to the machine on the field level
- **Growing performance requirements**: Intelligence in the field required for data pre-processing and analytics
- **Changing decision makers**: Sales staff need to address not only OT but also IT decision makers

The selection of ideas/concepts will be made by Siemens Digital Factory experts and Corporate Technology. These Ideas/concepts will be evaluated according to the following criteria:

- **Innovativeness**: Incremental or disruptive innovation
- **Automation & Digitalization**: Degree of automation and data digitalization
- **Feasibility**: Degree of technical and/or economical feasibility and implementation
- **Business impact**: Business model behind the idea and risks
- **Customer desirability**: Customer value addressing needs and pains

Edge App Example: Condition monitoring via machine sounds

Cloud
- Detected **maintenance status**
- Unknown anomalies sounds + classification
- **App updates** based on learnings
- **Device updates** e. g. security

On Premise

Edge Device — **Edge Apps**

Machine Sound Analysis App
- **Collect** machine data
- **Process** w/ pre-taught and learned rules
- **Report** maintenance status

Maintenance buffer, important variables

Untouched Machine Application

USB Microphones, Vibration Sensors

Why not in the cloud:
- Local processing of large data volumes for cost efficiency / security

Why not typical classic automation:
- Apps programmed with cutting edge code libraries / technologies
- Support of untypical interfaces and low cost sensors
- App updates to be deployed from remote as app is improving
- Core machine decoupled from negative impacts by apps
- Side by side deployment of apps w/o impact on each other

Prizes (What's in it for the students)

- Hackathon participation (travel accommodation & catering paid by Siemens)
- Great opportunity to secure internship placements with Siemens global organization
- Visit to the future factory of Siemens in Amberg
- Opportunity to pitch to high-ranked Siemens Management audience
- 10.000€ for the winning teams as well as cool technology prizes

Contacts:

Overall Global University Challenge Project:
- Christian Barthel, christian.barthel@siemens.com (Project Leader)
- Vitaliy Volevach, vitaliy.Volevach@siemens.com (Technical Leader)
- Ilaria Carrara Cagni, ilaria.carrara_cagni@siemens.com (University Relations)

Link to the idea generation contest:
http://www.siemens.com/automation-meets-edge-challenge

Link to Digital Factory:
https://www.siemens.com/global/en/home/company/about/businesses/digital-factory.html

Link to Corporate Technology:
https://www.siemens.com/innovation/en/home/corporate-technology.html