Summer School 2019

Smart Cities for a sustainable energy future– from design to practice

Call for Participation

Technical University of Berlin, Germany, GT-ARC, Germany, Simula Metropolitan Center for Digital Engineering, Norway, University of Oslo, Norway, University of Stavanger, Norway, University of Lille, France, and Technical University of Munich, Germany, are jointly organizing the Summer School on ***Smart Cities for a sustainable energy future – from design to practice***, in August 2019.

Target audience for the summer school is early-stage PhD students and MSc students in the related degree programs of any institution worldwide. Students from the host universities and institutes, are particularly encouraged to apply.

Location: TU Berlin, Ernst-Reuter-Platz 7, 10587 Berlin, Germany

Dates: August 19-30, 2019.

Description

The concept of Smart City is an urban development vision that integrates multiple information and communication technologies through the Internet of Things (IoT) concept in a secure and environmentally sustainable manner, enabling cities to improve the quality of life of its citizens, provide high quality services efficiently, and allow for the efficient and effective use of the available resources. In terms of the scope, the summer school will cover future smart energy systems and intelligent transportation systems, two key components that constitute the smart city vision.

In particular, distributed energy resources are a very promising way to solve today´s climate and energy problems. In a city context private renewable energy production mostly implies thermal and photovoltaic (PV) solar energy, possibly complemented with battery storage, as it can be installed on roof tops and facades. At the same time, energy demand will change: electric vehicles (EVs) will become our means of transportation, (hybrid) heat pumps will keep our houses warm during cold winter nights and EV charging will start when solar power peaks or demand is low. Advancements in ICT make this scenario feasible. ICT will give us direct insight into our energy consumption, and become a major controlling component throughout our entire energy system. Intelligent software will seamlessly match energy supply and demand

without human interaction, ensuring uninterrupted availability of energy whenever we need it, leading to the concept of Internet of Energy (IoE).

With the advancement in communication technologies and automotive industry, autonomous driving is expected to become a reality earlier than it was envisioned. Although the perception of vehicle is mainly constructed through on-vehicle sensors (e.g., LIDAR, Radar, Cameras, etc.), the objectives of Level 5 (highest level) of automation is achieved by enriching the vehicle perception through external information capture by on-road deployed sensors, backend of OEMs, and other vehicles. It goes without saying that the communication technologies (ITS-G5, 4G/5G) play a crucial role in creating the information flow between and amongst vehicles (V2V), Vehicles and Infrastructure (V2I), Vehicles and Networks (V2N), Vehicles and Pedestrian (V2P). 5G concepts such as mobile edge computing (MEC), network slicing, flexible control via SDN (software defined networking), and elastic and scalable networks via NFV (network function virtualization), enable majority of the use cases of autonomous driving.

Nonetheless, vehicular networks, are no longer just a use case dictating performance requirements on communication networks. Instead, connected vehicles- also referred to as Internet of vehicles, is growing as a paradigm of its own. Internet of vehicles encompass several fields such as vehicle dynamics, sensing technology, V2X communication and big data analytics. Connected vehicles can also play a crucial role in enhancing 5G network performance e.g., in terms of network coverage or latency.

Contents covered

The summer school will cover contemporary topics in smart energy and intelligent e-mobility systems in a smart city context. These include sustainable energy management in neighborhoods and buildings, integration of renewable energy resources into the smart grid, demand-response management, charging infrastructures for electric vehicles, future energy information networks, security and privacy, citizen engagement, and data analytics in energy systems, and V2X communication, vehicular edge computing, advanced vehicle safety and autonomous driving.

The lectures will cover the recent trends and modern approaches in each domain such as artificial intelligence and blockchain for smart energy systems, autonomous driving, internet of things and network security. Introductory lectures in each field will be followed by tutorials and project assignments. The school includes several lectures from industry speakers who will focus on technological advancements in the related fields and current market models and new business models. In addition, the summer school includes poster sessions from our students on

their current research, and demos from MONROE (Measuring Mobile Broadband Networks in Europe) project, and from Distributed Electrical Systems Laboratory, EPFL, Switzerland.

A total of 80 hours of lectures and lab sessions are planned as part of a two-week program.