



# KOÇ UNIVERSITY

*the perfect view*



<http://www.ku.edu.tr>



## PROJECT IDEAS 1: TeraFemto: TeraHertz Femtocell for 5G Wireless Communications

- 4G Wireless Systems, and recently obtained funding of 1 Million Euros from TUBITAK. **TeraFemto is the first project in the world, which aims to build a communication system operating on low THz band.**
- NWCL directed by Prof. Akan at Koc University, AVEA, one of the largest Turkish Mobile operators, and two SMEs will study the low THz band channel modelling from the analytical and experimental perspectives, design novel communication techniques for indoor THz communications, and develop the first experimental Femtocell testbed for 5G communication systems in THz frequency band providing ultra high bandwidth with extremely challenging channel characteristics.
- **The main purpose of the project** “*TeraFemto- Terahertz Femtocell for 5G Mobile Networks*” is to develop communication techniques for mobile communication in the frequency range above 275 GHz, which is yet to be allocated for active services by ITU. Ultimate goal of the project is **to realize a communication system, which operates on low THz band with femtocell network architecture for *the first time in the world.***





## PROJECT IDEAS 1: TeraFemto: TeraHertz Femtocell for 5G Wireless Communications

- **Prof. Ozgur B. Akan** (<http://home.ku.edu.tr/~akan/>) has a strong expertise in 4G and 5G wireless communications and research carried at the Next-generation and Wireless Communications Laboratory (NWCL - <http://nwcl.ku.edu.tr/>), directed by him, which has been funded by several national and international agencies and companies, including **EU-ERC Consolidator Grant**, IBM, EU-COST 290, Intel, **Lockheed Martin**, and **Turk Telekom**.

**E-mail: [akan@ku.edu.tr](mailto:akan@ku.edu.tr)**





## PROJECT IDEAS 2: Future Wireless Communication Networks

Vehicles | 5G | Internet of Things | LTE

Wireless Magnetic Sensors for Traffic Monitoring

Intra-Vehicular Wireless Sensor Networks

Inter-Vehicular Communication Networks

Cyber-Physical Systems

### Wireless Networked Control Systems

#### Benefits of wireless

- Ease of installation and maintenance
- Low complexity and cost
- Large flexibility to accommodate modification and upgrade of components

#### Backed up by several industrial organizations

- International Society of Automation (ISA)
- Highway Addressable Remote Transducer (HART)
- Wireless Industrial Networking Alliance (WINA)

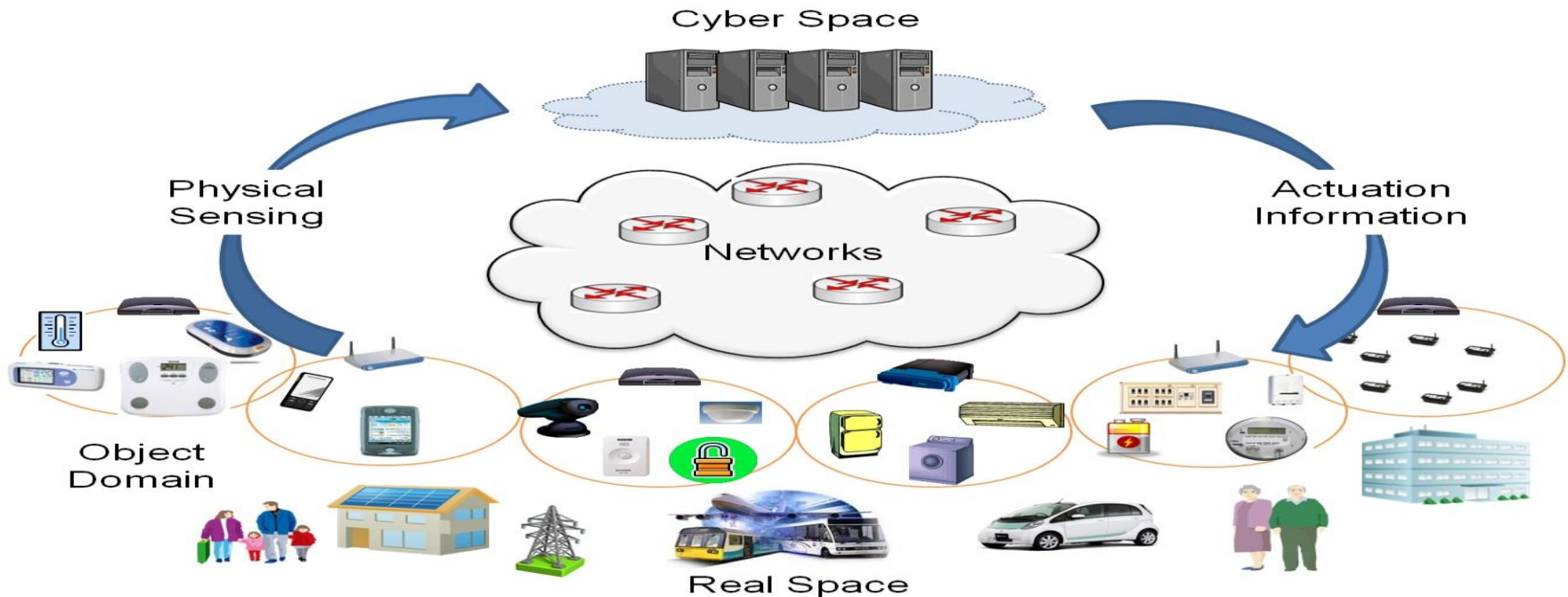




# PROJECT IDEAS 2: Future Wireless Communication Networks

Vehicles | 5G | Internet of Things | LTE

## Cyber-Physical Systems



collaborating computational elements controlling physical entities

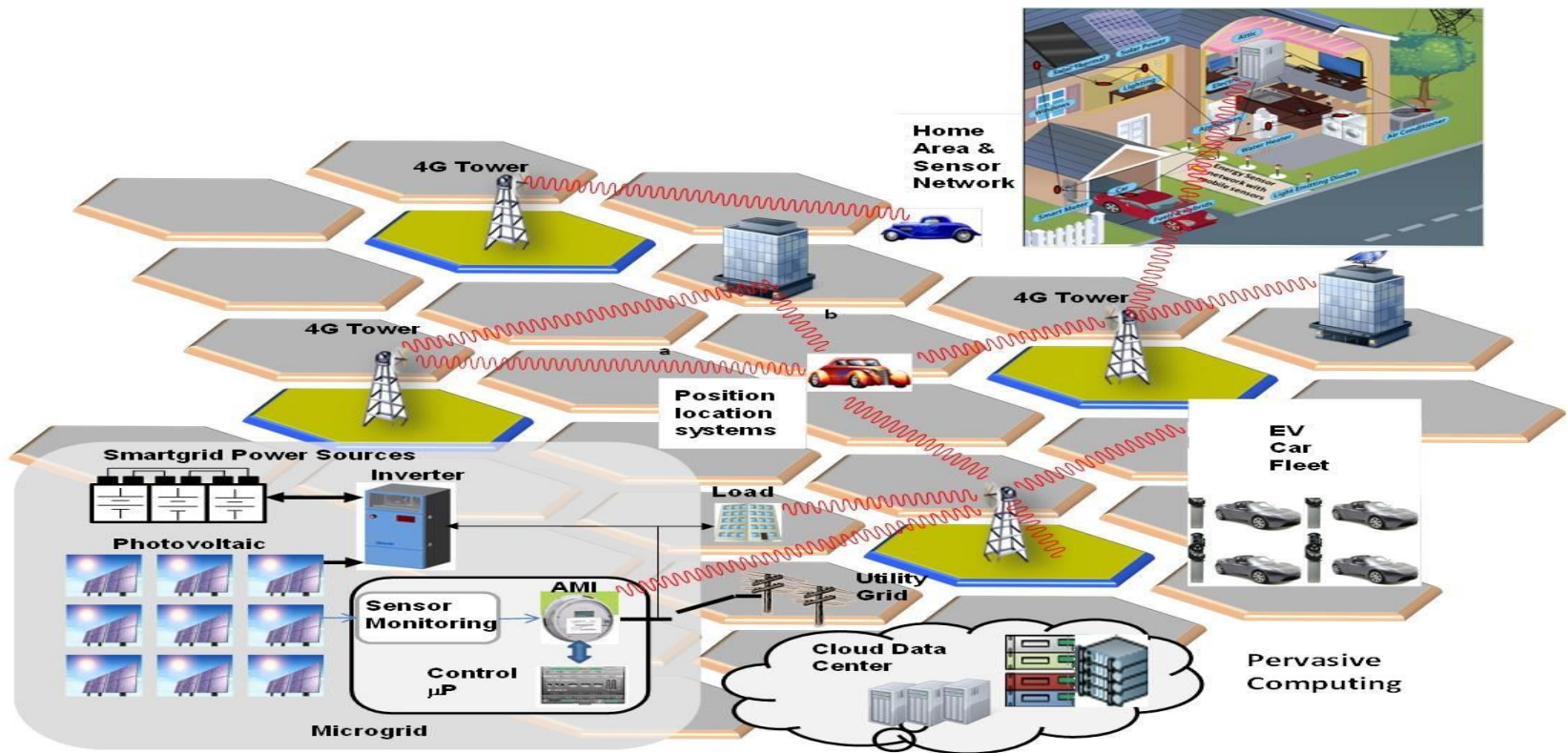




# PROJECT IDEAS 2: Future Wireless Communication Networks

Vehicles | 5G | Internet of Things | LTE

Sensors, actuators and controllers connect through a wireless network





## PROJECT IDEAS 2: Future Wireless Communication Networks

Vehicles | 5G | Internet of Things | LTE

### 5G Projects

- ❑ Visual Light Communication – LiFi: Vehicle To Vehicle Communications -- Intra-Vehicle Communication -- Roadside to Vehicle Communication --
- ❑ Advancement in OFDMA: Non-orthogonal OFDMA -- Filter Bank OFDMA -- Massive MIMO
- ❑ Vehicular Communications: 360 Degrees Collision Avoidance -- Safety and Infotainment Protocols -- Self Intelligence for driving and detection

Sinem Coleri Ergen: [sergen@ku.edu.tr](mailto:sergen@ku.edu.tr)

Personal webpage: <http://home.ku.edu.tr/~sergen>

Wireless Networks Laboratory: <http://wnl.ku.edu.tr>



**Thank you!**

[www.tto.edu.tr](http://www.tto.edu.tr)

