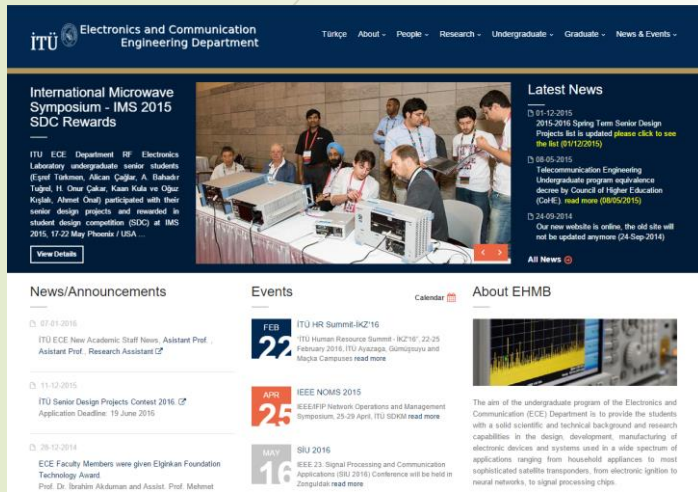


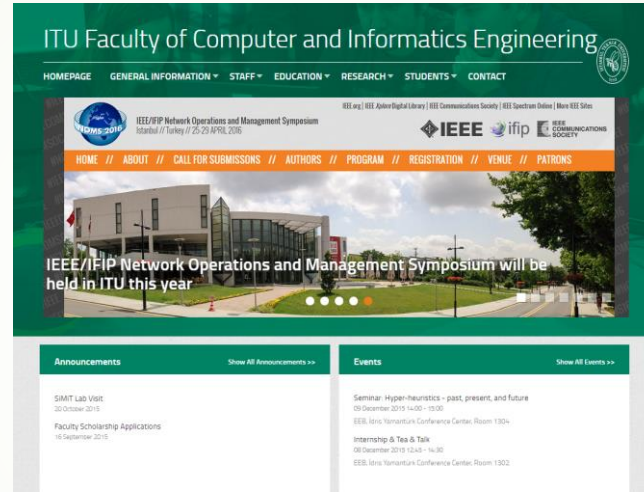


# Istanbul Technical University 5G and beyond Communication Network Technologies

ITU 5G Group established 2015 by participating



Electronics and  
Communication  
Engineering Department  
[www.ehb.itu.edu.tr](http://www.ehb.itu.edu.tr)



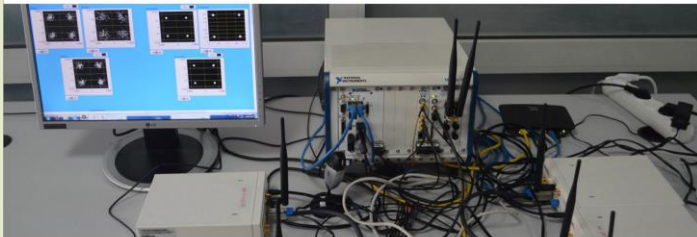
Faculty of Computer and  
Informatics Engineering  
[www.cs.itu.edu.tr](http://www.cs.itu.edu.tr)



Informatics Institute  
[www.be.itu.edu.tr](http://www.be.itu.edu.tr)



Istanbul Technical University  
Wireless Communication  
Research Laboratory



### ITU Wireless Communication Research Laboratory

THAL Laboratory carries out research activities on wireless communications topics, including, but not limited to, fading channels, MIMO systems, multi-carrier communication systems, OFDM, signal processing for MIMO systems, coding, cooperative communications, network coding, advanced security issues in the communication systems. There are ongoing projects involving theoretical / experimental works, as well tests and carrying out practical measurements.

[Learn more](#)

### Research Areas

- Wireless Communication Systems and Networks
- Digital Modulation Techniques
- Channel Coding, Coded Modulation
- Turbo and LDPC Codes Polar
- Multi-input Multi-output (MIMO) systems, OFDM
- Diversity Techniques (Space-Time Coding, Cooperative Diversity)

### Announcements

May 15, 2015  
**OPEN PHD POSITION**  
Open PHD Position about DoS Attacks in LTE Networks  
If you are interested please send your resume to thal@itu.edu.tr by June 15, 2015. [read more](#)

### Latest News

28 December  
**INPT Researcher Visit...**  
National Institute of Post and Telecommunications (INPT, Fas), faculty member Assistant Professor Houda Chafnaji, visited WCRIL for a week with the aim of collaborating with our research group. [daha fazla oku](#)

**Electromagnetics Research Group**  
istanbul technical university

SCOPE RESEARCH OPPORTUNITIES LABORATORY MEMBERS CONTACT

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**Information of Experiments**

- FreeSpace Imaging System
- Experimental Data
- Experimental Results

**Collaborated Institutions**

- ELELAB
- IEEA
- Institute for Humoral and Applied Mathematics

**Related Links**

- International Association for Inverse Problems

**Today**  
18.1.2016

**Announcements**

**Anechoic Chamber**  
No ElectroMagnetic Wave Inside ...

**Applications**  
Direct and Inverse Scattering Problems and

**Electromagnetic Diagnostics**

Determination of the geometrical (locational) shape and physical material properties of any inaccessible object, region, surface constitutes an important and interesting class or problems in different fields such as electromagnetics, optics, acoustics, elastics, etc. This due to the fact that the result of such investigations has direct practical applications in the areas, but not limited to, medical diagnostic, nondestructive testing, geophysical exploration, detection of mines, underground tunnels, pipelines, surface imaging from radar data etc.

The common name of such kind of problems is tomography, and in real life, one is very familiar with their medical applications such as CT (Computer Tomography), MR (Magnetic Resonance) tomography, ultrasound tomography.

Our group is a part of ITU Electrics-Electronics Faculty, and is working on the electromagnetic tomography of the inaccessible objects. For 10 years of period, we have been working on the developing of reconstruction methodologies. Our special attention is concentrated on the imaging of buried objects.

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**Deneyim Merkezi**

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**WELCOME TO THE USER EXPERIENCE CENTER**

UX Center was founded by TUTED in Istanbul Technical University Computer and Information Faculty with the support from Istanbul Development Agency (ISTKA) under the Information-Oriented Economic Development Financial Support Program for Nonprofit Organizations, ITU and TURKCELL. It serves as a user experience, training and test center to respond to the requirements of all industries.

# 7 Labs and sub-group joined ITU-5G-Group which are studied related areas

**Informatics Institute**  
ISTANBUL TECHNICAL UNIVERSITY

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**Cyber-Physical Security and Cryptographic Engineering**

Cyber-physical (CPS) systems are engineered systems that are built from, and depend upon, the seamless integration of computational algorithms and physical components. They provide functionality to infrastructure systems in aviation, automotive, rail, healthcare, telephony and network, utilities and electrical power generation and distribution. Most cyber-physical system components—particularly those of critical nature—are networked using wireless and wired communication networks, embedded processors, sensors and actuators. They interact with humans and the rest of the physical world, deliver critical real-time data, and support quantified performance. Cyber-physical systems can provide much richer functionality, efficiency, autonomy and reliability than manually controlled and loosely coupled systems. However, they also create inherent vulnerabilities related to privacy, security, robustness and reliability of the underlying components and as a whole system. Because CPS can be significantly faster than humans or they can control and coordinate large-scale systems (such as the electrical grid), security and reliability issues are critically important.

In the coming years, cryptography will become integral to CPS: from the controller of a braking system, to server and client computers, to handheld, portable, and wireless devices, all interacting devices will have to be capable of encrypting and decrypting or signing and verifying messages. That is to say, without exception, all networked computers and devices must have cryptographic layers implemented, and must be able to access cryptographic functions in order to provide security features. In this context, efficient in terms of time, area, and power consumption hardware structures will have to be designed, implemented, and deployed. Furthermore, general-purpose (platform-independent) as well as special-purpose software implementing cryptographic functions on embedded devices are needed. An additional challenge is that these implementations should be done in such a way to resist cryptanalytic attacks launched against them by adversaries having access to primary (communication) and secondary (timing, power, electromagnetic, acoustic) channels.

Research Group Director: Prof. Dr. Çetin Kaya Koç  
Group Members:  
Assis. Prof. Enver Özdemir  
İhsan Çiçek  
İsmail San  
Mustafa Parlak

**Computer Networks Research Laboratory**

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Computer Vision, Image Processing and Pattern Recognition  
Earthquake Prediction  
Natural Language Processing  
Parallel and Distributed Computing  
Heuristic Optimization and Search  
TARBIİL  
Learning from Data  
Artificial Intelligence and Robotics

Current research studies in Computer Networks Laboratory are mainly grouped under the following areas. Quality of Service issues in IP Networks, Optical Networks, Network & Data Security, Wireless & Ad-Hoc Networks and Traffic Engineering & Teletraffic.

For more information about this research area: <http://baal.ce.itu.edu.tr/>

**People working in this area**

Prof. Dr. Sema F. Oktug, Dean

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Phone:	[(+90 212) 3853594]
E-mail:	oktug[at]itu.edu.tr
Research Interests:	
Web page:	<a href="http://akademik.itu.edu.tr/oktug/">http://akademik.itu.edu.tr/oktug/</a>

**ITU RF Lab**

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**23rd Telecommunications Forum**  
Laboratory member Oğuz Kisil attended 23th TELFOR conference in Belgium.  
[Read more: 23rd Telecommunications Forum](#)

**10th EMO Graduation Project Competition, Award Ceremony**  
RF Electronics Laboratory members have 3 awards at the IMS 2015 Student Design Competitions.  
[Read more: 10th EMO Graduation Project Competition, Award Ceremony](#)

**3 Awards from IMS 2015 Student Design Competition**  
RF Electronics Laboratory members have 3 awards at the IMS 2015 Student Design Competitions.  
[Read more: 3 Awards from IMS 2015 Student Design Competition](#)

**SIU 2015**  
Laboratory master student member Lida Kouhalvandani attended the 23rd IEEE National Signal Processing Meeting.  
[Read more: SIU 2015](#)

**Laboratory Member Esref Turkmen is a recipient of MTTs Undergraduate Scholarship**  
Senior year student Esref Turkmen has received Undergraduate Scholarship from MTTs Education Section.  
[Read more: Laboratory Member Esref Turkmen is a recipient of MTTs Undergraduate Scholarship](#)

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Three mobile operator and multiple sub - constructor now preparing LTE-Adv. on April 2016 in TURKEY

Organized ITU 5G Group preparing and submitted projects for 5G and beyond communication network technologies

ITU 5G group is ready to join the 5G-PPP Phase 2 projects.