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L'Ingegneria dell'Informazione a Stoccolma parla anche italiano

10 febbraio 2021 – 10:00
Scuola di Ingegneria, Università di Firenze
Via di S. Marta, 3 - 50139 Firenze

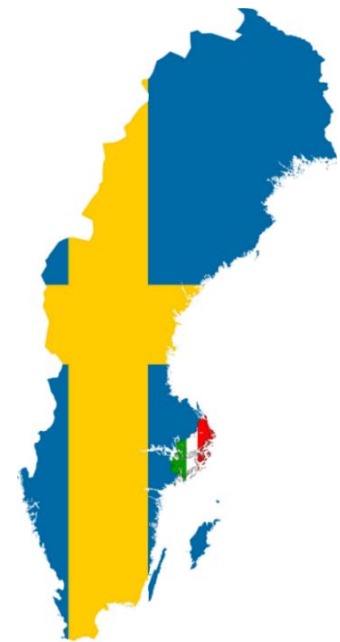
Information Engineering in Stockholm also speaks Italian

February 10, 2021 – 10:00 AM
School of Engineering, University of Florence
Via di S. Marta, 3 - 50139 Florence

This workshop is organized in collaboration between the Embassy of Italy in Stockholm and the Department of Information Engineering (DINFO) of the University of Florence. It is held in the form of a "virtual workshop".

The workshop aims to present some scientific and technological research activities carried out in the academic and industrial fields by Italian researchers residing in Stockholm (Sweden) in the field of Information Engineering. Furthermore, some research activities currently carried out in collaboration between the Department of Information Engineering and the Kungliga Tekniska Högskolan (KTH) of Stockholm are presented (between which an Erasmus + agreement is in force).

Instructions for participating in this workshop will be available on the website:
<https://www.dinfo.unifi.it/vp-601-l-ingegneria-dell-informazione-a-stoccolma-parla-anche-italiano.html>



From 10:00 AM to 12:00 AM

10:00 Welcome address

Enrico Vicario

Head of Department of Information Engineering
University of Florence

Mario Cospito

Italian Ambassador in Sweden

10:30 An Introduction to the Internet of Things

Carlo Fischione

Full Professor of Internet of Things

Director of the KTH Data Science International Degree Program

We can define IoT as "the world of everything connected", because it can connect physical objects, person, infrastructures, or even businesses. IoT includes many technologies and methods that allow us to gather data, make data analysis, and ultimately take some intelligent decisions. We are using IoT in the digitalized world, where vehicles will drive without human drivers, or energy and water resources will be distributed much more efficiently than today. In this talk, I will give an overview of some of the important IoT engineering problems my group has been working with in the recent years.

Then I will mention some basic engineering research questions, such as dis First, I will give an overview on prominent scenarios where IoT is changing social and economic systems, such as IoT for smart cities, wireless industrial controls, smart grids, IoT for sound and music, tributed optimization, real-time networking, and new distributed machine learning methods

11:00 Artificial Intelligence and Machine Learning in 5G Radio Access Networks

Gino Masini, MBA

3GPP RAN3 Chairman

Ericsson AB – Systems and Technologies

Angelo Centonza, Ph.D.

Principal Researcher, Standardization

Ericsson AB – Systems and Technologies

In recent years, the possibility to store vast amounts of data and the massive improvement in computational capability have enabled the use of Artificial Intelligence and Machine Learning (AI/ML) for many new applications, including performance optimization in Radio Access Networks. One of the distinctive features of 5G and 4G mobile networks was the capability of the network to self-adjust and fine-tune a range of parameters in order to optimize its performance according to the different radio and traffic conditions.



This was commonly referred as SON (Self-Organizing Networks) functionality.

AI/ML seems able to take this capability to new levels to the point of suggesting a completely new paradigm, so 3GPP (the 3rd Generation Partnership Project, responsible for mobile telecommunications standards) has started to study the applications of AI/ML in 5G.

With this activity 3GPP is breaking new ground, aiming to define a general framework for AI/ML optimization of Radio Access Networks (RAN) applied to current 5G network architecture. The focus will be on AI/ML functionality and ranges of input/output parameters with the goal of potential standardization, while leaving the details of algorithms and models to implementation. Among the use cases initially selected for this study are energy saving, load balancing, and mobility optimization.

11:30 Socio-Economic Benefits of Broadband and Digitalization
Marco Forzati

Division Digital Systems
RISE Research Institute of Sweden

The social-economic impact of broadband has been studied extensively. The consensus is that basic broadband has positive impact on economic growth and performance in terms of e.g. GDP and employment. But is very-high speed broadband connectivity really needed? At RISE we have investigated fiber broadband access impact on the employment rate, population evolution, reduced driving distance per capita and new company registrations at the municipality level in Sweden using multiple regression analysis. We show that, all other things fixed, increased fiber broadband penetration would result in population increase in rural communities, higher employment rate, reduced use of private cars, and enhanced business creation.

From 2:00 PM to 3:20 PM

**Research activities between University of
Florence and KTH in Information Engineering**

2:00 Energy Efficient Wireless Communications and Networking
Simone Morosi

University of Florence
Cicek Cavdar
KTH Royal Institute of Technology, Stockholm, Sweden

In this presentation, green mobile networking is reviewed, providing general guidelines and design criteria in order to reduce power consumption, to increase the energy efficiency in cellular networks and to generalize these strategies to ICT systems. A particular focus will be on techniques that incorporate the concept of the "sleep mode" in base stations, also by taking into account the recent joint activities about the adoption of Artificial Intelligence strategies.

**2:20 My Personal Experience as an Italian in pursuing a Ph.D. in
Artificial Intelligence in Sweden**

Andrea de Giorgio
KTH Royal Institute of Technology, Stockholm, Sweden

Although Italians receive a very theoretical education at university, they can surprise the world with their intuitive applied knowledge. Sweden is currently among the countries spending most part of their GDP in research & development and with the highest number of researchers per population. A PhD in Sweden is a 4 or 5 years full time job compared to an Italian PhD that is 3-years long. Why is a PhD in Sweden a competitive advantage? And why does the world need more researchers in artificial intelligence?

**2:40 To Cloud or to Edge? An Integrated Computing and
Networking Perspective toward 6G Systems**

Alessio Bonadio, Francesco Chiti, Romano Fantacci
University of Florence
Carlo Fischione
KTH Royal Institute of Technology, Stockholm, Sweden

The pervasive computing and communications era is requiring disruptive paradigms to efficiently handling mobile traffics in the presence of usually time varying operative conditions and requirements. In this presentation, a comparative performance evaluation of Cloud vs. Mobile Edge computing architectures is presented, pointing out the possible trade-off and integration schemes, depending on the system load and available resources. In addition, we focus on the possible access networks technologies by reviewing the capabilities offered by the 5G cellular systems and addressing the perspectives opened by the incoming 6G communications concept.

**3:00 Energy Harvesting as the Enabling Technology for Internet-of-
Things paradigm**

Giovanni Collodi, Stefano Maddio, Giuseppe Pelosi
University of Florence
Carlo Fischione
KTH Royal Institute of Technology, Stockholm, Sweden

The Internet of Things (IoT) is arguably the enabler of most groundbreaking technological revolutions of the current decade. It will provide the most powerful and versatile communication standard of the 21st century, permitting a massive deployment of autonomous objects to be connected to the internet. This new paradigm opens many brand-new scenarios for technological research: from wearable and implantable devices for healthcare to the autonomous driving vehicle. The distributed and pervasive nature of IoT devices demands for energy efficiency of the batteries and even no possibility of direct battery recharge. We give an overview to this research area, with reference to Energy Harvesting, and we argue that the technical solution to the many research problems in this domain would fully enable the IoT vision.

Scientific Coordinators: Francesco Chiti, Stefano Maddio and Simone Morosi (University of Florence)

For the organizational aspects, refer to Monica Righini (monica.righini@unifi.it), technical manager of the "RF, Microwaves and Electromagnetics Laboratory" of Department of Information Engineering, University of Florence.

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