Thursday, 3rd of November 2011
Lecture hall TU1, 1st floor, TUAS building, Otaniementie 17, Espoo

14:15 – 14:45
Bringing Navigation Indoors

Fabio Belloni, Ph.D., Principal Researcher, Nokia Research Center, Helsinki, Finland
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Using a mobile phone for indoor navigation can save hassle and be fun. The presentation describes Nokia's research for bringing accurate localization and navigation indoors. Navigation and location based services are popular and widely-spread but currently limited to outdoor use. GPS or other satellite based positioning systems do not offer ubiquitous coverage indoors due to attenuation by building structures. Mobile communications devices and local area networks may serve as basis for extending navigation and other location based services indoors. Wi-Fi signal strength based positioning offers positioning accuracy from building level accuracy up to room level accuracy, depending on type of indoor environment and density of Wi-Fi access points. However, Wi-Fi positioning accuracy is limited in large open indoor areas, such as shopping malls, train stations, or airports, where navigation and location based services are mostly needed. In order to improve the positioning accuracy from shop to product level, and to bring turn-by-turn navigation indoors, Nokia Research Center (NRC) has developed High Accuracy Indoor Positioning technology (HAIP). HAIP is based on direction-enhanced Bluetooth Low Energy technology and it provides sub-meter location accuracy in real time with only a small fraction of GPS power consumption.

14:45 – 15:15
Bringing Anarchy to TDMA in the Versatile, Fully-Distributed Reins-MAC

Matteo Ceriotti, Ph.D., Postdoc researcher at Fondazione Bruno Kessler, Trento, Italy
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Enabling access to the wireless medium in a Wireless Sensor Network is considered by many a solved problem. Many CSMA-based solutions are currently in use in real-world scenarios. Their anarchic nature, in which nodes essentially seize the channel on demand, yields simple, fully-distributed protocols. Nevertheless, this beneficial anarchy prevents them from supporting communication guarantees. In contrast, disciplined, TDMA-based solutions address these shortcomings, but impose considerable cost to form and conform to rigid, inflexible schedules. This work shows that we can have the best of both worlds, namely a simple, anarchic TDMA-based solution that offers guarantees in many dynamic, real-world settings. Our fully-distributed protocol, Reins-MAC, is grounded in the theoretical literature on pulse-coupled oscillators (a.k.a. firefly pulsing), providing a framework for straightforwardly describing its behavior. In contrast to existing disciplined approaches, Reins-MAC employs an online scheduling mechanism that forms and reserves slots of variable size, tailoring medium access both to network conditions that vary in time and space, and to the explicit communication quality needs of nodes.

15:15 - 15:45
WSNs and wired-wireless monitoring systems for rock-collapse and landslide forecasting

Prof. Cesare Alippi, Ph.D., Politecnico di Milano, Milan, Italy
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Rock collapse and landslides represent harmful natural hazards threatening human settlements, transport routes and critical infrastructures in mountain regions. An effective and real-time monitoring action is thus crucial to anticipate critical events; at the same time, the provided infrastructure must be flexible enough to host other application scenarios. The talk will introduce a real-time monitoring system based on wireless

and wireless-wired (hybrid) technologies coexisting withing an homogeneous framework to provide remote data transmission, storage and interpretation at challenging spatial and temporral scales. The systems have been successfully deployed on the Italian and Swiss section of the Alps where forerunners making feasible a rockfall forecasting action have also been identified.