

PFC a Empreses (Tardor 2007-08)



Empreses on pots fer el PFC

Empreses i Institucions que ofereixen projectes a l'ETSETB i que gestiona l'escola Última actualització: 17 Maig 2007

Quan demaneu una plaça mitjançant l'Intranet, ho haureu de fer en referència al codi que surt a la taula.

ATENCIÓ: hi ha empreses que continuament estan ofertant projectes. Un dels requisits és que els has de sol·licitar pel teu compte, però pots demanar-nos qualsevol document que et sol·licitin i tingui a veure amb l'escola. Consulta aquí quines són.

DLR
CNES
NEC
ACCENTURE
TOSHIBA
PHILIPS
SIEMENS

DLR

DLR (Alemania-Wessling)

Codi	D DLR Dres-1
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	Mobile Satellite Systems Technologies Different topics for a master thesis are available in the following areas: -QoS Support and Radio Resource Management/Scheduling for Mobile Satellite Systems -Impact of Fade Mitigation Techniques on RRM -Satellite Systems for Aeronautical Communications and Air Traffic Management -Fade Mitigation Techniques for Mobile Satellite Systems
Durada	6 months
Requisits	-Basic background of communications systems -Fluency in English -Strong Motivation -Systems
Nombre de places	1
Codi	D DLR Dres-2
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	Beam Steering Assembly Development for Optical Freespace Communications For beam-pointing and -tracking in high-speed freespace optical communications systems a precise optomechanical assembly is required for optimum system performance. Based on existing pre-developments, a fast and very precise tracking system shall be designed, build and tested in a lab-testbed and possibly in a freespace communications scenario. This work is part of an ongoing science project inside DLR.
Durada	Start: July 2007 Duration: 6-8 months
Requisits	-Basic background of communications systems -Fluency in English -Experience with DSPs, MatLab, and LabView
Nombre de places	1
Codi	D DLR Dres-3
Data d'entrada	16/05/07
Tipus d'estada	PFC

Descripció	Aeronautical RF-link for TCP-communications in a combined optical/RF fullduplex link Optical freespace communication links are often one-directional on the optical physical layer. To enable protocol techniques like ARQ a backchannel is necessary. In this thesis an according link for an aeronautical scenario shall be investigated, bought if available and qualified. Testing in a mobile scenario shall prove the performance. This work is part of an EC project.
Durada	Start: July 2007 Duration: 6-8 months
Requisits	-Basic background of communications systems -Fluency in English -Experience with TCP, MatLab, and electronic design
Nombre de places	1

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CNES

CNES (França-Toulouse)

Codi	F CNES Tou-1
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	Signal processing algorithms for radionavigation signal analysys With the creation of new radionavigation satellite systems and the modernization of others, new signals will be emitted very soon. It is necessary to analyse the broadcast signal to assess future performance of these systems or to detect possible emission anomalies. Analysys can be performed by signal processing in frequency or time domain. This analysys is made difficult as radionavigation signals are well below the noise floor. Various means have to be conducted : high gain antenna (not always available) or advanced signal processing with classical antennas. The objective here is to develop, test and validate signal processing algorithms applied to radionavigation signal analysys. They will be developed using Matlab or langage C.
Durada	-Starting time of the stay (students finish their exams at the end of June, so they are available at in July or September): July -Duration of the stay (diploma thesis involve preferable around 6 months of work): 6 months
Requisits	Signal processing, radionavigation fundamentals (would be preferable), Matlab, C (optional)
Nombre de places	1

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NEC

NEC (Alemania-Heidelberg)

Codi	D NEC Hei-1
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	Development of a hybrid simulation and emulation testbed for VANETs Vehicular networks are being developed for efficient broadcast of safety alerts, real-time traffic congestion probing, and for distribution of on-road multimedia content. In order to investigate vehicular networking protocols and study effects of incremental deployment, performance evaluations are essential. Network simulation and measurements represent the main techniques for performance evaluation. Network simulation is best suited to study scalability effects, but often lacks accuracy due to its abstraction from reality. Measurements are typically more accurate, but require considerable efforts in manpower, time, and equipment. Currently we have developed a test and measurement environment that combines simulation and emulation techniques. Benefits of the combination of both are: i) it utilizes real network model and protocols and it is close to a real environment and, hence, more accurate than pure simulations ii) achieved performance results provide higher credibility than pure network simulations, and iii) it saves time and efforts compared to measurements.

	<p>Building blocks of the environment are</p> <ul style="list-style-type: none"> - a VANET communication system for OBUs and RSUs (NEC's prototype for IVC) - Wireless MAC/PHY simulator modules - Mobility traffic generator (VISSIM http://www.ptv.de/cgi-bin/traffic/traf_vissim.pl) <p>The focus of this thesis is to design and implement simulation/emulation extensions and conduct experiments and measurements to test transport protocols and position-based routing protocols in VANETs. In particular, the thesis includes:</p> <ol style="list-style-type: none"> 1) extending the simulation/emulation modules 2) design of protocol extensions 3) implementation of the extensions in existing software prototypes 4) measurements using real road movement scenarios
Durada	<p>Starting date: June or July 2007 Duration: 6 months</p>
Requisits	<p>Language: English</p> <p>Required skills:</p> <ul style="list-style-type: none"> - good knowledge of IP networking and Wireless LAN principles - good knowledge of Linux OS, language C, Bash scripting - team working spirit <p>Additional appreciated skills:</p> <ul style="list-style-type: none"> - basic knowledge of simulation principles - basic knowledge in mobile ad-hoc networks (MANETs)
Nombre de places	1

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ACCENTURE

ACCENTURE (França-Sophia-Antipolis(Niça))

Codi	F ACCENTURE Niç-1
Data d'entrada	09/05/07
Tipus d'estada	PFC
Descripció	<p>Development of technology services for synchronized, task-oriented (remote) collaboration</p> <p>This internship will take place at the Accenture Technology Labs (ATL) in Sophia Antipolis, France. ATL is the technology research and development organization within Accenture, a global consulting and IT services company. Its goal is to explore technologies three to five years from maturity and develop compelling prototypes that demonstrate the business implications of these technologies to Accenture clients. This internship will cover the fields of telecommunications and user interaction.</p> <p>Subject Description:</p> <p>Most technological solutions used to facilitate remote meetings from videoconference systems to slide-sharing applications enable meetings to be held among far located participants but have not succeeded to make meetings more efficient. Current systems are not yet flexible enough, do not adapt to the participants context and limits participation and interaction. HCI, telecom and CS research communities have long investigated how to improve synchronous remote collaboration. The state-of-the-art presents many solutions based on developing advanced and futuristic technology that hopefully will help increasing the efficiency and user experience in meetings (e.g. the paradigm of smart rooms [1] [2]) Previous experience in putting many of these ideas into practice has shown that technology does not create needs. Users will not adopt solutions that become more a hassle than they ease their tasks. For this reason, researchers at ATL are investigating how to design and create technological solutions from understanding the needs of meeting participants, their context and based upon that, provide the collaboration and communication options. The "Advanced Communication Platforms" (ACP) project aims at driving technology research from both technical and social challenges.</p> <p>The ACP project will have an adaptive, customizable, service-oriented approach to designing synchronized and task-driven communications. As starting point, simple different technology services built on mainstream communication platforms (e.g. Skype[3] as opposed to expensive videoconference technology like Halo[4]) will be integrated and proposed to the users depending on their context (who and where they are, objectives of meeting, etc...). This internship will focus on developing a first "proof-of-concept" on a simple use-case which will serve as a test-bed, in order to have an initial illustration and validation of our approach. ATL's weekly Bread-and-Circus seminars will be such a use-case</p> <p>The task of the intern will be to develop a first set of simple technology services meant to improve the results of Bread-and-Circus from a variety of point-of-views: improvement of feeling of community (e.g. enabling to understand who is who at each locations, e.g. allow people to attend when off-site), improvement of quality of experience (e.g. improve sound using individual VoIP channels), improvement of global exchange of ideas (e.g. by tracking and displaying contributions by location; providing alternative tools to contribute and ask questions), improvement of time management etc... Under the ACP project framework, we are currently working in developing novel meeting modeling techniques (see [5] and [6] for similar work) that the intern will exploit and refine as part of his/her work.</p> <p>Description of the internship work:</p> <p>During this internship we expect to develop an innovative collaboration/communication solution for synchronous task-oriented. The intern will design and develop several communication and interaction technologies to create those services that best suit</p>

the B&C meetings. He/she will base his work on the analysis output from utilizing the ACP model and methodology for meetings. The technologies chosen to implement the services will be developed in a modular architecture and will be integrated to adapt to the context requirements.

Expected Output:

- a first set of operational technology services, as a basis to develop the "Advanced Communication Platform" project further, both in term of business scenarios and underlying technology
- a "proof-of-concept" prototype for the project approach, using B&C as a test bed
- a conference paper related to the research associated with the internship

References:

- 1) Augmented Multiparty Interaction, AMI EU project: <http://www.amiproject.org/>
- 2) Computers in the Human Interaction Loop, CHIL EU project <http://chil.server.de/servlet/is/101/>
- 3) Skype <http://www.skype.com>
- 4) Video collaboration from HP: HALO <http://www.hp.com/halo/index.html>
- 5) John, A., Klemm, R. et al. (2006) "Hermes: a platform for context-aware enterprise communication" In proceedings of the 4th IEEE International conference on pervasive Computing and Communications Workshops. [Pisa]
- 6) Kavimandan, A., Klemm, R. et al. (2006) "A client-side architecture for supporting pervasive enterprise communications" In proceeding of the IEEE International Conference on Pervasive Services [Lyon]

Durada	September 2007 to February 2008 (dates are flexible)
Requisits	<ul style="list-style-type: none"> - Minimum 5 years of higher education in Computer Science or Telecom Engineering - Proficiency in an object-oriented programming language (C++, Java...) - Good knowledge of signal processing and communication tools - Fluent English - Ability and willingness to do practical and hands-on work
Nombre de places	1
Codi	F ACCENTURE Niç-2
Data d'entrada	09/05/07
Tipus d'estada	PFC
Descripció	<p>Automated Visual Repository Building</p> <p>Subject Description:</p> <p>Accenture Technology Labs (ATL) is the technology research and development organization within Accenture, a global consulting and IT services company. Its goal is to explore technologies three to five years from maturity and develop compelling prototypes that demonstrate the business implications of these technologies to Accenture clients.</p> <p>The state-of-the-art in visual object recognition has matured to a level where many objects can be recognized in real-time in video streams. In order to recognize objects in pictures taken from camera phones, 3G video streams, webcams, or any other video recording device, there is a need for a database of images of the objects to be recognized (along with accompanying data such as product ratings, prices, reviews, comparisons or any relevant metadata). Instead of manually taking pictures to build such a database we can make use of the (increasingly) high number of pictures available on-line by downloading images from the web (Amazon, Google image search, Flickr...) with a spider so as to retrieve a larger, more diverse, and continuously increasingly growing set of images, all with just a simple click of a button. Once the images have been downloaded they need to be filtered, clustered, and cleaned after which feature points are extracted and stored in a database. It is this feature point database that is used to recognize the objects in images. In order to filter out irrelevant images we are planning on using the object recognition itself to create better databases to be used for object recognition!</p> <p>The objective of the "Automated Visual Repository Building" project is to develop new algorithms and methods to (semi-)automatically build image databases from online disparate image sources with the goal of supporting a variety of visual object recognition and image acquisition applications, and to explore the interest, deployment capabilities, and possible new services associated with this new technology. More specifically, we want to improve the quality of and restrict the size of the image databases by using the SIFT features [1,2] used for visual object recognition in order to cluster and filter a set of images retrieved from online image databases for a given object or class of objects. Beyond object recognition applications, the research results coming from this project can also be extended to other areas such as image retrieval and content-filtering.</p> <p>We are currently performing initial tests on various sets of pictures and objects to validate this quality improving approach and to identify practical challenges linked to it.</p> <p>Description of the internship work:</p> <p>The task of the intern will be to develop and "package" an operational methodology to build the repository based on the results of these tests. This includes a quantitative validation of the general method proposed as well as proposing additional methods to overcome challenges identified.</p> <p>Expected Output:</p>

	<ul style="list-style-type: none"> • A software module able to build a high quality database of images for Object Recognition applications, starting from text descriptions of an object or a class of objects • A "packaged" demonstration that can be showed internally within Accenture and externally to clients of Accenture • a conference paper introducing this new methodology <p>References:</p> <p>1) David G. Lowe, "Distinctive image features from scale-invariant keypoints," <i>International Journal of Computer Vision</i>, 60, 2 (2004), pp. 91-110.</p> <p>2) David G. Lowe, "Object recognition from local scale-invariant features," <i>International Conference on Computer Vision</i>, Corfu, Greece (September 1999), pp. 1150-1157.</p>
urada	September 2007 to February 2008 (dates are flexible)
Requisits	<ul style="list-style-type: none"> - Minimum 5 years of higher education in Computer Science, Physics or Engineering - Proficiency in an object-oriented programming language (C++, Java...) - Fluent English - Ability and willingness to do practical and hands-on work - Experience with image processing is a plus
ombre de places	1
Codi	F ACCENTURE Niç-3
Data d'entrada	09/05/07
Tipus d'estada	PFC
Descripció	<p>Data Anonymization</p> <p>Subject Description:</p> <p>Accenture Technology Labs (ATL) is the technology research and development organization within Accenture, a global consulting and IT services company. Its goal is to explore technologies three to five years from maturity and develop compelling prototypes that demonstrate the business implications of these technologies to Accenture clients.</p> <p>Data Anonymization project deals with the development of algorithms to prevent identity disclosure when sensitive dataset are, partly, released.</p> <p>Statistical agencies, hospitals, financial institutions hold a huge amount of personal data containing sensitive information. They have often to release part of these data for research purpose, data analysis or application testing, but, at the same time, they need to preserve people privacy. For this scope they use data masking techniques for limiting disclosure risk in releasing sensitive datasets, such as recoding variables into broader classes, randomly swapping some fields among original data records or adding random noise. These data modifications increase protection, lowering the disclosure risk, but, clearly, they also decrease the quality of the data and hence their utility. Finding the ideal trade off between risk and utility is the main scope of the data masking process (anonymization). Accordingly, there is the need to quantitatively characterize these concepts defining measures of disclosure risk and utility.</p> <p>Accenture Labs have recently developed a novel method for estimating disclosure risk in anonymized database based on conditional entropy. This estimator, as many others, needs a reliable computation of linkage probability (i.e., the probability to match an anonymized record to the original one). Various techniques have been proposed for this scope, such as Monte Carlo methods, distance-based probability, a priori methods; but they are still not validated on real-world datasets.</p> <p>The aim of the internship project is twofold: first, implementing state-of-the-art algorithms for estimation of linkage probability for different masking scenarios. Second, to test these algorithms using both simulated and real data, comparing the performance of various disclosure risk measures</p> <p>Description of the internship work:</p> <p>The task of the intern will be to implement algorithms for Monte Carlo and Bayesian methods, and test them on extended datasets.</p> <p>Expected Output:</p> <ul style="list-style-type: none"> • A software tool to derive probability for different anonymization methods • A conference paper on the estimation of probability of identification in real-world scenarios <p>References:</p> <p>1) Reiter, J. P. Estimating Risks of Identification Disclosure in Microdata <i>Journal of the American Statistical Association</i>, 2005, 100, 1103-1111</p> <p>2) Sweeney, L. k-anonymity: a model for protecting privacy <i>Int. J. Uncertain. Fuzziness Knowl.-Based Syst.</i>, World Scientific Publishing Co., Inc., 2002, 10, 557-570 http://chil.server.de/servlet/is/101/</p>

Durada	September 2007 to February 2008 (dates are flexible)
Requisits	<ul style="list-style-type: none"> - Minimum 5 years of higher education in Computer Science or Engineering - Proficiency in a programming/script language (C++, C#, Java...) - Fluent English - Experience with machine learning, data mining or stochastic process theory.
Nombre de places	1
Codi	F ACCENTURE Niç-4
Data d'entrada	09/05/07
Tipus d'estada	PFC
Descripció	<p>Visual Object Recognition Service</p> <p>Subject Description:</p> <p>Accenture Technology Labs (ATL) is the technology research and development organization within Accenture, a global consulting and IT services company. Its goal is to explore technologies three to five years from maturity and develop compelling prototypes that demonstrate the business implications of these technologies to Accenture clients.</p> <p>Visual object recognition has matured to a level where many objects can be recognized in real-time in video streams. The object recognition requires images of all objects that are to be recognized and a fast yet robust image comparison mechanism. For real-time performance, the object images are typically reduced to a smaller set of feature points that are then stored in an object database. Object recognition on a query image then consists of a feature extraction step followed by a database matching step where the query image's feature points are compared with the feature points of the objects in the database. Correspondence of a cluster of features in the query image with a cluster of features in the object database indicates that the object appears in the image, and the label of the object can be returned as a positive match. Unfortunately, building the fast lookup-style data structures for the object database is a computationally costly operation that can take hours or even days as hundreds of thousands or millions of objects are added, and matching against the database also becomes slower the more objects there are in the database.</p> <p>This project seeks to address the scalability problems of visual object recognition. Rather than putting all objects into a single large centralized database, this project aims at splitting the objects into several distributed databases that are matched in parallel and whose local results are subsequently aggregated to provide a single global result.</p> <p>Concretely, a distributed architecture based on web services is to be constructed. Work will consist of creating an implementation of the latest state-of-the-art feature extractor SURF by Bay <i>et al.</i> (2006), an efficient feature cluster comparison mechanism for the per-database object recognition, and a cross-database results aggregation mechanism to provide a single aggregated result. The design of visual object recognition service interface and the accompanying aggregation mechanism are critical components for where there are no known existing solutions, and will therefore require research level reasoning and problem solving. Beyond the distribution of visual object recognition, the same architecture could be used for distribution of face recognition, speech recognition, optical character recognition, and other technologies that do not scale as single centralized points of execution.</p> <p>Description of the internship work:</p> <p>The task of the intern will be to design and implement a distributed visual object recognition service, including a feature extraction implementation, a feature cluster comparison mechanism, and a novel result aggregation mechanism.</p> <p>Expected Output:</p> <ul style="list-style-type: none"> • A web-accessible interface to a single object database instance where an image can be submitted and where object labels of all matching objects in that database are returned in real-time • A web-accessible interface to a group of object databases where an image can be submitted and where object labels from all matching objects in the group of databases are returned in real-time • A conference paper on distribution of visual object recognition databases and aggregation of results in real-time <p>References:</p> <p>Bay, H., Tuytelaars, T., and Van Gool, L. (2006), SURF: Speeded Up Robust Features, <i>Proceedings of the 9th European Conference on Computer Vision (ECCV)</i>, Lecture Notes in Computer Science, vol. 3951, pp. 404–417.</p>
Durada	September 2007 to February 2008 (dates are flexible)
Requisits	<ul style="list-style-type: none"> - Minimum 5 years of higher education in Computer Science or Engineering - Proficiency in an object-oriented programming language (C++, C#, Java...) - Fluent English - Ability and willingness to do practical and hands-on work - Experience with image processing or computer vision
Nombre de places	1
Codi	F ACCENTURE Niç-5

Data d'entrada	09/05/07
Tipus d'estada	PFC
Descripció	<p>Wireless sensor network</p> <p>Subject Description:</p> <p>Accenture Technology Labs (ATL) is the technology research and development organization within Accenture, a global consulting and IT services company. Its goal is to explore technologies three to five years from maturity and develop compelling prototypes that demonstrate the business implications of these technologies to Accenture clients.</p> <p>Wireless sensor networks are comprised of sensors that are equipped with wireless transceivers and so are able to form a wireless network. The sensors use this network to coordinate their sensing and relay the data they sense without the need of any infrastructure which is very appealing from the technology point of view. It is envisioned that, in the upcoming years, wireless sensor networks, of up to several thousands of sensors, will be deployed. The typical applications would be the monitoring of large structures, such as bridges and pipelines, and large geographical areas such as forests and plantations. Modern wireless sensors – also called motes – represents a paradigm shift with respect to traditional wired sensor technology. Indeed, the low cost of wireless sensors will allow for an abundance of sensing capabilities as opposed to rather scarce resources in the wired sensors era. This evolution will generate a whole generation of new applications but it will also modify the philosophy of sensor networks deployment and operation.</p> <p>Accenture Techlabs hosts an ongoing project, on deployment and maintenance of large wireless sensor networks, which is the framework within which this internship proposal falls.</p> <p>An important question that pops up, when deploying a new sensing application, is how many sensing modules should be used and where to locate them. The answer to this question is function of the sensing need (which phenomena is to be monitored and which type of information need to be collected), the sensing environment (static or changing), and cost considerations (the infrastructure size being a major cost factor of the sensing application). Currently deployed sensing applications tackle this problem in a very "artisanal manner" (i.e. non-method based) due to the lack of such a well defined methodology. Therefore the adopted solutions, in the majority of cases, tend to be arbitrary. The research literature in this domain is not negligible. Nevertheless, the obtained results rely on unrealistic assumptions which make them of very limited use for real-life applications. Indeed those methods are based on a perfect prior-knowledge of the statistics of the phenomena to be monitored (the latter being modeled as an information source) which is extremely rarely the case in practice. The objective of this project is to develop a methodology for wireless sensor networks in realistic conditions where the sensing environment characteristics are only partially known to the sensor network designer. Operational aspects such as reliability and maintenance needs will be considered.</p> <p>Description of the internship work:</p> <p>The intern's task would consist on developing a comprehensive methodology for wireless sensor networks sizing and implementing it into a prototype tool.</p> <p>Expected Output:</p> <ul style="list-style-type: none"> • IP around wireless sensor network's sizing methodology • A software tool for sizing the required sensing infrastructure for a given sensing application. The tool will enrich Accenture's sensor network offering <p>References:</p> <ol style="list-style-type: none"> 1. Toupis S., and Tassioulas L., "Optimal Deployment of Large Wireless Sensor Networks," IEEE Transactions in Information Theory, Vol. 52, NO. 7, July 2006. 2. Zongkai Y.; Yuan Y.; Jianhua H. "Determining the number of nodes for wireless sensor networks" IEEE 6th Circuits and Systems Symposium on Emerging Technologies: Frontiers of Mobile and Wireless Communication, 2004. Page(s): 501 - 504 Vol.2
Durada	September 2007 to February 2008 (dates are flexible)
Requisits	<ul style="list-style-type: none"> - Minimum 5 years of higher education in Electrical Engineering - Fluent English - Experience with statistical signal processing is a plus - Ability and willingness to do practical and hands-on work
Nombre de places	1

Codi	J TOSHIBA Kaw-1
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Student Internship</p> <p>Toshiba Research and Development Center (RDC), Kawasaki, Japan, are offering a 6 month to 1 year internship in speech recognition or speech synthesis (signal processing). The international candidate will be a masters or PhD level student. She or he will work in the Multimedia Laboratory at RDC. The Center is situated in Kawasaki which is between Tokyo and Yokohama.</p> <p>http://www.toshiba.co.jp/rdc/index.htm http://www.toshiba.co.jp/rdc/mmlab/index_e.htm</p> <p>Toshiba RDC will provide a dormitory for accommodation and living expenses. PC, software tools and other necessities will be provided. Travel costs to and from Japan are not covered by this internship.</p> <p>Applications in the first instance should be made to Dr Kate Knill, Cambridge Research Lab, Toshiba Research Europe Limited. Electronic applications preferred to kate.knill@crl.toshiba.co.uk. Please include a covering letter, your CV and the names of 3 referees.</p>
Durada	A 6 month to 1 year internship. Closing date for applications: Monday 21st May, 2007
Requisits	--
Nombre de places	1

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PHILIPS

PHILIPS (Alemania-Aachen)

Codi	D PHILIPS Aac-1
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Automation of a LED colour control prototyping environment</p> <p>The light of coloured light emitting diodes (LEDs) can be mixed to provide light sources with adjustable colour, including both saturated colours and white. However, reproducibility and stability issues require using feedback control schemes to meet colour accuracy requirements.</p> <p>We have set up a MATLAB / Simulink / dSPACE based rapid control prototyping environment for investigating colour control concepts. Both the control and calibration procedure are essential for the colour accuracy that can be achieved. In this project the operation of the prototyping environment shall be automated in order to investigate calibration procedures.</p>
Durada	Starting time: as soon as possible Duration: 6 months
Requisits	<ul style="list-style-type: none"> -basic knowledge in control, power electronics and sensors -familiar with MATLAB and Simulink -readiness to become acquainted with supportive software (e.g. Visual basic, LabView) -high motivation and good English skills
Nombre de places	1

Codi	D PHILIPS Aac-2
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Energy Management Architecture for Wireless Sensor Networks</p> <p>Background:</p> <p>Wireless sensornets are becoming more widely adopted for commercial and scientific use and, in settings where battery replacement or recharging is difficult, it is important that sensornets have long and predictable lifetimes. We thus expect energy management to play an increasingly important role in meeting user requirements.</p>

	<p>Objectives:</p> <p>To provide a basis for energy management, Jiang et al. suggests in [1] an architecture comprising</p> <ol style="list-style-type: none"> (1) a policy interface for user input, (2) a mechanism to monitor and control the usage of system and component usage (e.g. current power consumption), and (3) a management module for enforcing the user policy directives. <p>The objectives of the final project is to analyse and improve the proposed energy management architecture, and to implement and validate it on the Philips IEEE 802.15.4-based wireless sensor network platform AquisGrain.</p> <p>References:</p> <p>[1] Xiaofan Jiang, Jay Taneja, Jorge Ortiz et al: "An Architecture for Energy Management in Wireless Sensor Networks", In: Proceedings of WWSNA 2007 Cambridge, MA April 2007, http://www.cs.berkeley.edu/~jaein/papers/jiang07management.pdf</p>
Durada	Start: September 2007 (individual arrangements possible) Duration: 6 months
Requisits	<ul style="list-style-type: none"> -Interest in wireless sensor networks -Experience in programming embedded systems (C) -Background in wireless networking, communication protocols and distributed systems -Initiative, analytical skills, organized and task-oriented. -Fluent English in speaking and writing
Nombre de places	1
Codi	D PHILIPS Aac-3
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Security Management for the Internet of Smart Things</p> <p>New applications such as pervasive healthcare, smart environments or building automation are going to deploy a world of smart things [1] in which every object around us will have sensing, computing and communication capabilities. Successful deployment of this Internet of smart things (IoTs) requires essential security services such as, e.g., confidentiality, authentication and authorization. Key management is the security's keystone as it handles the cryptographic secrets that enable those security services.</p> <p>In Philips Research Laboratories, Aachen, we are exploring novel fully distributed key management security solutions for the IoTs. In this context, this master thesis comprises the analysis and conceptual extension of those solutions as well as the implementation and evaluation of them in resource-constrained embedded systems.</p> <p>References:</p> <p>[1] ITU Internet Reports, "The Internet of Things" November 2005 - http://www.itu.int/osg/spu/publications/internetofthings/</p>
Durada	Start: September 2007 (individual arrangements possible) Duration: 6 months
Requisits	<ul style="list-style-type: none"> -Interest in computer and network security, distributed systems. -Experience in programming, at least in one of Java, C++, C#. -Background in wireless networking and communication protocols. -Initiative, analytical skills, organized and task-oriented. -Fluent English in speaking and writing
Nombre de places	1
Codi	D PHILIPS Aac-4
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Wireless Actuator Control Protocol</p> <p>Background:</p> <p>The „Internet of Things“ (IoT) is the widely-shared vision of a world of networked and interconnected devices that will provide relevant content and information to users, wherever they may be located. We envision an „Internet of Things 2.0“ that not only allows real-world objects to communicate with each other and with human users but which in addition also allows the physical interaction with real-world objects by means of wirelessly controlled actuators.</p> <p>Objectives:</p>

	<p>The aim of the project is to develop a "Wireless Actuator Control Protocol" that solves the technical challenges associated with such wireless actuator networking, especially Quality-of-Service and Resilience of the wireless links. The protocol must allow to control multiple wirelessly connected actuators and sensors in a dependable way, i.e. the overall system must always stay in a safe state (also in cases where the wireless link is disturbed by interferences) and synchronous operation of multiple actuators must be ensured (also in cases where wireless packets are lost or duplicated). The developed protocol shall be implemented on Philips' wireless sensor network platform AquisGrain and a demonstrator of a multi-actuator application shall be designed and built using a robotics hardware development platform (in cooperation with the project "Wireless Actuator Programming Environment").</p>
Durada	<p>Start: September 2007 (individual arrangements possible) Duration: 6 months</p>
Requisits	<p>-Communication protocols -Programming (C) -Fluent English in speaking and writing</p>
Nombre de places	1
Codi	D PHILIPS Aac-5
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Wireless Actuator Programming Environment</p> <p>Background:</p> <p>The „Internet of Things“ (IoT) is the widely-shared vision of a world of networked and interconnected devices that will provide relevant content and information to users, wherever they may be located. We envision an „Internet of Things 2.0“ that not only allows real-world objects to communicate with each other and with human users but which in addition also allows the physical interaction with real-world objects by means of wirelessly controlled actuators.</p> <p>Objectives:</p> <p>The aim of the project is to develop a "Wireless Actuator Programming Environment" that enables the development of applications that control a multitude of wireless sensors and actuators in a reliable and dependable way. It must support the application developer to express assertions on synchronous operations, e.g. allowing a motor to move only after another motor has moved to achieve reliable synchronous multi-actuator movements. It must also allow asserting „safe states“, e.g. define how the overall system shall behave in the presence of wireless link interferences. A prototype of the Wireless Actuator Programming Environment shall be implemented as extension to the „Robotics Studio“ programming tool from Microsoft. A demonstrator of a multi-actuator application shall be designed and built using a robotics hardware development platform (in cooperation with the project "Wireless Actuator Control Protocol").</p>
Durada	<p>Start: September 2007 (individual arrangements possible) Duration: 6 months</p>
Requisits	<p>-Communication protocols -Programming (C#) -Fluent English in speaking and writing</p>
Nombre de places	1
Codi	D PHILIPS Aac-6
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Energy Efficiency of Short-Range Radio Technologies in Body/Personal Area Networks</p> <p>Background:</p> <p>Today, more and more devices of our personal environment are becoming wirelessly connected to networks, from consumer electronic devices to personal healthcare devices, tiny medical sensors and even implants. These Body Area Networks (BANs) and Personal Area Networks (PANs) consist of a set of battery-powered devices or miniaturized wireless sensors that can communicate with each other by means of short-range radio technologies and are placed on the user's body or in its vicinity. While there is a rising demand for increasingly complex processing tasks of these devices, battery capacities are only slowly increasing. This sets a major challenge on an energy efficient design of sensor architectures, short-range radio technologies and network protocols requiring particular power management algorithms.</p> <p>Objectives:</p> <p>Various different technology standards for short-range radio connectivity exist and the technology best suited for BANs and PANs strongly depends on the specific application requirements. Often the networks have a heterogeneous architecture employing different radio technologies. The aim of this Master's Thesis is to evaluate and compare the energy efficiency of different radio technologies (Bluetooth, IEEE 802.15.4/ZigBee, and IEEE 802.11) for given medical sensor and healthcare</p>

	device application categories and use case scenarios. The evaluation is expected to be performed on different system levels taking into account the various stack layers and also power management strategies offered by these technologies.
Durada	Start: September 2007 (individual arrangements possible) Duration: 6 months
Requisits	-Background in wireless communications (e.g. IEEE 802.15.4, ZigBee, Bluetooth, IEEE 802.11). -Ability to become acquainted with standards documents -Good knowledge and practical skills in C-programming. -Experience in programming resource-constrained systems (e.g. programming of Atmel microcontroller in C, AVR Studio or IAR Embedded Workbench). -Interest in wireless ad-hoc networking, embedded systems and their application to the medical domain. -Fluent English in speaking and writing, German (optional).
Nombre de places	1
Codi	D PHILIPS Aac-7
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>A gateway for interoperable medical sensor networks</p> <p>Personal Healthcare (PHC) is of growing importance, ranging from fitness up to monitoring specific health risks. Applications like home health monitoring increase quality of care as people can stay at home with risks that today demand a stay in hospital. The Continua Health Alliance is working to specify interoperable devices and services, which is of key importance to empower people and organizations to efficiently deploy new healthcare solutions and better manage health and wellness. Zigbee is a new communication standard, being preferably deployed for smart wireless medical sensors and sensor networks. Thus, ZigBee devices are promising candidates to be connected to Continua systems.</p> <p>This master thesis will combine both technologies by realizing a gateway solution. The main work comprises the interface analysis, design of a software gateway architecture, as well as the implementation and evaluation of them in resource-constrained embedded systems.</p> <p>References:</p> <p>Continua Health alliance: http://www.continuaalliance.org/home ZigBee consortium: http://www.zigbee.org</p>
Durada	Start: September 2007 (individual arrangements possible) Duration: 6 months
Requisits	-Background in wireless networking and communication protocols. -Interest in distributed systems and sensor networks. -Experience in programming, at least in one of Java, C++, C#. -Initiative, analytical skills, organized and task-oriented. -Fluent English in speaking and writing
Nombre de places	1
Codi	D PHILIPS Aac-8
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Energy efficient communication protocols for wireless sensor networks</p> <p>Wireless sensor networks are going to be applied for new application areas from environmental monitoring to clinical healthcare and personal healthcare to automation and control. Energy efficiency is a common concern for all application areas, as wireless sensor nodes require long operational periods without battery changes. A significant degree of sensor nodes energy consumption is consumed by the communication protocols - both for local processing the elements of the protocol stacks, as well as for sending&receiving protocol messages between nodes. Thus, a cross-layer protocol optimization will significantly improve the wireless sensor network energy efficiency,</p> <p>This master thesis will realise the energy optimization for a specific part of the communication protocol - the system security. The main work comprises the analysis of an existing security communication protocol stack, specification and design of common, re-usable elements, as well as the implementation and evaluation of them in resource-constrained embedded systems.</p> <p>References:</p> <p>http://www.hitech-projects.com/euprojects/wasp/</p>

Durada	Start: September 2007 (individual arrangements possible) Duration: 6 months
Requisits	-Background in wireless networking and communication protocols. -Interest in distributed systems and sensor networks. -Experience in programming, at least in one of Java, C++, C#. -Initiative, analytical skills, organized and task-oriented. -Fluent English in speaking and writing
Nombre de places	1
Codi	D PHILIPS Aac-9
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	Intra-Body Communication System: Network Protocols and Applications Intra-Body Communication (IBC) is a new short-range communication technology using Electric Fields propagation all around the human body for transmitting data. IBC enables simple, intuitive and ultra low power identification systems, access control or device personalization. We, at Philips Research Europe, designed a new IBC platform (including a new transceiver). The Master Thesis consists in developing, simulating, implementing and evaluating network protocols and applications for this new sensor node platform. The main objectives are to analyze the requirements of an IBC system and to design communication mechanisms achieving high reliability and low power consumption.
Durada	Start: September 2007 (individual arrangements possible) Duration: 6 months
Requisits	-Excellent C or C++ knowledge -Embedded software programming experience -Wireless network protocols knowledge (at least one in the following list: 802.11, 802.15.4, Zigbee, Bluetooth, NFC,...) -Fluent English in speaking and writing
Nombre de places	1

PHILIPS (Holanda-Eindhoven)

Codi	NL PHILIPS Ein-1
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	Automatic Style Interpretation Assignment: The goal of this assignment is to design a vision system to automatically identify and interpret fashion and clothing styles. With the natural language of fashion being abstract and subjective (e.g. clothing may be 'casual', 'hip', or 'suitable for business'), the assignment will focus on investigating the translation of low-level image features (e.g. colors, shape, texture) to high-level semantic descriptors (such as 'hip' and 'casual'). The following steps may be used as a guideline for the assignment: <ul style="list-style-type: none"> • Survey of the commonly used semantics used for fashion and clothing styles (which may include a survey of the available literature on this topic). • Translation of these 'subjective' semantic descriptors into 'objective' descriptors (e.g. 'business' into 'dark colored pants, jacket and tie'). • Translation of high-level objective features into low-level visual primitives, and the subsequent design of a prototype system (using e.g. a webcam-equipped PC). The student will have the opportunity to gain valuable work experience while working in the Video Processing & Analysis group within the Philips Research Laboratories, a world-class research environment.
Durada	Start date: September 2007 (alternative starting dates possible) Duration: 6 months (preferably 9 months, if possible)
Requisits	-Video/image processing and/or computer vision skills are desirable -Good programming skills (c/c++, matlab) -Inventive, creative, willing to take initiative

Nombre de places	1
Codi	NL PHILIPS Ein-2
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Enhancement to create a 3D impressions on a 2D panel</p> <p>Background:</p> <p>3D-TV is a key differentiator for Philips Consumer Electronics in the near future. In 2008, Philips will introduce special 3D-TVs on the market, which can show different images in for different viewing angles. This way, a slightly different image can be generated for each of the two eyes, thus creating the so-called <i>disparity cue</i>, which is the most important and dominant 3D cue. In order to create content for the 3D display, algorithms have been created that estimate depth from a normal (2D) video, and use the depth to convert the 2D-video to 3D-video.</p> <p>Yet, disparity is not the only source that gives a person a 3D impression: other information like color, sharpness/focus, and contrast, can also be used to distinguish between near- and far-depth. These cues may also be applied to a 2D display. Philips has state-of-the-art algorithms on image enhancement (color, local contrast, sharpness) as well as depth-estimation. The assignment will focus on combining enhancement and depth estimation, and creating depth-dependent enhancement that creates a 3D impression on a 2D display. Rather than applying maximum enhancement in the entire image, the image could also be enhanced selectively: foreground may be enhanced more than the background. This principle of <i>less-is-more</i> needs to be reassessed for new state-of-the-art video enhancement algorithms.</p> <p>Goal:</p> <p>Final goal of the assignment is to design and implement depth-dependent enhancement and test its effectiveness for creating a 3D impression. State-of-the art algorithms for image enhancement (incorporated in our high-end TV sets) and the latest depth-estimation algorithms that are designed for 2D-3D conversion should be combined. Although this principle is not new, our algorithms have advanced substantially such that we currently reached a point where it may become effective for creating an enhanced 3D impression.</p> <p>This needs to be tested. The tasks can be described as follows:</p> <ul style="list-style-type: none"> • Integrating sharpness, contrast, color, and noise-filtering algorithms with depth estimation to create a depth-dependent enhancement on a 2D or 3D display. • Ensuring that these algorithm have a stable spatio-temporal behavior. <p>As an alternative, we could use depth-from a high-resolution range-measuring camera to enhance natural images shot by a parallel normal camera. This way, the principle could be tested for reliable, true depth information. Eventually, this configuration may be relevant for video conferencing.</p>
Durada	<p>Start date: soon</p> <p>Duration: 6-9 months</p>
Requisits	Working level of English. Programming skills. Academic math skills to create/adjust algorithms for video enhancement. Interest in video/signal processing.
Nombre de places	1
Codi	NL PHILIPS Ein-3
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>High accuracy, calibration-free gaze tracking at consumer prices</p> <p>Background:</p> <p>Despite the great advances in technology in the past 20 years, human-machine interaction has experienced little changes since then. Researchers in this area consider head, eye and gaze tracking systems to be fundamental in the development of this area, but the current price of these technologies is still prohibitive in its application to the consumer market.</p> <p>Goal:</p> <p>The goal of this assignment is to contribute to the realization of a demo of a high-accuracy, calibration-free gaze tracking system, which can be implemented at consumer prices. This requires smart exploitation of the human visual system using available low-cost technologies including signal processing. This work will continue the work of a previous student in the area, hopefully to completion.</p> <p>The assignment incorporates:</p> <ul style="list-style-type: none"> • Understanding basic principles of the human visual system;

	<ul style="list-style-type: none"> Reviewing and developing signal processing algorithms to extract visual features such as iris contours and light glints; Reviewing and developing models for relating extracted visual features and actual gaze; Reviewing and developing numerical methods that compute gaze from the estimated visual features, given the models that relate each other; <p>Testing the algorithm and proposing improvements.</p>
Durada	<p>Start date: September 2007</p> <p>Duration: 6 months (preferably 9 months, if possible)</p>
Requisits	<ul style="list-style-type: none"> -Interest in research in a challenging and ground-breaking area; -Interest in image and signal processing in general; -Creative spirit & problem solving talent (as opposed to being a simple programmer following direct orders...). It is expected that the student is able to handle reasonably complex problems with a low degree of supervision; -Knowledge and interest in mathematics and numerical methods; -Good programming skills in C and Matlab -Knowledge in image processing is a plus, but not mandatory -Fluency in English
Nombre de places	1
Codi	NL PHILIPS Ein-4
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Gesture Recognition using Blur</p> <p>Gestures are often used to create an intuitive interaction between a human and a machine. To automatically recognize the gestures a camera is used that films the user while performing the gestures. However, when the distance between the user and the camera is large (typically a couple of meters) it is hard to obtain a picture of the hand that has enough resolution to be able to perform a reliable recognition. Therefore, a more practical approach is not to use hand gestures, but to use waving gestures (using the arm as well). However, the typical low frame rate of the cameras used causes the moving arms and hands to become heavily blurred. Fortunately, the amount of blurring depends both on the speed and the direction of the movement. Hence, this could be used to recognize gestures. The assignment would be to build such a gesture recognition system.</p>
Durada	<p>Starting time of the stay: July or September</p> <p>Duration of the stay: minimally 6 months, preferably 9 months</p>
Requisits	<ul style="list-style-type: none"> -video/image processing and/or computer vision skills are desirable -good programming skills (c/c++, matlab) -inventive, creative, willing to take initiative
Nombre de places	1
Codi	NL PHILIPS Ein-5
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Human Tracking and Activity Analysis in Video under Occlusion and Appearance Changes</p> <p>Automatic tracking of persons in video is an intensely investigated area with most applications so far in surveillance and security. Beyond these tasks there is more recently an interest in understanding people's movement and actions in the context of intelligent homes and for consumer data mining in shops. With these applications as the main target this project aims at addressing several technical challenges inherent to the tracking problem starting from the state of the art techniques. The main goal will be the design and implementation of algorithms that are robust to occlusion and to appearance changes. We also aim for an efficient and low-cost solution that can be implemented in real-time. The student will have the opportunity to learn and apply advanced video processing and pattern analysis techniques towards the finalization of this project.</p>
Durada	<p>Starting time of the stay: July or September</p> <p>Duration of the stay: minimally 6 months, preferably 9 months</p>
Requisits	<ul style="list-style-type: none"> • Basic programming skills • Solid Math background • Knowledge of image processing is a plus

Nombre de places	1
Codi	NL PHILIPS Ein-6
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Local Contrast Equalization for Face Detection</p> <p>Face detection is an important first step for interactive applications. Recently an important step has been made by the research community in the field of face detection. Viola and Jones proposed a face detection method based on Haar features and a cascade of weak classifiers. Although the Viola Jones algorithm is quite robust, it can still have problems with difficult lighting conditions. Two options to improve the detection rate can be investigated. The first option is to change the local contrast within the picture as pre-processing before the detection algorithm. The second option is to train the detection algorithm using input that has been equalized in contrast.</p>
Durada	<p>Starting time of the stay: July or September Duration of the stay: minimally 6 months, preferably 9 months</p>
Requisits	<ul style="list-style-type: none"> -video/image processing and/or computer vision skills are desirable -good programming skills (c/c++, matlab) -inventive, creative, willing to take initiative
Nombre de places	1
Codi	NL PHILIPS Ein-7
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Rowing Coach Assistant</p> <p>Video images are often used by top athletes to analyze their performance during training in order to improve their performance during important matches. The Dutch rowing champion Sjoerd Hamburger is very talented and currently training hard, because his goal is to win a gold medal during the next Olympics in Beijing, China. We would like to help Sjoerd achieve his goal by making a system that helps to analyze his performance. This system should consist of a camera that follows Sjoerd when he is rowing. The assignment would be to build a tool that analyzes the video and overlays interesting characteristics onto it, to make them visible to Sjoerd and his coach. One such characteristic is the motion path of the peddles during a whole stroke.</p>
Durada	<p>Starting time of the stay: July or September Duration of the stay: minimally 6 months, preferably 9 months</p>
Requisits	<ul style="list-style-type: none"> -video/image processing and/or computer vision skills are desirable -good programming skills (c/c++, matlab) -inventive, creative, willing to take initiative
Nombre de places	1
Codi	NL PHILIPS Ein-8
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Upper Body Detection using Histogram of Oriented Gradients</p> <p>Recently an important step has been made by the research community in the field of face detection. Viola and Jones proposed a face detection method based on Haar features and a cascade of weak classifiers. This approach seems promising to tackle the more difficult problem of upper (or full) body detection. However current research indicates that the Haar features are inadequate to capture the essential shape information. Therefore new features, such as histograms of oriented gradients (HOG) have been proposed. The assignment would be to design a machine learning algorithm for upper body detection based on these HOG features.</p>
Durada	<p>Starting time of the stay: July or September Duration of the stay: minimally 6 months, preferably 9 months</p>

Requisits	-video/image processing and/or computer vision skills are desirable -good programming skills (c/c++, matlab) -inventive, creative, willing to take initiative
Nombre de places	1

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SIEMENS

SIEMENS VDO (Alemania-Lindau)

Codi	D SIEMENS Lin-1
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Algorithm Development for Radar-Based Advanced Driver Assistance Systems</p> <p>Subject of Stay:</p> <p>The diploma student will work on improvements of radar-based algorithms in Advanced Driver Assistance Systems (ADAS). Examples:</p> <ul style="list-style-type: none"> - Improvement of Risk Management/Warning Strategy based on Fuzzy Logic. - Improvement of Classification Algorithms using Multivariate Statistical Analysis. - Improvement of Signal Processing, e.g. the runtime-optimized separation of radar signals from noise.
Durada	<p>Starting Time of Stay:</p> <ul style="list-style-type: none"> - Either July or September is ok. <p>Duration of Stay:</p> <ul style="list-style-type: none"> - Stay of 6 month is ok.
Requisits	<ul style="list-style-type: none"> - Knowledge in Statistical Mathematics - Technical Understanding - Good communication skills in German and/or English - Good programming skills in C (optional: C++). - (optional: Knowledge in microcontroller programming)
Nombre de places	2

SIEMENS (Dinamarca-Aalborg)

Codi	DK SIEMENS Aal-1
Data d'entrada	16/05/07
Tipus d'estada	PFC
Descripció	<p>Link Adaptation (LA) for UTRAN LTE Uplink</p> <p>DESCRIPTION OF THE SUBJECT OF THE STAY</p> <p>Universal Terrestrial Radio Access Network Long-Term Evolution (UTRAN LTE) is a system currently under standardization within the 3rd Generation Partnership Project (3GPP). Such a system uses the Orthogonal Frequency Division Multiple Access (OFDMA) technology in downlink and the Single Carrier-Frequency Division Multiple Access (SC-FDMA) in uplink.</p> <p>In mobile communication systems link adaptation (LA) plays a fundamental role. LA can be considered as a subset of the RRM functionalities which in UTRAN LTE include: power control (PC), adaptive modulation and coding (AMC) and adaptive transmission bandwidth (ATB).</p> <p>The different parameters - power, modulation and coding scheme (MCS) and bandwidth - that can be adapted to the varying channel, interference and traffic conditions as well as the different ways such an adaptation can be performed make the solution space very large. A full search for the optimal solution is certainly not an option in a system where there are severe time constraints.</p> <p>The aim thus is to design some simple but effective algorithms able to perform sensible choices for the combination of the mentioned parameters in uplink with a reasonable computational complexity. The criteria considered when performing such a choice involve the mentioned channel, interference and traffic conditions but also the relative priority of users within the same cell, the constraints imposed by the SC-FDMA technology, the interaction with packet scheduling, etc.</p> <p>The performance of the different algorithms the students will propose will be evaluated using and extending a system level simulator developed in C++ within Nokia Siemens Networks (NSN).</p> <p>A general description of the UTRAN LTE system is available as Technical Report at the 3GPP website at the following link: http://www.3gpp.org/ftp/Specs/archive/25_series/25.814/25814-710.zip</p>

Durada	<p>Starting Time of Stay: -Preferably beginning of September.</p> <p>Duration of Stay: -Approximately 8 months and preferably 2 students. Students who have been working together in the past years will be given priority.</p>
Requisits	<p>Good knowledge of C++ programming and possibly, but not necessarily, of the C++ Standard Template Library (STL).</p> <p>Communication skills in written and oral English.</p>
Nombre de places	1