

## PFC a Empreses (Tardor 2011-12)



### Empreses on pots fer el PFC

#### Empreses i Institucions que ofereixen projectes a l'ETSETB i que gestiona l'escola Última actualització: 19 de maig de 2011

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.

TriaGnoSys GmbH  
Continental, A.D.C. GmbH  
Thales Nederland Land & Joint BV  
Nokia Siemens  
Philips Research Europe  
VPISystems GmbH  
DLR – German Aerospace Centre, Institute of Communications and Navigation  
Swiss Federal Institute of Technology Lausanne  
NEC, Network Laboratories  
Bell Laboratories (Alcatel-Lucent)  
Telecom Italia

#### TriaGnoSys GmbH

#### TriaGnoSys GmbH. Wessling-Oberpfaffenhofen. Germany.

Codi	D TriaGnoSys Wess-1
Data d'entrada	17/02/11
Tipus d'estada	PFC
Descripció	<p><b>Efficient Database Synchronisation over Satellite for Management of Disaster Events</b></p> <p>This diploma thesis is embedded in the research project "e-Triage" supported by the German Federal Ministry of Education and Research and aiming at facilitating emergency communication in the situation of a mass casualty incident (MCI) by providing digital communication and input devices replacing paper-based triage systems (<a href="http://www.triagnosys.com/e-triage/">http://www.triagnosys.com/e-triage/</a>). The triage consists in classifying the victims depending on the severity of their injuries by means of colours. Nowadays this is done using paper tags that are hanged on the body and the information is distributed to hospitals by telephone calls. In e-Triage all the triage information as well as the registration of victims is saved in a database and distributed immediately and electronically to hospitals and control centres. In case of a disaster event, the terrestrial commercial communication networks are likely to be overloaded, damaged or not operative, if they ever existed. In order to provide reliable communication means to the rescue forces a fast deployable network is foreseen. This network offers GSM, TETRA and WLAN connectivity for the rescue personnel in the area and backhauls over satellite the whole voice and data traffic to a disaster-safe area.</p> <p>The main task of this Diploma Thesis consists in finding a feasible solution to transmit the database related traffic over satellite with the minimum bandwidth possible. The concrete work to be performed includes the following (not preventing adaptations and flexible reaction to lessons learnt while performing the work): studying the statistical characteristics of the database related traffic; research and document existing compression and multiplexing solutions and/or protocols available; exploit the problem similarities between the case of study and the above mentioned solutions; evaluate the implementations available and eventually implement an own customized proposal; install and configure the most promising solution in the prototype and assess the obtained results; write a self-contained scientific report (diploma thesis), comprehensively summarizing the work performed. The thesis is to be written in English.</p>
Inici	The preferred starting date is in summer 2011
Durada	6 months, extension possible
Requisits	<p>Prerequisites for interested candidates are: Medium to advanced English language proficiency, Basic to advanced knowledge in C/C++ and other programming languages, Familiar with IP networking on Linux, Knowledge of LaTeX is welcome but not mandatory.</p> <p>A high level of commitment, engagement, and independent research capability are expected from the candidate performing this work; however, the challenge of the task can only be appropriately met by excellent team work, which shall be guaranteed by close contact and regular discussion among candidate and supervisor throughout the whole period.</p>
Nombre de places	1
Compensation	a compensation will be given
Codi	D TriaGnoSys Wess-2
Data d'entrada	17/02/11
Tipus d'estada	PFC

Descripció	<p><b>Development of a propagation prediction tool for aircraft cabins</b></p> <p>Among the long-term objectives of TriaGnoSys GmbH, the provision of on-board mobile coverage and connectivity to passenger and crew members is envisaged. In the future, this will enable the on-board wireless access to local content as well as off-board connection possibilities. Prior to the deployment of a wireless network within an aircraft cabin, a network planning study is required. Such a network planning procedure is usually divided into three subprocedures: propagation prediction, network simulation and network optimization. The offered project is centered on the first of these three subprocedures, thus focusing on the implementation of a reliable wireless propagation prediction software tool. Objectives:</p> <ol style="list-style-type: none"> <li>1. To design and implement a software engine that implements empirical propagation models within aircraft cabins. In the following, let us call this software tool TGSProp. In particular, the following parameters are expected to be the output of such an engine: Received signal power, Received signal-to-noise-and-interference-ratio, Fading, Wideband channel parameters.</li> <li>2. To design and implement a web API (preferable, REST compliant) that provides the following functionality: Steering of TGSProp (input of settings), Results retrieval.</li> <li>3. To design and implement a simple web GUI to enter and display results from TGSProp.</li> </ol> <p>Methodology: Understanding the basics of wireless channel modeling and coverage prediction. Designing the system architecture (e.g. with UML). Implementing TGSProp core engine. Implementing the web API. Implementing the control GUI.</p> <table border="1" data-bbox="363 517 1442 633"> <thead> <tr> <th>Month 1</th> <th>Months 2-3</th> <th>Months 4-5</th> <th>Month 6</th> </tr> </thead> <tbody> <tr> <td>System design</td> <td>Engine implementation and testing Mid-term presentation at the end of month 3</td> <td>Web API implementation and testing Control GUI implementation and testing</td> <td>Writing up Final presentation</td> </tr> </tbody> </table>	Month 1	Months 2-3	Months 4-5	Month 6	System design	Engine implementation and testing Mid-term presentation at the end of month 3	Web API implementation and testing Control GUI implementation and testing	Writing up Final presentation
Month 1	Months 2-3	Months 4-5	Month 6						
System design	Engine implementation and testing Mid-term presentation at the end of month 3	Web API implementation and testing Control GUI implementation and testing	Writing up Final presentation						
Inici	beginning from early September 2011								
Durada	6 months								
Requisits	C and/or C++ knowledge for the implementation of the propagation model. Experience/Interest in developing APIs for web services with architectures such as SOAP, REST, etc. PHP and Javascript for the implementation of the control GUI. Desired skills: UML for system design, Parallel computing knowledge, Documentation generation tool (e.g. Doxygen), Experience programming in Linux environments, Experience with version control systems (e.g. CVS, Mercurial, ...).								
Nombre de places	1								
Compensation	a compensation will be given								
Codi	D TriaGnoSys Wess-3								
Data d'entrada	17/02/11								
Tipus d'estada	PFC								
Descripció	<p><b>Security in Broadband Satellite System</b></p> <p>The successful integration of interactive broadband satellite systems within the Internet is crucial for their future. The Satcom industry has developed many techniques to mitigate satellite systems constraints (e.g. high latency) and prevent end-to-end performance degradations, to comply with end-to-end Quality of Service (QoS) classification and prioritization requirements, and to be cost competitive with regards to terrestrial alternatives. However, the use of Virtual Private Network (VPN) by end-users to protect their data from end to end, or by satellite operators to guarantee the confidentiality and integrity of the data transmitted over the satellite segment to their customers, creates new challenges. The presence of VPN may indeed result in performance degradations. For example, the encryption of metadata, e.g. TCP header, may prevent the proper working of performance enhancing proxies used by satellite system operators. The satellite system efficiency may also be degraded because of the additional overhead from the VPN encapsulation process. This thesis is aimed to investigate the implications on interactive broadband satellite systems of VPN techniques used to guarantee the security of user communications.</p> <p>The concrete works to be performed will be investigating issues related to the implementation of security protocols in broadband satellite network, with focus on the following aspects:</p> <ul style="list-style-type: none"> <li>• TCP Performance Enhancement Proxy (PEP): PEP is commonly used to mitigate the impact of the high latency of satellite links to TCP protocol. However problems may arise in the case data packets "enter" a VPN and are encrypted before the PEP process take place. Information required by the PEP, e.g. TCP header, will not be available, which results in the PEP not functioning properly, and the end-to-end performance degradations.</li> <li>• Extra overhead, IP fragmentation and Maximum Transfer Unit (MTU) size: VPN data protection in general introduces extra overhead due to the additional in-band signalling. This extra overhead is seen as a clear drawback by satellite system operators because of the scarcity of the satellite bandwidth. It may also result in the fragmentation of packets if the packet size plus overhead is larger than the available link MTU. Fragmentation in general results in higher packet loss, and hence the perceived end-to-end user QoS.</li> <li>• IPSec anti-replay mechanism: IPSec provides anti-replay protection against an attacker duplicating encrypted packets by assigning a unique sequence number to each encrypted packet. The decryptor keeps track of which packets it has seen on the basis of these numbers. It uses for that a 64-Byte sliding window. If packets arrive outside of this sliding window, they are considered hacked and are dropped. The use of advanced QoS classification/queuing functions may re-order and delay IPSec packets such that they fall outside of the anti-replay window. These packets will be dropped by the IPSec receiver, impacting the end-to-end performance.</li> <li>• Multicast: the protection of multicast communication in an optimised way (i.e. avoiding the encapsulation of the multicast traffic in unicast encrypted packets) is not straightforward, since all current VPN techniques have been defined for unicast terrestrial communications. The IETF Multicast Security (MSEC) Working Group is working to standardise protocols for securing group communications over the Internet. Available IETF MSEC standards should be analysed in order to determine if they are suitable and what the most appropriate ones are for interactive broadband satellite systems.</li> <li>• Mobile services: In interactive broadband satellite systems providing mobile services, a major aspect to be investigated is the impact of network handover over an established VPN. It is important that the protection provided by the VPN is maintained during and after the handover. Specific measures to guarantee this continuity are to be investigated. The first days of the work will be dedicated to background reading and understanding the challenges of the thesis. This will be followed by the main thesis work, which will involve researching existing solutions for the problems mentioned above, and analysis of advantages and drawbacks of each solution. Own ideas and proposals for solving the problem from the candidate will also be welcomed. The work done is envisaged to be implemented in the TriaGnoSys network test-bed. At the end of the period the candidate is expected to write a self-contained scientific report (diploma thesis), comprehensively summarizing the work performed. The thesis is to be written in English. The company supervisor will provide support and materials required for the candidate to perform his/her task.</li> </ul>								
Inici	beginning from early June or July 2011								

Durada	6 months. The scope and level of detail of the studies to be adapted to the exact duration and skills of the candidate
Requisits	Medium to advanced English language proficiency is required. Knowledge of TCP/IP protocols and/or Linux IP networking is recommended. Knowledge of scripting languages (e.g. awk, Perl, or Tcl) and LaTeX is welcome. A high level of commitment, engagement, and independent research capability are expected from the candidate performing this work; however, the challenge of the task can only be appropriately met by excellent team work, which shall be guaranteed by close contact and regular discussion among candidate and supervisor(s) throughout the whole period.
Nombre de places	1
Compensation	a compensation will be given

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### Continental, A.D.C. GmbH

#### Continental, A.D.C. GmbH. Lindau, Germany

Codi	D CONTINENTAL_Lin_1
Data d'entrada	18.02.11
Tipus d'estada	PFC
Descripció	<p><b>Investigation of the Influence of Image Encoding and Decoding on the Performance of Image Processing Algorithm</b></p> <p>Advanced Driver Assistant Systems is one of the most promising fields in the automotive business. Camera Systems with image processing are playing a key-role. With increasing system complexity in the car, the need for image data compression and transmission rises. Especially lossy encoding algorithms are of special interest due to their high compression rates. The advantage of high compression rates is accompanied by a loss of information. The Diploma Thesis shall clarify the influence of different image Encoding / Decoding algorithms on the performance of Image Processing algorithms. The contents of the Diploma Thesis is: getting familiarized with image processing as used at ADAS, getting familiarized with image compression algorithms available, identify the most promising compression algorithm(s) and implementation, setting up PC based test environment, encode – decode test data with the implemented compression algorithms, evaluate and compare the influence of the lossy compression using ADAS, algorithms, documentation.</p>
Inici	August 2011 or later
Durada	Minimum duration of 6 months
Requisits	Sound knowledge of Communications Engineering / Communications Technology, Working Knowledge of Image Processing, Good communication skills in German and/or English, Good programming skills in C/C++, Skills in Matlab are beneficial, Working knowledge of Office Tools (Excel, Word, etc...).
Nombre de places	1
Compensation	a compensation will be given

Codi	D CONTINENTAL_Lin_2
Data d'entrada	18.02.11
Tipus d'estada	PFC
Descripció	<p><b>Design, Implementation and Evaluation of an efficient Polygonal Sign Detection Algorithm</b></p> <p>The student will work on improvements of camera-based algorithms for speed limit information systems. Specifically he/she shall work on the detection of stop signs and give-way signs, which have a polygonal (hexagonal and triangular) form in most of the countries in the world. The Generalized Hough Transformation (GHT) can theoretically be used to optimally detect them, but unfortunately it has a high computational load in his general form. The goal of this master thesis is thus to investigate alternatives to the previous approach which are less computationally expensive but have a comparable detection performance. In particular he/she shall be responsible for: Implement a baseline algorithm for the detection of polygonal signs, Assess its performance and computational load on real video data, Design, implement and evaluate alternatives which improve the performance of the baseline, Write a report to summarize the results and conclusions.</p>
Inici	September, 2011
Durada	Minimum duration of 6 months
Requisits	Sound knowledge of Statistical Mathematics and Image Processing, Good communication skills in German and/or English, Good programming skills in C/C++ and Matlab, Working knowledge of Office Tools (Excel, Word, etc...).
Nombre de places	1
Compensation	a compensation will be given

Codi	D CONTINENTAL_Lin_3
Data d'entrada	18.02.11
Tipus d'estada	PFC
Descripció	<p><b>Investigation of Image Rectification of Strongly Warped Images as a pre processing step for Image Processing Algorithms</b></p> <p>Advanced Driver Assistant Systems is one of the most promising fields in the automotive business. Camera Systems with image processing are playing a key-role. For future applications, Camera systems with wide angle lenses (fish eye lenses)</p>

	will gain importance. The advantage of an increased field of view is accompanied by the disadvantage of strong image warping. The warped images are improper for already existing image processing algorithms. In the Diploma Thesis algorithms shall be developed and implemented to rectify the warped images. Furthermore, its influence on the performance of the image processing shall be assessed. The contents of the Diploma Thesis is: getting familiarized with image processing as used at ADAS, modelling the distortions of the wide angle lens, implementation of algorithms for rectification, setting up PC based test environment, evaluate and compare the influence of the rectified images using ADAS algorithms, Documentation.
Inici	August 2011 or later
Durada	Minimum duration of 6 months
Requisits	Sound knowledge of Image Processing, Good communication skills in German and/or English, Good programming skills in C/C++, Skills in Matlab are beneficial, Working knowledge of Office Tools (Excel, Word, etc...).
Nombre de places	1
Compensation	a compensation will be given
Codi	D CONTINENTAL_Lin_4
Data d'entrada	18.02.11
Tipus d'estada	PFC
Descripció	<b>Optimal Object Modelling and Tracking for an Automotive Application</b> Our company develops state of the art driver assistance systems employing radar and camera sensors for an accurate detection and tracking of traffic participants. Therefore it is necessary to develop algorithms that model the environment and associate sensor data to modelled objects. The offered position implies the implementation of a new approach to tracking and data association for radar reflections. A new object model has to be defined. Furthermore, the characteristics of this new approach should be evaluated in terms of RAM and CPU usage as well as tracking performance. The necessary tasks include: definition of the concept and design of the new tracking approach, implementation of a suitable Kalman tracker, implementation of efficient data association techniques, code implementation in C for simulation and if possible embedded, documentation.
Inici	as soon as possible
Durada	Minimum duration of 6 months
Requisits	Ability of analytic structured working, programming knowledge in Matlab and C/C++, knowledge of basic statistics methods and/or Kalman filtering, systems and signals lecture and competence, enthusiasm to study and develop new algorithms, good English language skills.
Nombre de places	1
Compensation	a compensation will be given
Codi	D CONTINENTAL_Lin_5
Data d'entrada	18.02.11
Tipus d'estada	PFC
Descripció	<b>Development of an evaluation chain for an automotive sensor system with joined radar and camera object detection</b> To improve the object assessment performance of sensor systems for automotive applications multi-sensor systems will be used for upcoming products. The subject of this thesis will be the development of an objective evaluation chain to find and document advantages and limitations of the involved sensors (e.g. radar, camera) in different kinds of realistic traffic scenarios. Typical topics of this work are: Definition of relevant test cases, Data acquisition, Comparison of sensor object detection results, Design and development of a highly automated evaluation chain to gain, statistical meaningful results without the risk of operational errors, Database oriented storage and processing of results, Deliver statistical data for sensor fusion system design and performance evaluation, Documentation.
Inici	as soon as possible
Durada	Minimum duration of 6 months
Requisits	Ability of analytic and structured working, Programming knowledge in C, C++ and MATLAB, Basic data base knowledge, Systems and signals lecture and competence, Knowledge in statistical decision theory and analysis, Driver licence, good English language skills. Optional: Basic German language skills (e.g. reading specification documents).
Nombre de places	1
Compensation	a compensation will be given

inici de pàgina 

## Thales Nederland Land & Joint BV

Thales Nederland Land & Joint BV. Huizen. The Netherlands.

Codi	NL Thales Hui_1
Data d'entrada	18.02.11
Tipus d'estada	PFC

	<b>Real-time application performance in mobile (ad-hoc) networking nodes (Simulation study)</b>
Descripció	Thales Defence & Security C4I Systems is part of Thales Nederland and member of the international Thales Group. Thales is a global technology leader for the Aerospace, Space, Defence, Security and Transportation markets and has approximately 68,000 employees in 50 countries. With its 25,000 engineers and researchers, Thales has a unique capability to design, develop and deploy equipment, systems and services that meet the most complex security requirements. Thales develops and manufactures high quality integrated communication systems for both commercial organisations and defence and has approximately 330 employees including 150 engineers working in Research and Development. The Innovation, Research & Technology department offers many opportunities for internships in the area of communication systems, navigation systems (Inertial/GPS), video and audio processing, and energy optimization. Applications for internships in these and related fields are welcomed. Vehicle communication systems have shifted from in-vehicle intercom systems towards IP-based multi-media networking nodes that connect a number of vehicles to exchange information. Initially, analog radios (networks) were used to deliver inter-vehicle voice services. Contemporary systems, however, rely on IPbased networks to transport voice and data services in a network topology that may change over time; vehicles may join or leave the network without any fixed infrastructure and the link quality may vary over time. These dynamics pose many challenges to the in-vehicle networking nodes with regard to routing, discovery, self-configuration and Quality of Service. The goal of this assignment is to (1) create a network simulation model (in OPNET Modeler) of the in-vehicle networking node, and (2) to evaluate the performance of a set of real-time applications (most notably VoIP-related) in a network consisting of several mobile networking nodes.
Inici	The starting date is flexible but August/September is desirable.
Durada	The duration of the stay is approximately 8 months
Requisits	Programming in C/C++, Simulation, Communication Networks, (OPNET if possible)
Nombre de places	1
Compensation	a compensation and accommodation expenses will be given

[inici de pàgina](#) 

## Nokia Siemens

### Nokia Siemens. Aalborg. Denmark.

Codi	DK NSN Aal_1
Data d'entrada	18.02.11
Tipus d'estada	PFC
Descripció	<b>Investigation of antenna tilt in an urban micro-cellular network</b> The students should investigate the influence of base station antenna tilt using a semi-empirical procedure. An existing ray-tracing tool is calibrated with respect to measurements in a live UMTS/LTE network and subsequently used for investigation of the influence from antenna tilt to radio coverage and capacity. As an outcome of the project it is expected to have suitable models to predict the performance impact of antenna tilting. The project is likely to involve some experimental activities.
Inici	Fall semester, start of September
Durada	8 months
Requisits	Good knowledge of radio propagation and mobile communication system fundamentals, including operation of CDMA based systems.
Nombre de places	2
Compensation	a compensation will be given

[inici de pàgina](#) 

## Philips Research Europe

### Philips Research Europe – Eindhoven. The Netherlands.

Codi	NL Philips Ein_1
Data d'entrada	21.02.11
Tipus d'estada	PFC
Descripció	<b>Bed-leave detection</b> To prevent falls of patients in hospitals it is helpful to warn nurses when a fragile patient is about to leave the bed. For that purpose we want to exploit an existing body-worn device with a built-in accelerometer sensor and Cortex M3 processor. The objective is to develop and implement an algorithm and application for early bed-leave warning.
Inici	Summer
Durada	6 months
Requisits	Signal processing, MatLab, algorithm development, embedded programming, UI programming.
Nombre de places	1
Compensation	a compensation will be given

Codi	NL Philips Ein_2
Data d'entrada	17/02/11
Tipus d'estada	PFC
Descripció	<p><b>Test bed and sensor platform for building usage profiling</b></p> <p>The project is working towards a methodology and a tool framework that enable the accurate performance prediction of energy saving measures prior to a retrofit project. The attainable savings by advanced lighting and building control solution heavily depend on the occupant's behavior and how a particular building is being used. A wireless sensor monitoring system is therefore introduced to audit and assess space utilization, occupancy and light conditions. The master thesis project will be concerned with the realization and further enhancement of a test lab facilitating sensing strategy investigations and the selection of sensor system configurations for space utilization monitoring. Testing of sensor placements and configuration alternatives for varying space setups and locations (e.g. with different daylight conditions) has to be performed. Calibration strategies and guidelines for reliable and robust data acquisition shall be developed. Finally, concept development and specification towards a suitable sensor platform - to be deployed in a building monitoring project - is a major part of the master thesis project. FP7-ICT Project 'ENPROVE' (<a href="http://www.enprove.eu">www.enprove.eu</a>).</p>
Inici	July 1 – December 31, 2011 (or earlier)
Durada	6 months, extension by 1 month for final documentation possible
Requisits	Studies: Electronics, Engineering. Signal processing; Sensor systems. Hands-on experience (and enthusiasm) in electronics and embedded HW/SW. Strong communication skills in English (written and verbal) and good documentation style. Helpful: lighting (controls) domain knowledge.
Nombre de places	1
Compensation	a compensation and accomodation expenses will be given
Codi	NL Philips Ein_3
Data d'entrada	17/02/11
Tipus d'estada	PFC
Descripció	<p><b>Occupancy and behavior profiling for energyefficiency in buildings</b></p> <p>The project is working towards a methodology and a tool framework that enable the accurate performance prediction of energy saving measures prior to a retrofit project. The attainable savings by advanced lighting and building control solution heavily depend on the occupant's behavior and how a particular building is being used. A wireless sensor monitoring system is therefore introduced to audit and assess space utilization, occupancy and light conditions. A corresponding test-bed exists that delivers long-term observations and data samples for an office setup. The master thesis project will be concerned with the creation of reliable and robust usage profiles from observed building data acquired during a limited monitoring period. This will involve the development of a suitable methodology to process the monitoring data and to correlate them with necessary side information for the performance prediction. Weather data, seasonal information, space characteristics as well as exceptions from typical utilization (e.g. vacation periods) have to be factored in. Based on available data sets from the test bed, new strategies and algorithms for data clustering and evaluation shall be developed and validated. Suitable ways to characterize the usage profiles and interfacing methods with the prediction engine have to be specified and implemented. Finally, the master thesis shall also validate and quantify the benefit of usage profiling over averages and heuristics provided in related ISO standards (Energy Performance of Buildings). FP7-ICT Project 'ENPROVE' (<a href="http://www.enprove.eu">www.enprove.eu</a>).</p>
Inici	July 1 – December 31, 2011 (or earlier)
Durada	6 months, extension by 1 month for final documentation possible
Requisits	(Technical ) information sciences and/or communications background. Signal processing and analysis. Data and mining, clustering, filtering. Statistics. Programming skills, MatLab. Fluent English and good documentation style. Helpful: lighting (controls) domain knowledge.
Nombre de places	1
Compensation	a compensation and accomodation expenses will be given
Codi	NL Philips Ein_4
Data d'entrada	17/02/11
Tipus d'estada	PFC
Descripció	<p><b>Advanced led drivers</b></p> <p>The Philips Research Solid State Lighting group is searching for graduate and undergraduate students willing to contribute to the exciting solid state lighting revolution. The student/s will work in a high tech industry facility together with a professional research team of electrical engineers. Related to this large research program, students may choose among the following specific topics: 1. Converter topology study: The student/s will closely work with the research team to fundamentally analyze a number of novel converter topologies suitable for offline drivers. 2. Converter control: The student/s will test a number of control strategies applied to novel converter topologies targeting a particular lighting application. 3. Dimmer compatibility: A fundamental understanding of phase-cut dimmers will be carried out by the student/s in order to identify the best solution candidates from a number of basic driver architectures. 4. Computer assisted hardware platform for converter prototyping: A computer aided reconfigurable power stage will be built and control with a software interface to automate the task of testing and characterizing novel converter topologies. Solid state lighting technologies are among the most prominent innovations influencing the way in which we improve our future by reducing energy consumption. So much so that the current 20% of the world's electricity consumed by lighting can potentially be reduced to 4% with the full-scale adoption of LEDs (Light-Emitting Diodes).</p>
Inici	July 1 – December 31, 2011 (or earlier)

Durada	6 months, extension possible
Requisits	Good knowledge in power electronics (Topic 1, optional for other topics). Good knowledge in circuit theory and circuit simulation tools (Topics 1, 2, and 3). Good knowledge in control theory and related simulation tools (Topic 2). Practical skills to set up and measure circuits (Topic 3 and 4, optional for other topics). Practical skills to set up and measure computer controlled circuits (Topic 4). High motivation, teamwork, good English (written and spoken).
Nombre de places	1
Compensation	a compensation and accomodation expenses will be given
Codi	NL Philips Ein_5
Data d'entrada	24/03/11
Tipus d'estada	PFC
Descripció	<b>WIRELESS POWER TRANSMISSION FOR LIGHTING APPLICATIONS</b> For data communication, no wires are needed any longer. But still, wires are necessary to power devices. However, recent progress in power electronics allows the application of wireless power transmission concepts. Philips Research is active in this area to investigate concepts to wirelessly power electronic devices. Of particular interest is the wireless powering of lamps. Imagine a surface, on which you can place a lamp on any place without any wires or other effort and it gets power through the invisible infrastructure. While the general concept has been proven, now demonstrators for an applicable solution are in investigation. In the context of this work, a diploma work is offered. As aim of the diploma work, an electronic circuit related to the described investigations is to be designed, built, tested and described. Details will be discussed with the contact person.
Inici	July 1 – December 31, 2011 (or earlier)
Durada	6 months, extension by 1 month for final documentation possible
Requisits	Good knowledge in power electronics, electronic circuit design and eventually programming of microcontroller. Practical skills to measure and to set up electronic circuits. Familiar with a circuit simulation tool like Pspice and mathematic tools like MathCad. High motivation and good English skills
Nombre de places	1
Compensation	a compensation and accomodation expenses will be given

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### VPIsystems Gmbh

#### VPIsystems Gmbh. Berlin. Germany.

Codi	D VPI Ber_1
Data d'entrada	07.02.11
Tipus d'estada	PFC
Descripció	<b>Analysis and modeling of electro-optical interactions in integrated high-speed optical transmitter</b> Modeling of driving circuits for different modulation schemes (200-400 Gb/s PolMux QPSK and 16QAM) which will be generated by the same PIC transmitter. Study of electro-optical interactions originated at the driving circuit and the impact of non-ideal electronics. Optimization of the electronic circuit in order to reduce the power consumption and enhance the system performance. Investigations and numerical simulations would be carried out to using Agilent Advanced Design System (ADS) and VPItransmissionMaker/VPIcomponentMaker simulation tools (eventually, Python or Matlab).
Inici	as soon as possible
Durada	6 months
Requisits	Knowledge of optical communications technologies. Use of English literature. Capable of working independently. Experience with VPItransmissionMaker/VPIcomponentMaker and ADS simulation tools would be desired. We offer the opportunity to study most novel research topics. The candidate will have intensive technical support from our engineers. Motivation and independent work is expected.
Nombre de places	1
Compensation	a compensation will be given

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### DLR – German Aerospace Centre, Institute of Communications and Navigation

#### DLR – German Aerospace Centre, Institute of Communications and Navigation. Oberpfaffenhofen-Wessling. Germany.

Codi	D DLR Wess-1
Data d'entrada	26.02.11
Tipus d'estada	PFC



	<b>Adaptive Optics without Wavefront Sensor for Low-Order Atmospheric Distortion</b>
Descripció	Optical free-space communication (FSO) is strongly influenced by atmospheric turbulence, which induces distortions of the beam wave-front. The effects of these distortions can be mitigated by adaptive optics (AO) systems, as they are now used by astronomers. At DLR a new AO method for wavefront correction without dedicated wavefront sensor has been developed which reduces system complexity and allows high processing speed. This method is limited to low-order distortions, i.e. the ratio of receiver aperture diameter to wavefront distortion pattern size is small, as it is usually the case in FSO systems. In this work the new method shall be simulated numerically and its correction quality shall be tested under different atmospheric conditions to find the limits of its applicability. If time allows, a real setup can be tested in DLR's AO lab testbed.
Inici	June 2011 or later
Durada	6 to 8 months
Requisits	Students of Electrical Engineering, Physics or Computer Science. Experience with MatLab and Software Development (C/C++). Desirable Experience in at least one of the following fields: Image Processing, Adaptive optics, wavefront sensing, atmospheric turbulence.
Nombre de places	1
Compensation	a compensation will be given

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## Swiss Federal Institute of Technology Lausanne

### Swiss Federal Institute of Technology Lausanne (EPFL). Switzerland.

Codi	CH EPFL Lau-1
Data d'entrada	22.02.11
Tipus d'estada	PFC
Descripció	<b>Multiview Audio-Visual Speech Recognition</b> During the last years a general framework for Audio Visual Automatic Speech Recognition has been developed. A practical deployment has not yet taken place because technology lacks robustness against non-ideal working conditions. Research has particularly neglected the variability of the visual modality subject to real scenarios, which is now object of some studies. Audio-Visual Speech Recognition in a car provides a task where ideal conditions are not met and thus the feature extraction and audio-visual integration blocks of the system should be adapted. The work will focus modality fusion in multiple-view sequences, where several cameras provide multiple views of the speaker subject to different poses and lighting conditions. The aim of this project is to study how to combine the information of the multiple cameras into the speech classification system.
Inici	summer
Durada	6 months
Requisits	The project will be developed in Matlab and the HTK toolkit (C environment). Basic knowledge of signal/image processing is required.
Nombre de places	1
Compensation	a compensation will be given
Codi	CH EPFL Lau-2
Data d'entrada	22.02.11
Tipus d'estada	PFC
Descripció	<b>Segmentation of Magnetic Resonance Images of the Fetal Brain</b> In vivo fetal magnetic resonance imaging (MRI) provides a unique approach for the study of early human brain development. In utero cerebral morphometry could potentially be used as a marker of the cerebral maturation and help to distinguish between normal and abnormal development in ambiguous situations. The goal of this project is a comprehensive and clinically meaningful study of the fetal brain in the third trimester of gestation, that is, after 24th weeks of gestation where most of the gyral development takes place. To do so, a pipeline of segmentation methods for brain tissue will be investigated: first, classification of voxels will be done based on the observed intensity of the fetal MRI images and local spatial priors; second, more sophisticated methods based on deformable models will be investigated. This project is held in collaboration with Dr. M. Schaer from the University of Geneva School of Medicine.
Inici	summer
Durada	6 months
Requisits	knowledge in image processing techniques, Bayesian frameworks, Active Contours; programming skills: C++ and Matlab
Nombre de places	1
Compensation	a compensation will be given
Codi	CH EPFL Lau-3
Data d'entrada	22.02.11



Tipus d'estada	PFC
Descripció	<p><b>Retrospective analysis of multimodal image registration in radiosurgery</b></p> <p>Radiosurgery is a sub-domain of neurosurgery where lesions like tumors are "removed" by very high intensity radiation beams. The Lausanne University Hospital has developed an expertise in using this technology for treating some types of tumors, with a device call the Gamma Knife. When planning an operation with this device, several 3D images of the patient's head are used, namely Magnetic Resonance (MRI) and Computed Tomography (CT). Their registration, i.e. their geometrical alignment and superimposition, is now based on the placement, on the head of the patient, of a heavy box, called a stereotactic frame, visible in both the MRI and C images, that serves as a landmark for aligning the images. In this project we want to study 3D MRI and CT image registration techniques that do not involve the frame, but use directly the content of the images for the registration. The accuracy of such a registration will be measured, and its influence on the radiation dose delivery to the target and to adjacent regions will be studied.</p>
Inici	summer
Durada	6 months
Requisits	This project will be developed in ITK (C++ environment). Basic knowledge in signal/image processing is required.
Nombre de places	1
Compensation	a compensation will be given
Codi	CH EPFL Lau-4
Data d'entrada	22.02.11
Tipus d'estada	PFC
Descripció	<p><b>Automatic Assessment of Difficult Intubation from Video</b></p> <p>Difficult tracheal intubation remains a constant and significant source of morbidity and mortality in anesthetic practice. Difficult or failed intubation leads to complications ranging from airway trauma, severe hypoxemic brain injuries to death of the patient. Before anesthesia induction, accurate difficult airway identification allows optimal preparation, including dedicated equipment, experienced personnel or specific techniques. Within this project, we will develop computer vision methods to automatically extract the relevant features from the face and the neck and use them to classify patients as risky or non-risky cases for tracheal intubation. The project will be performed in collaboration with the anesthesia department of the University Hospital in Lausanne, and we will use the recordings of patients that actually undergo intubation. The aim of the project is to develop techniques to accurately segment and track the head and the neck, measure the mobility of the neck, extract the features from inside the mouth and other necessary features using both the high-res videos (frontal and side) and the depth-map we shall obtain using the Kinect camera (built for Xbox360 by Microsoft). Additional tasks to perform are to build a GUI to facilitate recordings and manual measurements, and to use the obtained data for classification and validate the results using the ground truth information.</p>
Inici	summer
Durada	6 months
Requisits	This project will be developed in C++ and Matlab. Basic knowledge in image processing / computer vision is required. Experience in GPU programming is a plus.
Nombre de places	1
Compensation	a compensation will be given

inici de pàgina 

## NEC, Network Laboratories

### NEC, Network Laboratories. Heidelberg. Germany.


Codi	D NEC Hei_1
Data d'entrada	07.02.11
Tipus d'estada	PFC
Descripció	<p><b>Analysis and modeling of electro-optical interactions in integrated high-speed optical transmitter</b></p> <p>The Internet of Things (IoT) describes the idea of a global network of devices, objects, and things based on today's Internet technologies. Advances in wireless sensor and actuator networks enable the realization of the IoT vision in which virtually any physical object can be connected to the internet and interact with other objects or humans. The IoT vision emerged with increased use of RFID technologies and is now expected to have considerable impact on our daily lives with applications in such important domains as logistics, retail, healthcare, transport, entertainment and many other areas of our daily lives. At NEC Laboratories Europe (NLE) we are developing architectures, service infrastructures and applications for the Internet of Things. The successful applicant will extend NLE's IoT Java/OSGi based middleware with advanced processing capabilities and features for executing processes and services with connected real-world objects. The main focus of the work will be on the design, implementation and evaluation of middleware functionalities. We also expect the applicant to develop small applications that show how physical objects can interact with mobile phones and public displays. The student will therefore have the possibility to work with sensing and actuation technologies and should be proficient in UI programming and web technologies (REST, AJAX, etc.). The work is relevant to the IoT-A project (<a href="http://www.iiot-a.eu/public">http://www.iiot-a.eu/public</a>) funded by the European Union in which NEC is participating. The NEC Laboratories Europe in Heidelberg provide an excellent working environment supporting individual creativity as well as strong teamwork. We provide students with the opportunity to experience and participate in leading-edge research activities in international projects within a multinational environment.</p>
Inici	summer
Durada	6/9 months

Requisits	We expect the applicant to have proficient programming skills in object-oriented languages (Java or .NET languages) and web technologies (JavaScript and REST) and an interest in software design, programming abstractions and the willingness to explore new ideas. Knowledge about business process modeling languages (BPMN and BPEL), technologies for Service Oriented Architectures, or Complex Event Processing (CEP) engines are helpful, but not required. The capability to work and contribute in a team, demonstrate good human communication skills and have good English language knowledge will be essential for a successful internship.
Nombre de places	1
Compensation	a compensation will be given

[inici de pàgina](#) 

### Bell Laboratories (Alcatel-Lucent)

#### Bell Laboratories (Alcatel-Lucent). NJ. USA.

Codi	USA ALCATEL-LUCENT_NJ_1
Data d'entrada	02.03.11
Tipus d'estada	PFC
Descripció	<p><b>High Capacity Fiber-Optic Transmission Systems</b></p> <p>Bell Labs has helped weave the technological fabric of modern society. Since its founding in 1925, technology from Bell Labs has shaped the ways people live, work and play. Over the past 80 years, the Bell Labs R&amp;D community has made seminal scientific discoveries, created powerful new technologies, and built the world's most advanced and reliable networks. Here are some Bell Labs innovations that changed the world: The Transistor (1947), Shannon's Information Theory (1948), Laser (1958), Communications Satellites (1962), The CCD (1969) Unix Operating System and C Language (1969-1972), Digital Signal Processor (DSP) (1979), Optical WDM systems and networks (1990), First 100G Ethernet transmission (2005).</p> <p>Fiber-optic communications are evolving from simple intensity modulation with direct detection systems towards sophisticated multilevel modulation with coherent detection. Furthermore, digital signal processing techniques are also under development to overcome the main limitations given by transmission impairments. The scope of the project is to investigate on advanced modulation and detection schemes to exploit the huge capacity of an optical fiber. Some scientific references on the topic are:</p> <p>Peter J. Winzer, "Beyond 100G Ethernet", IEEE Communications Magazine, vol. 48, no. 7, pp. 26-30, July 2010.  René-Jean Essiambre, Gerhard Kramer, Peter J. Winzer, Gerard J. Foschini, Bernhard Goebel, "Capacity Limits of Optical Fiber Networks", IEEE-OSA Journal of Lightwave Technology, vol. 28, no. 4, pp. 662-701, February 2010.</p> <p>Location: 791 Holmdel-Keyport Rd., Holmdel, NJ 07733, USA  <a href="http://maps.google.es/maps?hl=es&amp;tab=wl">http://maps.google.es/maps?hl=es&amp;tab=wl</a>  40.390736,-74.1866  70 Km from Manhattan (New York City) <a href="http://www.nycgo.com">www.nycgo.com</a>  Public Transport <a href="http://www.njtransit.com">www.njtransit.com</a>  Newark Int. Airport <a href="http://www.panynj.gov/airports/newark-liberty.html">www.panynj.gov/airports/newark-liberty.html</a></p>
Inici	September, 2011 (flexible)
Durada	6 to 9 months
Requisits	Fiber-optic communications, digital communications, signal processing, laboratory skills, Matlab simulation, excellent academic records, good English knowledge.
Nombre de places	1
Compensation	Economic compensation will be considered subject to student's performance.

[inici de pàgina](#) 

### Telecom Italia

Codi	
Data d'entrada	18.05.11
Tipus d'estada	PFC
Descripció	<p><b>Understanding phase transition in future networks</b></p> <p>In about five-ten years, future networks will become so ubiquitous as to seem swarms of lightweight, highly interconnected nodes. These nodes, interacting in multi-domain environments, will abstract not only the traditional communications, processing and storage resources but eventually also any services, applications and the associated pieces of data. This level of complexity will make networks design and control highly challenging. Like large scale complex systems, networks of the future will eventually exhibit a behavior far from equilibrium implying the existence of multiple phases: i.e. identical local dynamic can give rise to widely different global dynamics. An innovative approach in the analysis of future network stability and performance is realizing the risk of network phase transitions (which is to characterize the network behavior in the vicinity of a critical point). The order parameter essentially quantifies the presence of order in the underlying system, which is zero (or negligible) in the disordered phase (low probability that network is connected) and takes on non-zero values in the ordered phase (high probability that network is connected). Thesis should investigate theoretically and with simulations the phase transition analysis as an approach for determining network stability/integrity, resource-efficient operating points for various global network properties.</p>
Inici	
Durada	
Requisits	

Nombre de places	1
Compensation	