Anexo I

PROJETOS GRADUAÇÃO E PÓS-GRADUAÇÃO - PROPICIE 5

1) Instituto Superior de Engenharia do Instituto Politécnico do Porto - Portugal

**PROJECT 1**

<table>
<thead>
<tr>
<th>Title:</th>
<th>Electricity Markets Data Analysis for Scenarios Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives:</td>
<td>Based on a large database, that includes data related to several electricity markets, the objectives of this project will be to organize the data, in order to define a set of relevant electricity market scenarios. Scenarios definition consists of establishing market players, such as buyers and sellers, their characteristics, and the type of market mechanisms to be considered. Those scenarios are then to be analyzed through a simulator, MASCEM, able to simulate several markets mechanisms, among those usually found in electricity markets. The main technologies to be used are an SQL database and the simulator, which is a multi-agent simulator developed in Java, but the simulator will only be managed through its user interface.</td>
</tr>
<tr>
<td>Requirements:</td>
<td>Electrical Engineering</td>
</tr>
<tr>
<td>Supervisor:</td>
<td>Prof. Isabel Praça - Email: <a href="mailto:icp@isep.ipp.pt">icp@isep.ipp.pt</a></td>
</tr>
<tr>
<td>Level of the students:</td>
<td>Bachelor or Post-Graduation Level</td>
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**PROJECT 2**

<table>
<thead>
<tr>
<th>Title:</th>
<th>Automatic Tool for Data Analysis</th>
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<tbody>
<tr>
<td>Objectives:</td>
<td>One important research line of GECAD is the application of knowledge Discovery techniques to, among others, obtain electricity consumers profiles, wind power forecast, etc… The data, usually available as excel files, pre-processing is a very time consuming task and subject to human errors. The objective of this project is the development of an application able to automatically pre-process data, to be used in the Data Mining process. This consists of transforming excel data files into files with only the relevant data, without errors or missing values. The main technologies to be used are Java and Matlab,</td>
</tr>
</tbody>
</table>
although some SPSS modeler algorithms may also be used.

**Requirements:**
Computer Science

**Supervisor:**
Prof. Isabel Praça - Email: icp@isep.ipp.pt

**Level of the students:**
**Bachelor or Post-Graduation Level**

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**PROJECT 3**

**Title:**
Electric bus fleet scheduling

**Objectives:**
Develop optimization methodology using deterministic and/or heuristic/metaheuristic approaches to schedule a electric bus fleet taking into account range limitations according to bus characteristics, route length and conditions and desired bus frequency along the day.

**Requirements:**
Excel, MATLAB, optimization

**Supervisor:**
Prof. Zita A. Vale zav@isep.ipp.pt; email.zitavale@gmail.com

**Level of the students:**
**Bachelor**

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**PROJECT 4**

**Title:**
Knowledge-based Platform for matching Brazilian and Portuguese Enterprises in Incubators

**Objectives:**
The main goal is to create a web-based platform to store characteristics of enterprises installed in Incubators from two countries (Brazil and Portugal) and to develop an intelligent algorithm to establish the matching between Brazilian and Portuguese enterprises based in similarities or complementarities.

Another goal is the development of a Observatory part for the monitoring of the evolution of the cooperation between enterprises identified by the platform.

**Requirements:**
Good command of Web-based platforms and computer programming

**Supervisor:**
Doutor Carlos Ramos - csr@sc.ipp.pt

**Level of the students:**
**Bachelor**

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**PROJECT 5**

**Title:**
CAN Network Platform
## PROJECT 6

**Title:** Hotel Room Controller  

**Objectives:** The main objective of this work is to develop a system to control the resources of a hotel room with a mobile phone. The system should provide:

- Bluetooth and Wi-Fi connections for mobile interconnectivity;  
- External Computer connection through Wi-Fi;  
- Access control based on NFC and RFID;  
- Interactivity with different slave modules for room resources control.

**Requirements:** required skills:  
- Electronics;
C programming language for microcontrollers;

<table>
<thead>
<tr>
<th>Supervisor</th>
<th>Doutor Lino Baptista Figueiredo - <a href="mailto:lbf@isep.ipp.pt">lbf@isep.ipp.pt</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of the students</td>
<td>Bachelor or Post-Graduation Level</td>
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</table>

### PROJECT 7

**Title:** Accommodation Management System using Mobile devices

**Objectives:**
The aim of this project is to develop a mobile application for the Android operating system to provide interaction between the user and the central system of an accommodation. The mobile device will function as the identifier of a person, allowing interaction with the available services (e.g., check-in, book services). Another important feature is the interaction between the mobile device and the components in the room where the user is hosted. Namely control lights, TV, access to the room (without the necessity of using a physical key card), HVAC unit, among others.

**Requirements:** Information Technology Management

**Supervisor:** Doutor Lino Baptista Figueiredo - lbf@isep.ipp.pt

**Level of the students:** Bachelor

### PROJECT 8

**Title:** Accommodation Management System

**Objectives:**
The aim of this project is to develop a central system that allows the management and monitoring of various services and resources available at an accommodation. The following objectives are considered:

- Build a scalable and extensible data model capable of describing the required information;
- Define roles (e.g., client/guest, manager, cleaning staff) for different types of users and handle all
associated authorization and authentication needs (including access to rooms);

- Interact with room control units, handle all sensor (e.g., lights, temperature, sound, door handle state) related events, trigger pre-defined actions (e.g., close shutters) and send notifications;

- Provide a machine interface (e.g., web services) for mobile applications;

- Provide a user interface that allows full control of the whole system.

Requirements: Information Technology Management

Supervisor: Doutor Lino Baptista Figueiredo - lbf@isep.ipp.pt

Level of the students: Bachelor or Post-Graduation Level

PROJECT 9

Title: Stress Estimation in Group Decision Making

Objectives:
De literatura é possível concluir que o stress afecta os processos de tomada de decisão em Grupo, nomeadamente em situações de crise. Pretende-se que o aluno estude as diferentes abordagens descritas na literatura para avaliar os níveis de stress dos participantes em processos de decisão em grupo, com particular foco na fase de negociação e escolha. Com base no estudo efectuado pretende-se que o aluno desenvolva/adapte um modelo de avaliação de níveis de stress que possa ser usado no que ilustre a tomada de decisão em grupo. Por último pretendem-se elaborar uma pequeno protótipo do modelo proposto por forma a realizar algumas experiências que permitam retirar algumas conclusões sobre o tema em estudo.

Requirements: Conhecimentos nas áreas de algoritmia e programação e conhecimento básico na área de conhecimento da Inteligência Artificial.


Level of the students: Bachelor or Post-Graduation Level
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<tr>
<th>PROJECT 10</th>
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<tbody>
<tr>
<td><strong>Title:</strong></td>
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<td><strong>Objectives:</strong></td>
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<tr>
<td>Metodologia:</td>
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<td><strong>Requirements:</strong></td>
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<tr>
<td><strong>Supervisor:</strong></td>
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<td><strong>Level of the students:</strong></td>
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### PROJECT 11

**Title:** Processamento e aquisição de imagem em Tomografia Computorizada (TC) - (Radiologia)

**Objectives:**
Utilizar as diferentes ferramentas de aquisição e processamento de imagem em TC. **Metodologia:** Imagens de TC, de diferentes regiões anatômicas e utilizando diferentes técnicas (ex: Angio-TC), de uma Instituição de Saúde serão anonimizadas e remetidas para as estações de processamento de imagem da ESTSP.

Os estudantes poderão utilizar os softwares disponíveis para processar imagem, nomeadamente: Médicas de patologia; Algoritmos de reconstrução; Reformatações; Volume rendering (VRT); Maximum intensity projection (MIPs).

Os estudantes poderão ainda deslocar-se às Instituições de Saúde, parceiras da ESTSP, para localmente utilizarem as estações de trabalho dos equipamentos de TC e vivenciarem o processamento de imagem, em função da clínica.

**Requirements:**
Conhecer os princípios físicos de TC; Ter conhecimento de protocolos técnicos de TC; Conhecer as principais aplicações clínicas

**Supervisor:** Maria Luísa Nogueira

**Level of the students:** Bachelor

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2) **International Graduate School on Mobile Communications, Ilmenau University of Technology – Alemanha**

### PROJECT 12

**Title:** Applying the wireless communication for the localization of user devices using flying Unmanned Aerial Vehicles (UAVs)

**Objectives:**
The goal of this project is to investigate different approaches for the localization of user devices, like smartphones and tablets, using wireless interfaces, like Wi-
<table>
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<tr>
<th>Project 13</th>
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<tbody>
<tr>
<td><strong>Title:</strong> Development of Case Studies for the Ilmenau Hybrid Online Laboratory</td>
</tr>
<tr>
<td><strong>Objectives:</strong> To control several electromechanical models (elevator, 3-axis portal, process cell) of the Hybrid Online Lab of the Ilmenau University of Technology different design tasks with various specification techniques (software based, hardware based) should be developed. These case studies will be used for teaching purposes.</td>
</tr>
<tr>
<td><strong>Requirements:</strong> Microcontroller programming (ATMEL, C) for software oriented design studies, FPGA programming (VHDL) for hardware oriented design studies</td>
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<tr>
<td><strong>Level of the students:</strong> Bachelor or Post-Graduation Level</td>
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<th>Project 14</th>
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<tbody>
<tr>
<td><strong>Title:</strong> FPGA-based Testing</td>
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<tr>
<td><strong>Objectives:</strong> Testing printed circuit boards is a more and more challenging issue, caused by the increasing complexity of chips and 3D technologies. Developing test-IP-cores in hardware as well as software environments for workflows are tasks inside this project that can be broken down to smaller tasks for students but also to more challenging ones for graduate and post graduate students.</td>
</tr>
<tr>
<td><strong>Requirements:</strong> Basic knowledge in high level hardware design (e.g. VHDL) and/or software skills in programming and scripting</td>
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<td>PROJECT 15</td>
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<tr>
<td><strong>Title:</strong> Cognitive Radio Networking</td>
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<tr>
<td><strong>Objectives:</strong> The goal of cognitive radios is the reuse of radio spectrum by secondary users. For these studies we have setup a cognitive radio network testbed as well as a simulation platform. The focus of this project are practical studies in our USRP-based cognitive radio network or simulation studies based employing our Omnet simulation tool.</td>
</tr>
<tr>
<td><strong>Requirements:</strong> Advanced knowledge and skills in the following areas are required: Linux and C/C++ for the practical work and discrete event simulation, preferably in Omnet and C++ for the simulation work.</td>
</tr>
<tr>
<td><strong>Level of the students:</strong> Bachelor or Post-Graduation Level</td>
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<th>PROJECT 16</th>
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<tr>
<td><strong>Title:</strong> Energy-saving in LTE-Advanced Networks</td>
</tr>
<tr>
<td><strong>Objectives:</strong> The goal of this work is to study the benefits of switching off LTE base stations during low off-peak hours. Students will use our LTE radio network simulation tool for the studies</td>
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<tr>
<td><strong>Requirements:</strong> Requirements: Advanced knowledge and skills in the following areas are required: simulation, techniques, radio systems, C/C++ programming</td>
</tr>
<tr>
<td><strong>Level of the students:</strong> Bachelor or Post-Graduation Level</td>
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3) Carinthia University of Applied Sciences, Austria
## PROJECT 17

### Title:
VLSI/FPGA Design of Audio-Range Decimation Filters Using Wave Digital Filters

### Objectives:
The proposed project contributes to research in the design and implementation of high performance and low power multi-rate filters at Carinthia University of Applied Sciences. As part of the digital filter design course offered in the master degree program ISCD – Integrated Systems and Circuits Design a case study compares several architectures of decimation filters for oversampled analog to digital converters (ADCs). The main focus in this case study is on low power operation, followed by small silicon area. Filter structures like CIC, FIR, Polyphase-FIR, Halfband-FIR and cascaded Biquads (IIR) are used. This case study will be extended by the proposed use of Wave Digital Filters (WDFs).

The design of WDFs is supported by the Matlab Filter Design Toolbox as well as the (L)WDF toolbox published by TUDelft. While the later offers the generation of VHDL code, the Filter Design HDL Coder presently does not generate VHDL code for WDFs, the code has to be generated manually.

Main objective of this project will be to evaluate the use of WDFs for high performance and low-power decimation filters as well as to evaluate scripts available in relevant toolboxes. A comparative analysis of will be documented.

### Requirements:
- Solid knowledge in digital signal processing
- Experience in using Matlab
- VHDL and experience in using CAD tools for logic simulation
- Knowledge of digital filters is of advantage

### Level of the students:
Bachelor or Post-Graduation Level

### Contact person for questions about the project:
FH-Prof. Dipl.-Ing. Erwin Ofner e.ofner@fh-kaernten.at
## PROJECT 18

<table>
<thead>
<tr>
<th>Title:</th>
<th>Different FPGA Implementations of Digital Part of Color Sensing System</th>
</tr>
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</table>
| Objectives: | This internship contributes to ongoing research activities at Carinthia University of Applied Sciences.  

The COSMOS project is set out to research a novel monolithically integrated low-cost color sensor, based on standard CMOS technology without costly process modifications or any external color filter structure. It will therefore technologically out beats the current integrated solutions and is fully compatible with mass-market applications. The sensor is based on a radical new photodiode color sensing technology in combination with new algorithms for color reconstruction. It will include a high dynamic range analog frontend with a minimum of 20bit resolution optimized for low-power and minimum area, which is a mandatory requirement for focused SOC applications. Research on new analog-to-digital converter architectures to fulfill the stringent requirements out-performing low-cost state-of-the-art solutions is a mandatory project task. A fully integrated color sensor prototype system will be realized as key enabler for scientific and technical exploitations.  

The necessary algorithms for color reconstructions of the incoming light will be developed and verified with Matlab. The hardware implementation will be done in standard CMOS technology and FPGA evaluation board.  

The following design activities will be conducted: |
| | • FPGA implementation with GENESYS Virtex5 evaluation board  
• Comparison the results between existing Matlab fixed point simulation and FPGA output  
• Area and power analysis with different truncations and structures in 0.35um CMOS technology in semi-custom design flow  
• Connect to optical measurement system with I²C bus  
• Improvement in algorithm, structure or circuit design with the aspect of area and power consumption |
### Requirements:
- Basic knowledge in Matlab
- Basic knowledge in logic and circuit design with VHDL
- Basic knowledge in FPGA implementation

### Level of the students:
**Bachelor or Post-Graduation Level**

### Contact person for questions about the project:
**FH-Prof. Dipl.-Ing. Erwin Ofner e.ofner@fh-kaernten.at**

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### PROJECT 19

#### Title:
**Light Spectrum Emulator for Color Sensor Characterization**

#### Objectives:
This internship contributes to ongoing research activities at Carinthia University of Applied Sciences.

The proposed internship will be based on the COSMOS research project, which is about a novel monolithically integrated low-cost color sensor, as already explained in Project 2 description.

The fully integrated color sensor prototype system needs to be characterized by optical / electrical lab measurements. To measure the color reconstruction performance of the sensors, different light sources with varying spectral distributions are necessary. Usually this is done by using a set of different classical broad-band light sources, like halogen and incandescent light sources, LED sources, fluorescent lights or also monochromatic sources like single LED’s or lasers.

Within this internship a novel light source concept should be realized, which provides a fully configurable spectral light characteristics. By using actively controlled light mixing, any pre-defined light spectrum should be generated. A continuous spectral monitoring together with active control loops should guarantee a stable light spectrum and power over time and temperature. Since there is no commercial tool available, the proposed topic is an interesting pioneer development work, combining electronics, optics and control.
The following design activities will be conducted:

- Concept evaluation and feasibility of optical setup
- Realization of opto-mechanical components
- Realization of electronic components to measure and control the spectral light characteristics
- Realization of a simple user interface to define the required light spectrum and power

Requirements:

- Solid knowledge in development of electronic systems using hardware evaluation platforms (like National Instruments or similar).
- Knowledge in control theory
- Basic knowledge in optics is of advantage

Level of the students: Bachelor or Post-Graduation Level

Contact person for questions about the project:
FH-Prof. Dipl.-Ing. Erwin Ofner e.ofner@fh-kaernten.at

**PROJECT 20**

**Title:** RF-Amplifier Design and Build-Up

**Objectives:** In this project the student will be supposed to perform the knowledge – transfer from theoretical RF – design to a real application. All up to date software tools and measurement equipment are available.

The working frequency of the amplifier is around 1GHz, the input and the output impedance should be 50 Ohms. Bandwidth, gain and power supply voltage have to be defined. One of the project goals is the verification of the design process via measurements (s-parameter, noise figure).

State of the art RF simulation software and measurement equipment is available in house. The project could be understood as a follow up of a recently successful completed project which concerns the influence of parasitic effects to passive structures and transmission lines. The student should be able to work independently, on one’s own. Basic knowledge in fundamentals of electromagnetic
(Maxwell’s Equations) and fundamentals of RF circuit design will be beneficial. Special knowledge of any software packages for solving electromagnetic field problems and network circuit simulations will be helpful, but not necessary. All the experiments and results must be documented in a scientific form, so adequate skills in mathematics and English will be helpful. A secondary goal is a paper submission at an international conference. The student has the possibility to work in an inspiring environment with state-of-the-art measuring equipment and software.

Requirements:
- Fundamentals in analog Circuit Design at Board Level
- Experience in using Network Simulators (P-Spice)
- Basic Knowledge in using S-Parameters, Z-Parameters

Level of the students: Bachelor or Post-Graduation Level

Contact person for questions about the project: Dipl.-Ing. (FH) Hermann Sterner h.sterner@fh-kaernten.at

4) Universidad de Deusto, Espanha

PROJECT 21

Title: Processing of Medical Images (medical speciality: otolaryngology)

Objectives:
- To develop cutting edge algorithms to study/analyze medical images
- To work in Computer Aided Diagnosis (CAD)
- To study advances techniques of image/video processing
- To apply data mining
<table>
<thead>
<tr>
<th>Requirements:</th>
<th>Telecomm or Electronics or Computing students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of the students:</td>
<td>Bachelor or PostGraduation (a student interested in research, who considers pursuing a PhD)</td>
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**PROJECT 22**

<table>
<thead>
<tr>
<th>Title:</th>
<th>Serious Games for Learning</th>
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<tbody>
<tr>
<td>Objectives:</td>
<td>Within the Deustotech Learning activity we are developing serious games for education. We experiment with the creation of serious games according to different models, areas of knowledge and skills. We evaluate them in degree and graduate courses of the University of Deusto, measuring technological and pedagogical quality and impact. This project is being carried out in collaboration with other research groups and industry-leading companies in the development of video games and serious games.</td>
</tr>
<tr>
<td>Requirements:</td>
<td>Computing students; programming skills are needed, HTML5, Javascript and CSS3 are valued</td>
</tr>
<tr>
<td>Level of the students:</td>
<td>Bachelor or PostGraduation</td>
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**PROJECT 23**

<table>
<thead>
<tr>
<th>Title:</th>
<th>Development of a hybrid AC/DC power supply with renewable generation: implementation and simulation with Matlab-Simulink</th>
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<tbody>
<tr>
<td>Objectives:</td>
<td>The intrinsic properties of micro-grids promotes the small-scale use of renewable energy sources for electricity generation, whether these are net-connected or work independently. In this project we propose, the development of an hybrid model of generation from renewable sources that incorporates all the elements of both generation and flow control active and reactive power, rectifiers, inverters, etc. Additionally, the model will be tested by virtual output impedance. All the models will be implemented with the Matlab-Simulink module: Power System Blockset.</td>
</tr>
<tr>
<td>Requirements:</td>
<td>Electrical Eng. students</td>
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</tbody>
</table>
5) University of Applied Sciences Neubrandenburg, Alemanha

**PROJECT 24**

<table>
<thead>
<tr>
<th>Title:</th>
<th>Fortress Rosenberg (former German Research Council [DFG] funded project)</th>
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<tbody>
<tr>
<td>Objectives:</td>
<td>Documentation of historic building and analysis of building’s history, presentation of results, publication</td>
</tr>
<tr>
<td>Requirements:</td>
<td>Computer skills: CAD – AutoCAD and Photoshop/Photopaint</td>
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<tr>
<td>Level of the students:</td>
<td><strong>Bachelor or PostGraduation</strong></td>
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**PROJECT 25**

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<thead>
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<th>Title:</th>
<th>Monitoring in geodetic control networks</th>
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<tbody>
<tr>
<td>Objectives:</td>
<td>Data base orientated software and precision total stations</td>
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<tr>
<td>Requirements:</td>
<td>Bachelor or master Student, programming and surveying skills</td>
</tr>
<tr>
<td>Level of the students:</td>
<td><strong>Bachelor or Post-Graduation</strong></td>
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6) Fraunhofer Geselschaft e.V, Alemanha

**PROJECT 26**

<table>
<thead>
<tr>
<th>Title:</th>
<th>Sensor Manipulator development</th>
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<tr>
<td>Objectives:</td>
<td>The intensive expertise on obtaining images from CFRP</td>
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</table>
(Carbon Fiber Reinforced Plastic) through Eddy Currents is to be broadened through this project research project. Fraunhofer IZFP already delivers solutions to the industry based on this technique.

Eddy current is being used for many years in many segments of industry, including automotive and aeronautical due to the flexibility and reliability of the technique. The automation of this kind of measurement will enable the use of such technique in 100% inspection tasks, in applications where high quality is a requisite.

The scholar shall be familiarized with the methods of automation, industrial movement and position tracking. The extend of involvement of the student depends on his/her previous experience and pro-activity.

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<tr>
<th>Requirements:</th>
<th>Mechatronic</th>
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<td>Level of the students:</td>
<td><strong>Bachelor or Post-Graduation</strong></td>
</tr>
<tr>
<td>Supervisor:</td>
<td>Matthias Pooch – mail: <a href="mailto:matthias.pooch@izfp-d.fraunhofer.de">matthias.pooch@izfp-d.fraunhofer.de</a></td>
</tr>
</tbody>
</table>