Project in Pervasive Computing

340.027 First Meeting / Introduction
Univ.-Prof. Dr. Alois Ferscha (Institute for Pervasive Computing, JKU Linz)
Altenberger Straße 69, A-4020 Linz, SE 0614 (Pervasive Computing Labor)
ferscha@pervasive.jku.at
JKU Linz, March 14, 2016
340.027 Project in Pervasive Computing :: Points of Contacts

Lecturers

Name
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Mag. Dr. Klemens Weigl, weigl@pervasive.jku.at

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Johannes Kepler University Linz
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340.027 Project in Pervasive Computing :: General Information

Lecture type       Practical

SWS               5 (PR), 7.5 ECTS

Start             March 14, 2016

Further dates     by arrangement

Study plan        Master's program Computer Science 2013W
                  [921PECOPECP13 ] PR Project in Pervasive Computing

Target group      Students of Master CS (major: Pervasive Computing)


CEUS              Studienhandbuch JKU Linz
                  https://lss.jku.at/studienhandbuch/45143 (Subject Pervasive Computing)
                  https://lss.jku.at/studienhandbuch/45154 (Project in Pervasive Computing)
340.027 Project in Pervasive Computing :: Subject Pervasive Computing

[ 921PECO13 ] Subject Pervasive Computing

<table>
<thead>
<tr>
<th>Workload</th>
<th>Mode of examination</th>
<th>Education level</th>
<th>Study areas</th>
<th>Responsible person</th>
<th>Coordinating university</th>
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<tbody>
<tr>
<td>37.5 ECTS</td>
<td>Accumulative subject examination</td>
<td>M1 - Master's programme 1. year</td>
<td>Computer Science</td>
<td>Alois Ferscha</td>
<td>Johannes Kepler University Linz</td>
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</tbody>
</table>

**Detailed information**

**Original study plan**
Master's programme Computer Science 2013W

**Objectives**
The design of miniaturized systems, which are invisibly integrated in their environment and are connected in a spontaneous and wireless way require special computer science methods. The specialization in Pervasive Computing therefore deals with a combination of technologies (e.g., sensors, actuators, wireless communication, miniaturized memories and processors), paradigms (e.g., context-aware and adaptive systems, autonomous and self-organizing systems, organic and bio-inspired systems) and methods (e.g., for inter-action, coordination, computational perception, reasoning and learning, artificial intelligence, virtual reality, semantic interoperability, system reliability, security, and user friendliness). The educational goals are decision and evaluation skills as well as skills for designing and developing pervasive computing systems such as "information appliances", "wearable systems", or "ambient intelligence systems".

**Subject**
The contents of this subject result from the contents of its courses.
### [ 921PECOPECP13 ] PR Project in Pervasive Computing

- **Workload**: 7,5 ECTS
- **Education level**: M2 - Master's programme 2. year
- **Study areas**: Computer Science
- **Responsible person**: Hanspeter Mössenböck
- **Hours per week**: 5 hpw
- **Coordinating university**: Johannes Kepler University Linz

### Detailed Information

**Objective**: By working on a non-trivial and coherent project from the area of the Major Subject, students should demonstrate their ability to apply the acquired knowledge from the Major Subject in a practical setting. Since the project is usually done in a team, this course should also practice team work and project management.

**Subject**: Independent and team-oriented work on a project from the area of the Major Subject.

**Criteria for evaluation**: The evaluation criteria are specified by the course leader at the beginning of the semester. Usually the course is evaluated by continuous project monitoring as well as by a final presentation and possibly a final written report.

**Methods**
- **Language**: English
- **Study material**: Yes
- **Changing subject?**: Yes
- **Corresponding lecture**: [PR: PRaktkum aus Pervasive Computing (7,5 ECTS)]]

### On-site course

- **Maximum number of participants**: 15
- **Assignment procedure**: Direct assignment
# 340.027 Project in Pervasive Computing :: List of Registrations

## Project in Pervasive Computing (PR)

<table>
<thead>
<tr>
<th>KlassenId</th>
<th>Lva Nr.</th>
<th>Semester</th>
<th>Wochenstunden</th>
<th>ECTS</th>
<th>LVA-LeiterIn</th>
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<tr>
<td>921PECOPECP13</td>
<td>340027</td>
<td>2016S</td>
<td>5.0</td>
<td>7.5</td>
<td>Alois Ferscha</td>
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<th>Name</th>
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<tr>
<td>1</td>
<td>1155969</td>
<td>Jungwirth Florian</td>
<td>921</td>
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<tr>
<td>2</td>
<td>1256566</td>
<td>Knoll Florian</td>
<td>521</td>
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<td>3</td>
<td>0957749</td>
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<td>1155649</td>
<td>Starzer Philipp</td>
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<tr>
<td>5</td>
<td>1255973</td>
<td>Thallner Stefan</td>
<td>521</td>
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340.027 Project in Pervasive Computing :: Schedule, Contents

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
<th>Date &amp; Time</th>
<th>Location</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>First meeting (Introduction)</td>
<td>Mo, March 14, 2016 (15:30-17:00)</td>
<td>S3 0614</td>
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<tr>
<td>2</td>
<td>„Related Work“/Concept presentation</td>
<td>Mo, April 4, 2016 (15:30-17:00)</td>
<td>S3 0614</td>
</tr>
<tr>
<td>3</td>
<td>Preliminary result (Prototype, demo)</td>
<td>Mo, May 9, 2016 (15:30-17:00)</td>
<td>S3 0614</td>
</tr>
<tr>
<td>4</td>
<td>Evaluation and results discussion</td>
<td>Mo, June 20, 2016 (15:30-17:00)</td>
<td>S3 0614</td>
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<tr>
<td>5</td>
<td>Write-up of the final report</td>
<td>n.n., (end of summer holidays 2016S?)</td>
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IEEE CS style, ca. 8-10 pages long
340.027 Project in Pervasive Computing :: 2nd Meeting

Related work presentation (basic information and hints)

- Slides in english, Presentations in english
- ca. 10 slides, ca. 15 min. presentation time
- Proposed structure
  a) Introduction (what is your topic?), Problems/Open issues, Challenges
  b) „Related work study“
     o Existing solutions? Related approaches in other domains?
     o Was is unsolved, constraints, what is better in my approach (innovation, creativity)?
     o Room for improvements?
  c) Methodology
     o System concept/design (considerations: why this way?)
     o Research questions/hypotheses
     o Innovation and creativity is appreciated!
  d) Identified (or expected) problems, how to solve? (e.g., how to compensate for sensor drift, inaccuracy of GPS), non-existing hardware, firmware problems, „beta“ channel/program
     o Think about potential issues very early in the design phase!
     o Discuss about alternatives or ways out...
  e) Time plan, Design of user study (quantitative/qualitative, lab/field, etc.)
Project in Pervasive Computing

List of Topics
Multi-Sensor/Actuator Platform

(I) **Cognitive Modelling** of users

(II) Evaluation of **Experience and Skill Levels** for selection of assistance and interaction mode

(III) **Knowledge Transfer Database** as stock of reference processes

(IV) **Deployment** of machine control commands and interaction feedback and assistance information to the interacting worker
Opposing two general sensing concepts

(i) local stationary sensor-actuator modules for the equipment of existing production infrastructure with sensors

(ii) mobile, wearable sensor modules - equipment of every worker with sensors, processing units and communication interfaces, embedded devices (Sensor Jacket), equipment of the infrastructure with communication receiver and actuators.
340.027 Project in Pervasive Computing :: Recognition Module
Public Displays: Pose/Gesture Tracking via Depth/RGB streams

- Behavior Analysis
- Body Pose Analysis
- Head Pose Estimation

Behavior Description
- Speed / Acceleration
- Direction / Orientation
- Taken Path / Detours

Classification
- Machine Learning algorithms (SVM) used for training and classification
- Real-time classification of overall and current attention values

Contact: A. Ferscha
Public Displays: Eye Tracking via Mobile (SMI 2.0, Google GLASS)

- Eye Gaze Features
  - Fixation
  - Saccades
- Mapping of Scans to Content
- Online Annotation of Content
- Online Recommender Coupling
- Reading Experience Classification
- Typology of Readers

Classification
- Machine Learning algorithms (SVM) used for training and classification
- Real-time classification of overall and current attention values

Contact: A. Ferscha
Problem definition, Approach

- (Visual) information overload is a topic of increasing importance. In this project, the influence of information transmitted in a subliminal manner should be investigated.
- Information, if displayed/flashed for only very short time (< 20ms; =subliminal) cannot be consciously detected/“seen” by the eye, but is recognized by the brain (electrical stimuli).
- To study this effect, a interface is required allowing for overlaying different types of information to normal screen contents (Webbrowser, Email-client, Word/Excel), and for measuring differences in their use with/without subliminal information.
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