

Rules & Regulations Dates & Times Resources Projects Discussion &

# Introduction Updated: May 10, 2019

Jörg Cassens

SoSe 2019

#### Lab Course Media Informatics



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## Welcome



Me

#### Welcome

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  - Building Samelsonplatz, Office A 115
- My Background

- Deutsch oder English
  - German: Du oder Sie
- Office Hours
  - Wednesday, 17:00-18:00



## Ме

#### Welcome

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- Projects
- Discussion & Attendance

- Jörg Cassens
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  - Building Samelsonplatz, Office A 115
- My Background
  - Media Informatics = Human-Centred Computing + Human-Computer Interaction + Artificial Intelligence + Digital Media + Transdisciplinarity + ...
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# What is a lab course?

- Single task every (n) week(s)
  - I give an assignment, you solve it
- **2** Big project being done by yourself
  - You get one task, I evaluate
- 3 Training practical skills through mid-sized project
  - More structured than the second option
  - Mixture of "lectures", group meetings and independent group work phases



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# What is a lab course?

- **1** Single task every (n) week(s)
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- Big project being done by yourself
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- 3 Training practical skills through mid-sized project
  - More structured than the second option
  - Mixture of "lectures", group meetings and independent group work phases

This lab course is of the third kind, with somewhat more supervision in the beginning and more and more independent work (but with reporting) at the end.



## Process

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#### **Problem-Based Learning**

Solving an open-ended problem found in trigger material. We do not focus on problem solving with a predefined solution, but we strive for the development of skills through solving a real world problem.



#### Process

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#### Problem-Based Learning

Solving an open-ended problem found in trigger material. We do not focus on problem solving with a predefined solution, but we strive for the development of skills through solving a real world problem.

#### Student-focused active learning

I provide guidance and scaffolding, you solve the problem. This type of process is not suited for learning basic knowledge, which is better served by lectures (cognitive load, retention of knowledge).



## Feedback

Agility

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The number of course vs. group meetings depends on the topics chosen, individual and group competencies and the need for support. Constant feedback is explicitly welcomed.

Just quitting the course does help neither you nor me, therefore, I would like to ask you to tell me about any problems with the course immediately (if needed anonymously).



#### Rules & Regulations

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# **Rules & Regulations**



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# Workload

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Workload

# Workload

- 3 SWS
  - About 2 SWS during term time
    - Course meetings
    - Group meetings
  - The rest group meetings & presentations during the autumn break
- 5 ECTS
- 125 hours
  - 45 hours course/group meeting
  - 80 hours self-study
- Self-study includes
  - 60 hours group work
  - 16 hours written documentation
  - 4 hours presentation (incl. preparation)
- If you want to finish the course during term time this translates to a workload of about 8 hours per week.



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## Credits



Credits

# Credits

## Data Analytics:

Elective – Application – Media Systems

## **IMIT (PO** $\leq$ **2011):** Veranstaltungen Master

- Gebiete der Informatik Gebiet Medieninformatik
- Gebiete der Informatik Gebiet Algorithmen
- IMIT, AI (PO ≥ 2014): Veranstaltungen Master
  - Wahlmodule Informatik Gebiet Medieninformatik

# LA Informatik:

Fachwissenschaftliche Vertiefung

## ■ WINF (PO ≤ 2011): Veranstaltungen Master, entweder

- Gebiete der Informatik, Gebiet Algorithmen
- Wahlbereich, Gebiet Medieninformatik
- WINF (PO ≥ 2014): Wahlbereich
- Other: Maßgabe des zuständigen Prüfungsausschusses



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## Learning Outcomes



## Lernziele

#### Aus dem Modulhandbuch:

[...] Erfolgreiche Studierende *konzipieren und realisieren* kleinere und mittlere *Projekte* im Bereich der Medieninformatik. Sie wenden dazu die in der Veranstaltung benutzten *Prinzipien, Methoden und Werkzeuge* an und kennen deren Möglichkeiten und Grenzen. Die Studierenden erlernen die *Lösung komplexer Probleme in kleinen Teams*. Hierfür sollen sie lernen, verschiedene Aufgaben zu identifizieren sowie komplexe Aufgaben in handhabbare Bestandteile zu zerlegen, und ihr Projekt so zu planen, dass sie das gesetzte Ziel erreichen. Das im bisherigen Studium *angeeignete Wissen* soll von ihnen *genutzt* werden, um sich die für die Aufgabe nötigen technischen und methodischen Fertigkeiten *anzueignen* [...]



## Learning Outcomes

# From the **course catalog**:

[...] Successful students *design and implement* small or medium sized *projects* in the area of media informatics. They make use of *principles, methods and tools* presented and know their limits and benefits. Students learn to *solve complex problems in teams*. To do this, they have to identify different tasks and divide complex tasks into solvable sub problems. They learn how to plan and manage their projects so that they can achieve the set goal. The *knowledge accumulated* in previous courses has to be *put to use* in order to *acquire* the technical and methodological competencies necessary to solve the task at hand [...]



# **Course Content**

#### From the **course catalog**:

- Requirements elicitation for multimedia systems
  - User-Centered Processes (Contextual Design, Scenario-Based Design)
- Design of multimedia systems
  - Prototypes, design methods
- Use of modern authoring tools
  - Android SDK, Arduino SDK, Livecode, gitlab, ...
- Implementation of multimedia applications
  - Java, Python, JavaScript, (angular, meteor, node), ...
- Project documentation and presentation
  - Writing a documentation and giving presentations



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## **Course Format**



# Project

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- Problem-based learning
- Student-focused active learning
- One project from requirements analysis up to a finished (prototypical) product
  - One larger task to be finished until the end of term or, if the group chooses so, until the end of autumn break
  - Group work in groups of 3-6 students (group size depends on size and complexity of task)
  - Topic suggestions will be made later in this slide deck
- Voluntary task if suited for the course
  - Product demos
  - Presentation of tools, methods and processes



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# Team Building

- Between 3 and 6 students
  - Vou cannot work individually, in groups of two or in groups larger than six
- Formation via topic
  - Groups of student can collectively decide on topics
  - Individual students can join groups for the topics
- If groups should get too big it is usually possible to divide them into sub-groups with independent topics
- The convener has the last word on who is in which group
  - Groups can be split or merged so they work smoothly
  - In case of problems, the convener will act as a mediator



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# Regulations



Regulations

# Admission

- The number of slots in the seminar is limited
  - Max 20 participants
  - Max 6 groups
- Admission to the course is prioritized as follows
- Attending the kick-off meeting
- 2 LA Informatik because of limited choice in the run-up of the programme
- Number of courses in the area of "Media Informatics" that have successfully been completed
- Special circumstance (work in the university self governance institutions, parenting, ...)
- 5 Year of study



Regulations

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# Exam

## Implementation of an artefact in media informatics

- Generally a software artefact
- Other types of artefact if accepted by convener

## 2 Two presentations

- Mid-project presentation
  - 30 minutes of presentation plus 15 minutes of discussion
  - Requirements analysis and concept done
- End-project presentation
  - 30 minutes of presentation plus 15 minutes of discussion
  - Description of artefact and process
  - Demonstration of the artefact

## 3 Written documentation

- Between (15 + n \* 5) and (25 + n \* 5) pages, where n is the number of group members
- The media informatics template has to be used
  - mi.kriwi.de/templates
- **Self-evaluation** of participants and groups



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# **Evaluation Criteria**



**Evaluation** Criteria

# **Evaluation Criteria**

- The exam grade takes both presentations, the development process, the documentation and the implemented artefact into account
  - Active participation in course discussions is required & can be part of grade
  - Presentations are exams, you are required to attend
    - Exemptions must be arranged with the convener at least seven days before your presentation
    - If no exemptions have been arranged with the convener by that date, you will need proof for urgent circumstances (e.g. a certificate of incapacity for work)
- You are committed when you accept a topic and do not withdraw seven days before your mid-project presentation

Detailed list of evaluation criteria can be found in the handout version of slide deck.



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## **Dates & Times**



# Options

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- There are two options for completing the course
  - Complete the whole task during term time, giving the mid-project presentation in the middle of summer term and the end-project presentation in the first exam period (beginning of break)
  - 2 Make use of the autumn break for the completion of the project, giving a mid-project presentation at the end of term and the end-project presentation in the second exam period (end of break)
- Each group decides for themselves which option to chose
- A group that decides to complete the course during the summer term has to state this intention one week before the scheduled mid-term presentations



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# Meetings

- Two different types of meetings
  - Course meetings
    - Topics of interest to everyone
    - Mid-project presentations
    - End-project presentations
  - Group meetings
    - What have we done recently?
    - What are we going to do next?
    - What are the problems, where is support needed?
- Course meetings during term
  - Wednesday, 14-16 o'clock (kick-off, topic meetings) or
  - Wednesday, 14-18 o'clock (presentations)
  - Samelsonplatz B 148
- Course meetings during autumn break
  - See schedule for details
- Group meetings on individual arrangements
  - Group meetings can be cancelled by the group if a meeting is not needed



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# Meetings

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  - Wednesday, 14-18 o'clock (presentations)
  - Samelsonplatz B 148
- Course meetings during autumn break
  - See schedule for details
- Group meetings on individual arrangements
  - Group meetings can be cancelled by the group if a meeting is not needed
- Any Conflicts?



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# Dates: During Term

- **10.4.**  $\triangleright$  Kick-off, topics announced (14-16)
- **17.4.**  $\triangleright$  Topics assigned, tools lecture (14-16)
- 23./24.4. <> Group meetings
- **30.4./1.5.** D No meetings (labour day, group formation)
  - **7./8.5.** ⊲ Group meetings
  - **14./15.5.** <\le Group meetings (Vollversammlung)
  - **21./22.5.**  $\Box$  No meetings (conference)
- **28./29.5.** ⊲ Group meetings
  - **5.6.** ▷ Mid-project-presentations (14-18) Campusfest
- 11./12.6. 
  No meetings (project week)
- **18./19.6.** ⊲ Group meetings
- 25./26.6. <> Group meetings
  - **2./3.7.** □ No meetings (conference)
  - 9./10.7. ⊲ Group meetings



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# Dates: Autumn Break

Groups deciding to finish during term:

- **5.6.**  $\triangleright$  Mid-project-presentations (14-18)
- **17.7.**  $\triangleright$  End-project-presentations (12-18)

Groups deciding to work during autumn break:

- **5.6.** ▷ Mid-project-presentations (14-18) *or*
- **17.7.** ▷ Mid-project-presentations (12-18)
- 5.8. 🛛 Status report (email)
- 26.8. 🛛 Status report (email)
  - 9.9. ⊠ Status report (email)

Meetings/hangouts if needed

**23.9.**  $\triangleright$  End-project presentations (12-18)



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# Dates: Deliverables

Deliverables for all groups:

- **15.4.** ⊠ Outline of own project idea (email)
- **9.8.** ⊠ Slides mid-project presentation (PDF, learnweb)
- **28.10.** 🛛 Project documentation (PDF, learnweb)
- **28.10.** ⊠ Artefact (how depends on artefact type)
- **28.10.**  $\boxtimes$  Slides end-project presentation (PDF, learnweb)
  - **11.11.** ⊠ Self-evaluation (learnweb)
  - **11.11.** ⊠ Project documentation (paper)

▷ in-person general course meetings
 ⊲ in-person project group meetings
 ⊠ deadlines for online or offline delivery
 □ no meetings
 Dates subject to change



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## Resources



#### Learnweb

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course: So19\_5497\_PraktMI, password: Course Number



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>	C D mi.kriwi.de/mi/		☆	-	
	Medieninformatik an der Universität Hildesheim				
	Vorlesung Medieninformatik	Lehre			
	Materialien zur Vorlesung und Übung in Medieninformatik im Wintersemester 2016/2017. Weitere Webseiten: [ Learnweb   LSF ]	Medleninformatik (VL+U) Contextual Design (VL+U) Visualization (VL+Ū)			
	Materialien	Seminar Praktikum/Lab			
	Folien, Handouts, Demos, Materialien aus vorhergehenden Semestern und Wolfram CDF-Worksheets.	Course Wissenschaftliches Arbeiten Abschlußarbeiten (@Uni)			

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# **Development Server**

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Resources

# Loan of Hardware

- You can get different types of devices from different sources
- Media Informatics
  - Embedded systems
    - Raspberry Pi, Arduino, Intel Galileo
    - Different sensors and actuators
  - Natural User Interfaces
    - 3D depth-imaging (kinect)
    - Hand gesture sensors (leap motion controller)
    - Webcams
    - Wii Remote and IR-pens
  - Mobile devices
    - Android-Tablets, Mobile phones
    - Windows Mobile, Blackberry OS
- Media technology by the University
  - Camera
  - Tripods
  - Microphones
- To a limited amount, we can purchase new devices



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#### Projects

ShareBoard Academic Writing Lecture Project Adaptive Learning Platform Privacy-respecting Learning Analytics Visual Annotator Video Concordancer Behavioural Interfact Ambient Systems ErRAI Interactive Exhibit BYOI

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# Projects

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In the following, I am going to introduce a number of possible project topics.

### Caveat

All ideas for projects are "underspecified" – what could or should be implemented depends on on how many of you commit to the different projects. It also depends on the competencies you bring into the project. Every project idea can be expanded as well as reduced. Not every project is suited for all group sizes, though. It does not make sense to let 6 people build an Arduino-based RFID scanner.

More information for the different projects can be found in the handout-version of the slides which will be available tomorrow.

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# ShareBoard



# ShareBoard: Examples

### Existing Work

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# ShareBoard: Status

**Existing Work** 

### What has been done before?

- First implementation (lab course)
- 3D-Gestures (large lab course)
- Diverse enhancements (Concept Maps, handwriting recognition, video chat; projects and bachelor theses)
- User-Avatars with depth keying (bachelor thesis)
- HTML5-Version (bachelor and master theses)
- Analysis of group behaviour when using ShareBoard for planning tasks (bachelor thesis)

### Technologies used

Java, C#, sensors (kinect), web technologies

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ShareBoard



# ShareBoard: Topics

### New Opportunities

- ShareBoard

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# Further development of web-version (ShareBoardJS)

- Starting from existing master thesis
- HTML-based, works out-of-the-box in the browser
- Uses angular.js and meteor.js

# Communication

- Video and Voice
- Support meetings, brainstorming, etc.

# Natural Interaction

- Supporting multi-modal interaction
- How do people interact with whiteboards?
- e.g. recognizing different situations and adaptation of the ShareBoard (context)

### Suggested technologies

### Sensors (kinect, leap), web technologies

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م Adaptive Learning Platform

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# Academic Writing: Status

**Existing Work** 

## What has been done before?

- Supporting academic text production (master thesis)
  - That could be you writing your next assignment, documentation, thesis
- Web-based system
  - Text-repository
  - Upload your own text in different formats
  - Preliminary analysis
    - Categorization, keywords
    - Statistics (Wordcount)

### Technologies used

Web technologies, web2py, NLP-tools

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# Academic Writing: Topics

New Opportunities

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## Supporting academic text production and reception

- Building on top of the existing pipeline
  - Text-repository
  - Upload own texts
    - Further analysis
  - Upload and analyse text you work with (references etc.)
  - Comparison with other texts
  - Visualization of key aspects
  - (Online-) support for the writing process
    - Finding other relevant texts
    - Support for citations
    - Citation management

### Suggested technologies

Web technologies, web2py, NLP-tools, machine learning



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# Lecture Project



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# Lecture Project

### New Opportunities

## The Lecture Project

- Suppose you have a system helping you understand lectures...
- Automatic recognition of important aspects of lectures from video
- Contextualised query-based summarization

# Early stages of project, big opportunities

- You might like to look at live behaviour tracking
  - or the corpus of videos
- or you might like to look at acoustic cues for importance
  - Emotion detection, affective computing
- or you might like to look at language modelling
  - linguistic models, NLP
- Cooperation with ongoing master thesis possible

### Suggested technologies

Web technologies, multi-modal analysis, NLP-tools, machine learning



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# Lecture Project

### New Opportunities

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# Adaptive Learning Platform

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#### Adaptive Learning Platform

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Research & develop a new adaptive learning platform

- Not just talking heads
- Adjust to needs and preferences of users
- Use sophisticated learning analytics to support the users
  - students
  - teachers

## Application Area

- Computer science curriculum for teachers
- Language learning
- Cooperation with an external partner possible

### Suggested technologies

### Web technologies, nlp-tools

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# Adaptive Learning Platform

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#### Adaptive Learning Platform

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# Privacy-respecting Learning Analytics

### New Opportunities

## Research & develop a anonymous learning analytics

- Use sophisticated learning analytics to support the users
  - students
  - teachers
- Make it possible to do so by preserving privacy
  - Virtual IDs for students and institutions
  - Privacy-preserving attendance tracking

# Application Area

- University or school courses
- Cooperation with ongoing bachelor thesis possible

### Suggested technologies

Sensors, actuators, web technologies, nlp-tools



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# Privacy-respecting Learning Analytics

### New Opportunities

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Visual Annotator

Video Concordancer Behavioural Interface Ambient Systems ExRAI Interactive Exhibit BYOI

Discussion & Attendance

#### oSe 2019

# **Visual Annotator**



# Visual Annotator: Example

### **Existing Work**

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IMPRESSION: Interval resolution of left frontal subdural fluid collection since previous exam of 3/27/13. Subtle right occipital non-displaced skull fracture.

Findings <u>consistent with</u> resolving right cerebellar contusion with small underlying focal cerebellar chronic infraction.

Supratentorial white matter disease consistent with chronic white matter ischemic changes.

Cerebral atrophy Minor mucosal inflammatory disease in the ethmoid air cells.

Resolution of the acute left sphenoid sinusitis.

- An annotator allows to mark, classify and annotate segments of texts (sentences, words, groups of words)
- Annotators are a basic tool for linguistic research



Visual Annotator: Topics

New Opportunities

## Build the collaborative online annotator

- Existing systems are restricted in the models that can be used and in usability
- In particular, there is a need for a web-based tool that allows for group collaboration
- The envisioned tool should also make it easy to annotate large corpora of texts
- Combination with machine learning tools is possible
- Cooperation with an external partner possible

### Suggested technologies

Web technologies, front-end development, machine learning, nlp-tools

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Visual Annotator: Topics

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# Video Concordancer



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# Video Concordancer

#### New Opportunities

- Video Concordancer
  - Several videos from field or lab studies
  - Finding & comparing videos
  - (Synchronous) annotation of videos
  - Multi-modality
  - Cooperation with an external partner possible

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### Suggested technologies

### Web technologies, front-end development



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### Suggested technologies

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# **Behavioural Interfaces**



# Star Trek Doors

Existing Work



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### Our Doors Existing Work



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Built as part of the Masters thesis of John Sverre Solem

Jörg Cassens – Introduction



Behavioural Interfaces

# Behavioural Interfaces: Status

Existing Work

## What is it?

- Behavioural Interfaces are interfaces that recognize and model user behaviour
- Can be used for e.g. intention recognition
  - Example star trek doors: automatic doors that do not open based on proximity (alone), but because they recognize the users' intentions to walk through the door

## What has been done before?

- Sliding Doors (2 Master Theses)
- Recognition of "Wandering behaviour" with Alzheimer's patient (Bachelor Thesis)

### **Technologies used**

### Java, reasoners, sensors (kinect)

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Behavioural Interfaces: Topics

Possible applications
Star-Trek-Doors 2.0

Other

Suggested technologies

Doors, whiteboards, lectures, Smart Rooms...

ShareBoard intention recognition

Cooperation with an external partner possible

Embedded systems, sensors (kinect), reasoning, machine learning

Connections to other topics mentioned (lecture project)

New Opportunities

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#### Jörg Cassens – Introduction

- Doors, whiteboards, lectures, Smart Rooms...
- Possible applications
  - Star-Trek-Doors 2.0
  - Other
    - ShareBoard intention recognition
    - Connections to other topics mentioned (lecture project)
- Cooperation with an external partner possible

#### Suggested technologies

Embedded systems, sensors (kinect), reasoning, machine learning



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## **Ambient Systems**

Jörg Cassens – Introduction



# Ambient Systems: Example

Existing Work

### **Context Awareness and Knowledge Environment**

Mate for Awareness in Teams



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### **Ambient Systems: Status Existing Work**

What has been done before

Server and protocols (case study)

Simulator CASi (lab course)

Different actuators and sensors (lab course)

Basic version in Python (Bachelor Thesis)

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**Technologies** used Java, reasoning



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Discussion & Attendance Ambient Systems: Topics

#### New Opportunities

#### Architecture

- Integration of Machine Learning and Reasoning
- PyCAKE and CAKE could act as starting point
  - or fresh start
- new sensors and actuators

### Applications

- Adaptive museum guide
- Ambient assisted living (AAL)
- Privacy respecting (Py-) CAKE in a Box
- Modelling, learning and reasoning

#### Suggested technologies

Java, Python, embedded systems, sensors (kinect, Leap), reasoning, machine learning



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### **ExRAI**



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# Explainable and Responsible AI: Topics

#### New Opportunities

- Not so much an topic on its own as a perspective on the other projects
- A lot of the topic areas include machine learning and artificial intelligence components
  - e.g. learning analytics, writing support, ambient systems
- This is about accountable, responsible, transparent, explainable systems
- Possible focus areas could include
  - (Multimodal) explanations of system behaviour
  - Dialogical aspects of explanation
- Cooperation with ongoing master thesis possible

#### Suggested technologies

Artificial intelligence, machine learning, nlp-tools, web technologies



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### **Interactive Exhibit**



### Interactive Exhibit: Examples Existing Work



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## Interactive Exhibit: Status

Existing Work

### What has been done before?

- Photo booth
  - An application uses depth-keying to identify a person
  - A raster image is saved
  - This image is converted to svg
- V-Plotter
  - Plotter made of Arduino, Raspberry, motors & servos
  - Can draw svg on paper
- Bandit Grendel
  - Mobile Game "Cops and Robbers"
  - Cops on the street, robber at home

#### Technologies used

Java, C, sensors (kinect), embedded systems, web technologies, mobile devices



# Interactive Exhibit: Topics

New Opportunities

### Further development of existing exhibit

- Automation or better support of existing workflow
- Better plotter
- Integration of 3D-modelling
- Balancing and enhancing the gameplay

### Something else that is exciting

#### Suggested technologies

Sensors (kinect, leap), actuators, web technologies, mobile devices



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### BYOI



# Bring Your Own Idea

- New applications based on your interests and competencies
- From requirements analysis to finished prototype
- Challenges:
  - Find and express ideas
  - Match my own competencies to ensure sufficient supervision
  - Choosing appropriate tools
- How to do it
  - You think about your project idea in a group
  - You write a one-page outline with a scenario on what the application will look like and send it to me next Monday evening at the latest
  - I will evaluate your proposal
    - Does it fit this course?
    - Am I able to supervise it?
    - Does it have an appropriate size (not too big, not too small)

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- Interactive Exhibit
- BYOI (please elaborate)



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## **Discussion & Attendance**



Discussion &

Attendance

# Attendance List I

Please fill in the forms that are being handed out

- If more than 20 people want to take the course the priorities defined earlier will be used
- Two types of lists
  - Several lists for groups
    - Please specify the time slots we can use for group meetings
    - You can specify up to 3 preferred time slots
  - One list for attendants without group preference yet
    - Use to mark your intent to take the course
- Groups have to be formed at the next meeting at the latest
- You can join any group where space is available
- If groups get larger than 6 they will be split



Discussion & Attendance

# Attendance List II

MI	Medieninformatik course taken
Seminar	Seminar Medieninformatik taken
CDIS	Contextual Design of Interactive Systems passed
	(previously Medieninformatik II)
Vis	Data & Process Visualization passed
Aml	Attending Contextualised Computing
	& Ambient Intelligent Systems
AI	Angewandte Informatik
DA	Data Analytics
IMIT	IMIT ©
LA Inf	Lehramt Informatik
WIN	Wirtschaftsinformatik
Other	Other program (please specify)



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# Group work and Discussion

- Questions and answers
- Team building
- Deficits that need to be addressed



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# Group Allocation

### Phase 1: Own ideas

1 You give an outline of an idea, it gets added to topics

## Phase 2: Elimination

- 1 You vote for any topic you would be willing to do
  - You have as many votes as you like
- 2 Eliminate topics with less than 3 votes

### Phase 3: Formation

- 1 You vote for the topic you like the most
  - You have one vote, signified through a Post-It
- 2 If you are in a group with less than 3 members
  - 1 Try to convince others to join
  - 2 If still less than 3, join another group
  - 3 Repeat till no group has less than 3 members
- If there a more than 6 groups with 3-6 primary members each
  - Eliminate topic with least interest (draw = coin toss)
  - 2 Repeat till max 6 groups, all with 3-6 members



### Contact

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    ür Mathematik und Angewandte Informatik
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  - Building Samelsonplatz, Office A 115
- Office Hours
  - Wednesday, 17:00-18:00

### Important: Register in Learnweb for email updates



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## Introduction Updated: May 10, 2019

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#### Lab Course Media Informatics



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