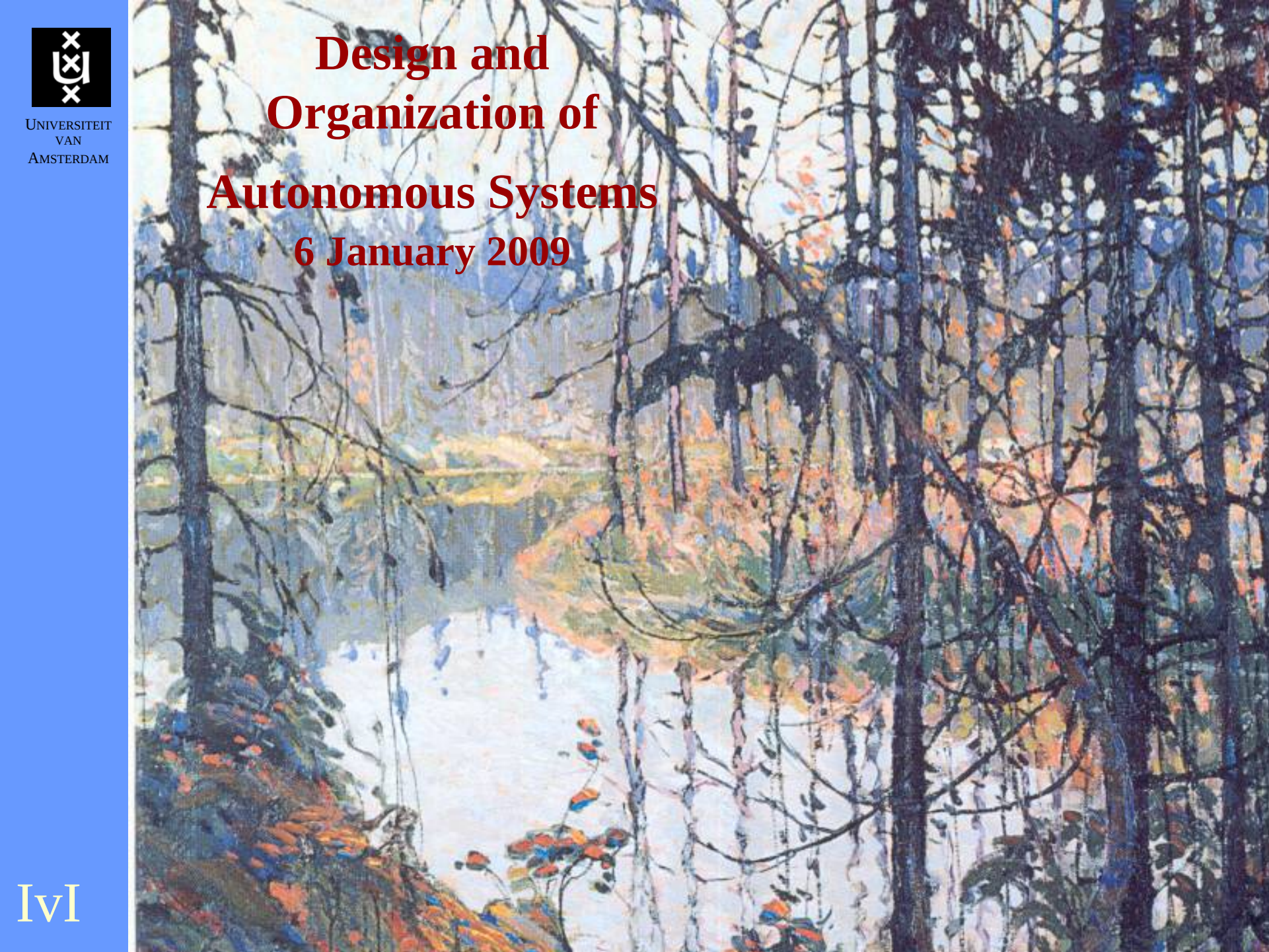

Design and Organization of Autonomous Systems

6 January 2009

Universiteit van Amsterdam

IvI

Objectives DOAS

- To know the concepts that are important in the design of Intelligent Autonomous Systems.
- To understand the problems that are to be solved.
- To identify the solutions found.
- To create a reference framework to situate future developments.

Organization DOAS

1. Today, we have a **small workshop** also giving some background of the research that is related to the project assignments.

2. For a month, the students will work in small groups on a specific project assignment, closely supervised by one of our senior researchers. An article is written about the project and its results.

3. A the end there is a mini-conference with external invites where your project and its results are presented. Your grade for this course will be based on the results of your project (article and presentation).

Project assignment

- The assignment will be a case study in designing and integrating a new algorithm in an existing autonomous system.

- During the project, the following aspects are important:
  - Perform a literature study to get acquainted with the existing autonomous system and the state-of-the-art on the subject of the new algorithm.
  - Make a clear assignment of tasks to the members of the team.
  - Document the technical progress during the project.
  - Finalize the project with an article and review the articles of the others.
  - Prepare a clear presentation to report about your project and its results on the mini-conference.

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Projects 2009

1. **Heterogeneous Robot Rescue Team**
   Arnoud Visser

2. **Looking-at-people: Multi-person tracking**
   Dariu Gavrila, Martijn Liem and Michael Hofmann

3. **Speech Recognition for Crisis Management Support**
   Marinus Maris

4. **Stereo based Motion Estimation for a Micro Arial Vehicle**
   Gijs Dubbeldam

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Schedule of Today

time	subject	lecturer
11:00 -11:15	introduction to the DOAS project	Frans Groen
11:15 - 11:35	description of the project: **Heterogeneous Robot Rescue Team**	Arnoud Visser
11:35 - 12:05	description of the project: **Looking-at-people : Multi-person tracking**	Dariu Gavrila
12:05 – 12:55	lunch	
12:55 -12:15	description of the project: **Speech Recognition for Crisis Management Support**	Marinus Maris
13:15 - 13:35	description of the project: **Exploiting time-coherences for autonomous vehicle vision tasks**	Gijs Dubbelman
13:35 - 14:00	formation of the project groups answering questions	

Plenairy meetings

- **Kick-off meeting,** Tuesdat 6th, 11:00-14:00
  Kruislaan 403, room F0.13.
- **Progress meeting,** Wednesday 14th, 15:00-17:00
  Kruislaan 403, room F0.13
- **Draft article**, Tuesday 27th, 9:00,
  pdf on website
- **Deadline review article** Wednesday 28th, 12:00
- **Deadline final article** Thursday 29th, 16:00,
  pdf on website
- **Mini-conference** Friday 30th, 10:00-14:00,
  Kruislaan 403.

Perception - Action Cycle

Real world

Perception

Model of the world

Action

Components

- **Perception**
  - Computer Vision
  - Sound interpretation
  - Gas sensors
  - Sensor networks
  - …..
- **Model**
  - Representation
  - Modeling and learning
  - Data fusion
  - SLAM
  - …..
- **Action**
  - Planning
  - Learning and adaptive behavior
  - Exploration, navigation
  - ……

Application Area's (1)

- **Crisis management** (project 1 and 3)
  inspection after disasters, Robot rescue
- **Surveillance and Safety** (project 2)
  watching over public places, fire and pollution detection
- **Service**
  cleaning devices, goods (food, mail) distribution, elderly care,…
- **Transport** (project 4)
  driver assistance, intelligent vehicles, automated highway, container transport, fully autonomous systems

Application Area's (2)

- **Space**
  planetary rovers, robot arms in space
- **Agriculture**
  harvesting, spraying
- **Entertainment**
  robot soccer, intelligent adaptive games, robots in film industry
- **Mining**
  unmanned excavation
- **Defense**
  mine detection, bomb dismantling, unmanned vehicles, robot soldier

Trends

- From ***structured static*** environments to ***unstructured dynamic*** environments
- From ***robots*** to ***embedded autonomy*** in existing systems
- Form single robots to **multi-robot** systems
- From **semi-autonomous** systems interacting with humans to **actor-agent** communities

Needs

- Real **robustness**
- To be able to operate in **human habited environments** (actor-agent communities)
- **Reactive to humans:** motion, gestures and speech….
- Able to operate in **unforeseen situations**.