

Project-Seminar

## RIKA

WS 2009/2010

Thursday, 14:15 – 17.15  
Prof. V. Turau, Prof. S. Schupp

## Goals

At the end of this project, students will be able

- to apply **object oriented analysis, design and implementation !!!!**
- to apply concepts, techniques and tools of modern information and communication systems:
  - system architectures
  - component based development
  - ...
- to **work in teams in a project-oriented way** (milestones, limited resources) !!!!
- to **present and defend their results in front of a technical audience !!!!**

## Preliminaries

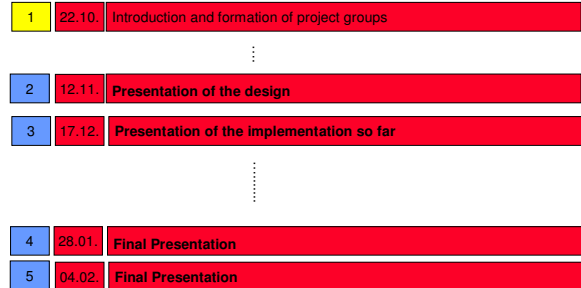
### Language:

- All slides in English
- Presentations in German or English
- Every presentation held by all team members

### Project work in small teams

- 4 persons per team
- Project management by the team itself!
- One supervisor per team, helping the team on request

## Project Plan with Deadlines



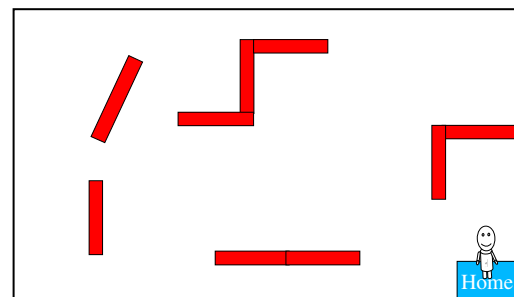
## 1. Explorer Project (Lego Mindstorms)

### Minimal requirements for **Explorer**.

STS

- Has a *home* where he starts exploring a closed place.
- Knows the size of the field but does not know where the elements are. Elements are walls, houses, gateways.
- Is able to learn the elements of the field (where they are).
- Is able to learn where he already was on the field.
- Can communicate with a software agent via Bluetooth. The software agent is responsible to learn the structure of the field. The agent can also be used for computation, storage of gathered data and implementation of strategic behaviour.

## Sample Field



## Lego Mindstorms Equipment

### □ Programming Environment: Java (Lejos)



- Servo Motors: Includes a built-in rotation sensor that measures speed and distance
- Touch Sensors: It can detect single or multiple button presses
- Light Sensors: Enables your robot to distinguish between light and dark
- Sound Sensors: for measuring noise levels in both dB and dBA
- Ultrasonic sensors: helps your NXT robot judge distances and "see" where objects are
- Bluetooth
- Colour Sensors: can distinguish some colours (see spec.)
- Compass: is able to measure the earth's magnetic field and calculates a magnetic heading to tell which direction your robot is facing



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## 2. Computer and Computer Lab online booking system STS

- An organization has several institutes. Each institute might wish to make their computers available for members. An institute can register itself as a computer provider which has to be confirmed by the system administration
- Each computer has a description of architecture a configuration of installed software which can be shared by several computers and a free text descriptions, e.g., for additional software. A computer resides in a room.
- A registered provider can create rooms with location description and computer descriptions. A room must be associated with bookable periods (Mo-Fr, 8.00-17.00, Oct-Feb). Before publishing a bookable period the provider might pre-book dates for himself or another institute.
- The institution members can book a computer, several computers or a computer lab in a bookable period.
- The booking types are those that can be found in calendar systems (single date, repetitions, ...). Therefore, a standard implementation should be chosen and integrated with the rest of the booking system.

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## 3. Combinatorial Auctions Project

### □ Requirements

STS

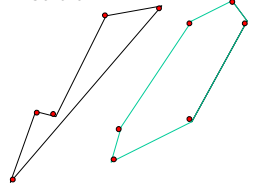
- A shipper can announce a set of goods to be transported to different locations.
- Transport agents can bid for subsets of goods and will get some goods to be shipped.
- Transport agents can then cooperate to fulfil their contracts and shorten their routes through a combinatorial auction. The goal is to optimize the net profit of the collaborative agent society.
- Simulation environment that shows the actions of the auction, auction outcome, initial routes, routes after cooperation.
- Interface for creating and executing the auction.
- Use some existing software to find "optimal" routes is recommended. Thus, more than one solution is possible by integrating different versions.

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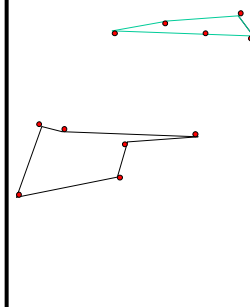
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## Combinatorial Auction Outcome

before



after

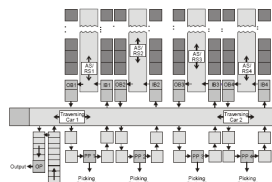


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## 4. Sequencing Traversing Cars in a Warehouse

STS



- Traversing cars have to move goods from a location (IP, OBx, PPx) to a destination (OP, PPx, IBx).
- Each transport is an order (Looks like TSP).
- Orders arrive continuously.
- For a minimal solution assume there is only one car.
- Use different heuristic search methods to find an approximately optimal schedule (ACS, Genetic Algo, ...).
- Output statistics that are able to compare results of different runs.
- Build a simulation environment to visualize the order execution.

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## 5. Student Project Proposal - IT-Quiz Webportal

### Requirements:

STS

- User webportal offers the possibility for a user to have a detailed profile with personal data and quiz progress level and to send messages internally.
- Small programming tasks are categorized according to their language and difficulty level.
- No user-side software installation is required, all tasks are solved in web-browser and submitted to the server.
- Server performs compilation of the submitted code and runs it in sandboxed environment to check if the task requirements are met. As soon as the requirements are checked the task score is added to the overall user rating.

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## 5. IT-Quiz Webportal

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Ideas for technologies to use:

- Use of .Net-Plattform is recommended (but not required)
  - WebPortal frameworks (DotNetNuke, ASP.NET Portal Start Kit, Umbraco CMS etc.)
  - Portal Server for customization (SharePoint)
  - MVC web technology (ASP.NET MVC)
  - Rich Internet Application technology (Silverlight)
  - Dynamic compilation through CsharpCodeProvider.
  - Sandboxing using Code Access Security.
- Use of other platforms (Java, PHP) can be discussed.

## 6. Student Project Proposal – Web based CRM

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- ▶ A web-based application, implementing a logic for collection, management and control of business relevant data, received through communication with the company's clients STS
- ▶ Employees call the clients and collect information, such as level of satisfaction, readiness to further cooperation, desirable improvements etc.
- ▶ System supports roles differentiation (e.g. which employees are allowed to work with which clients data).
- ▶ System contains a predefined set of questions and a set of probable answers as well as the possibility to provide own answer
- ▶ Collected data is stored and the capability for further reports generation is provided
- ▶ The core functionality might be extended with additional features, such as integration with the PBXs through the SIP protocol in order to seamlessly integrate the communication process to the system