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▼ Slack channel: https://cs383s2017.slack.com/
▼ Course website: http://cs.allegheny.edu/sites/jjumadinova/teaching/220
▼ Bitbucket repositories
  - create your own: cs383s2017-username
  - course repository: cs383s2017-share
Class exercises: class participation
Administrative Matters

- Class exercises: class participation
- Lab assignments (some include community engagement)
Administrative Matters

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- Presentation assignments
Administrative Matters

- Class exercises: class participation
- Lab assignments (some include community engagement)
- Presentation assignments
- Quizzes: about three
Administrative Matters

- Class exercises: class participation
- Lab assignments (some include community engagement)
- Presentation assignments
- Quizzes: about three
- Course project
## Administrative Matters

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Assignments</td>
<td>45%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Final Project</td>
<td>30%</td>
</tr>
</tbody>
</table>
Topics are intertwined

- Game Theory
- Robot Control and Navigation
- Coverage
- Biologically Inspired Algorithms
- Communication
- Auctions
- Information/Sensor Fusion
- Human-robot Interaction
Today

Broad Overview of the Multi-Agent System
Expanding Computer Science: Agents

An agent is a computer system that is capable of independent action on behalf of its user or owner.
An Agent

An agent is a computer system that is capable of independent action on behalf of its user or owner.
Expanding Computer Science: Multiple Agents

A Multi-Agent System

A multi-agent system is a system that consists of a number of agents which interact with one-another.
Expanding Computer Science: Multiple Agents

A Multi-Agent System

A multi-agent system is a system that consists of a number of agents which interact with one-another.
Multi-Agent Systems

Multiagent Systems are based on autonomous, intelligent agents

- Autonomy
- Reactivity
- Proactivity
- Social Ability
A Multi-Agent System

The field of multi-agent systems is influenced and inspired by many other fields:

- Game Theory
- Economics
- Philosophy
- Logic
- Social Sciences
- Ecology
- etc.
Working Together

- Cooperative Distributed Problem Solving
- Task Sharing
- Result Sharing
- Coordination
Typical Structure of a Multiagent System

Making Decisions

- Multiagent Interactions
  - Preferences and Utilities
  - Techniques to find choices (e.g., Nash Equilibria)

- Making Group Decisions
  - Voting Procedures
  - Auctions
From a Multi-Agent to a Multi-Robot System

Add hardware constraints (noise)
Remove assumptions (movements)
Robot Reanactment

- Need 3 volunteers!
Robot Reenactment

- Need 3 volunteers!
- Robot brain, vision system, two arms
- The arms and the brain are facing away from the table on which the boxes are placed.
1. The brain can talk to any or all of the other three robot parts.
2. The arms follow the directions of the brain.
3. The arms can understand directions in terms of moving their hands given distance in a given direction, up, down, left, right, forward, and backward.
4. The arms can answer yes/no questions from the brain and they can tell whether they are touching something or not. They cannot distinguish the table from the boxes or the other arm.
5. The vision system can answer any questions posed to it by the brain. The vision system can easily distinguish the table from the boxes and can estimate distances fairly well.
6. The vision system is allowed to move around to get a better view of the scene.