CS 378: Autonomous Intelligent Robotics (FRI)

Dr. Todd Hester

Are there any questions?

Talks

- **Justin Hart**
  - Robot Self Modeling & Creating Perceptions of Agency
  - Friday, April 19, 11 AM, PAI 3.14
- **Michael Kaess**
  - Apr. 23, 2013, 11:00am-12:00pm, ACE 2.302
  - "Robust and Efficient Real-time Mapping for Autonomous Robots"

Upcoming Talks

- **Yasutaka Furukawa**
  - Apr. 25, 2013, 11:00am-12:00pm, GDC 2.216
  - "Reconstruct and Visualize the World: From Academic Research to Product Deployment"

Logistics

- Topic Schedule
  - Today - Multi-Robot Coordination
  - Tuesday 4/30 - Reinforcement Learning
- Fall Class
  - Doodle Survey on piazza

Demos

- Nothing formal or prepared required
- Just show whatever you have working
- Visualizations, etc.
- About 5 minutes
- Demos last week

Demos This Thursday

- Visual_Odometry - Gisela Rossi, Hernaldo Nunez
- PersonRecognition - Ethan Jennings, Mukund Rathi, Chris de la Iglesia
- WiFi_Localization - Robert Lynch, Josh Eversmann
- MappingAndNavigation - Emily Tarrant, Kim Phung N Tran
- Obstacle Navigation - Victor Yap, Daniel Cheng, Eysa Lee
- Task Allocation - Greg Cerna, Zo Asmail
- BuildingInfoUI - Karl Kuhlman
- InteractiveTouchKiosks - Matt Broussard, Robert Lynch

Final Projects

- Two Goals
  - Final term paper. Show me what you did.
  - Enable others to understand/use/integrate your project
- Three components
  - Final report
  - Source code
  - Demo video

Final Report

- 6 pages double spaced
- Like a conference paper
  - Sections, citations, figure/table
- Well-written abstract
- 3 citations. Compare with related work.
- Team member roles
- Link to source code
- Experimental results
- Not a story. A report
- Proofread and spell-check!
- Hard copy due in class Thursday 5/2

Source Code

- Public github repository
- Include a README file.
  - How do we run your code?
  - What nodes/launch files should we run?
  - What parameters do we need to know?
  - What external packages do we need?
- Include a link to the code in the report and with the video.

Demo Video

- 1-2 minute video
- Explain and demonstrate your project
- Each group member should speak
- Each video should have a title slide
  - Project name, group members, class, and instructor
- Post videos to youtube
- In description, put:
  - Project name, group members, class, instructor
  - Abstract
  - Link to source code
- Post links to videos on piazza by 5pm 5/10

Today

- Multi-Robot Coordination

Why multiple robots?

- Problem too hard for single robot
- Interact with legacy systems
- Natural approach to problem
- Spatial distribution
- Distribution of specialists/experts
- Reliability, extendability, flexibility

Approaches

- Hierarchy
- Community of experts
- Market / Auction
- Swarm
- Ad hoc teams

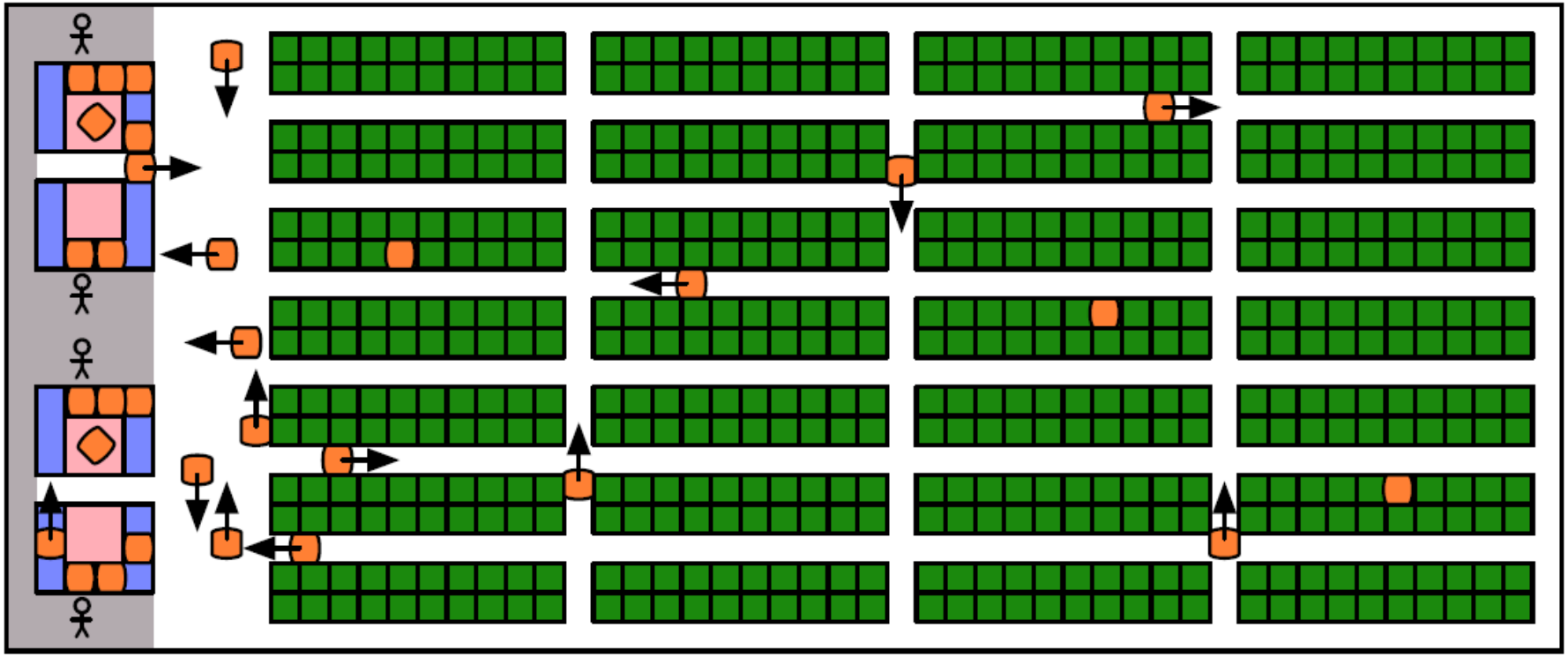
Challenges

- Task Allocation
- Multi-agent planning
- Resolving Conflicts
- Modeling other agents
- Communication
- Resources

Kiva Systems

http://www.kivasystems.com/resources/videos/press/segment-on-the-daily-planet-2006/

Kiva



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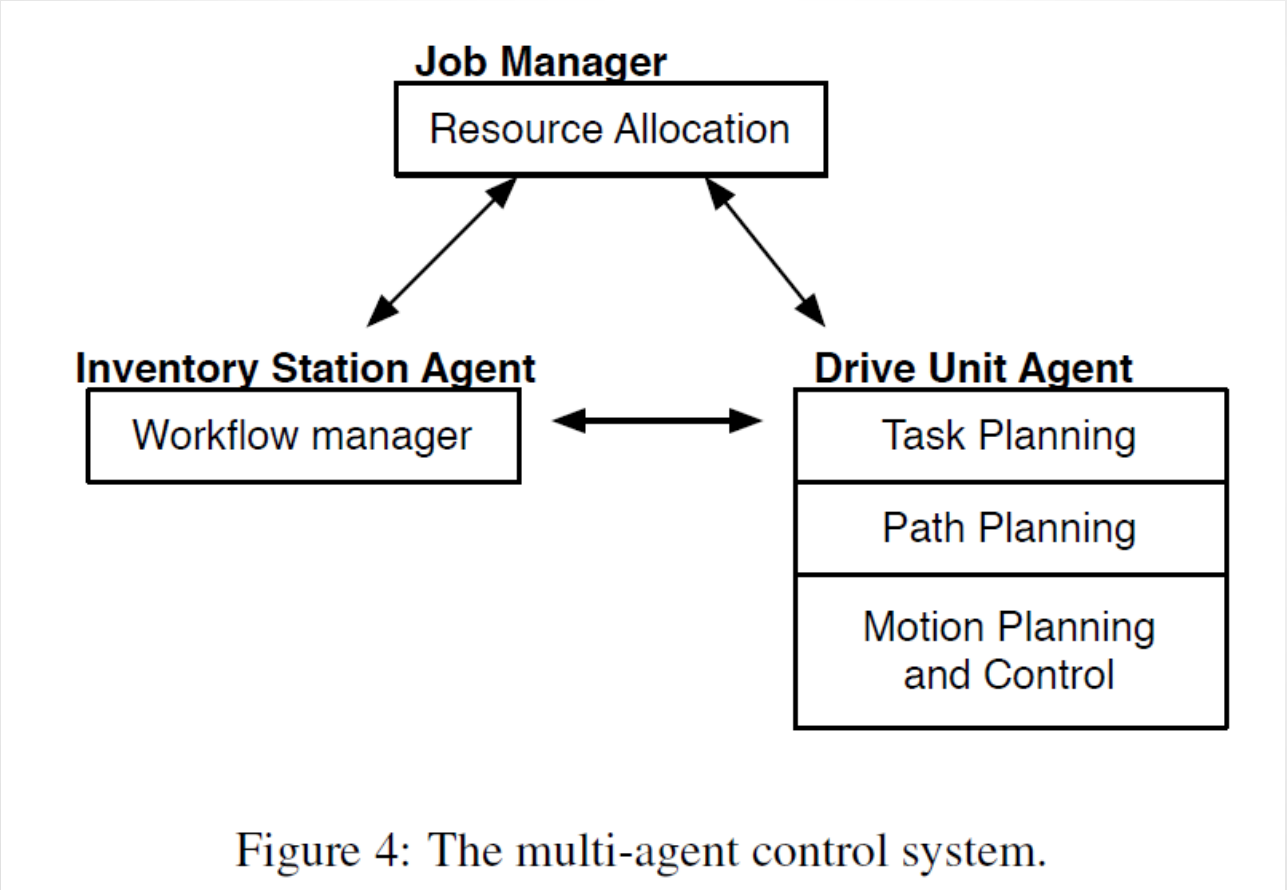


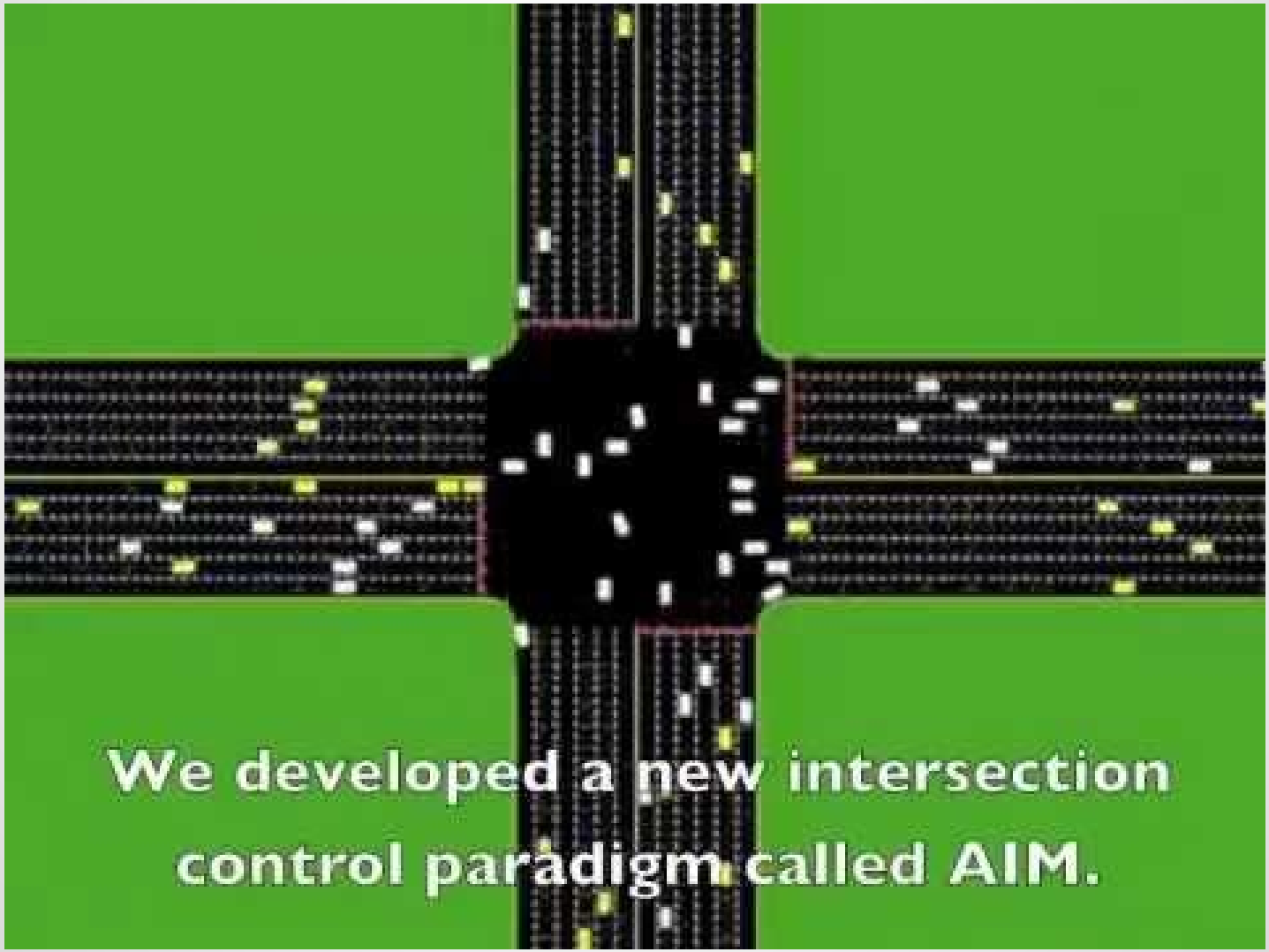
Figure 4: The multi-agent control system.

Optimization Problems

- Which jobs to which stations?
  - Same products?
- Which pods and drive units?
  - Distance, have products?
- Replenishment
  - Where to store a product?
- Pod storage
  - Distance drive unit has to go
  - Closeness of this product for next time

- Connections with our project?

Autonomous Intersection Management (AIM)



AIM

Slides

Connections to our project?

Continuous Area Sweeping

http://www.cs.utexas.edu/~AustinVilla/?p=research/surveillance

Swarms

http://www.red3d.com/cwr/steer/

Ad Hoc Teams

- Don't know the agents you will be working with
- Possibly can't communicate

- Any use for our project?

Readings

- Tell us about what paper you read
- What did they do?
- How did they test it?
- How does it relate to our project?

Thursday

Meet in Lab