

CS378

Autonomous Multiagent Systems

Spring 2004

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Final RoboCup Tournament
Thursday, May 13th, 2004

Agents

1. Sense
2. Decide (“think”)
3. Act

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3. Act

Situated in an Environment

Environments

Environment \Rightarrow sensations, actions

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Environment \Rightarrow sensations, actions

- fully observable vs. partially observable
- deterministic vs. non-deterministic
- episodic vs. non-episodic
- static vs. dynamic
- discrete vs. continuous
- single-agent vs. multiagent

An international AI and Robotics research initiative

RoboCup

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- Use **soccer** as a rich and realistic test-bed

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 - 2 teams of agents on a field with 2 goals
 - **Purpose:** direct ball into opponent's goal

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- Robot and simulation **competitions**

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- Use **soccer** as a rich and realistic test-bed
 - 2 teams of agents on a field with 2 goals
 - **Purpose:** direct ball into opponent's goal
- Robot and simulation **competitions**
- Workshops; RoboCup-Jr; RoboCup-Rescue

Research Challenges

- Multiple **teammates** with a common goal
- Multiple **adversaries** — not known in advance

Research Challenges

- Multiple **teammates** with a common goal
- Multiple **adversaries** — not known in advance
- **Real-time** decision making necessary
- **Noisy** sensors and actuators
- Enormous state-space

RoboCup Simulator

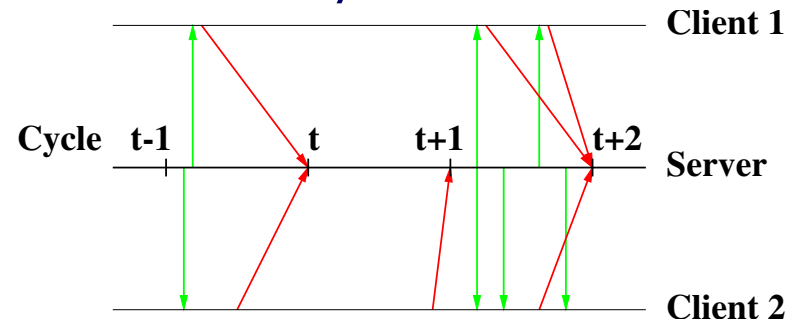


RoboCup Simulator

- Distributed: each player a separate client
- Server models dynamics and kinematics

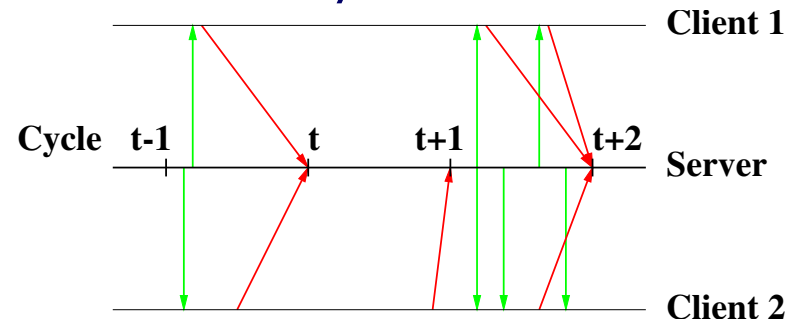
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- Clients receive **sensations**, send **actions**



RoboCup Simulator

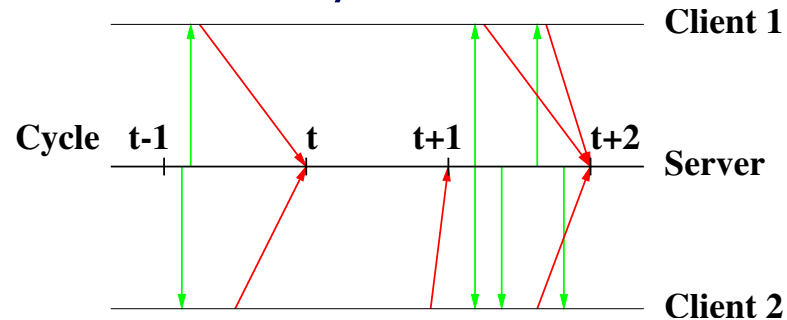
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- Clients receive **sensations**, send **actions**



- Parametric actions: **dash, turn, kick, say**

RoboCup Simulator

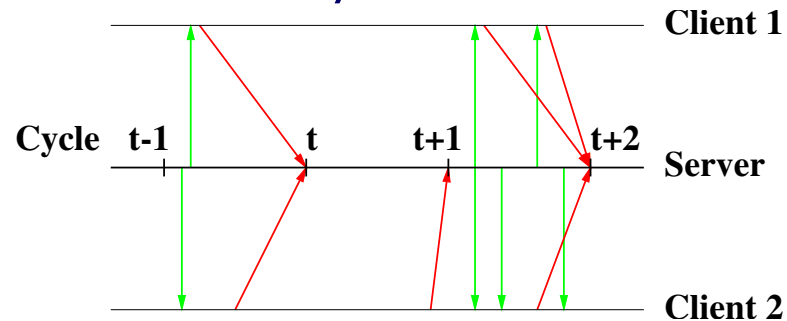
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- Abstract, noisy sensors, hidden state
 - **Hear** sounds from limited distance
 - **See** relative distance, angle to objects ahead

RoboCup Simulator

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- Server models dynamics and kinematics
- Clients receive **sensations**, send **actions**



- Parametric actions: **dash, turn, kick, say**
- Abstract, noisy sensors, hidden state
 - **Hear** sounds from limited distance
 - **See** relative distance, angle to objects ahead
- $> 10^{9^{23}}$ states
- Limited resources : stamina
- Play occurs in **real time** (\approx human parameters)

Schedule

1. Overview
2. **Tournament preliminaries**
3. *Video: real soccer robots*
4. Tournament playoffs
5. Challenge match: winner vs. UvA-trilearn 2003
6. *(More videos)*

The Teams

1. **Soccer Fascists**
2. **G-Cipher**
3. **Kablip_FC**
4. **Ottomans**
5. **CG United**
6. **MISC**

Sura and Hwang

Barksdale and Morris

Kane, Issen, and Parkeh

Deligonul and Ciftci

Su and Bradley

Lewis

7. **PG-11**
8. **The Big O's**
9. **Serendipity**
10. **Node Warrior**
11. **Team Quarks**
12. **Team Stamina**

Li and Fayyaz

Shao and Jones

Trimble and Hatfield

Fakhreddine and Clark

Chuah and Dasler

High and Ulrich

The Tournament

- Break into 2 groups of 6 for **round robins**

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- 2 from each group go to **semifinals**

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- Break into 2 groups of 6 for **round robins**
- 2 from each group go to **semifinals**
- Run **off-line**, but results kept secret

	A	B	C	D	E	F
A Fascists	—					
B G-Ciper		—				
C Kablip_FC			—			
D Ottomans				—		
E CG United					—	
F MISC						—

	G	H	I	J	K	L
G PG-11	—					
H Big O's		—				
I Serendipity			—			
J Node Warrior				—		
K Team Quarks					—	
L Team Stamina						—

Group 2

	G	H	I	J	K	L
G PG-11	—					*
H Big O's		—				
I Serendipity			—			
J Node Warrior				—		
K Team Quarks					—	
L Team Stamina						—

Group 2

	G	H	I	J	K	L
G PG-11	—					2-2
H Big O's		—				
I Serendipity			—			
J Node Warrior			*	—		
K Team Quarks					—	
L Team Stamina	2-2					—

Group 2

	G	H	I	J	K	L
G PG-11	—					2–2
H Big O's		—				
I Serendipity			—	3–0		
J Node Warrior			0–3	—		
K Team Quarks					—	
L Team Stamina	2–2	*				—

Group 2

	G	H	I	J	K	L
G PG-11	—					2-2
H Big O's		—				1-1
I Serendipity			—	3-0		
J Node Warrior			0-3	—		
K Team Quarks				*	—	
L Team Stamina	2-2	1-1				—

Group 2

	G	H	I	J	K	L
G PG-11	—				*	2–2
H Big O's		—				1–1
I Serendipity			—	3–0		
J Node Warrior			0–3	—	0–4	
K Team Quarks				4–0	—	
L Team Stamina	2–2	1–1				—

Group 2

	G	H	I	J	K	L
G PG-11	—				1-0	2-2
H Big O's		—				1-1
I Serendipity			—	3-0		
J Node Warrior			0-3	—	0-4	
K Team Quarks	0-1			4-0	—	
L Team Stamina	2-2	1-1				—

Group 2

	G	H	I	J	K	L
G PG-11	—			8–0	1–0	2–2
H Big O's		—		2–0		1–1
I Serendipity	*		—	3–0		
J Node Warrior	0–8	0–2	0–3	—	0–4	0–5
K Team Quarks	0–1			4–0	—	
L Team Stamina	2–2	1–1		5–0		—

Group 2

	G	H	I	J	K	L
G PG-11	—		2–3	8–0	1–0	2–2
H Big O's		—		2–0		1–1
I Serendipity	3–2		—	3–0		
J Node Warrior	0–8	0–2	0–3	—	0–4	0–5
K Team Quarks	0–1			4–0	—	
L Team Stamina	2–2	1–1		5–0		—

Group 2

	G	H	I	J	K	L
G PG-11	—	0–2	2–3	8–0	1–0	2–2
H Big O's	2–0	—	*	2–0	6–0	1–1
I Serendipity	3–2		—	3–0	2–0	
J Node Warrior	0–8	0–2	0–3	—	0–4	0–5
K Team Quarks	0–1	0–6	0–2	4–0	—	0–0
L Team Stamina	2–2	1–1		5–0	0–0	—

Group 2

	G	H	I	J	K	L
G PG-11	—	0–2	2–3	8–0	1–0	2–2
H Big O's	2–0	—	5–1	2–0	6–0	1–1
I Serendipity	3–2	1–5	—	3–0	2–0	*
J Node Warrior	0–8	0–2	0–3	—	0–4	0–5
K Team Quarks	0–1	0–6	0–2	4–0	—	0–0
L Team Stamina	2–2	1–1		5–0	0–0	—

Group 2

	G	H	I	J	K	L	Rank
G PG-11	—	0–2	2–3	8–0	1–0	2–2	4
H Big O's	2–0	—	5–1	2–0	6–0	1–1	1
I Serendipity	3–2	1–5	—	3–0	2–0	1–2	3
J Node Warrior	0–8	0–2	0–3	—	0–4	0–5	6
K Team Quarks	0–1	0–6	0–2	4–0	—	0–0	5
L Team Stamina	2–2	1–1	2–1	5–0	0–0	—	2

Group 1

	A	B	C	D	E	F
A Fascists	—					
B G-Ciper		—				
C Kablip_FC			—			
D Ottomans				—		
E CG United					—	
F MISC				*		—

Group 1

	A	B	C	D	E	F
A Fascists	—			*		13–0
B G-Ciper		—				24–0
C Kablip_FC			—			2–0
D Ottomans				—		28–0
E CG United					—	24–0
F MISC	0–13	0–24	0–2	0–28	0–24	—

Group 1

	A	B	C	D	E	F
A Fascists	—			2–0		13–0
B G-Ciper	*	—				24–0
C Kablip_FC			—			2–0
D Ottomans	0–2			—		28–0
E CG United					—	24–0
F MISC	0–13	0–24	0–2	0–28	0–24	—

Group 1

	A	B	C	D	E	F
A Fascists	—	0–4		2–0		13–0
B G-Ciper	4–0	—				24–0
C Kablip_FC			—			2–0
D Ottomans	0–2			—		28–0
E CG United	*				—	24–0
F MISC	0–13	0–24	0–2	0–28	0–24	—

Group 1

	A	B	C	D	E	F
A Fascists	—	0–4	0–5	2–0	1–10	13–0
B G-Ciper	4–0	—				24–0
C Kablip_FC	5–0		—		*	2–0
D Ottomans	0–2			—		28–0
E CG United	10–1				—	24–0
F MISC	0–13	0–24	0–2	0–28	0–24	—

Group 1

	A	B	C	D	E	F
A Fascists	—	0–4	0–5	2–0	1–10	13–0
B G-Ciper	4–0	—	0–0			24–0
C Kablip_FC	5–0	0–0	—	8–1	5–2	2–0
D Ottomans	0–2	*	1–8	—		28–0
E CG United	10–1		2–5		—	24–0
F MISC	0–13	0–24	0–2	0–28	0–24	—

Group 1

	A	B	C	D	E	F
A Fascists	—	0–4	0–5	2–0	1–10	13–0
B G-Ciper	4–0	—	0–0	0–1	*	24–0
C Kablip_FC	5–0	0–0	—	8–1	5–2	2–0
D Ottomans	0–2	1–0	1–8	—	2–0	28–0
E CG United	10–1		2–5	0–2	—	24–0
F MISC	0–13	0–24	0–2	0–28	0–24	—

Group 1

	A	B	C	D	E	F	Rank
A Fascists	—	0–4	0–5	2–0	1–10	13–0	5
B G-Ciper	4–0	—	0–0	0–1	0–0	24–0	3
C Kablip_FC	5–0	0–0	—	8–1	5–2	2–0	1
D Ottomans	0–2	1–0	1–8	—	2–0	28–0	2
E CG United	10–1	0–0	2–5	0–2	—	24–0	4
F MISC	0–13	0–24	0–2	0–28	0–24	—	6

Playoffs

11th Place: MISC vs. NodeWarriors *

9th Place: Fascists vs. Quarks

7th Place: CG United vs. PG-11

5th Place: G-Cipher vs. Serendipity

Semifinal: Ottomans vs. Big O's

Semifinal: Kablip vs. Team Stamina

3rd Place: ? vs. ?

1st Place: ? vs. ?

Playoffs

11th Place: MISC vs. NodeWarriors

1–3

9th Place: Fascists vs. Quarks *

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3rd Place: ? vs. ?

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Playoffs

11th Place: MISC vs. NodeWarriors 1–3

9th Place: Fascists vs. Quarks 0–1

7th Place: CG United vs. PG-11 *

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3rd Place: ? vs. ?

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Playoffs

11th Place: MISC vs. NodeWarriors 1–3

9th Place: Fascists vs. Quarks 0–1

7th Place: CG United vs. PG-11 2–1

5th Place: G-Cipher vs. Serendipity *

Semifinal: Ottomans vs. Big O's

Semifinal: Kablip vs. Team Stamina

3rd Place: ? vs. ?

1st Place: ? vs. ?

Playoffs

11th Place:	MISC vs. NodeWarriors	1–3
9th Place:	Fascists vs. Quarks	0–1
7th Place:	CG United vs. PG-11	2–1
5th Place:	G-Cipher vs. Serendipity	7–1
Semifinal:	Ottomans vs. Big O's *	
Semifinal:	Kablip vs. Team Stamina	
3rd Place:	? vs. ?	
1st Place:	? vs. ?	

Playoffs

11th Place: MISC vs. NodeWarriors	1–3
9th Place: Fascists vs. Quarks	0–1
7th Place: CG United vs. PG-11	2–1
5th Place: G-Cipher vs. Serendipity	7–1
Semifinal: Ottomans vs. Big O's	2–0
Semifinal: Kablip vs. Team Stamina *	
3rd Place: Big O's vs. ?	
1st Place: Ottomans vs. ?	

Playoffs

11th Place: MISC vs. NodeWarriors	1–3
9th Place: Fascists vs. Quarks	0–1
7th Place: CG United vs. PG-11	2–1
5th Place: G-Cipher vs. Serendipity	7–1
Semifinal: Ottomans vs. Big O's	2–0
Semifinal: Kablip vs. Team Stamina	0–2
3rd Place: Big O's vs. Kablip *	
1st Place: Ottomans vs. Team Stamina	

Playoffs

11th Place: MISC vs. NodeWarriors	1–3
9th Place: Fascists vs. Quarks	0–1
7th Place: CG United vs. PG-11	2–1
5th Place: G-Cipher vs. Serendipity	7–1
Semifinal: Ottomans vs. Big O's	2–0
Semifinal: Kablip vs. Team Stamina	0–2
3rd Place: Big O's vs. Kablip	1–0
1st Place: Ottomans vs. Team Stamina *	

Playoffs

11th Place: MISC vs. NodeWarriors	1–3
9th Place: Fascists vs. Quarks	0–1
7th Place: CG United vs. PG-11	2–1
5th Place: G-Cipher vs. Serendipity	7–1
Semifinal: Ottomans vs. Big O's	2–0
Semifinal: Kablip vs. Team Stamina	0–2
3rd Place: Big O's vs. Kablip	1–0
1st Place: Ottomans vs. Team Stamina	0–1

Final Standings

1. Team Stamina	High and Ulrich
2. Ottomans	Deligonul and Ciftci
3. The Big O's	Shao and Jones
4. Kablip_FC	Kane, Issen, and Parkeh
5. G-Cipher	Barksdale and Morris
6. Serendipity	Trimble and Hatfield
7. CG United	Su and Bradley
8. PG-11	Li and Fayyaz
9. Team Quarks	Chuah and Dasler
10. Soccer Fascists	Sura and Hwang
11. Node Warrior	Fakhreddine and Clark
12. MISC	Lewis

Challenge Match

Team Stamina vs. UvA-Trilearn 2003

For More Information

- www.robocup.org
- www.cs.utexas.edu/~pstone

**Layered Learning in Multiagent Systems:
A Winning Approach to Robotic Soccer**
Peter Stone. MIT Press, 2000.