Sharedo: To-Do List Interface for Human-Agent Task Sharing

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Background

Sharedo: To-Do List Interface for Human-Agent Task Sharing
Agents are Smart

• Task Coordination e.g. Electric Elves [Scerri et al., AAMAS ‘03]
  • Tasks are automatically assigned to appropriate agents
  • The user just needs to confirm the execution

• Task Execution e.g. Roomba
  • Agents can automatically handle tasks instead of users
  • The user is relieved from tedious tasks

How should the task be completed?

User Interface is Important

Sharedo: http://junkato.jp/sharedo/
User Interface is Important

• User Interfaces for Task Execution
  • The user can intuitively specify the task details

- Augmented Reality
  - TouchMe [Hashimoto et al., ICAT ’11]

- Printed Marker
  - Magic Cards [Zhao et al., CHI ’09]

- Joystick

- Graphical User Interface
  - Cooky [Sugiura et al., CHI ’10]

How about Task Coordination?

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Who should handle it?

• Do you always want **Roomba** to clean your room?
• Do you always want **Amazon** to deliver products?
• Do you want **PCs** to watch movies instead of you?
• There are always **good** and **bad** things about automation – we should always have **choices**.
Sharedo

• **To-Do List** Interface that allows to
  • **Share** tasks with agents
  • **Discuss** task details with agents
  • **Complete** tasks together

• A platform for **both task coordination and execution**

• Tested with **three** agents to share **both physical and digital tasks**

http://www.sharedo.info/ (requires Twitter account)
Use of Human-Human Interfaces as Human-Agent Interfaces

Social media
Robots in my Contact List
[Ma et al., APCHI ’12]

To-do list with chat
Towel
[Conley et al., AAAI Spring Symp. ’06]

One-to-one communication
Single agent for digital tasks
All tasks assigned by human users to agents

Sharedo: http://junkato.jp/sharedo/
Interaction Design

Sharedo: To-Do List Interface for Human-Agent Task Sharing

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Interaction Design of Sharedo

• **Share** tasks with agents
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Sharedo: http://junkato.jp/sharedo/
Share to-do lists

- Each user and agent is represented by an account.
- Each to-do list can be shared with others.

Currently available agents and their features:

<table>
<thead>
<tr>
<th>Currently available agents and their features</th>
<th>Home Cleaning</th>
<th>Shopping</th>
<th>Media Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share add user tasks</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Discuss clarify details</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Discuss notify progress</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>Complete tasks by itself</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Tasks are...</td>
<td>Physical</td>
<td>Both</td>
<td>Digital</td>
</tr>
</tbody>
</table>

Add new sharing members:

Let your friends know the URL of this to-do list and ask him/her to request sharing permission. The URL for the to-do list "Hobby" is shown below:

http://localhost/#list/6306
Share tasks

• Either a **user** or agent can add tasks on a to-do list
• Members sharing the list are notified by **Twitter** messages or web hook calls
  - Look for the word “clean”
  - Look for the word “buy”
  - Look for media URLs

Sharedo: http://junkato.jp/sharedo/
Share tasks

• Either a user or agent can add tasks on a to-do list
  ◎ Ask for help to recover from fatal errors
  ◎ Suggest running routine tasks
  ◎ Suggesting watching relevant media URLs

Sharedo: http://junkato.jp/sharedo/
Discuss details

- Discussion board helps removing task ambiguity
  - When and how many times should the room be cleaned?
  - Which product should the agent buy?
  - Who has viewed the media?
- Discussion board also works as a reminder

Sharedo: http://junkato.jp/sharedo/
Complete tasks

- Tasks can be completed by anyone regardless of the current assignment
- Task completion or deletion prevents from further agent actions

Sharedo: http://junkato.jp/sharedo/
Interaction Design of Sharedo

• **Share** tasks with agents
• **Discuss** task details with agents
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Our social interaction strategy:

Each operation on the to-do list makes each agent interpret new information

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Implementation

**Agents for Task Execution**
Hardware and software that provides actual service

**Agents for Task Coordination**
Software that specifies task details

**Sharedo platform**
Platform connecting agents and users

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Discussion and Conclusion

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Preliminary User Study

• Deploy Sharedo to observe its real use
  • 4 participants in 2 families
  • 2 months with home cleaning and shopping agents

• The system was used well for the targeted purpose
  • 179 tasks with 111 comments in 15 to-do lists
  • 61 tasks were created by agents

• Collected comments: “I worried about the cleaning robot even when I didn’t get messages while I was out.” “We felt like the shopping agent was a friend. (…) The feeling was very different compared to the website.”

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Discussion and Future Work

• The Sharedo platform is proved to work stably
• More interactive UI for task specification is desired
• account makes the agent more familiar
• More variety of more sophisticated agents can be implemented on top of the current platform
  • Agent-agent collaboration e.g. cooking agent asks to buy grocery; shopping agent delivers the grocery; the cooking agent waits for the delivery to start cooking
  • (We welcome collaborations!)

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Sharedo (Conclusion)

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