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

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

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

Share, Discuss, and Complete Tasks Together.

Sharedo: http://junkato.jp/sharedo/
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)

Sharedo: http://junkato.jp/sharedo/
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
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 account
- Each to-do list can be shared with others

Currently available agents and their features

<table>
<thead>
<tr>
<th></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>
</tbody>
</table>

Tasks are…
- Physical
- Both
- Digital

Sharing members of the to-do list "Hobby" is listed here. Since you are the creator of this list, you can accept or decline permission requests. You can also purge already accepted members.

Members list

- @arcatdmz
- @sharezon
- @sharecnt

No pending members.

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 🔄 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
• **Complete** tasks together

Our social interaction strategy:

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

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