

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

User Interface is Important

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



How about Task Coordination?

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**.



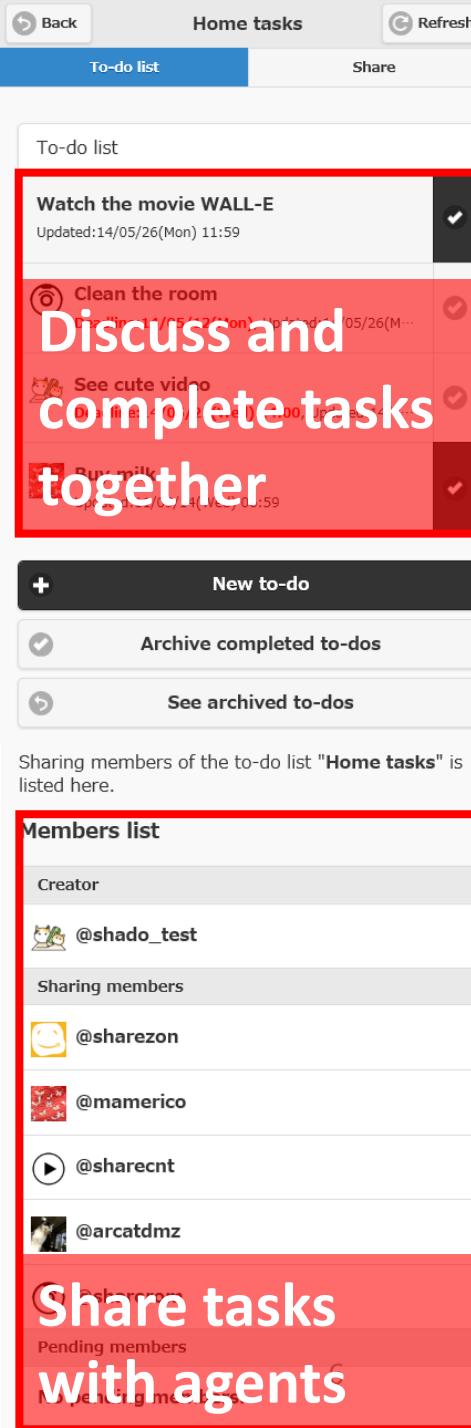
Share, Discuss, and Complete Tasks Together.

Sharedo

- **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  account)

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



The screenshot shows the Sharedo web interface. At the top, there are navigation buttons: 'Back', 'Home tasks' (highlighted), and 'Refresh'. Below the header, a 'To-do list' section displays several tasks:

- Watch the movie WALL-E (Updated: 14/05/26(Mon) 11:59)
- Clean the room (Due: 15/05/26(Mon) Updated: 14/05/26(Mon))
- See cute video (Due: 15/05/26(Mon) Updated: 14/05/26(Mon))
- Surprise (Due: 14/05/26(Mon) Updated: 14/05/26(Mon))

A large red banner across the tasks says "Discuss and complete tasks together". Below the tasks are three buttons:

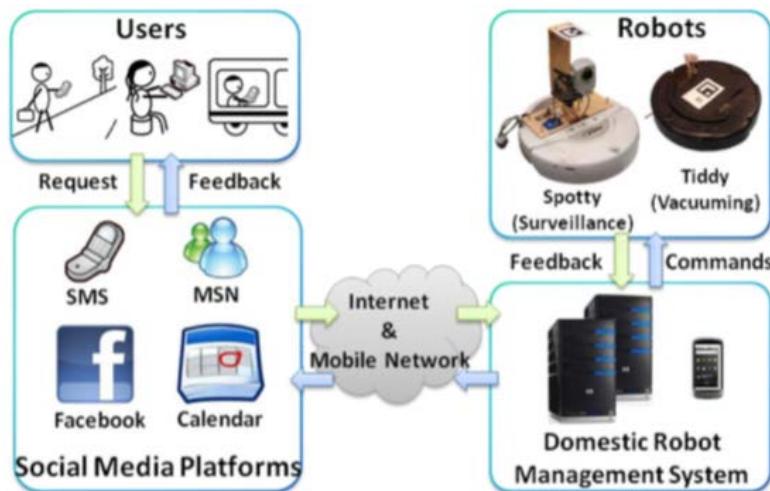
- + New to-do
- Archive completed to-dos
- See archived to-dos

Under the 'Members list' heading, it shows the 'Creator' (@shado_test) and 'Sharing members' (@sharezon, @mamerico, @sharecnt, @arcatdmz). A red banner at the bottom says "Share tasks with agents".

Use of Human-Human Interfaces as Human-Agent Interfaces

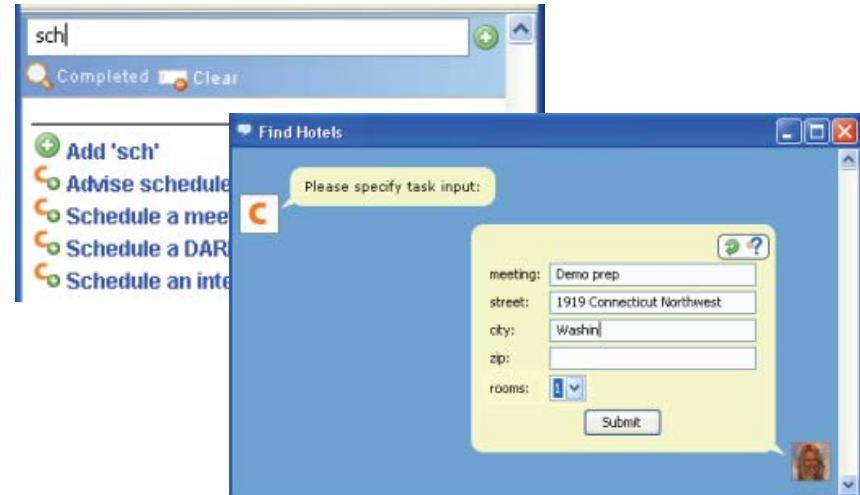
Social media

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

Interaction Design



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

Interaction Design of Sharedo

- **Share** tasks with agents
- **Discuss** task details with agents
- **Complete** tasks together

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	Home Cleaning	Shopping	Media Content
Share add user tasks	✓	-	✓
Discuss clarify details	✓	✓	-
Discuss notify progress	✓	-	✓
Complete tasks by itself	✓	✓	-
Tasks are...	Physical	Both	Digital

Back Hobby Refresh

To-do list Share

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

Creator

@arcatdmz

Sharing members

@sharezon

Purge

@sharecnt

Purge

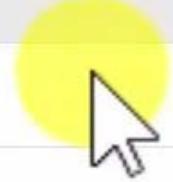
Pending members

No pending members.

Add new sharing members

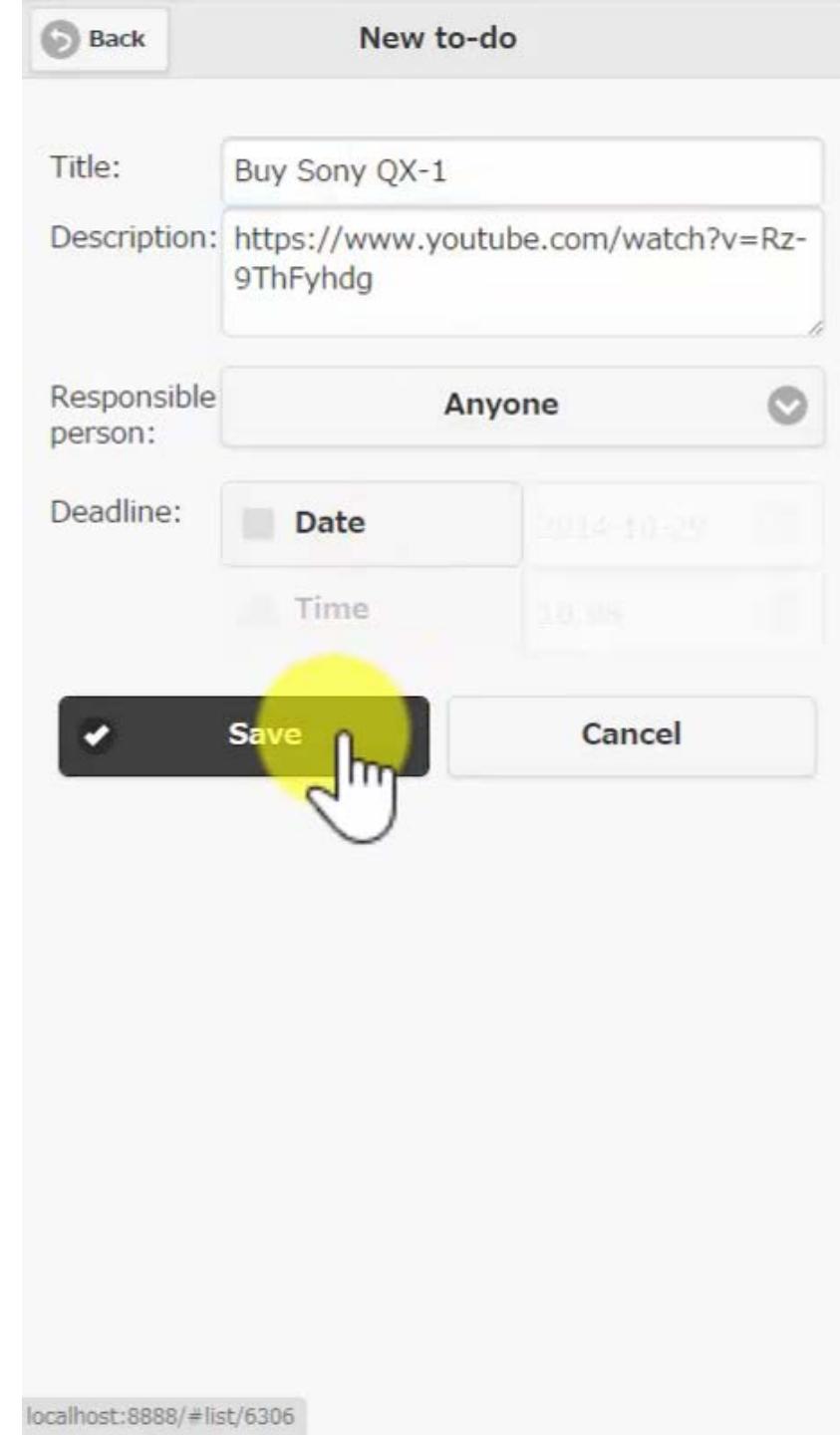
Let your friends know the URL of this to-do list and ask him/her to request sharing permission. The URL for the to-do list "Hobby" is shown below:

<http://localhost/#list/6306>



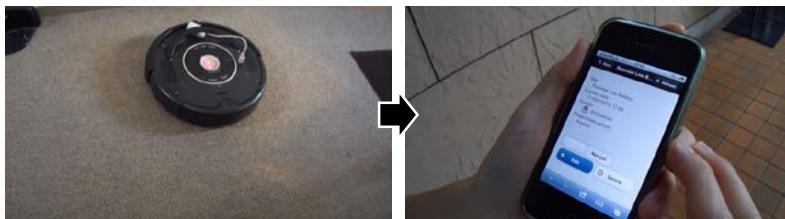
Share tasks

- 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



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

The image shows a mobile application interface. At the top, there are buttons for 'Back', 'Hobby', and 'Refresh'. Below the header is a blue navigation bar with 'To-do list' and 'Share' buttons. The main content area has a heading 'Want something cool?'. It lists two items in a 'To-do list':

- Sony QX100 Hands-on Review - Yo... (with a play icon and a yellow circular highlight over it, and a hand cursor icon pointing at it)
- Buy Sony QX-1 (with a checkmark icon)

Below the list are several buttons:

- + New to-do
- Archive completed to-dos
- See archived to-dos
- Edit or delete this list

At the bottom of the screen, the URL 'localhost:8888/#todo/6...' is visible.

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

Title: Buy Sony QX-1
Description: <https://www.youtube.com/watch?v=Rz-9ThFvhdg>
Created date: 14/10/29(Wed) 10:09
Deadline: Not specified
Creator:  @arcatdmz
Responsible person: Anyone

omplete Edit Delete

Discussion

New comment:

Refine lense kit

Post 

⌚ @sharecnt, 14/10/29(Wed) 10:11

Congrats! URL is watched by everyone it may concern.

Complete tasks

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

The screenshot shows the Sharedo application interface. At the top, there are three buttons: 'Config' (with a gear icon), 'Sharedo' (the main title), and 'Refresh' (with a circular arrow icon). Below the title, there are two tabs: 'To-do lists' (which is highlighted in blue) and 'Share'. A user profile picture of a cat is displayed with the text 'Logged in as @arcatdmz.' To the right of the profile picture, there is a 'To-do lists' section with three items: 'Home' (0 tasks), 'Hobby' (1 task), and 'Grocery' (0 tasks). Below this section is a large black button with a white plus sign and the text 'New to-do list'. At the bottom of the screen, there is a grey button with a gear icon and the text 'Edit or remove to-do list'.

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

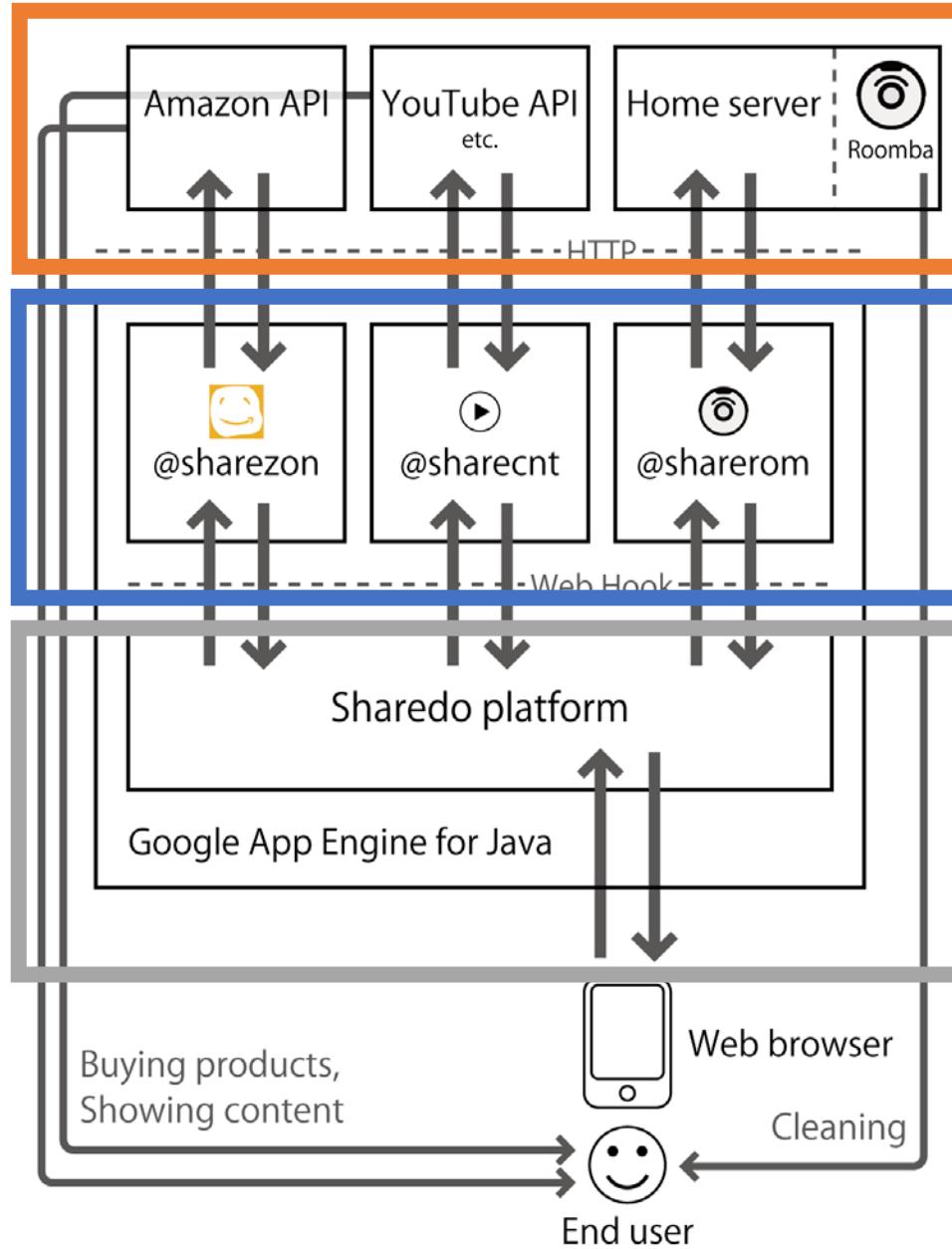
Hardware and software
that provides actual service

Agents for Task Coordination

Software that specifies task
details

Sharedo platform

Platform connecting agents
and users



Discussion and Conclusion



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

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.*"

Discussion and Future Work

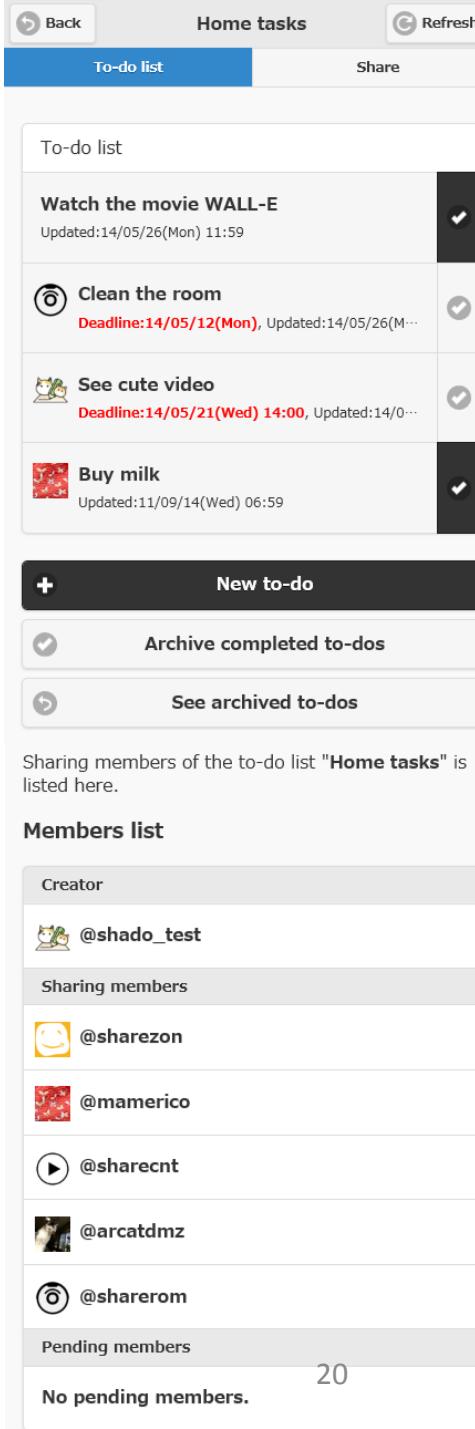
- The Sharedo platform is proved to work stably
- More interactive UI for task specification is **desired**
-  account makes the agent more **familiar**
- More variety of more sophisticated agents can be implemented on top of the current platform
 - Agent-agent collaboration e.g. **cooking agent** asks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



Sharedo (Conclusion)

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The screenshot shows the Sharedo web interface. At the top, there are navigation buttons: 'Back', 'Home tasks' (highlighted in blue), and 'Refresh'. Below the header, there are tabs for 'To-do list' and 'Share'. The main area displays a 'To-do list' with four items:

- Watch the movie WALL-E (status: Updated:14/05/26(Mon) 11:59)
- Clean the room (status: Deadline:14/05/12(Mon), Updated:14/05/26(M...))
- See cute video (status: Deadline:14/05/21(Wed) 14:00, Updated:14/0...)
- Buy milk (status: Updated:11/09/14(Wed) 06:59)

Below the to-do list are three buttons: '+ New to-do', 'Archive completed to-dos', and 'See archived to-dos'. To the right, under 'Members list', it says 'Sharing members' and lists six users with their icons and handles: @shado_test, @sharezon, @mamerico, @sharecnt, @arcatdmz, and @sharerom. Under 'Pending members', it says 'No pending members.'.