This is a reformatted version of the survey shown to participants in the study on legibility of light expressions.
Note: Individual questions were shown on separate pages (except for background questions); participants could not go back once they answered a question.

Explaining States and Actions of an Office Robot

Researchers at Carnegie Mellon University are interested in understanding how robotics experts and novices explain actual robot behavior.

We will ask you to answer a series of questions about some videos and capture your explanations of robot behavior. The survey you will be filling out will take around 20 minutes to complete. You will earn a 5$ Amazon Gift card for completing the survey in a reasonable manner (no random clicking). You will only be allowed to fill the survey once.

Instructions:
You will watch videos of robots moving around in the environment and answer questions after each video. You can watch the videos as many times as you would like. You can stop this study at any time at no cost to you, but **we will only pay participants who finished the survey with reasonable effort** (no random answers, etc). Please direct any questions you have to Stephanie Rosenthal:

Stephanie Rosenthal, Principal Investigator
Software Engineering Institute
Carnegie Mellon University
Collaborative Innovation Center 2325
Pittsburgh PA 15213
412-268-3834
srosenthal@sei.cmu.edu

Carnegie
Mellon
University

There are 55 questions in this survey

Introduction
[]First we would like to check that your web browser is set up properly to view the videos. Please tell us what word this video displays.
   *

Please write your answer here:

PLEASE READ the text below carefully as it will help you answer the questions in this survey.

The robot filmed in the videos of this survey is a collaborative service robot named CoBot. CoBot is able to do the following:
-Move around while avoiding obstacles
-Go to a certain location in a building
-Carry objects in its basket from one place to another (but has no arms to manipulate them)
-Accompany a person from one place to another

CoBot moves around autonomously and knows the full map of the building. It can even go on elevators to service multiple floors. It is able to overcome its limitations (for example having no arms to manipulate objects) by asking humans for help. CoBot mainly uses a touch screen for interaction but it also understands speech. Finally, it can access the Internet when needed.

Please press "Next" when you're ready to start.

P1N

[Video shown at https://youtu.be/2YXbngwnjEk]

In the video above, what is the robot doing? *
Please choose **only one** of the following:
- ○ Giving the person a tour of the building
- ○ Taking the person to a specific destination
- ○ Wandering around the corridors with no specific purpose
- ○ Avoiding the person behind it

[] *
Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	○	○	○	○	○

P2N

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****
****

[Video shown at https://youtu.be/LxH92vgAFp0]

In the video above, why isn't the robot answering the person's request? *

Please choose **only one** of the following:

- ○ The robot is thinking/searching the web for the answer
- ○ The robot didn't understand the person's speech
- ○ The robot is off
- ○ The robot is malfunctioning

[] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you	○	○	○	○	○

about your
choice?
Choose
the
number
that best
represents
your
confidence
level.

P3N

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COBOT***********************************

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****
****

[Video at https://youtu.be/wcP-q4HUFqM]

In the video above, what is the robot's state? *

Please choose **only one** of the following:

- ○ Charging
- ○ Idle
- ○ Turned off
- ○ Blocked by obstacles around it

[] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents	○	○	○	○	○

your
confidence
level.

S1N
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COBOT***********************************
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****
****

[Video at https://youtu.be/BbsFjW5S8yc]

In the video above, why did the robot stop? *
Please choose **only one** of the following:
- ⃝ The robot recognizes the person, who was expecting it
- ⃝ The robot sees the person as an obstacle
- ⃝ The robot needs help from the person
- ⃝ The robot is inviting the person to use its services

[] *
Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	⃝	⃝	⃝	⃝	⃝

S2N

[Video at https://youtu.be/JTKscqbzoLI]

In the video above, why did the robot stop? *
Please choose **only one** of the following:
- ⭕ The robot is trying to observe how the two people interact to gain some knowledge
- ⭕ The robot sees the people as obstacles
- ⭕ The robot needs help from the people
- ⭕ The robot is inviting the people to use its services

[] *
Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	⭕	⭕	⭕	⭕	⭕

S3N

CoBot moves around autonomously and knows the full map of the building. It can even go on elevators to service multiple floors. It is able to overcome its limitations (for example having no arms to manipulate objects) by asking humans for help. CoBot mainly uses a touch screen for interaction but it also understands speech. Finally, it can access the Internet when needed.
****
****

[Video at https://youtu.be/0LT-0qvv6SE]

In the video above, why did the robot stop? *
Please choose **only one** of the following:
- ○ The robot is blocked by an obstacle
- ○ The robot is "thinking" about its next step
- ○ The robot is waiting to accompany someone to an office
- ○ The robot reached its destination

[] *
Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	○	○	○	○	○

W1N
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[Video at https://youtu.be/NAbtWtVTvw8]

In the video above, what is the robot's state? *

Please choose **only one** of the following:

- ◯ Waiting for someone to help pressing the elevator button
- ◯ Out of battery
- ◯ Stopped for safety since its sensors cannot detect metal surfaces like elevators
- ◯ Placed there to discreetly collect data about ingoing and outgoing traffic on both elevators

[] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	◯	◯	◯	◯	◯

W2N

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****

[Video at https://youtu.be/ZUeR-yq-gyE]

In the video above, what is the robot doing? *

Please choose **only one** of the following:

- ◯ It is waiting for someone to put something in its basket
- ◯ It is idle
- ◯ It is waiting for its next task

- ○ It was trying to navigate through the corridor but got stuck in the kitchen

[ ] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	○	○	○	○	○

W3N

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[Video at https://youtu.be/P1_aPw8D8yY]

In the video above, why is the robot not moving after the person has taken the coffee? *

Please choose **only one** of the following:

- ○ It is waiting for the person to confirm the task is over
- ○ It has nothing to do
- ○ It is low on battery
- ○ It is trying to get inside the room but the door is too narrow

[ ] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	○	○	○	○	○

P1L

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****
****

[Video at https://youtu.be/EOmZpqh-caI]

In the video above, what is the robot doing? *

Please choose **only one** of the following:
- ○ Giving the person a tour of the building
- ○ Taking the person to a specific destination
- ○ Wandering around the corridors with no specific purpose
- ○ Avoiding the person behind it

[] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you	○	○	○	○	○

about your
choice?
Choose
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level.

P2L

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[Video at https://youtu.be/Oe_hfNoVjTA]

In the video above, why isn't the robot answering the person's request? *

Please choose **only one** of the following:

- ○ The robot is thinking/searching the web for the answer
- ○ The robot didn't understand the person's speech
- ○ The robot is off
- ○ The robot is malfunctioning

[] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number	○	○	○	○	○

that best
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P3L
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****
****

[Video at https://youtu.be/9LPo8ATMLu4]

In the video above, what is the robot's state? *
Please choose **only one** of the following:
- ○ Charging
- ○ Idle
- ○ Turned off
- ○ Blocked by obstacles around it

[] *
Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	○	○	○	○	○

S1L

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[Video at https://youtu.be/HJLvLr5R1wY]

In the video above, why did the robot stop? *

Please choose **only one** of the following:

- ○ The robot recognizes the person, who was expecting it
- ○ The robot sees the person as an obstacle
- ○ The robot needs help from the person
- ○ The robot is inviting the person to use its services

[] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	○	○	○	○	○

S2L

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****
****

[Video at https://youtu.be/_THs54tfTww]

In the video above, why did the robot stop? *
Please choose **only one** of the following:
- ○ The robot is trying to observe how the two people interact to gain some knowledge
- ○ The robot sees the people as obstacles
- ○ The robot needs help from the people
- ○ The robot is inviting the people to use its services

[] *
Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	○	○	○	○	○

S3L

****
****
[Video at https://youtu.be/Ad3oyOEggT8]

In the video above, why did the robot stop?
*
Please choose **only one** of the following:
- ○ The robot is blocked by an obstacle
- ○ The robot is "thinking" about its next step
- ○ The robot is waiting to accompany someone to an office
- ○ The robot reached its destination

[] *
Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	○	○	○	○	○

W1L
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****
****
[Video at https://youtu.be/V-L5wv8EhH8]

In the video above, what is the robot's state?
*

Please choose **only one** of the following:
- ◯ Waiting for someone to help pressing the elevator button
- ◯ Out of battery
- ◯ Stopped for safety since its sensors cannot detect metal surfaces like elevators
- ◯ Placed there to discreetly collect data about ingoing and outgoing traffic on both elevators

[] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	◯	◯	◯	◯	◯

W2L

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****
****

[Video at https://youtu.be/B23MeZMiGgo]

In the video above, what is the robot doing? *

Please choose **only one** of the following:
- ◯ It is waiting for someone to put something in its basket
- ◯ It is idle
- ◯ It is waiting for its next task
- ◯ It was trying to navigate through the corridor but got stuck in the kitchen

[] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you about your choice? Choose the number that best represents your confidence level.	○	○	○	○	○

W3L

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[Video at https://youtu.be/HghwlEw7OFY]

In the video above, why is the robot not moving after the person has taken the coffee? *

Please choose **only one** of the following:

- ○ It is waiting for the person to confirm the task is over
- ○ It has nothing to do
- ○ It is low on battery
- ○ It is trying to get inside the room but the door is too narrow

[] *

Please choose the appropriate response for each item:

	1 - Not confident at all	2 - Slightly confident	3 - Moderately confident	4 - Highly confident	5 - Extremely confident
How confident are you	○	○	○	○	○

about your choice? Choose the number that best represents your confidence level.

Background Information
[]Email address (won't be used or recorded except for payment) *
Please write your answer here:

[]Age *
Only numbers may be entered in this field.

Please write your answer here:

-

[]Gender *
Please choose **only one** of the following:
- ○ Male
- ○ Female
- ○ Other

[]Country *
Please write your answer here:

[]Occupation *
Please write your answer here:

[]Computer usage per week *
Please choose **only one** of the following:
- ○ < 10 hours
- ○ < 20 hours
- ○ < 30 hours
- ○ < 40 hours
- ○ > 40 hours

[]Which is your dominant hand? *
Please choose **only one** of the following:
- ○ Right
- ○ Left
- ○ Ambidextrous

[]Are you color blind? *
Please choose **only one** of the following:
- ○ Yes
- ○ No

[]Are you fluent in English? *

Please choose **only one** of the following:

- ○ Yes
- ○ No

[]
Do you agree with the following statement?
"I am experienced with robots."
*

Please choose **only one** of the following:

- ○ Strongly Agree
- ○ Somewhat Agree
- ○ Neither Agree nor Disagree
- ○ Somewhat Disagree
- ○ Strongly Disagree

[]Have you seen robots in person before? If yes, please explain. *

Please write your answer here:

[]Have you seen CoBot before (in person or in videos)? Please explain. *

Please write your answer here:

[]
Do you agree with the following statement?
"The robot was malfunctioning."
*

Please choose **only one** of the following:

- ○ Strongly Agree
- ○ Somewhat Agree
- ○ Neither Agree nor Disagree
- ○ Somewhat Disagree
- ○ Strongly Disagree

[]
Do you agree with the following statement?
"I trust this robot."
*

Please choose **only one** of the following:

- ○ Strongly Agree
- ○ Somewhat Agree
- ○ Neither Agree nor Disagree
- ○ Somewhat Disagree
- ○ Strongly Disagree

[]
Do you agree with the following statement?
"I trust robots (in general)."
*

Please choose **only one** of the following:

- ○ Strongly Agree
- ○ Somewhat Agree
- ○ Neither Agree nor Disagree
- ○ Somewhat Disagree
- ○ Strongly Disagree

[]
Do you agree with the following statement?
"After watching these videos, I will not trust robots as much as I did before."
*

Please choose **only one** of the following:

- ○ Strongly Agree
- ○ Somewhat Agree
- ○ Neither Agree nor Disagree
- ○ Somewhat Disagree
- ○ Strongly Disagree

Thanks for taking part in this study. We appreciate your honest input. After we check that you have put reasonable effort in the completion of this survey, you will be contacted by email within a week for your earned 5$ Amazon gift card.

Feel free to contact Stephanie Rosenthal (srosenthal@sei.cmu.edu, 412-268-3834) if you have any questions or concerns. Have a nice day!

11-30-2015 – 10:33

Submit your survey.
Thank you for completing this survey.