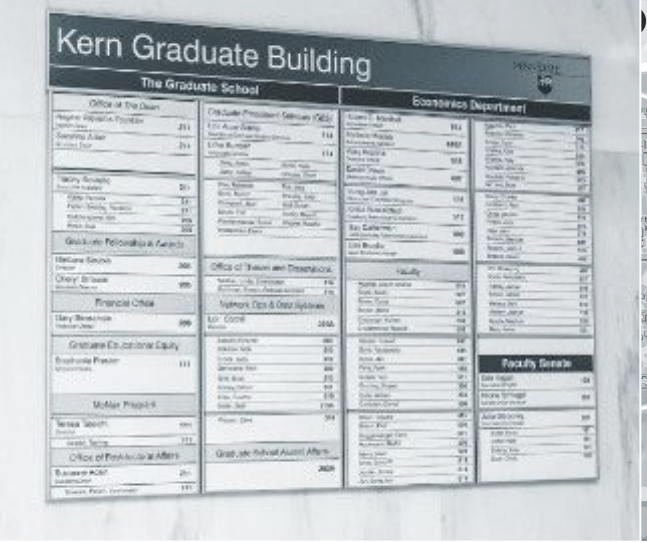
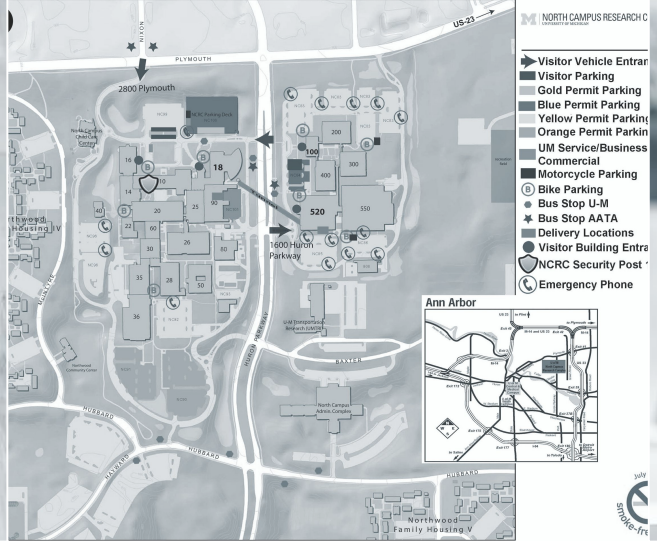
Kyabo

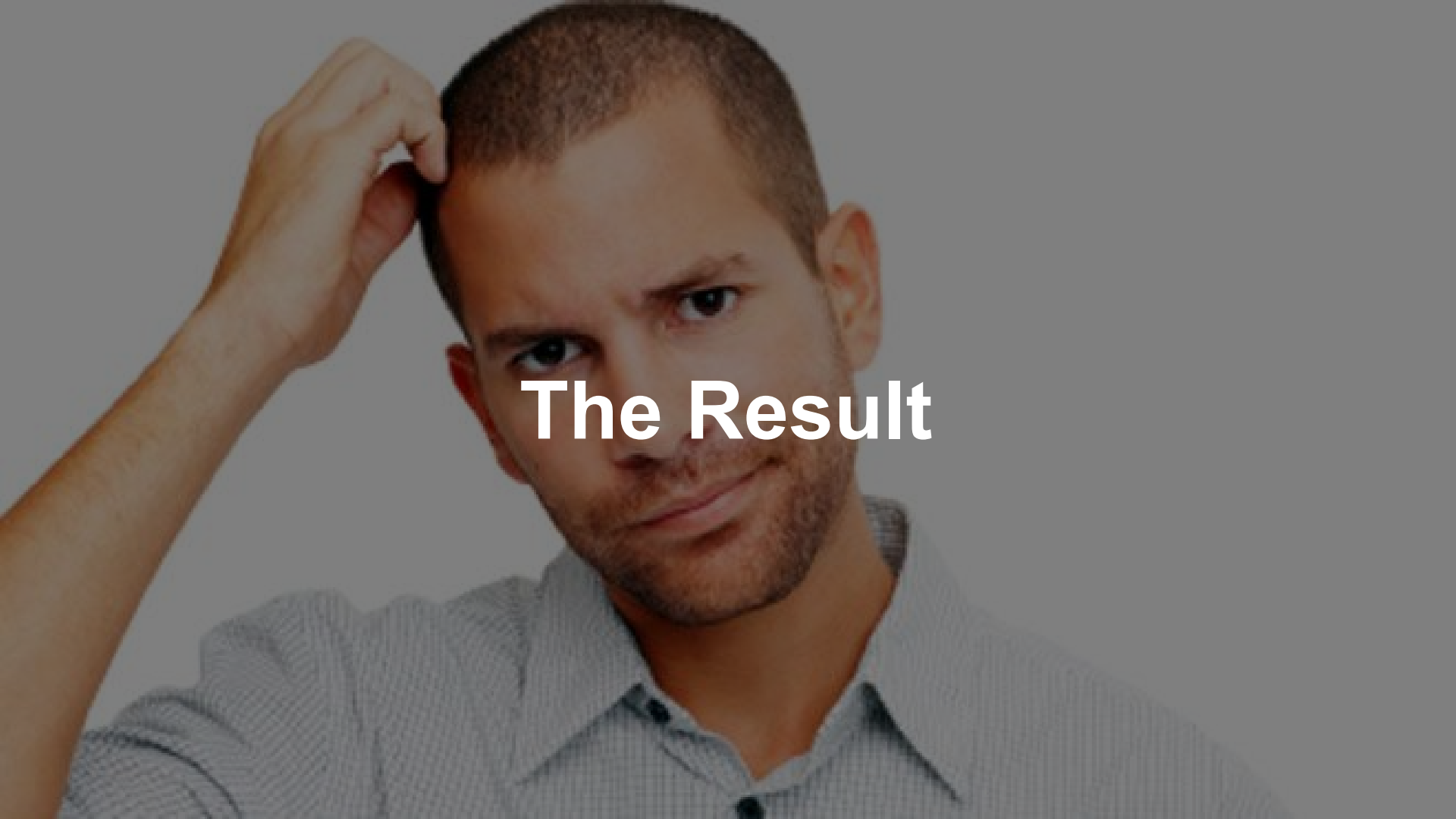
Bryan Bo Cao
Aadish Gupta
Kyle Wiese

The Problem

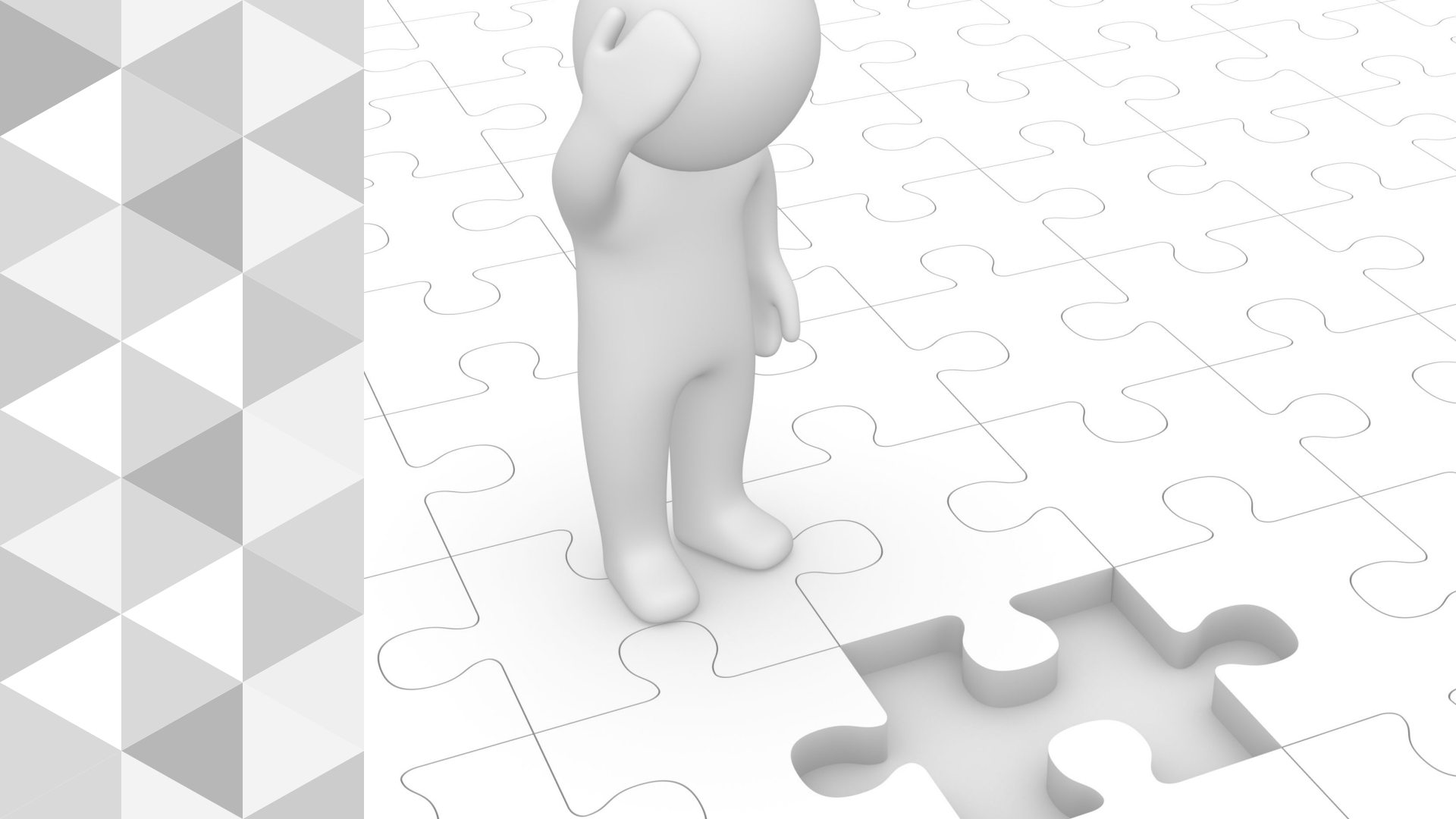


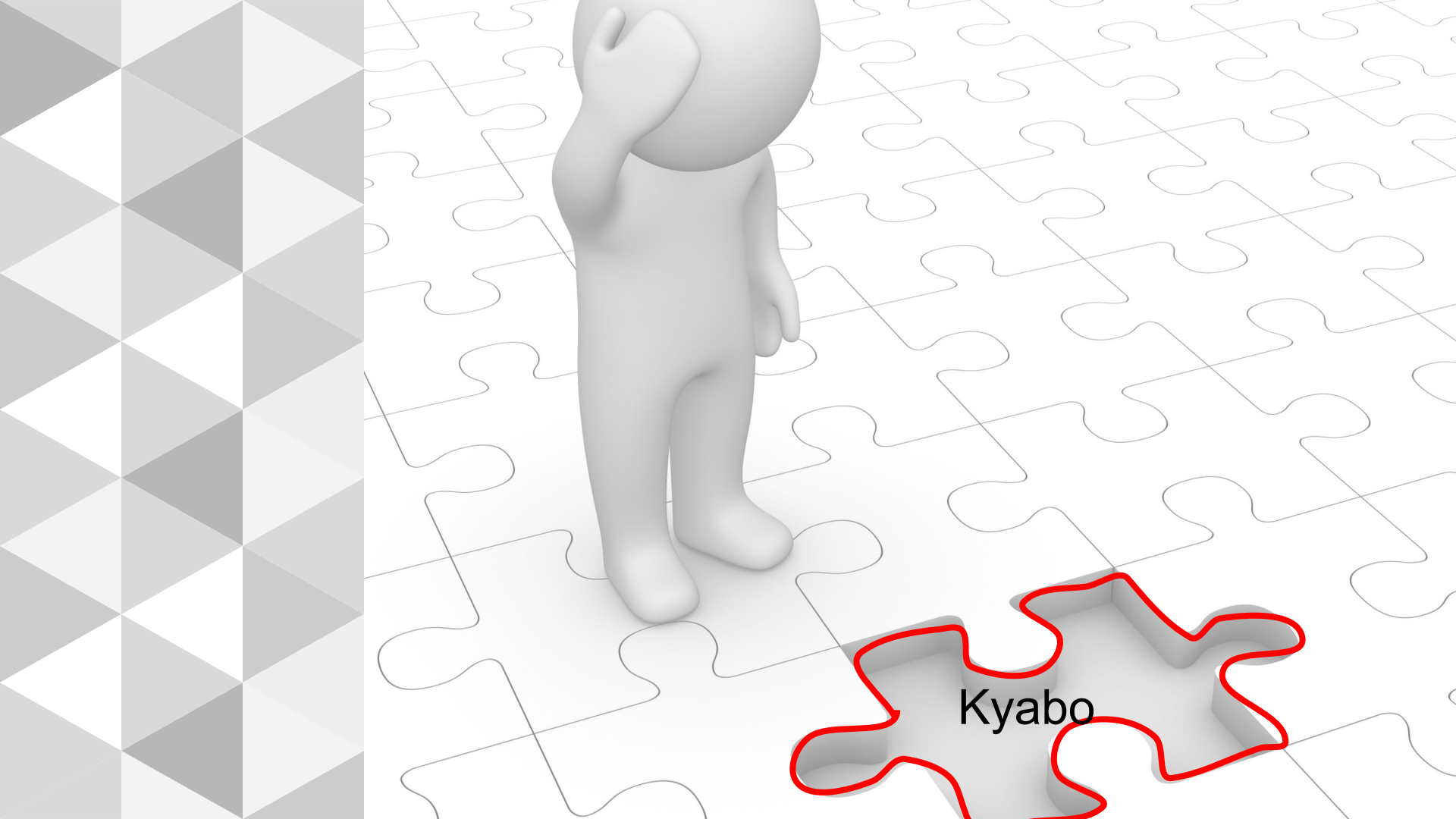


The Common Solutions


The Result

State of the Art

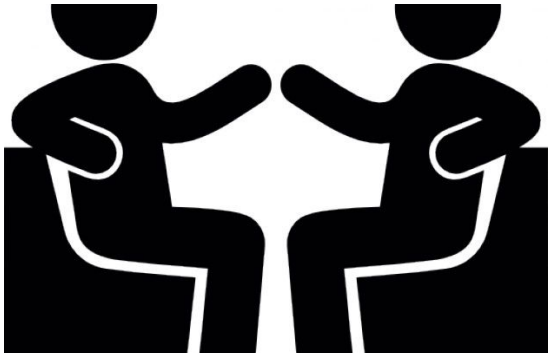



Kyabo

Goal

Explore the most effective robotic interface that assists people with navigating unexplored indoor areas.

Main Components

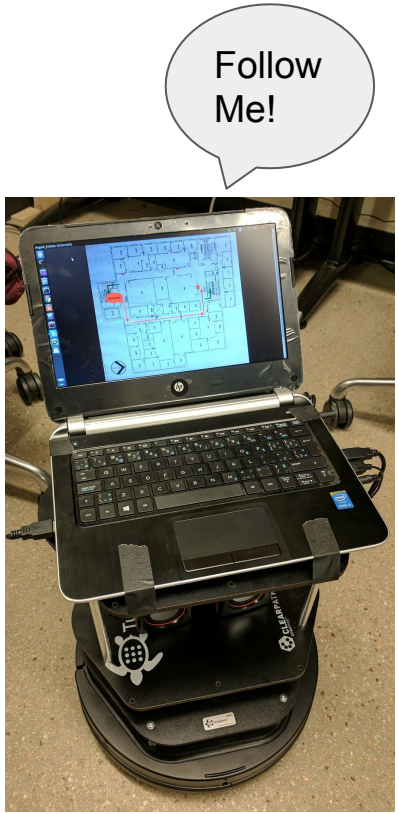


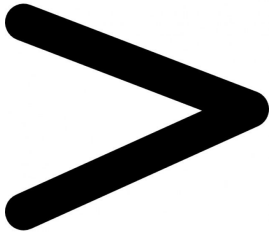
Social

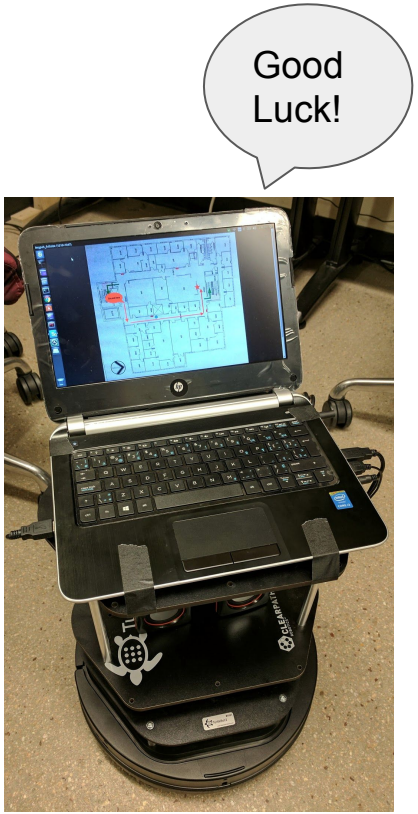
Intuitive

Effective

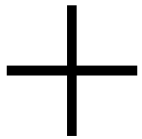
Hypothesis 1

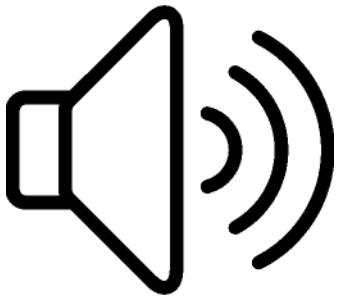






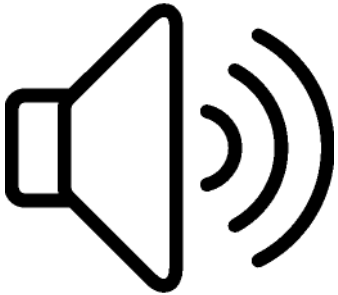
Hypothesis 2





Hypothesis 3

+



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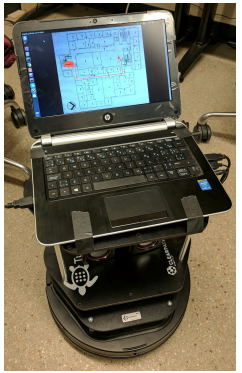


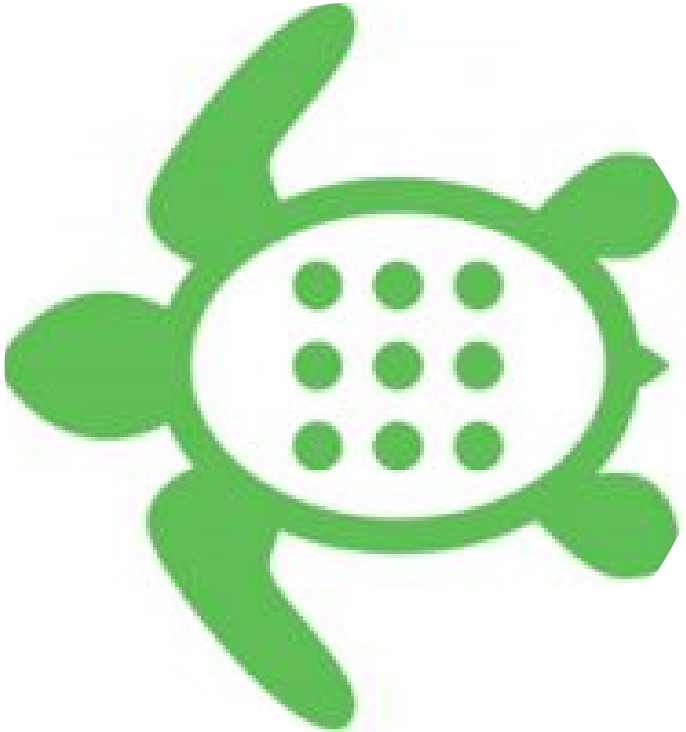
Robot Receptionist (Kyabo)

Study Method

Quantitative Analysis

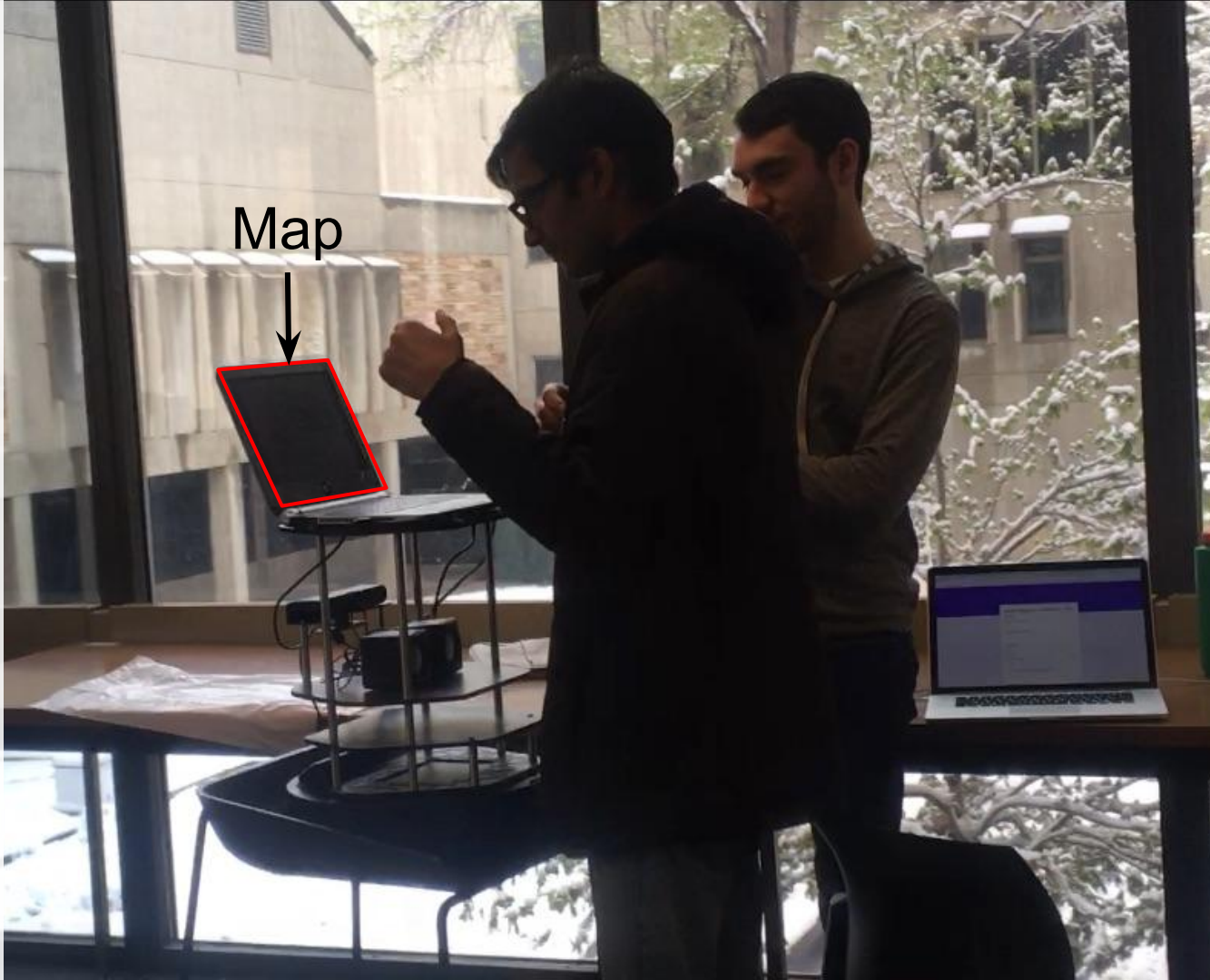
Qualitative Analysis

Robot Receptionist (Kyabo)



Kyabo in Action

Kyabo in Action



Kyabo in Action

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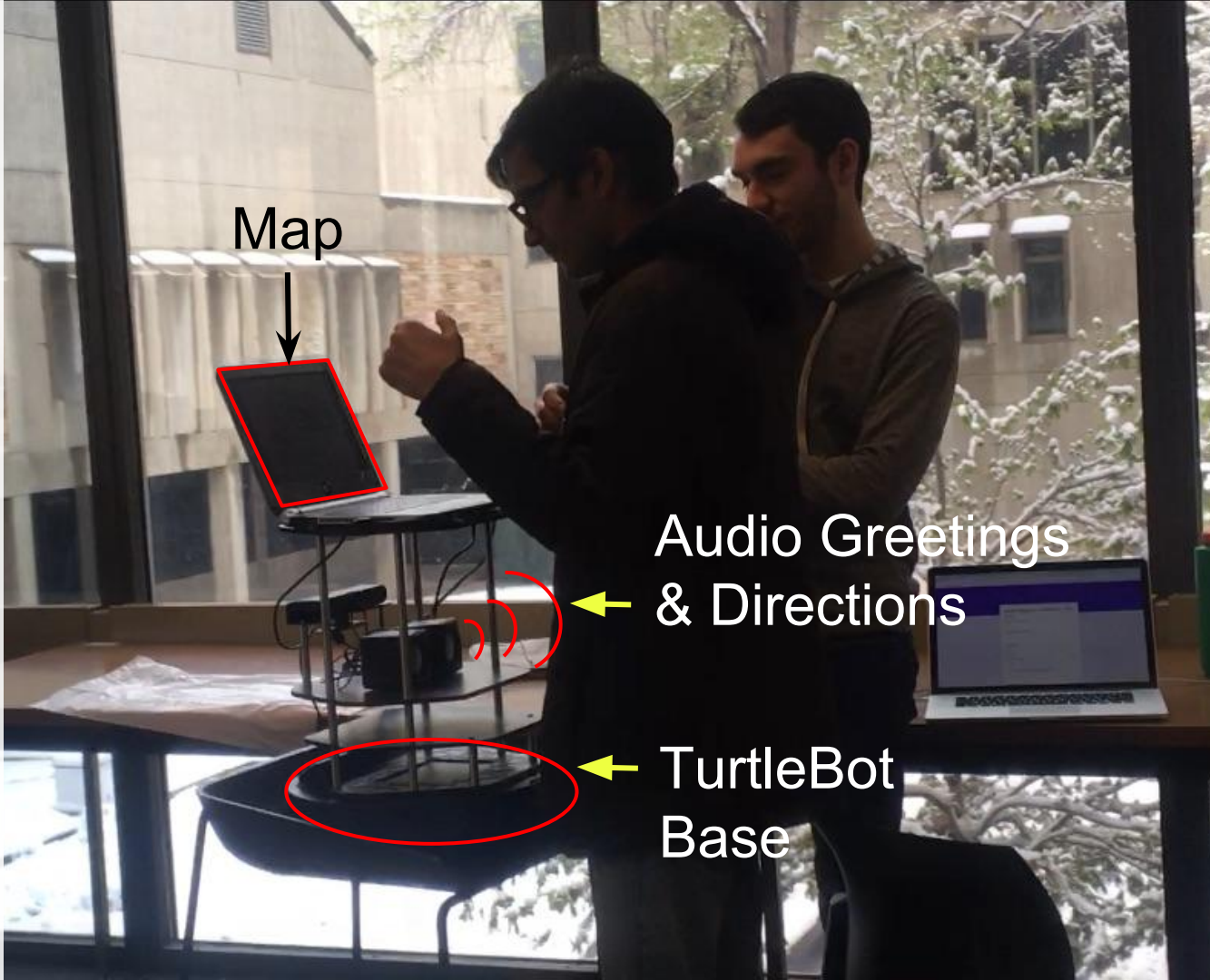
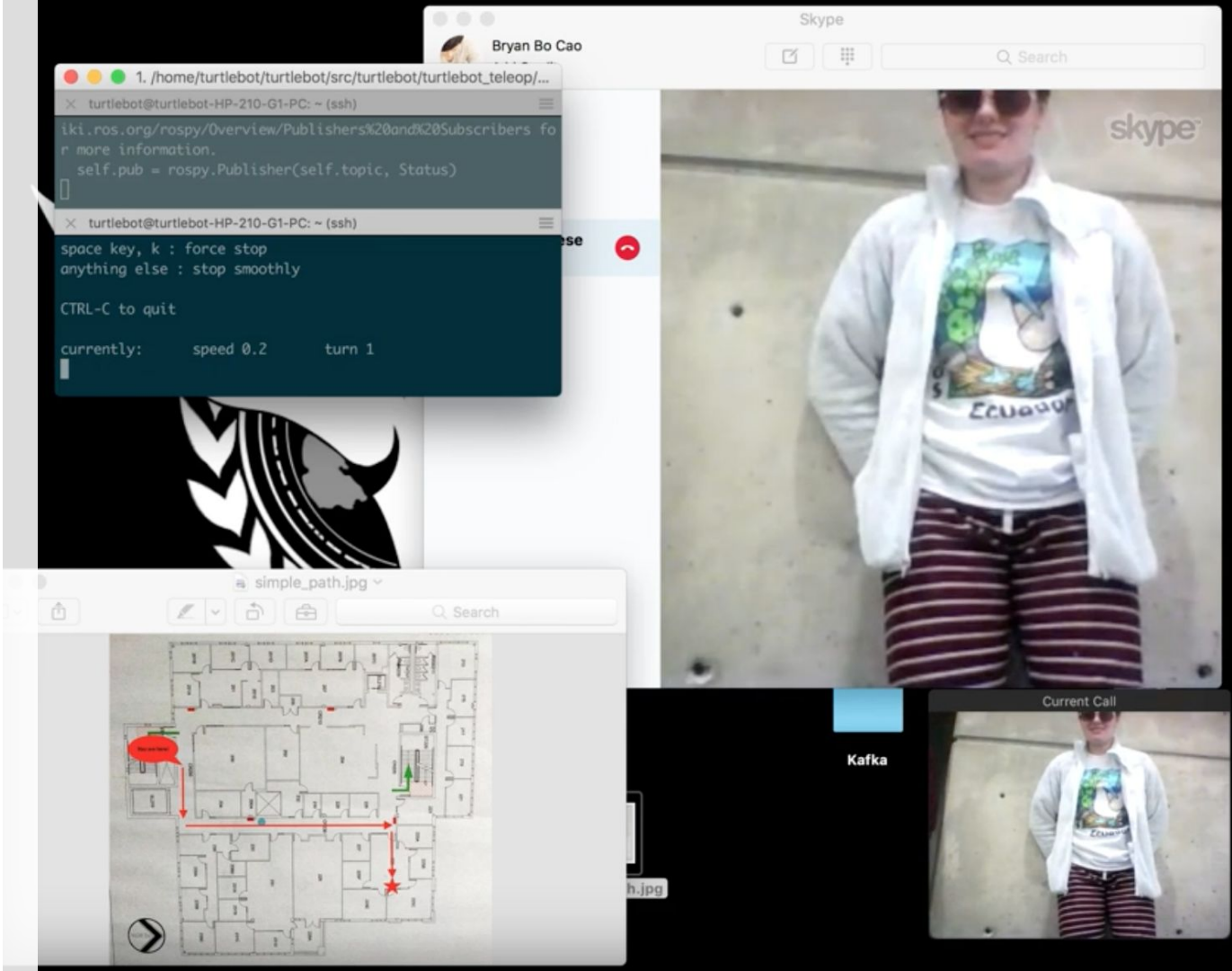
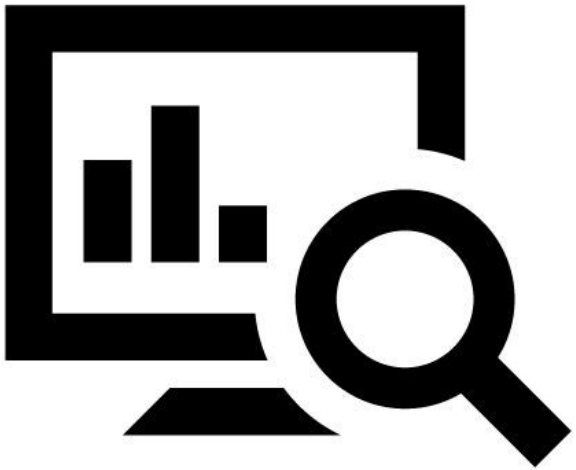
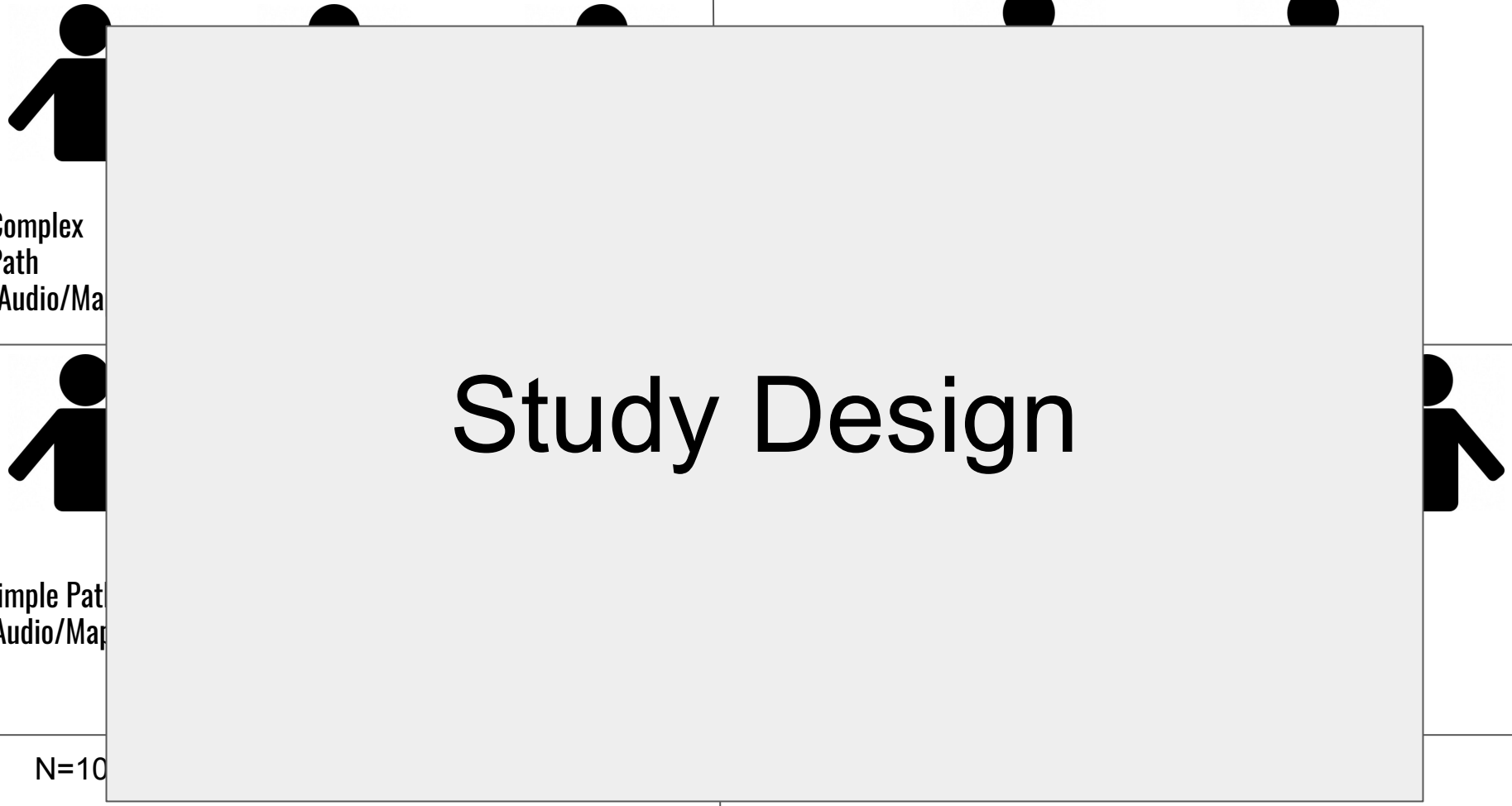


Behind the Scenes



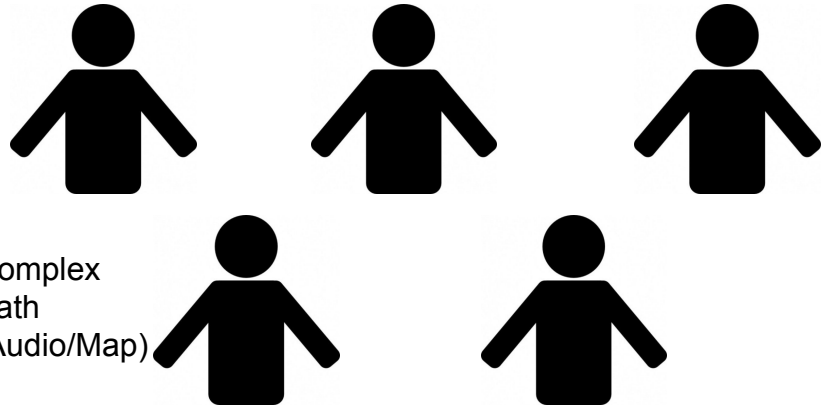


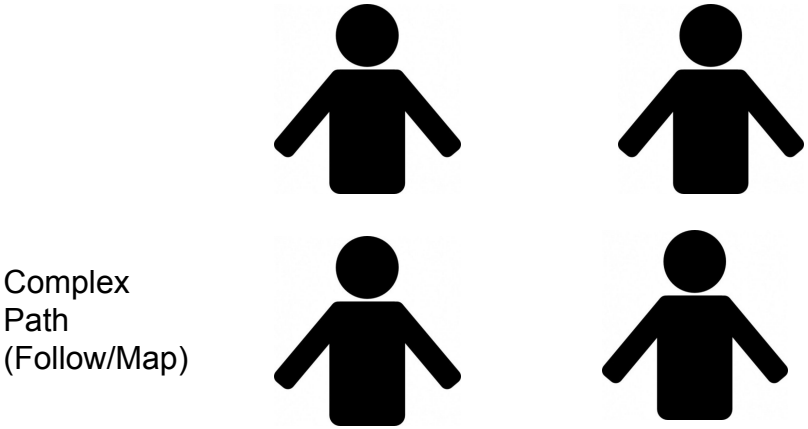
Study Method

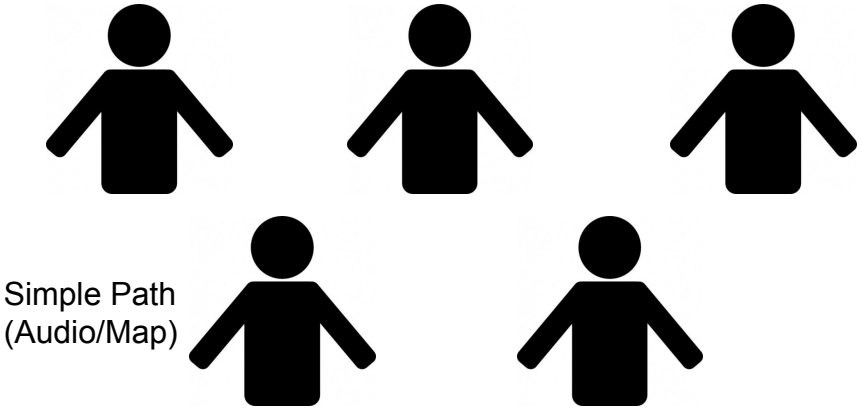


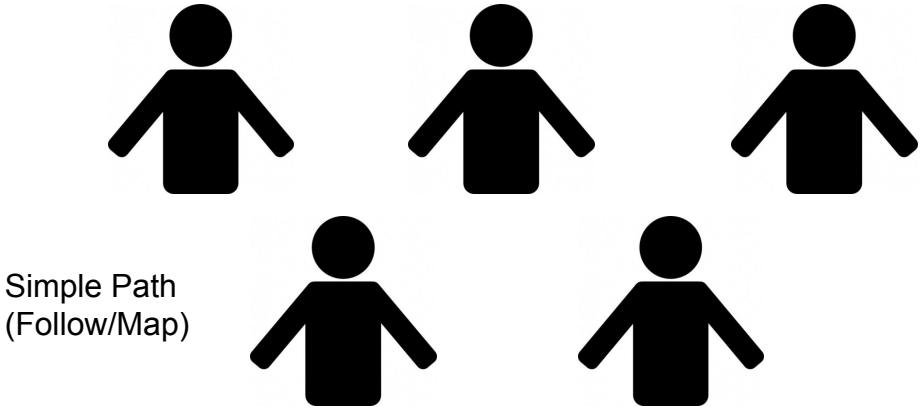
Study Design

	Receive Audio	Follow Robot
Complex Route		
Simple Route		









N=10 participants in **Engineering Center**

N=9 participants in **Atlas** Institute

Engineering Center Participants

Pre-survey

Natural Navigation with Robots - Pre-survey

Please answer the questions below.

* Required

Your native language? *

Your answer

Your gender *

- ○ Male
- ○ Female
- ○ Prefer not to say
- ○ Other:

If you are a student, what is your major? *

Your answer

Engineering Center Participants

Directions

Engineering Center Participants

Task

Engineering Center Participants

Task

Engineering Center Participants

Post-survey

Natural Navigation with Robots - Post-survey

Please answer the questions below.

* Required

How easy/difficult was the process? *

	1	2	3	4	5	6	7	
Very easy	○	○	○	○	○	○	○	Very difficult

To what extent do you think the robot provided information at a proper time? *

	1	2	3	4	5	6	7	
Not at all	○	○	○	○	○	○	○	Very

To what extent do you think the information the robot provided was useful? *

	1	2	3	4	5	6	7	
Not useful at all	○	○	○	○	○	○	○	Extremely useful

Atlas Participants

Pre-survey

Natural Navigation with Robots - Pre-survey

Please answer the questions below.

* Required

Your native language? *

Your answer

Your gender *

- ○ Male
- ○ Female
- ○ Prefer not to say
- ○ Other:

If you are a student, what is your major? *

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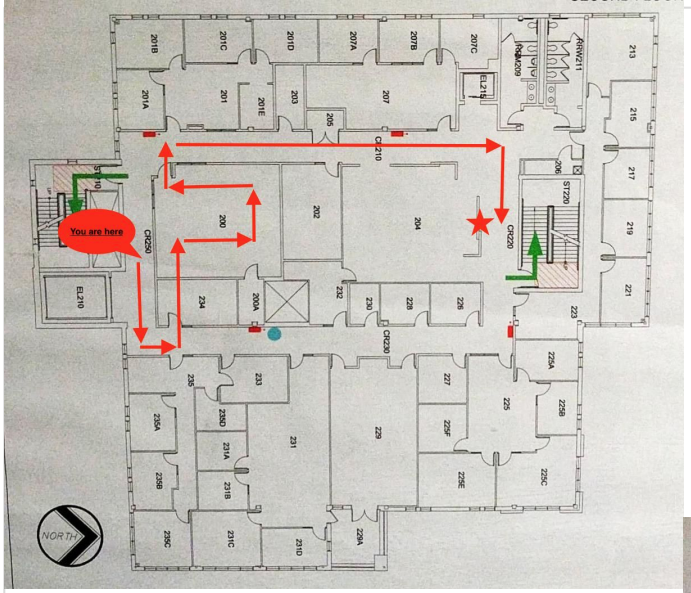
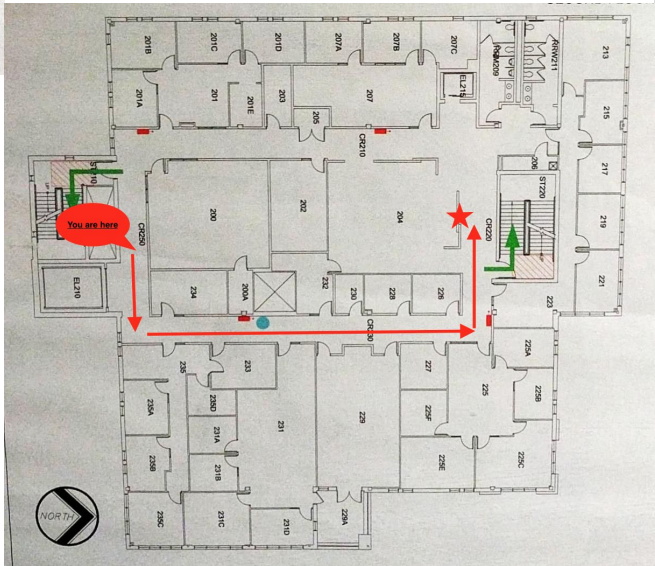
Atlas Participants

Directions





Atlas Participants

Task

Atlas Participants

Task

Atlas Participants

Post-survey

Natural Navigation with Robots - Post-survey

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Very easy	○	○	○	○	○	○	○	Very difficult

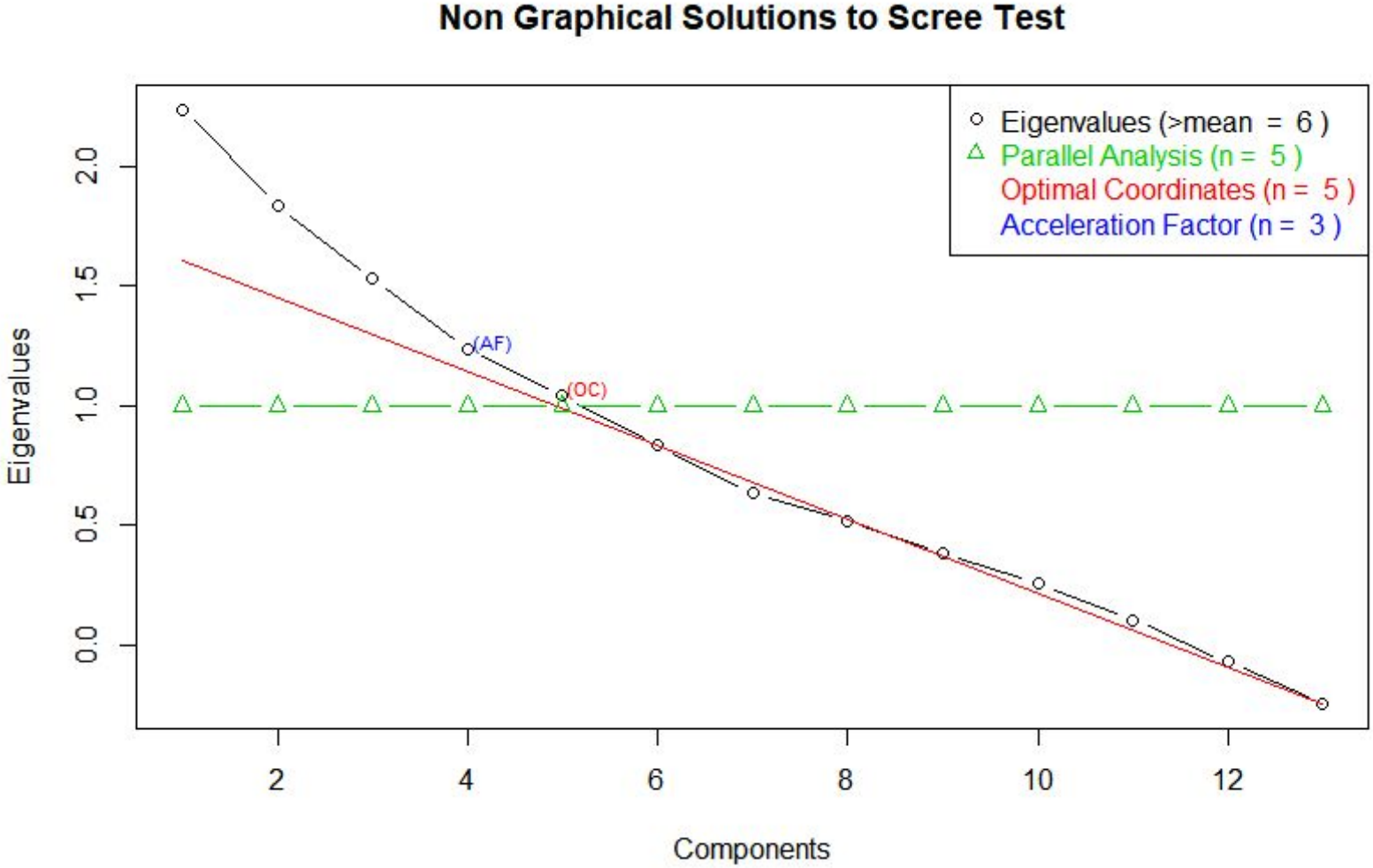
To what extent do you think the robot provided information at a proper time? *

	1	2	3	4	5	6	7	
Not at all	○	○	○	○	○	○	○	Very

To what extent do you think the information the robot provided was useful? *

	1	2	3	4	5	6	7	
Not useful at all	○	○	○	○	○	○	○	Extremely useful

Quantitative Method


Non Graphical Solutions to Scree Test
Eigenvalues (>mean = 6)
Parallel Analysis (n = 5)
Optimal Coordinates (n = 5)
Acceleration Factor (n = 3)
(AF)
(OC)
Eigenvalues
0.0
0.5
1.0
1.5
2.0
2
4
6
8
10
12
Components

Loadings:

Information Dissemination

Success

Interaction

	Factor1	Factor2	Factor3	Factor4	Factor5
Useful.Information	0.65				
Robot.Response	0.85				
Natural.Behavior	0.62		0.48		
Understand.Request	0.90				
Process.Time		0.89			
Process.Difficulty		0.88		-0.38	
Timely.Information	0.52	-0.52			
Effective.Interaction	0.57		0.73		
Comfort			0.71		
Natural.Interaction			0.56		
Speed				-1.00	
Security					0.99
Future.Use				0.48	

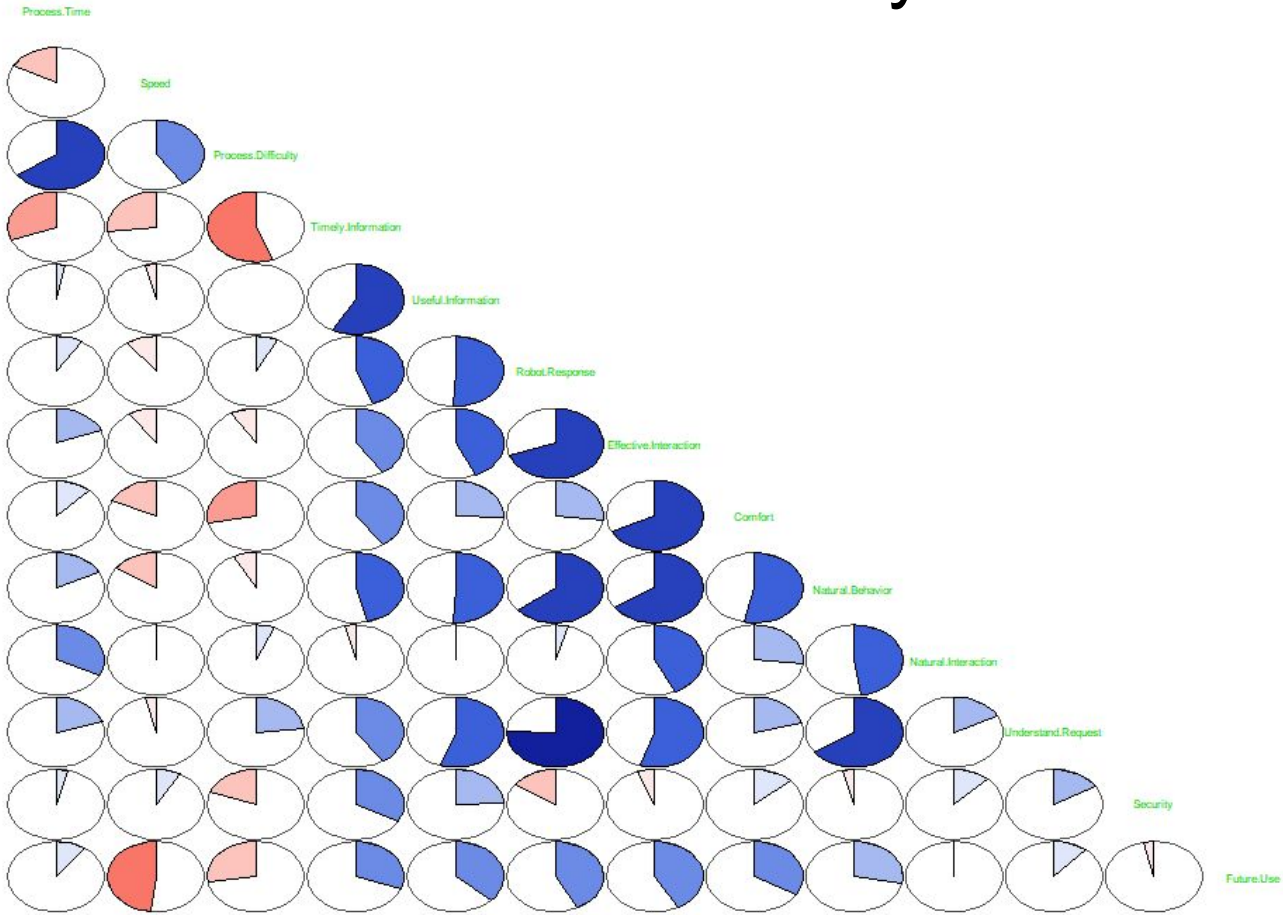
Scale Reliability

Information Dissemination: Good(0.86)

Success: ?*

Interaction: Good(0.8)

Correlational Analysis

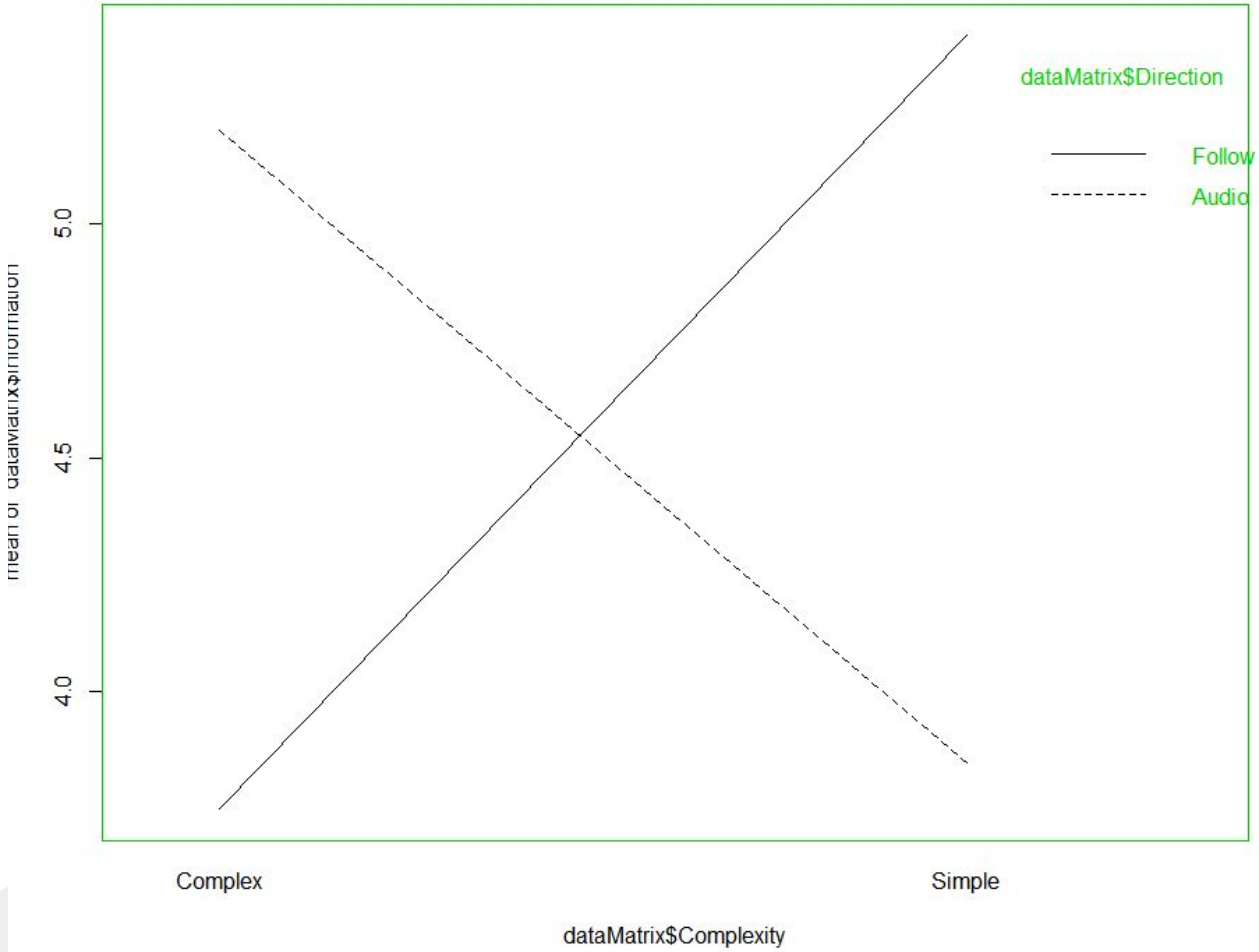


Two-Way Analysis of Variance

Effect on Information Dissemination

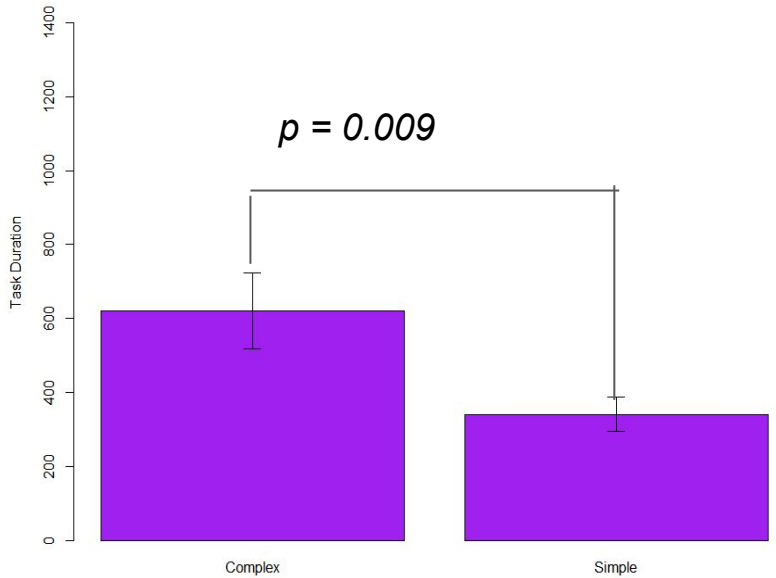
No Significant Main Effect.

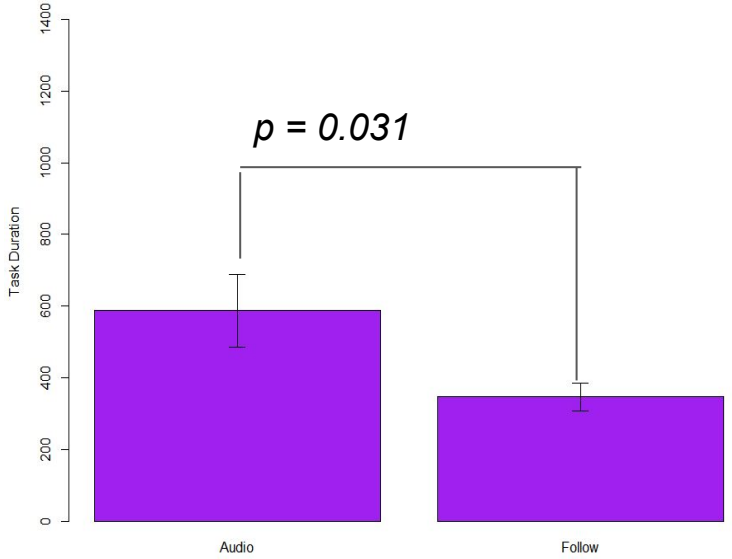
Significant Interaction Effect F(1, 15) = 6.56, p=0.022

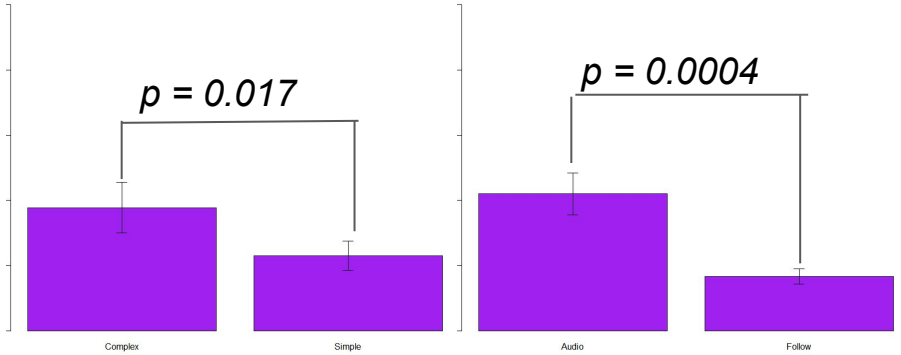


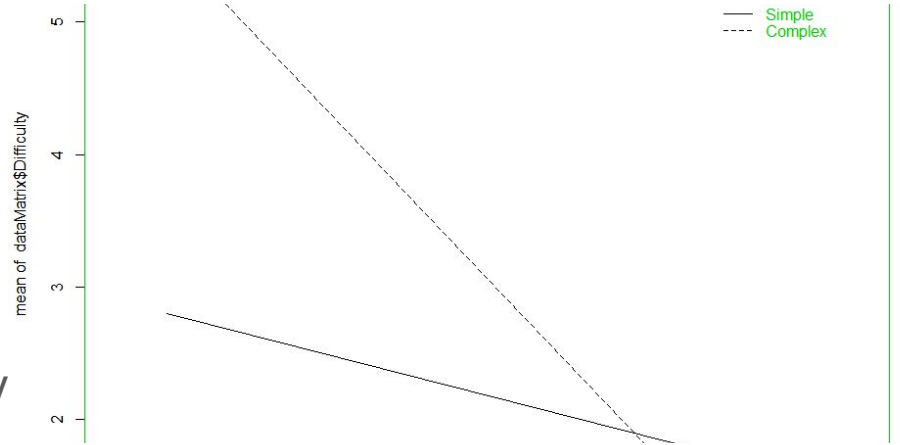
Two Way Analysis of Variance

Effect on Task Completion Time
Significant Main Effect
No Interaction Effect









Two Way Analysis of Variance

Effect on Task Difficulty

Significant Main Effect

Significant Interaction Effect F(1, 15) = 7.78, p = 0.014

Interesting Findings

“I wish it spoke more about what it was thinking.”

Interesting Findings

“Not exactly something I "dislike", but I wish there was more of the robot talking to me while it moved.”

Interesting Findings

“Never interacted with the bot. It was one way communication.”

Interesting Findings

“It is difficult to remember directions to a long distance - too many left rights can be confusing. This path had all first left and first rights so it was little easy. If it was first left followed by third right followed by first left it would have been impossible to reach the destination without writing it down somewhere”

Interesting Findings

One participant in Engineering Center followed the **Room Number sign** to complete the complex path in less than **4 min** (normally > 10 min)

Interesting Findings

One participant in ATLAS went **directly** to the destination when he/she **figured out** the destination on the map **without** the robot.

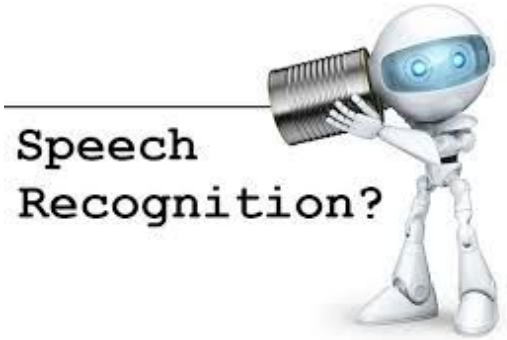
Limitations

- Robot was not able to follow the participant due to **unreliable Wifi** spots in Engineering Center.

Limitations

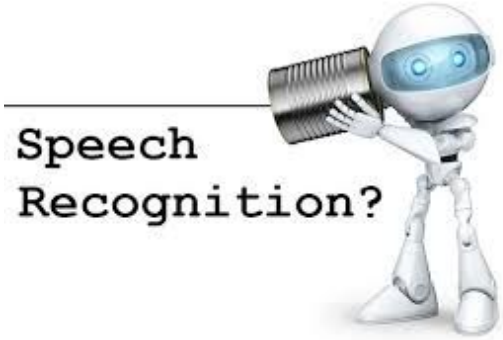
- Robot following participant could only be done in ATLAS but not in EC.

Future Work: Complete System at a Glance



Get Destination

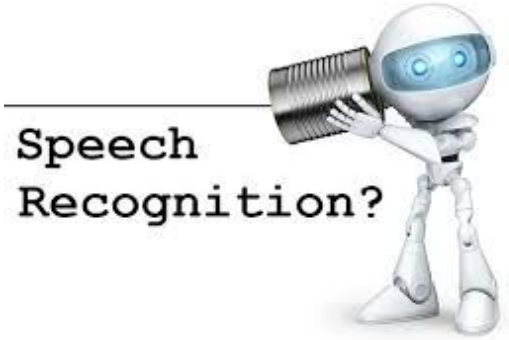
Future Work: Complete System at a Glance



Get Destination

Analyze Complexity of Path to Destination

Future Work: Complete System at a Glance



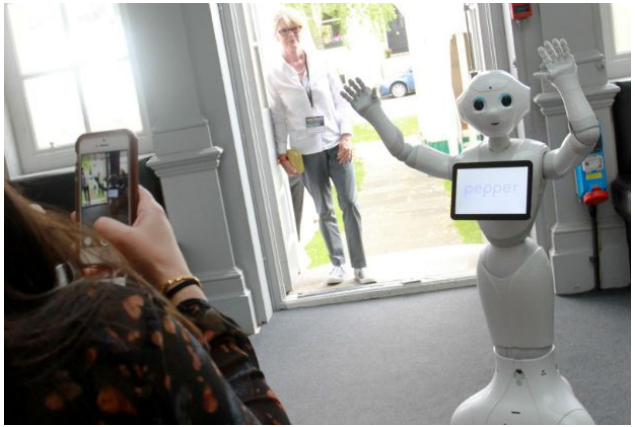
Get Destination

Analyze Complexity of Path to Destination

Determine Most Effective Way of Assisting

Future Work:

More Interaction



Context-Aware
Two Way
Communication

Thank you!

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One way:
https://www.google.com/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&cad=rja&uact=8&ved=0ahUKEwjtx5CM7MzTAhUJ74MKHbc1CVEQjRwIBw&url=http%3A%2F%2Fwww.scoopwhoop.com%2Finothernews%2F10-confusing-questions-our-generation-has-no-answer-to%2F&psig=AFQjCNERDqEBcab-H2nExza6lVsacFCOtA&ust=1493664519961162

Human Robot Interaction
https://www.iconfinder.com/icons/476758/communication_contact_cooperation_handshake_human_meeting_robot_icon

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