

DEVELOPING AND DESIGNING INTERACTIVE DEVICES

February 8, 2021

THE GOAL OF THIS COURSE
IS TO TEACH YOU
TO RAPIDLY PROTOTYPE
INTERACTIVE SYSTEMS
EARLY IN THE DESIGN PROCESS

ROBOT STEERING WHEEL





Mechanical Ottoman

David Sirkin, Brian Mok, Stephen Yang, Wendy Ju
Center for Design Research, Stanford University

Sirkin, D., Mok, B., Yang, S. & Ju, W. Mechanical Ottoman: How Robotic Furniture Offers and Withdraws Support. In Proc. HRI'15 March 2-5, 2015. Portland OR.



Yang, S., et al. *Adventures of an Adolescent Trash Barrel: Experiences Developing Socially Acceptable Interactions for Everyday Robots*. RO-MAN 2015. August 31-September 3, 2015. Kobe, Japan.

A field study investigating the interaction between pedestrians and driverless vehicles

Dirk Rothenbücher, Jamy Li, Brian Mok, David Sirkin, Wendy Ju. Ghost Driver: A Field Study Investigating the Interaction between Pedestrians and Driverless Vehicles. In RO-MAN 2016, New York NY Aug 26-31, 2016.

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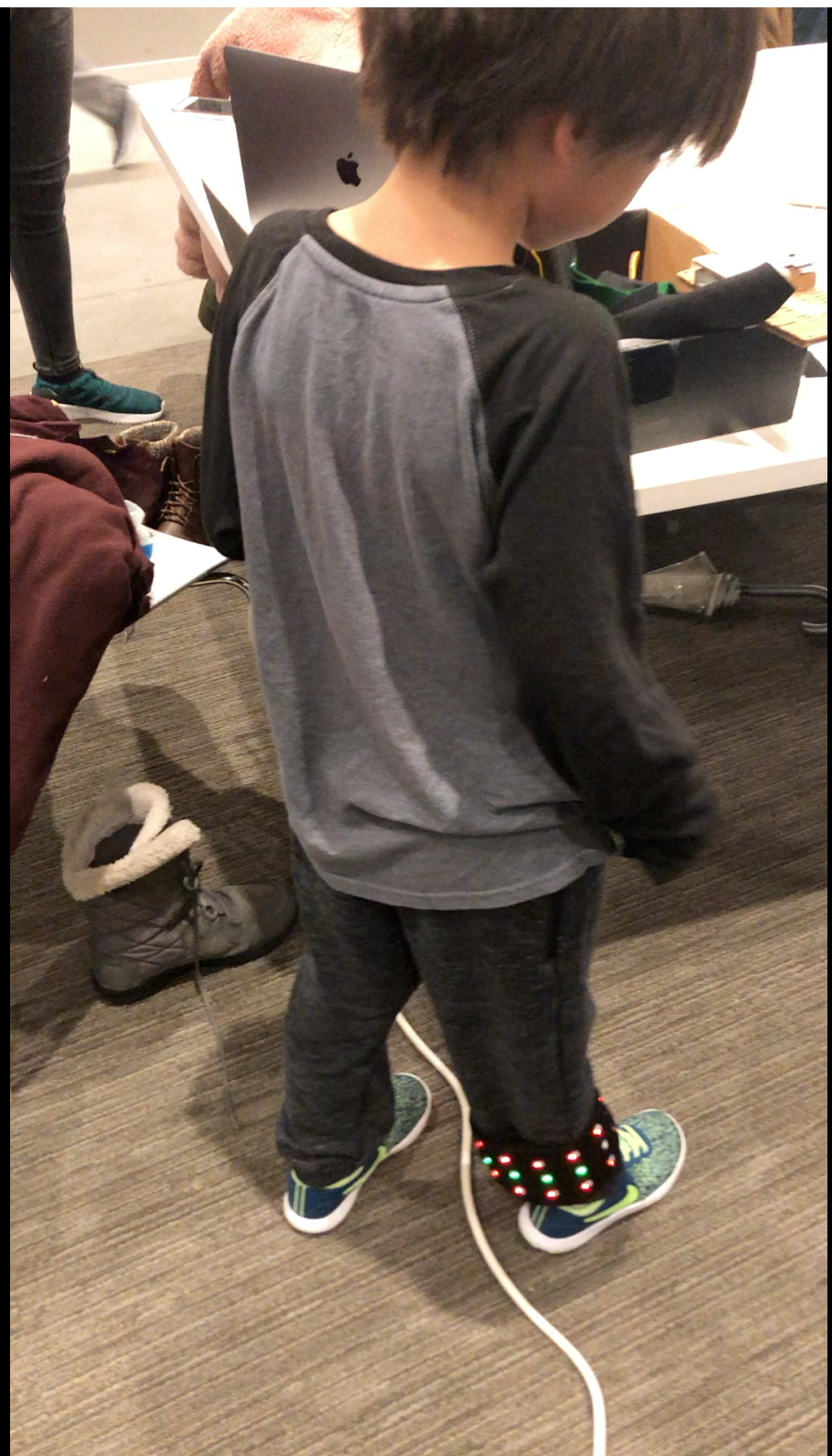
1 B U T T O N M P 3 P L A Y E R
J E R E M Y K E E S H I N



DIGITAL GHUNGROO

ANANYA PAUL,
MEERA NANDA,
NOEL KHONAGI

GITHUB LINK



DOG TREAT DISPENSER

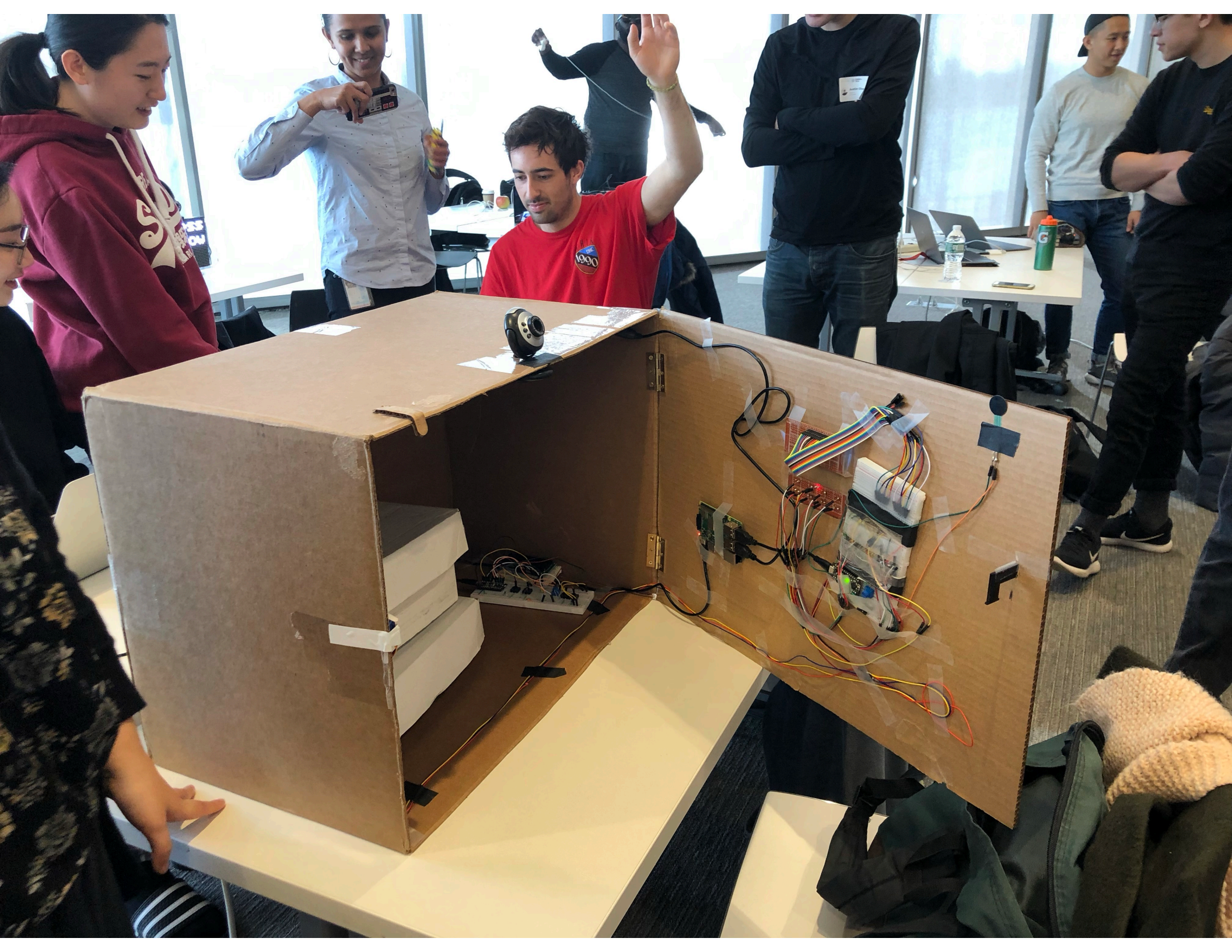
ZHENWEI ZHANG
IRENE WEI

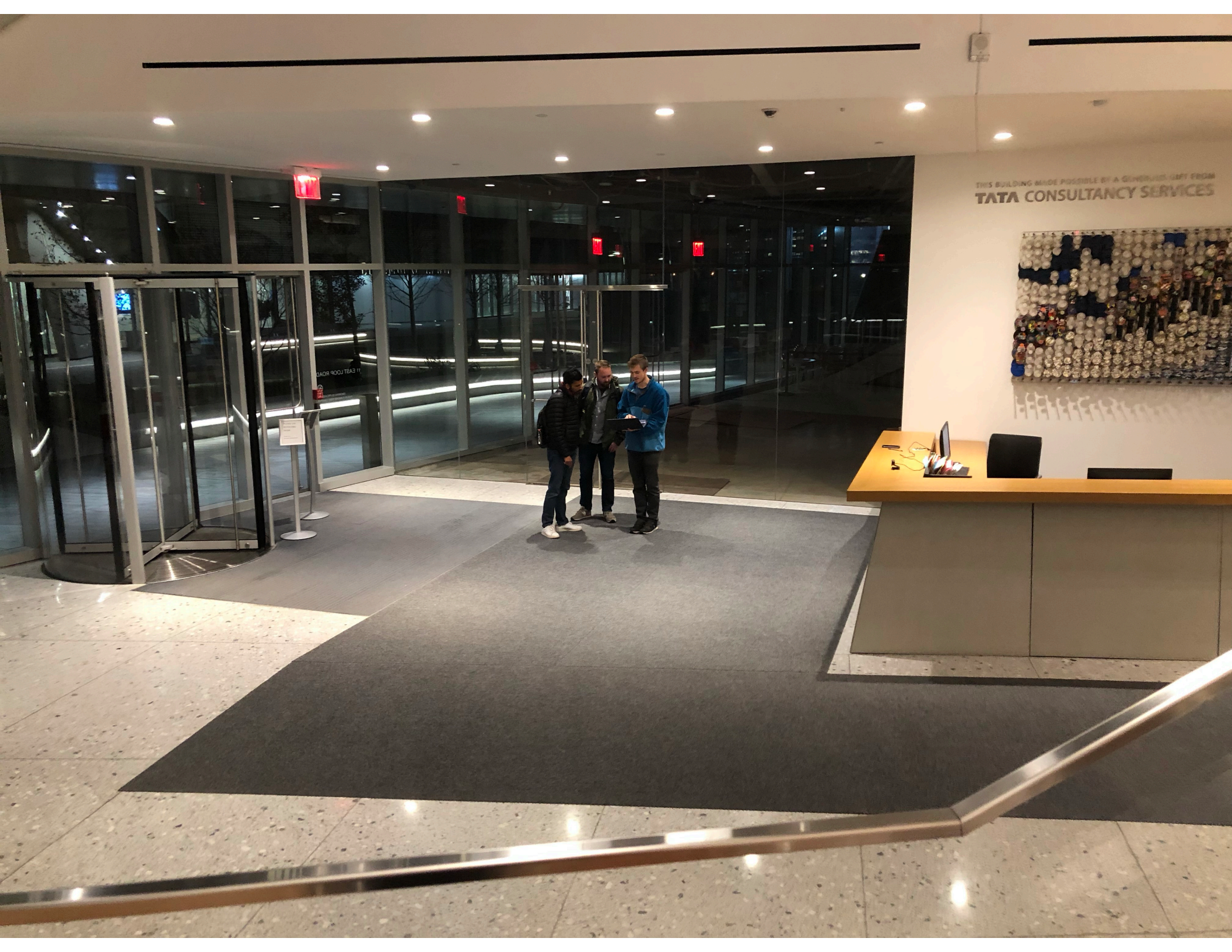


DOG TREAT DISPENSER

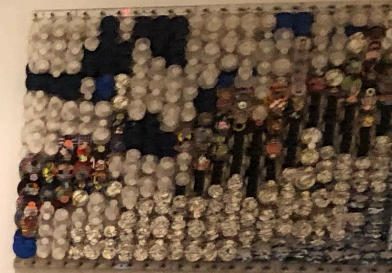
ZHENWEI ZHANG
IRENE WEI







THIS BUILDING MADE POSSIBLE BY A GENEROUS GIFT FROM
TATA CONSULTANCY SERVICES



EARLY DESIGN PROTOTYPES
HELP DESIGNERS UNDERSTAND
WHAT TO DESIGN

IN-LAB TESTING



U S A B I L I T Y T E S T I N G

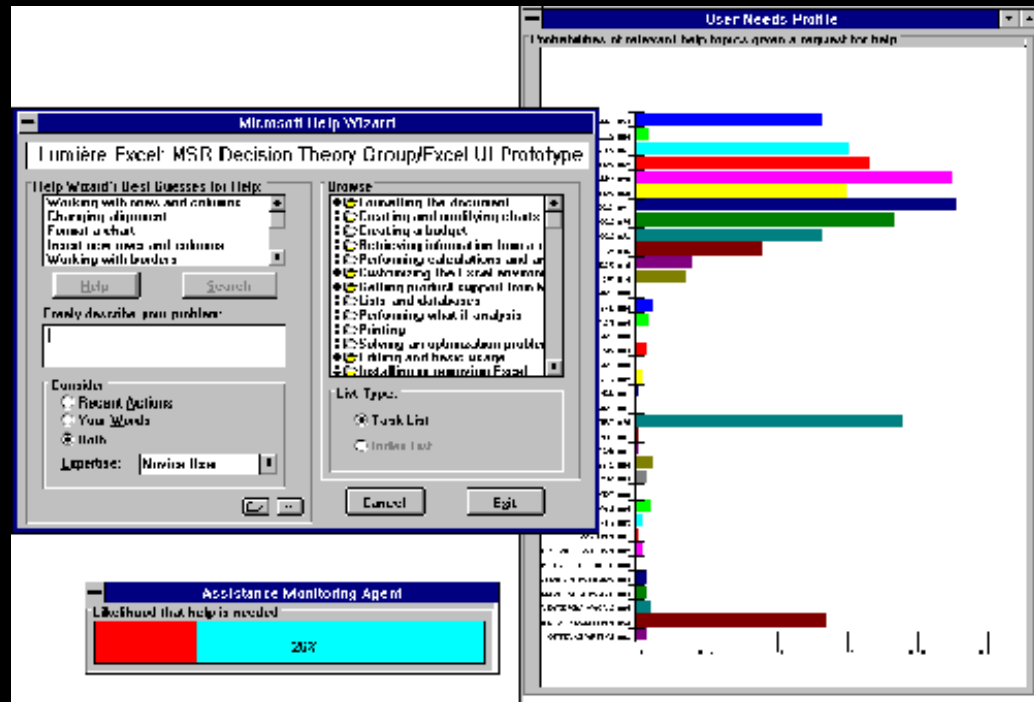
- Users given set tasks, usually in writing
- Designers/testers observe, and do not intervene to provide information or assistance
- Common metrics: task completion, time on task, errors, misunderstandings, user sentiment
- Tends to be summative—that is, it occurs at the end of the design process

LUMIERE PROJECT, MICROSOFT RESEARCH 1993



E. Horvitz, J. Breese, D. Heckerman, D. Hovel, and K. Rommelse. The Lumiere Project: Bayesian User Modeling for Inferring the Goals and Needs of Software Users. *Proceedings of the Fourteenth Conference on Uncertainty in Artificial Intelligence*, July 1998.

The Lumiere Wizard of Oz studies helped to elucidate important distinctions that were later woven into Bayesian networks.



ELICITATION STUDIES

- Users given high level goals
- Designers/testers may enact the role of interactive assistance or intervention
- Common outcomes: actions, maneuvers, patterns
- Tends to be generative—that is, brings up more questions than it answers

C O U R S E S Y L L A B U S R E V I E W

C O U R S E K I T

A C T I V E P A R T I C I P A T I O N

WHY VIDEO?

- Empirical proof of action
- Captures context, timing, dynamic reactions, interactions, experiences
- Supports reflection and analysis, reinterpretation, collaboration



VISION AND NARRATIVE
ARE CRITICAL ASPECTS OF
INTERACTIVE SYSTEM DESIGN

A U R (2 0 0 7)



<http://video.mit.edu/watch/robotic-desk-lamp-3051/>

FEATURE WALKTHROUGH: ROBIOT (2019)



Robiot: A Design Tool for Actuating Everyday Objects with Automatically Generated 3D Printable Mechanisms

Jiahao Li, Xiang 'Anthony' Chen

HCI Research, UCLA

Jeeun Kim

CS&E Department, Texas A&M University

V I D E O I S A K E Y T O O L
F O R S C O U T I N G , S T A G I N G ,
A N D C A P T U R I N G I N T E R A C T I O N

ELICITING RESPONSES

...when “what the user will do”
needs to be part of your design.



M enters & sits down,
w/ book
& opens book



ottoman
approaches &
offers to support
M's feet



M accepts

greatly
pleased

usually
put
feet

M demurs

"(•_•)"





Sirkin, D. & Ju, W. (2014) Using Embodied Design Improvisation as a Design Research Tool. In Proc. Human Behavior in Design. October 14-17, 2014. Ascona, Switzerland.



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LET'S WORK TOGETHER



HOW TO CREATE AND
EDIT VIDEOS

THINGS TO CONSIDER IN ADVANCE

- Activity and Instructions
- Subjectivity and Context
 - Framing
 - Points of View
- Permissions
 - To Record
 - To Present

THINGS TO CONSIDER AFTERWARDS

- Curatorial Decisions
 - Is this clip exceptional? representative?
 - Speed ups and special effects—distorting? Be clear.
 - Be respectful of participants
- Distinguish between envisionments, working prototypes and finished products
- Don't use video for unintended purposes
- Be careful where you put the video

FOR RESEARCH / DOCUMENTATION VIDEOS

- Know your footage.
- Write a script.
- Record yourself reading it (or use intertitles)
- Find footage to support the words.
- Keep it to two minutes

FOR PROTOTYPE / VISION VIDEOS

- Make a storyboard
- Make your props
- Record your shots
- Assemble the footage
- Keep it to two minutes

POWERPOINT AS CHEAPASS VIDEO EDITOR

Novel Human-Machine
Interfaces for the
Management of
User-Vehicle Transitions
in Automated Driving



POWERPOINT AS CHEAP * * *

VIDEO EDITOR

1. Film all videos in phone
2. Import videos into computer
3. Import videos into Powerpoint as slides
 - Recommend one clip to a slide.
 - Make all the videos fill the frame of the slide
 - Rough Trim clips: Playback->Trim Clips
4. Edit clips in Powerpoint
 - Re-order by moving slides around
 - Trim clips: Playback->Trim Clips
 - Show and hide clips using slide controls
 - Set clips to auto-start on transition: Playback->Start ->Automatically

POWERPOINT AS CHEAP * * *

VIDEO EDITOR

For Windows

1. Set the Slideshow settings:

- Check for Use Timings, Play Narrations (if you're going to voice over).
- Uncheck Show Media Controls.

2. Record Slideshow

- Use arrow keys to move forward to slides at a pace that feels right
- Narrate the slides if you're doing voice over
- Make sure to press stop when you are done.

3. Export Slideshow as Movie

- File->Export...->
- Select File format (Mp4 or MOV)
- Use Recorded Timings and Narrations

4. Double check the exported file to make sure it is what you want!

For Mac

1. 1. In Quicktime Player: File->New Screen Recording.

2. Set Powerpoint slide to Presenter Mode

3. Use command-tab to bring Quicktime record button to the top. Press the red button and click the Powerpoint slide to record.

4. Record slideshow

- Use arrow keys to move forward to slides at a pace that feels right
- Press "Stop" when you are done.

5. Name your file and save it!

6. Double check the movie file to make sure it is what you want!