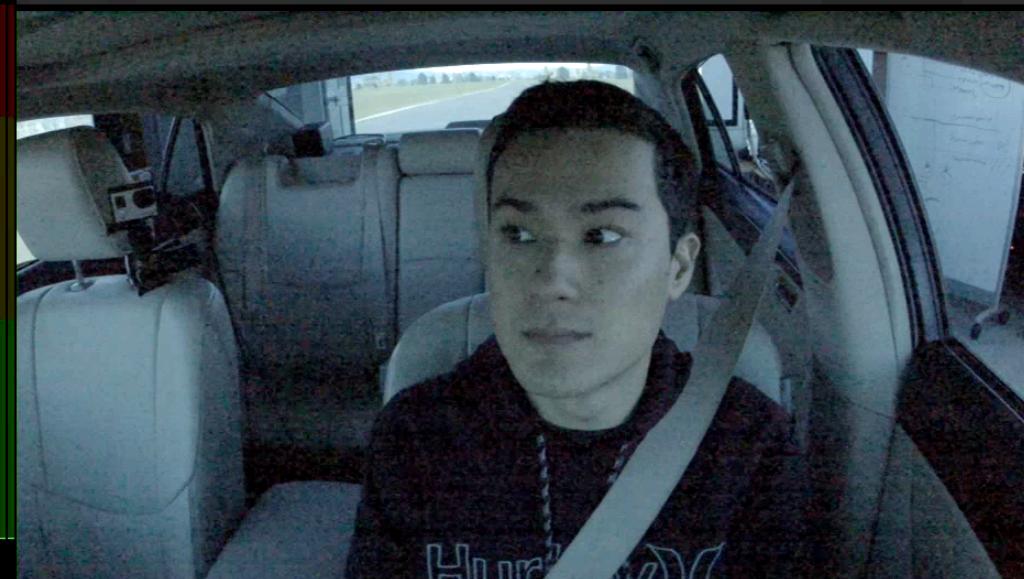


# DEVELOPING AND DESIGNING INTERACTIVE DEVICES

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 ROMAN 2016, New York NY Aug 26-31, 2016.*

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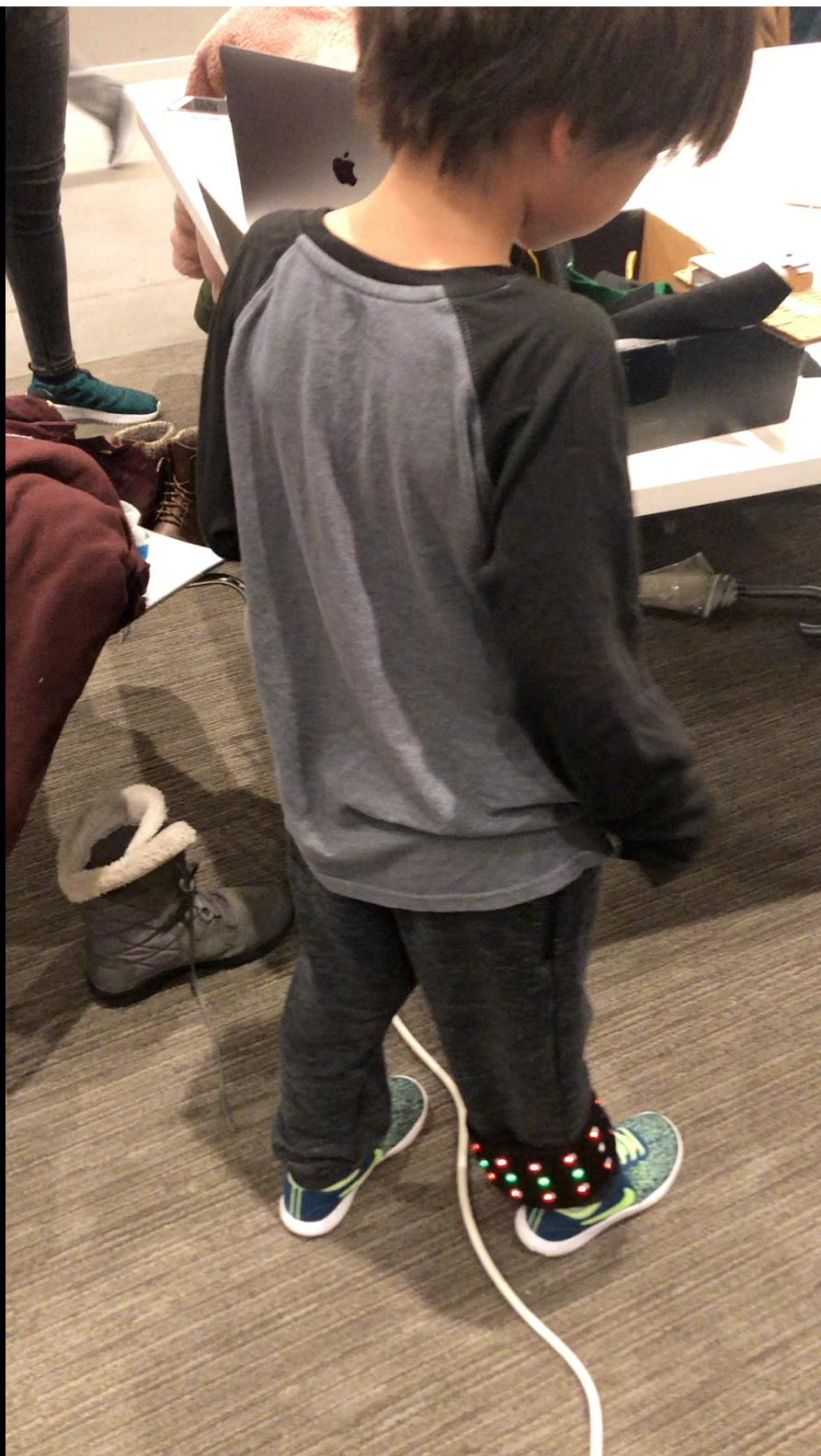
1 BUTTON MP3 PLAYER  
JEREMY KEESHIN



# DIGITAL GHUNGROO

ANANYA PAUL,  
MEERA NANDA,  
NOEL KHONAGI

GITHUB LINK



# DOG TREAT DISPENSER

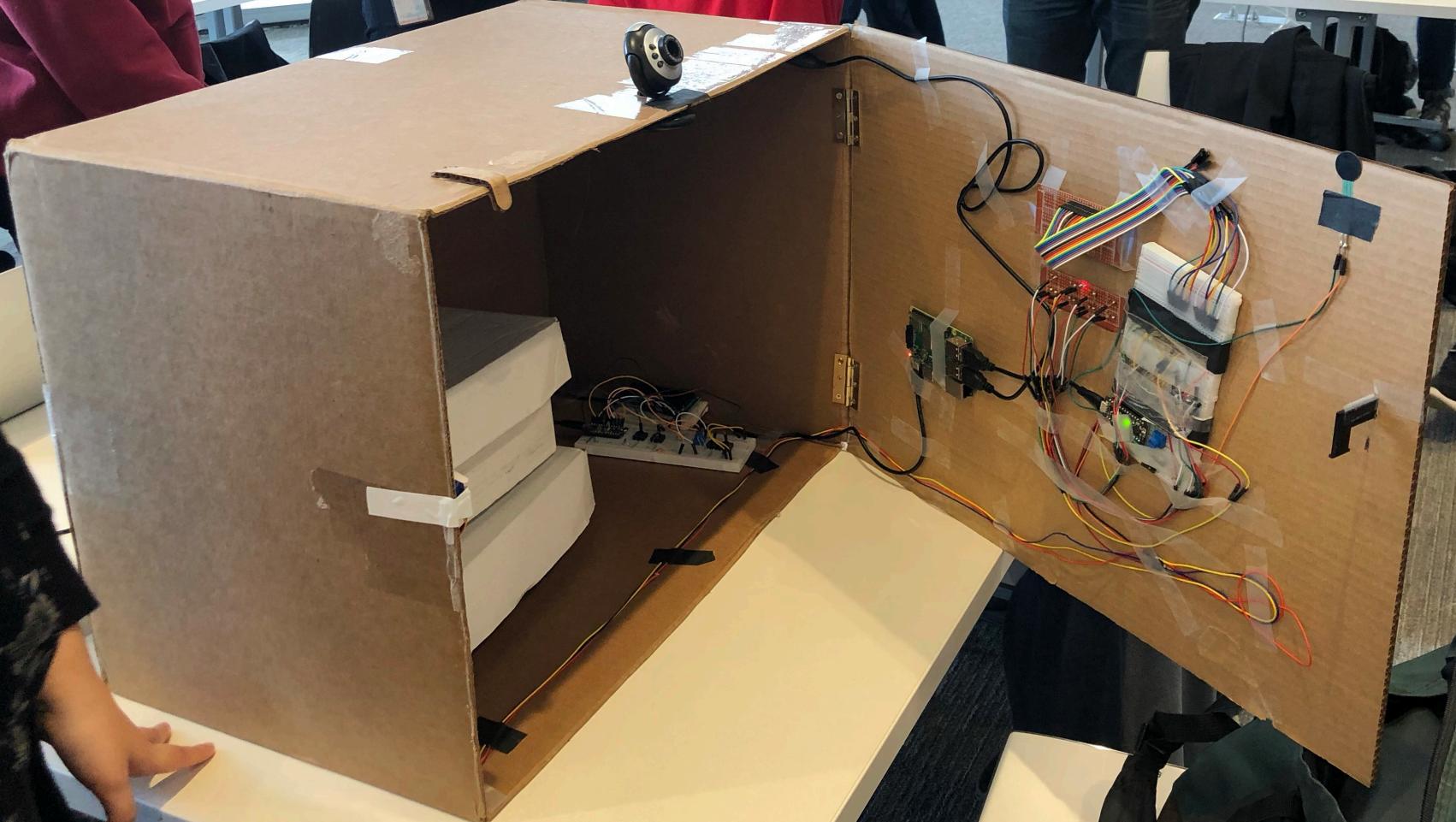
ZHENWEI ZHANG  
IRENE WEI



# DOG TREAT DISPENSER

ZHENWEI ZHANG  
IRENE WEI





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



E A R L Y   D E S I G N   P R O T O T Y P E S  
H E L P   D E S I G N E R S   U N D E R S T A N D  
W H A T   T O   D E S I G N

# I N - L A B   T E S T I N G



# USABILITY TESTING

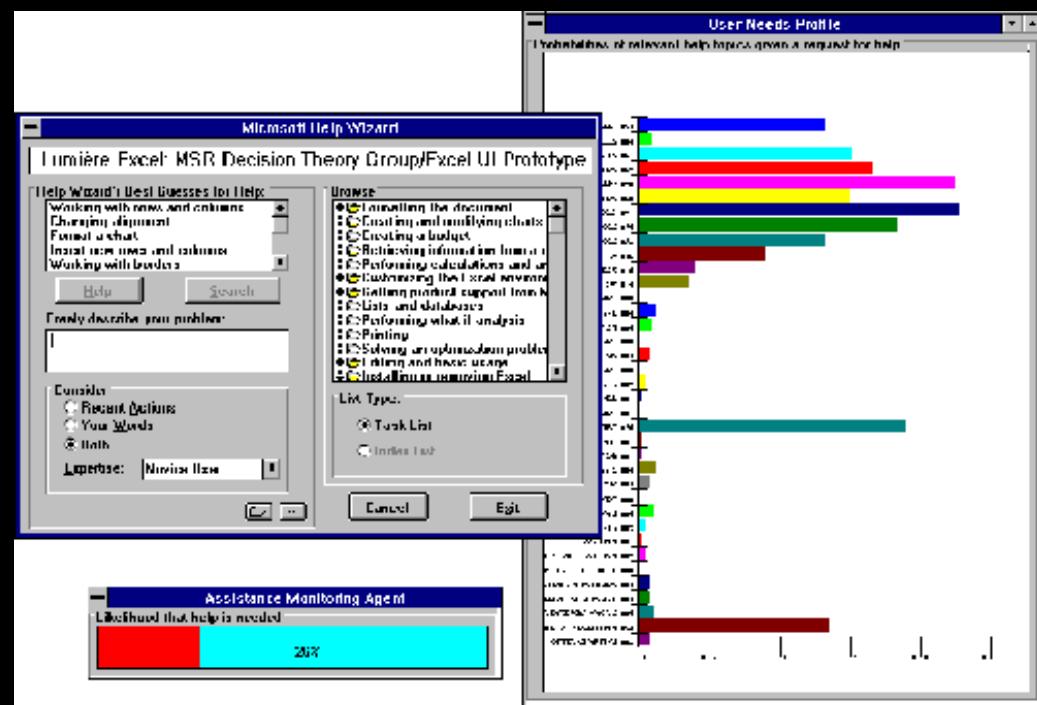
- Users given set tasks, usually in writing
- Designers/testers observe, and do not intervene to provide information or assistance
- Common metrics: task completion, time on task, errors, misunderstandings, user sentiment
- Tends to be summative—that is, it occurs at the end of the design process

# 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 Lumière 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

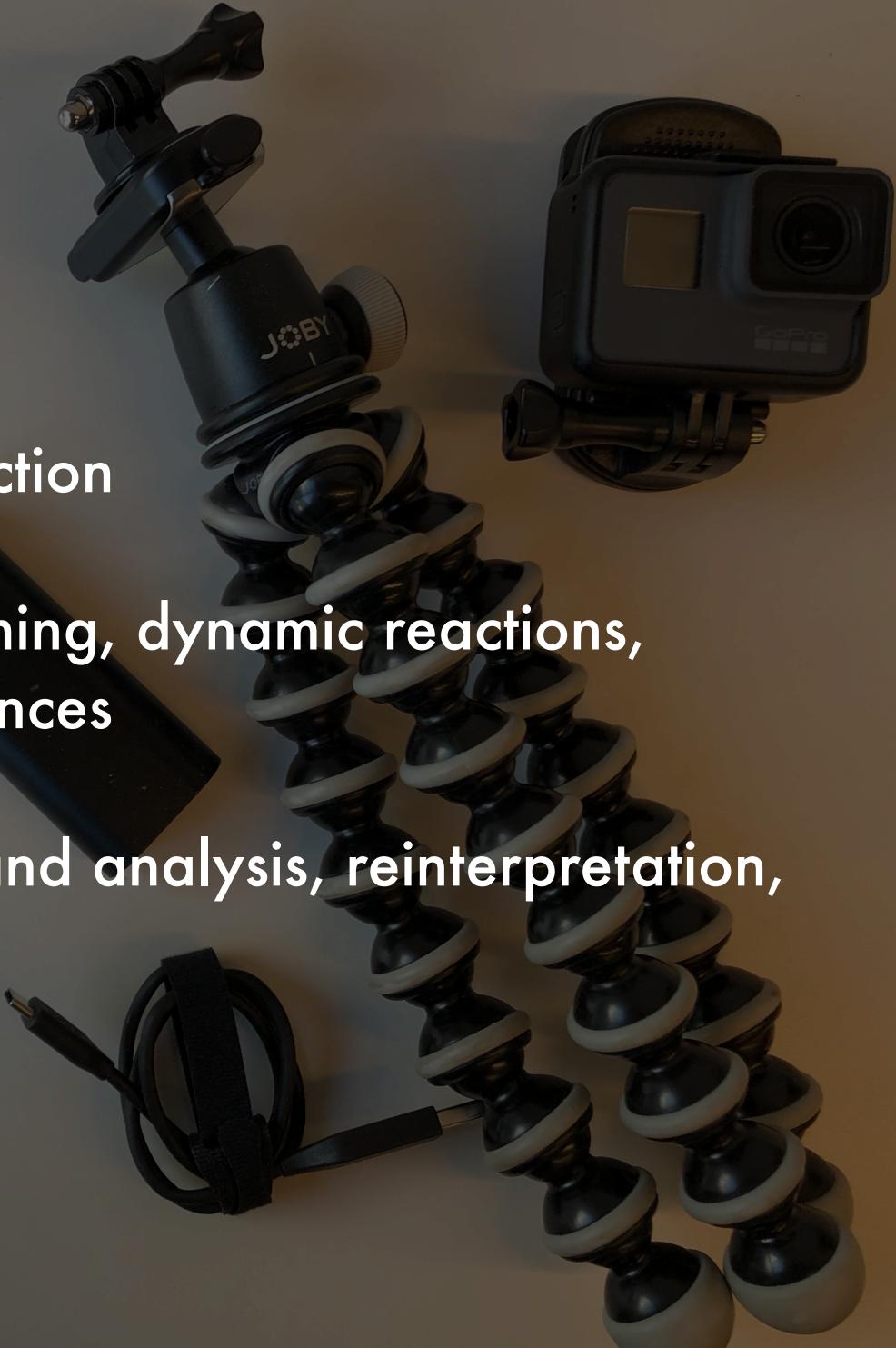
# COURSE SYLLABUS REVIEW

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

# W H Y   V I D E O ?

- 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

Jeeeun Kim

CS&E Department, Texas A&M University

<https://hci.ucla.edu/#projects-robiot>

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 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.



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.



# LET'S WORK TOGETHER



H O W   T O   C R E A T E   A N D  
E D I T   V I D E O S

# 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 envisions, 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



# **P O W E R P O I N T   A S   C H E A P \* \* \***

## **V I D E O   E D I T O R**

- 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. 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!