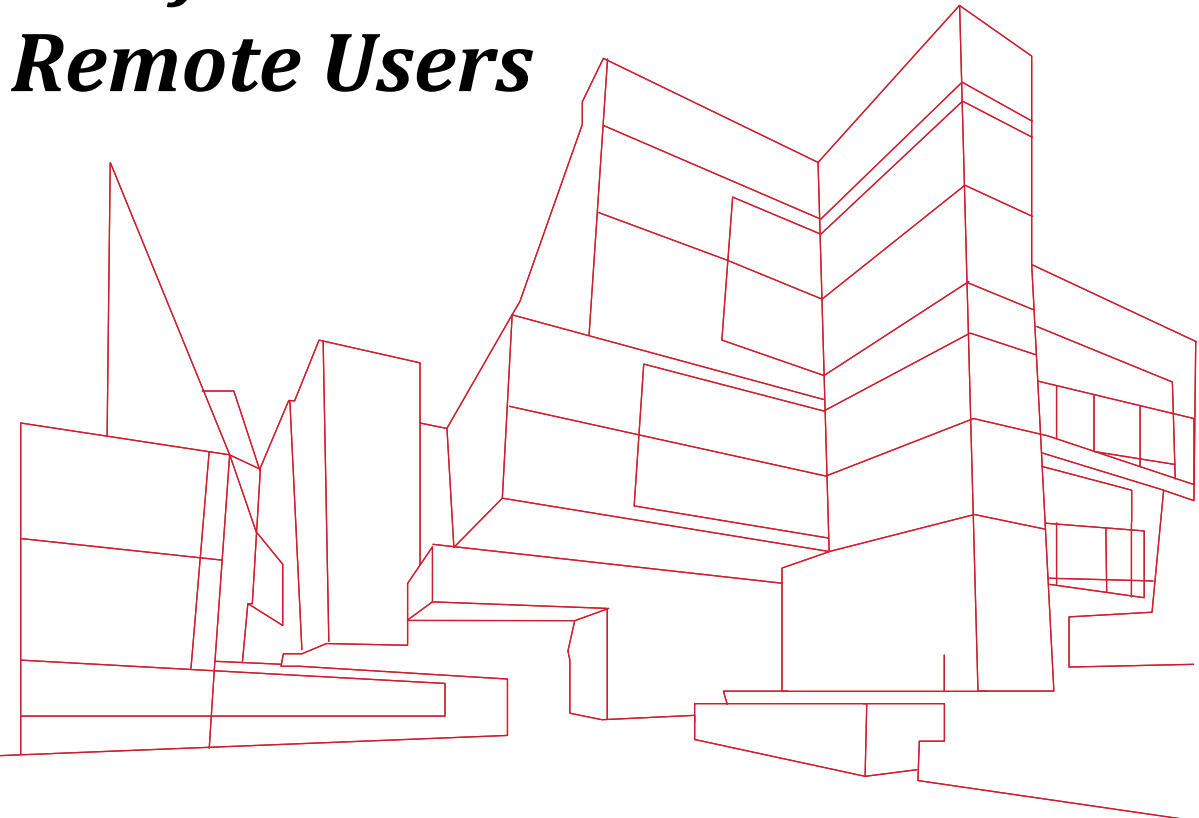


Daejeon, South Korea

All4One : A Moderated Sketching Tool for Supporting Idea-Generation with Remote Users

Hyelip Lee, Seungwoo Je, Andrea Bianchi

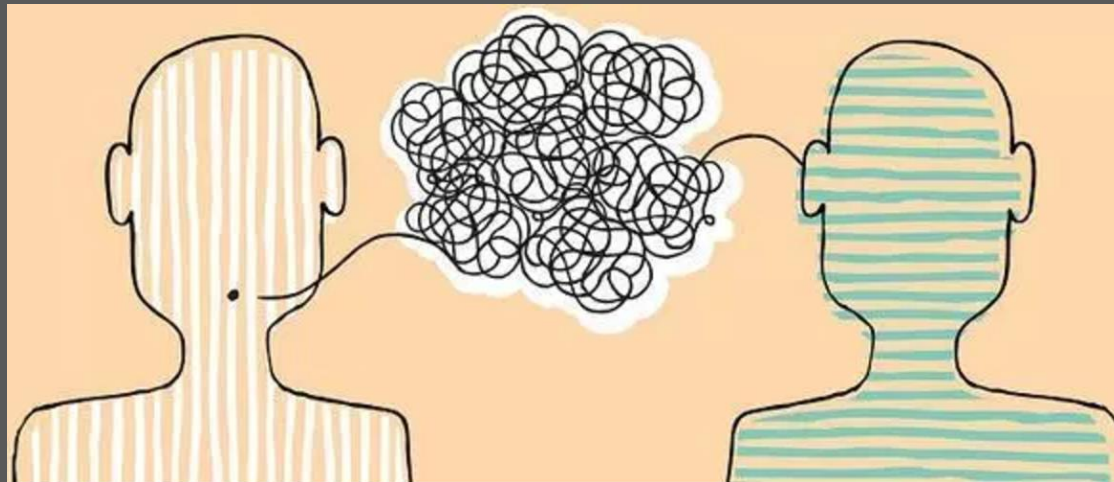
KAIST Industrial Design department



1. Research Background

Early stage of design

- 1) Good **brainstorming** is highly **visual and physical** (Kelly et al., 2001)
- 2) Benefit of **Moderated** Brainstorming (Oxley et al., 1996; Chan et al., 2016)
- 3) However, current **remote** collaborations are not physical and not moderated.



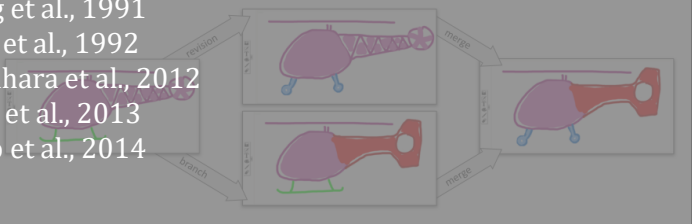
2. Related Works



Computer-supported collaborative drawing tools

Bly et al., 1990
Tang et al., 1991
Ishii et al., 1992
Kasahara et al., 2012
Yuill et al., 2013
Zhao et al., 2014

Colour
Line or Fill
Brush Size
Drawing Area
Progress Indicator
Timer



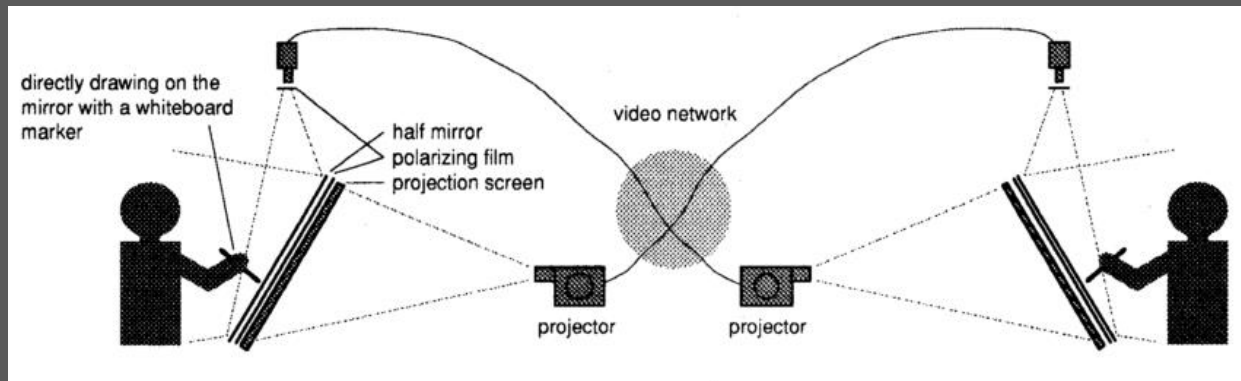
Tangible sketch-supporting tools

Rekimoto & Sciammarella, 2000
Schkolne et al., 2001
Zhen et al., 2013
Lee et al., 2014
Leon et al., 2014
Surface studio, Tilt Brush

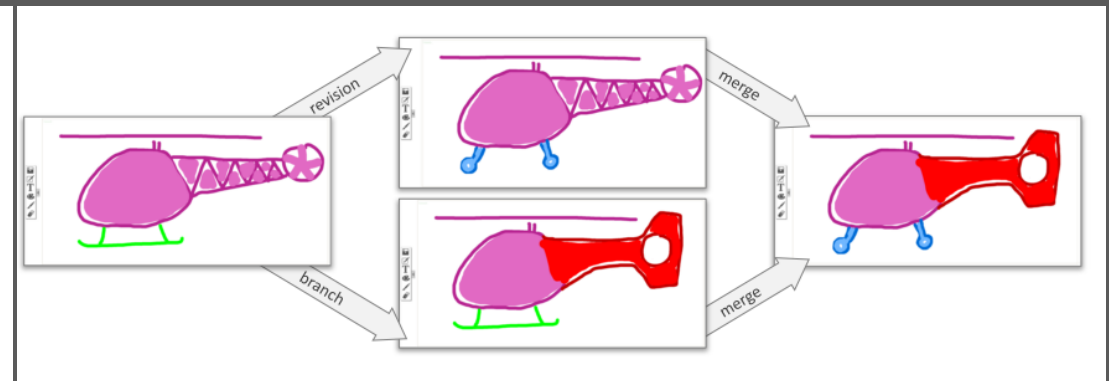
Tangible Camera Controller
Virtual Camera Proxy

2. Related Works: Collaborative drawing tool

Many drawing sharing tools for remote and also co-located people



ClearBoard (CHI 1992)



skWiki (CHI 2014)

But, they are all peer to peer interaction without moderation

2. Related Works: **Tangible** drawing tools

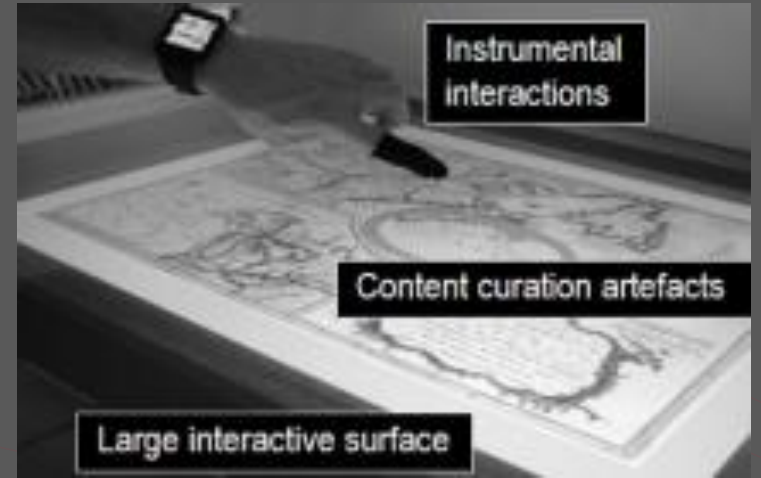
Easier and intuitive interaction with digital 2D, 3D drawings



ToolStone (UIST 2000)



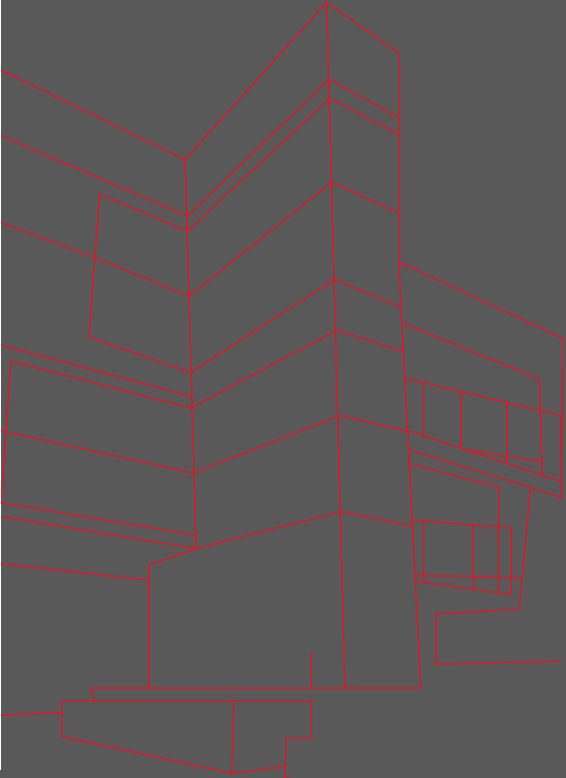
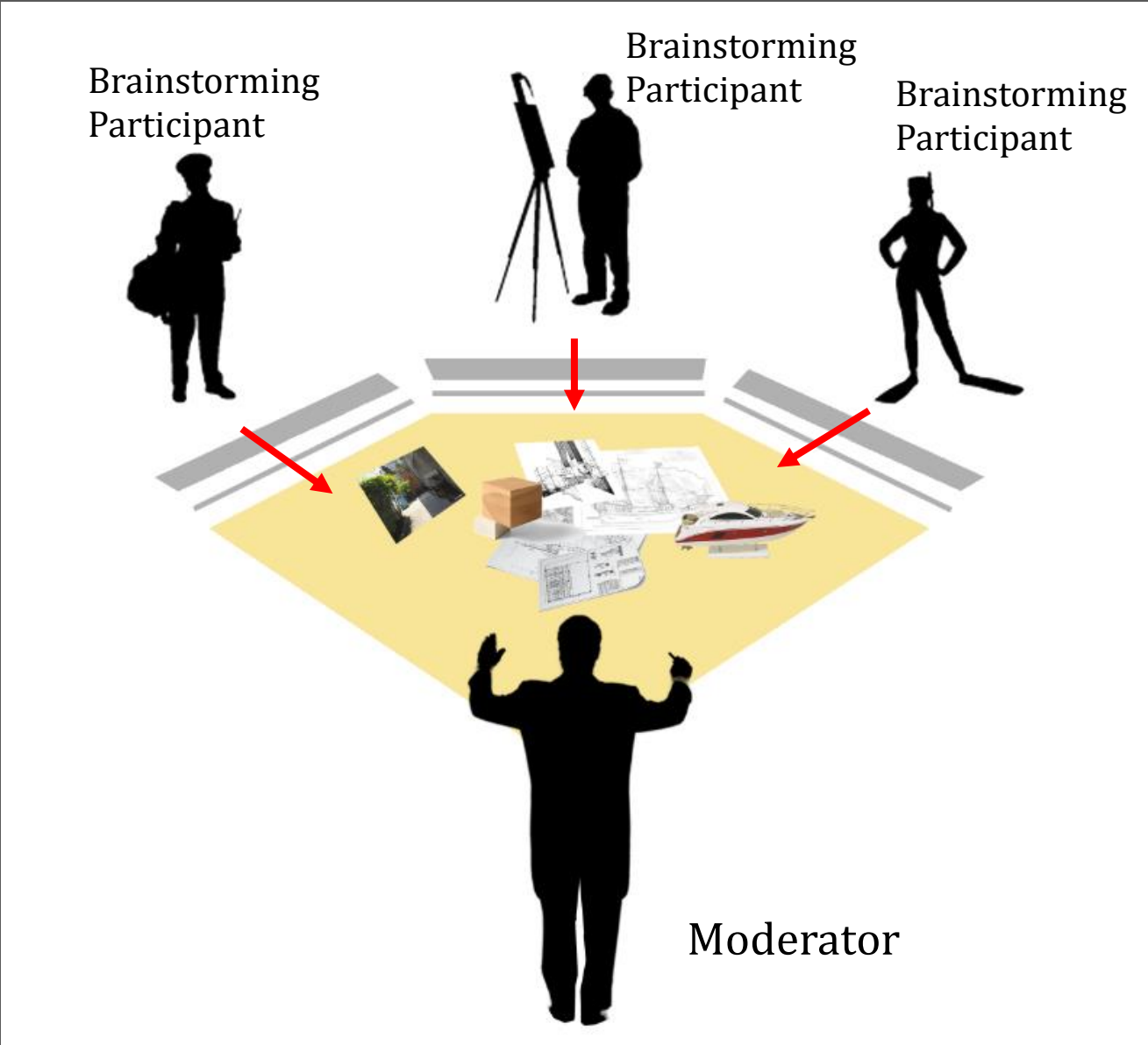
Tango (CHI 2013)



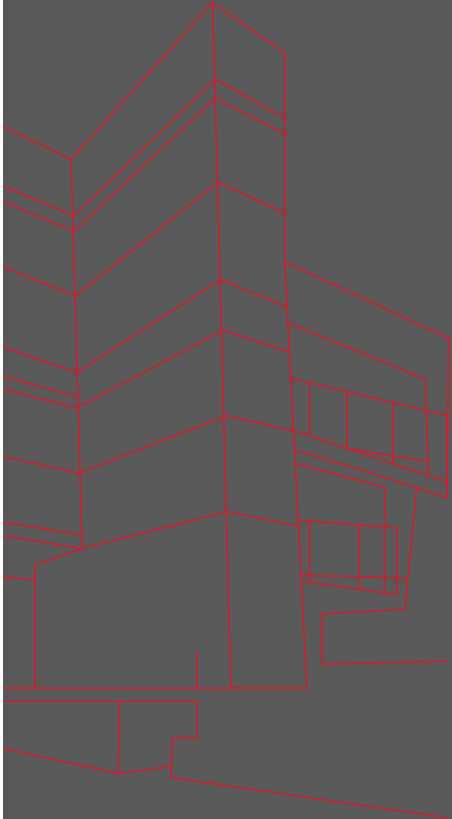
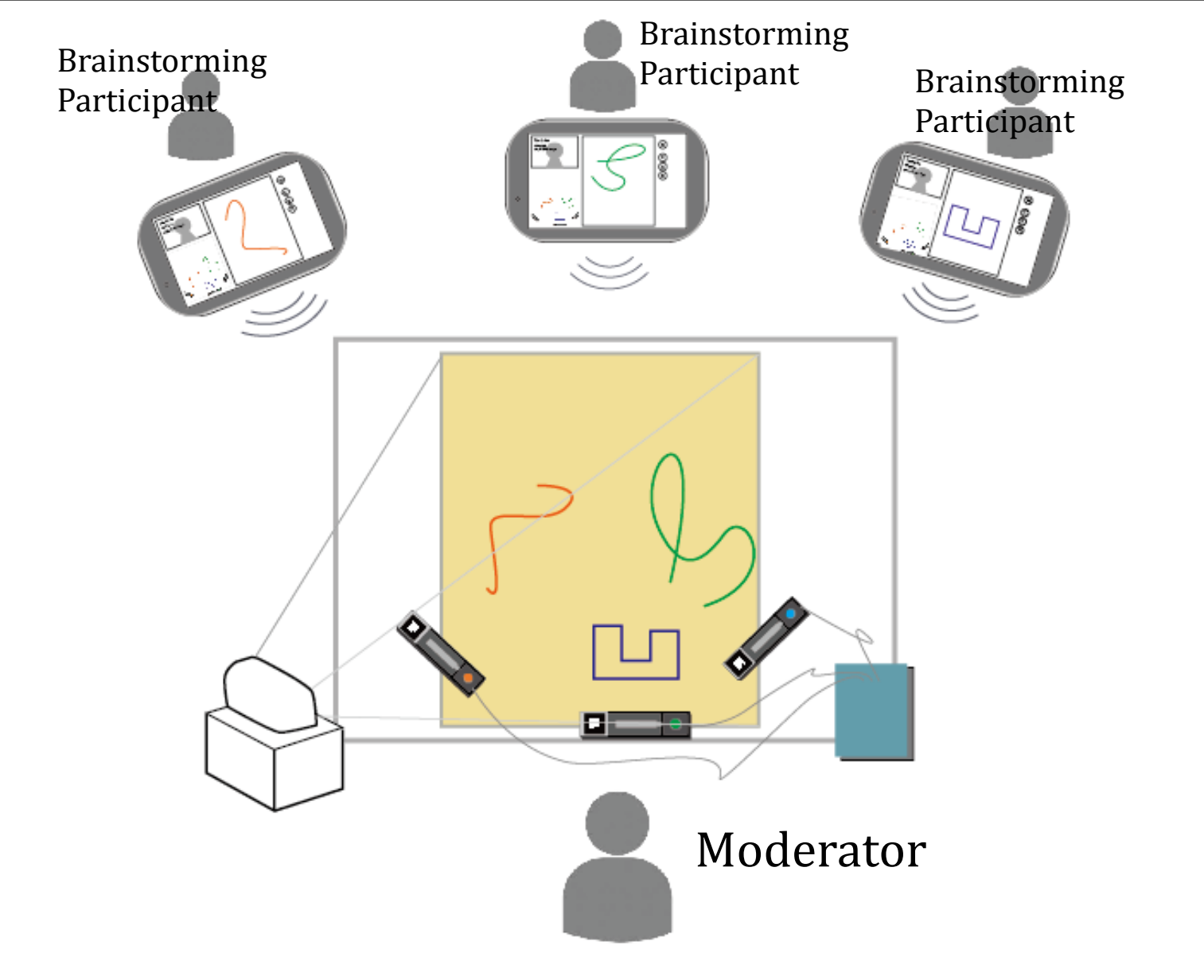
CurationSpace(2016)

Most of them are **not** for **remote collaboration**

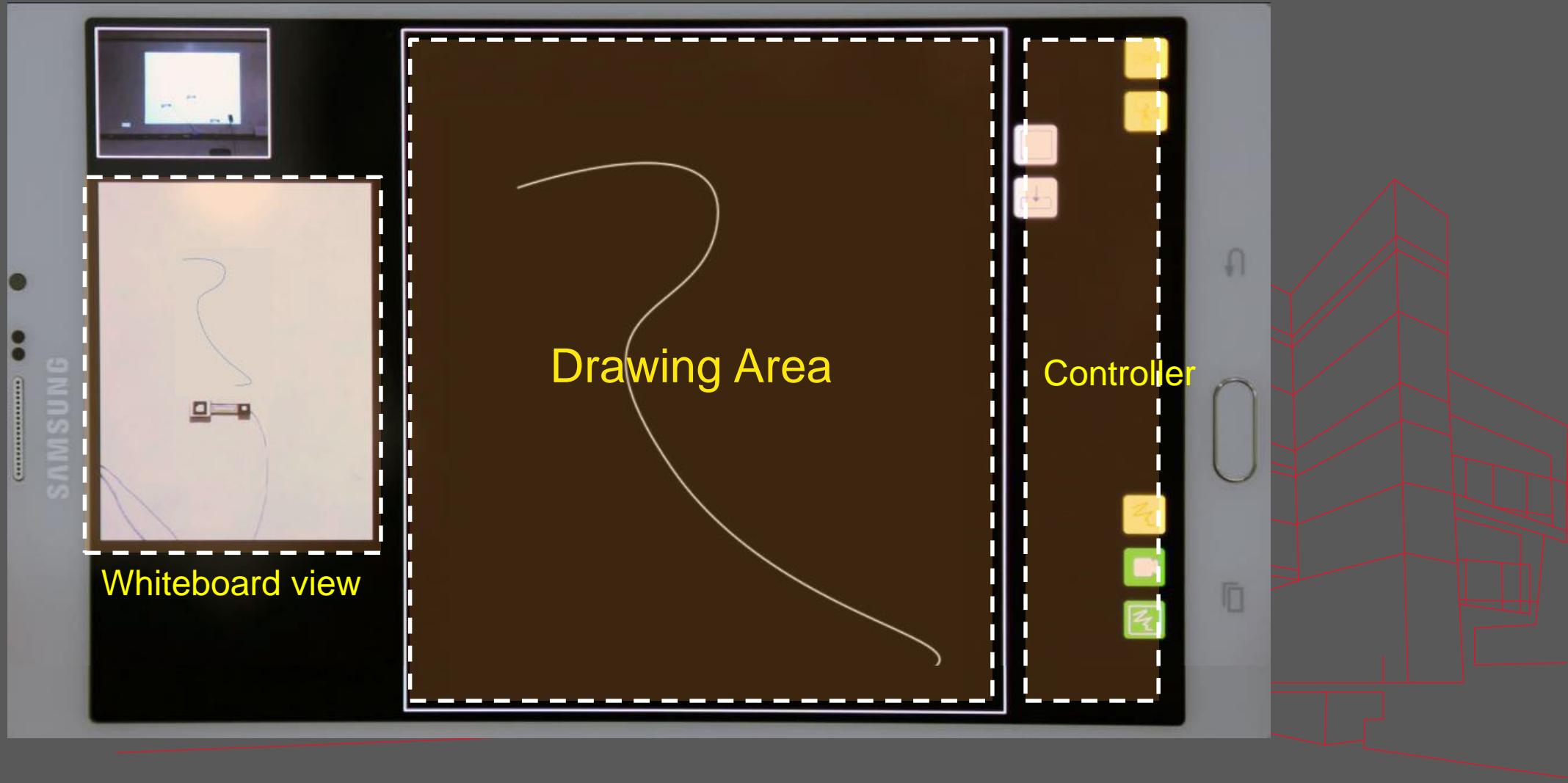
3. All4One



3. All4One System



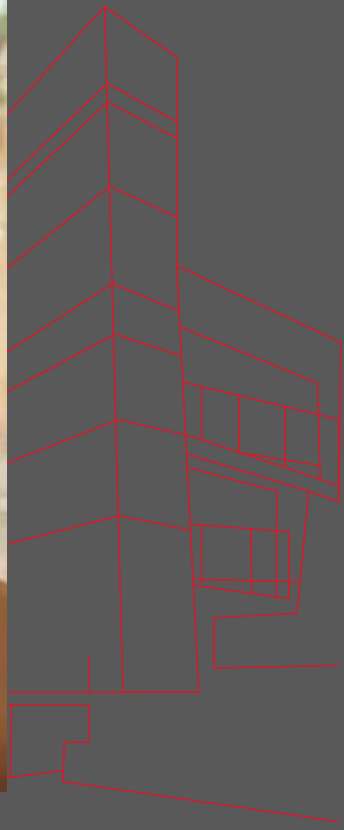
3. All4One : Mobile sketching application



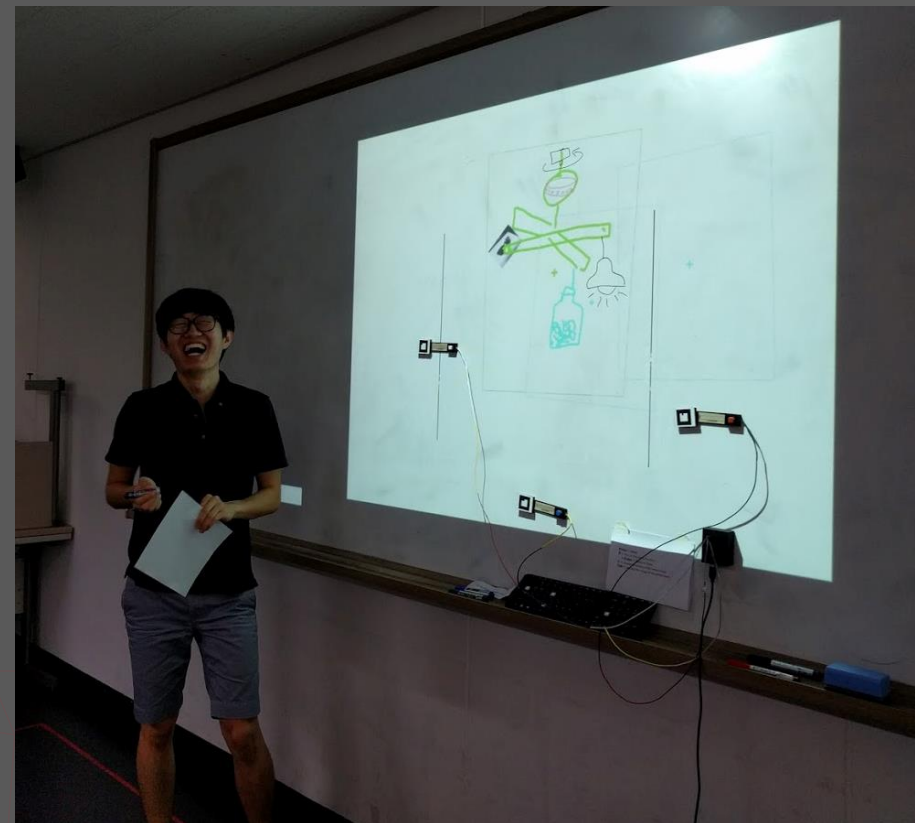
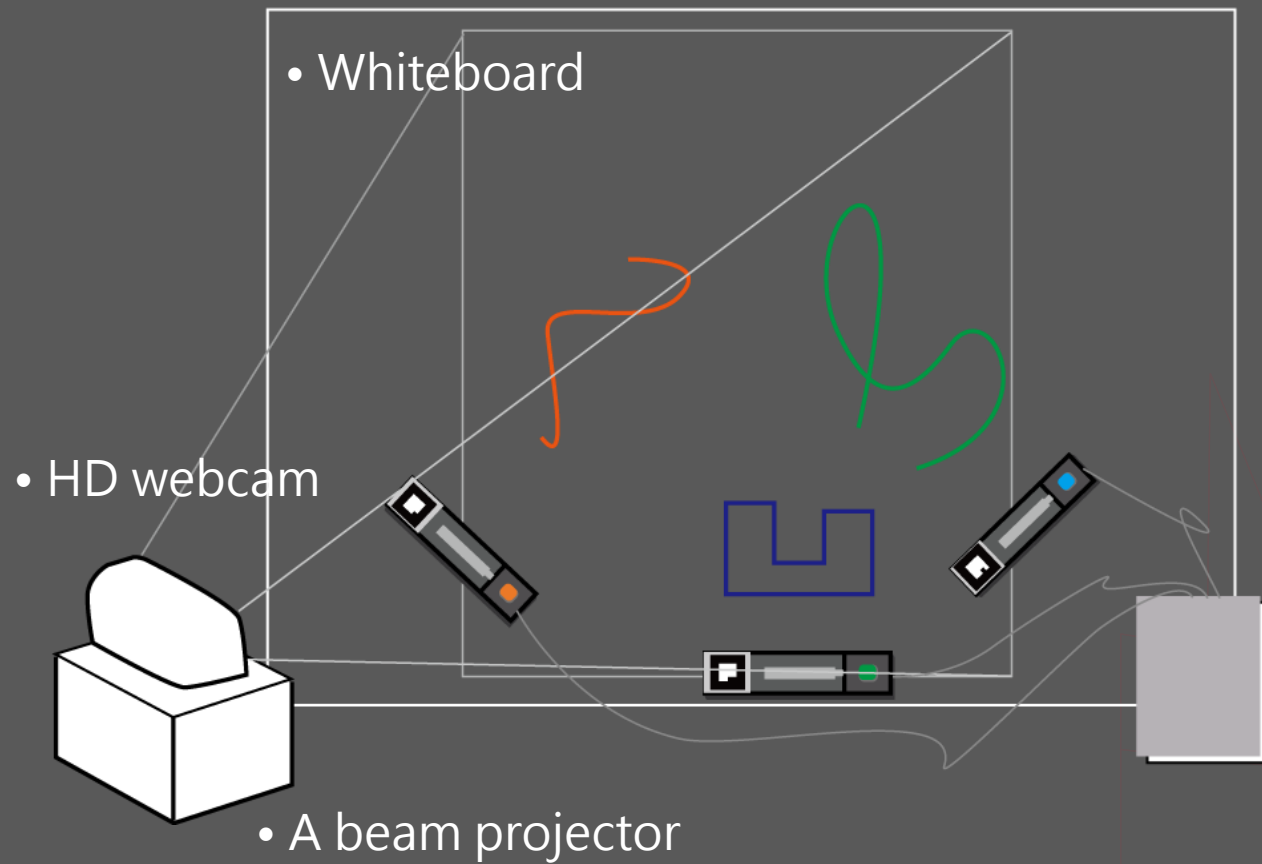


Built-in Camera

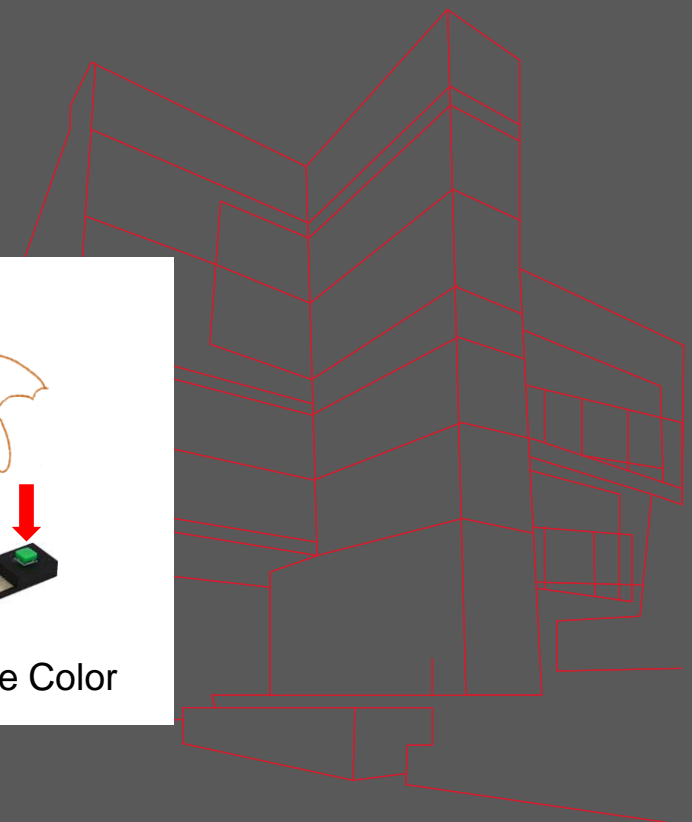
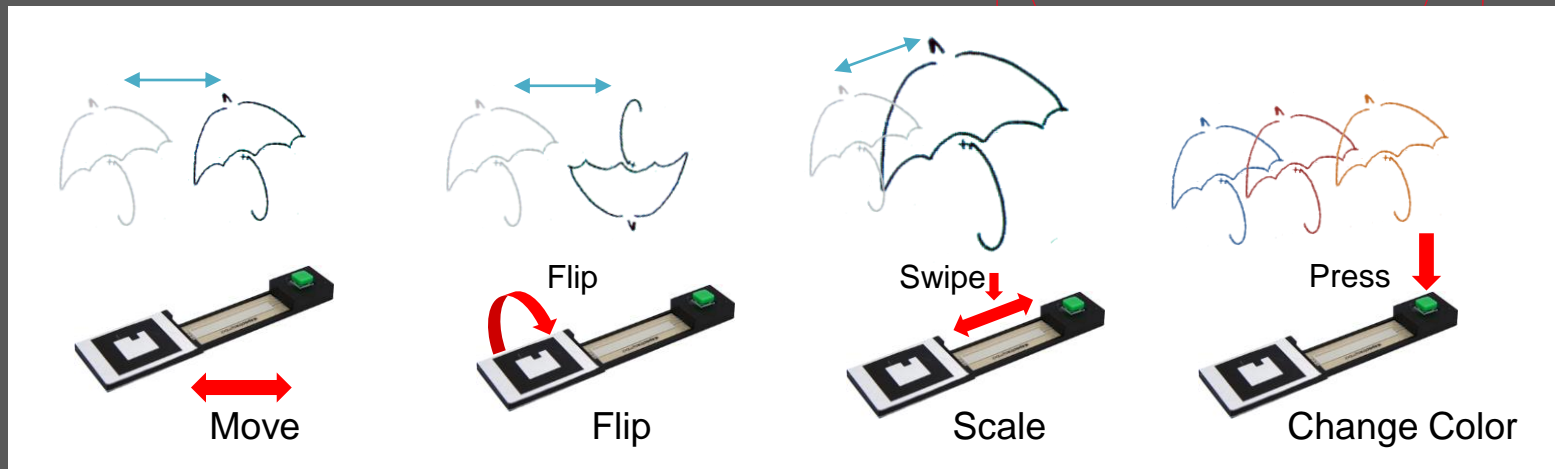
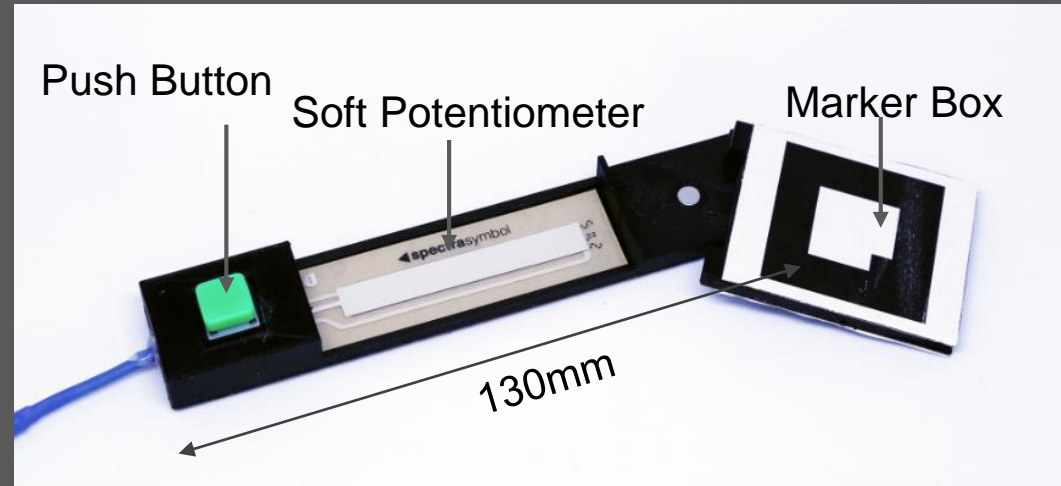
Touch for Capturing



3. All4One : Whiteboard system



3. All4One : Tangible MarkerTools



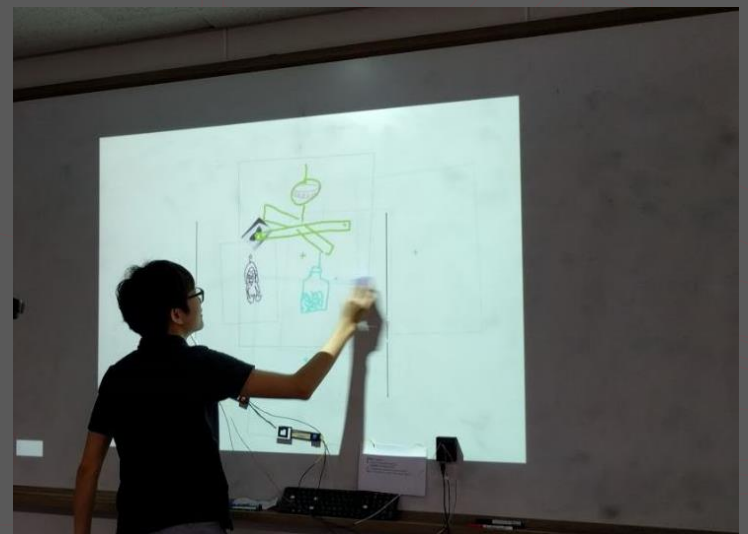
3. All4One : Working Prototype

Overall usage

4. Workshop

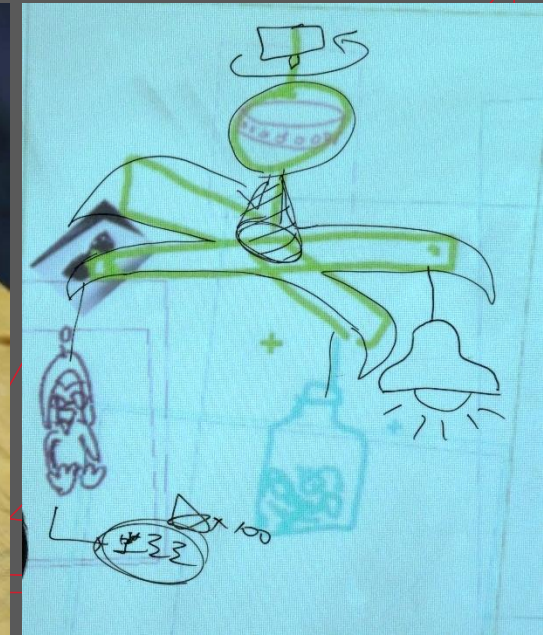
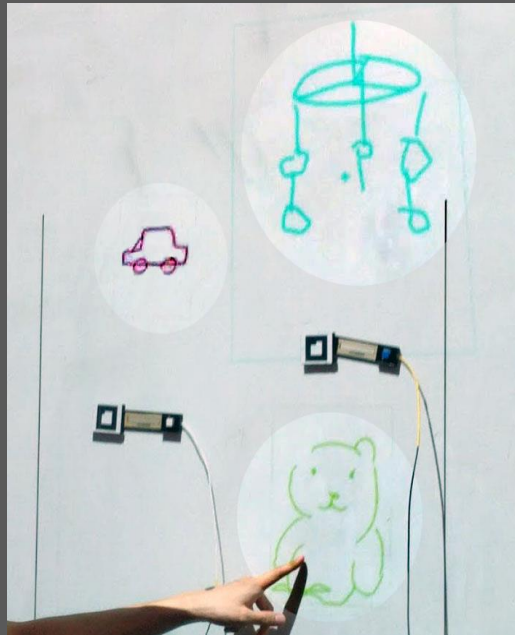
How this system can be used in real setting for boosting idea generation ?

- Four graduated students from industrial design department
 - aged 21 to 32 years old (M24.7, SD 4,7)
- Icebreaking with short demo of All4One system
- One brainstorming moderator
 - One collocated participant
 - Two remote participants
- Voice chat was opened in the background of the system
- Concept design – a toy for children in 30 minutes
- Post workshop interview



5. Result

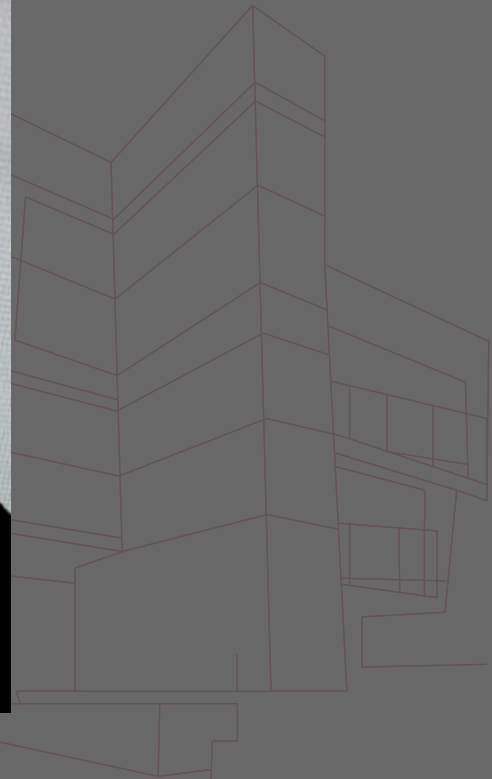
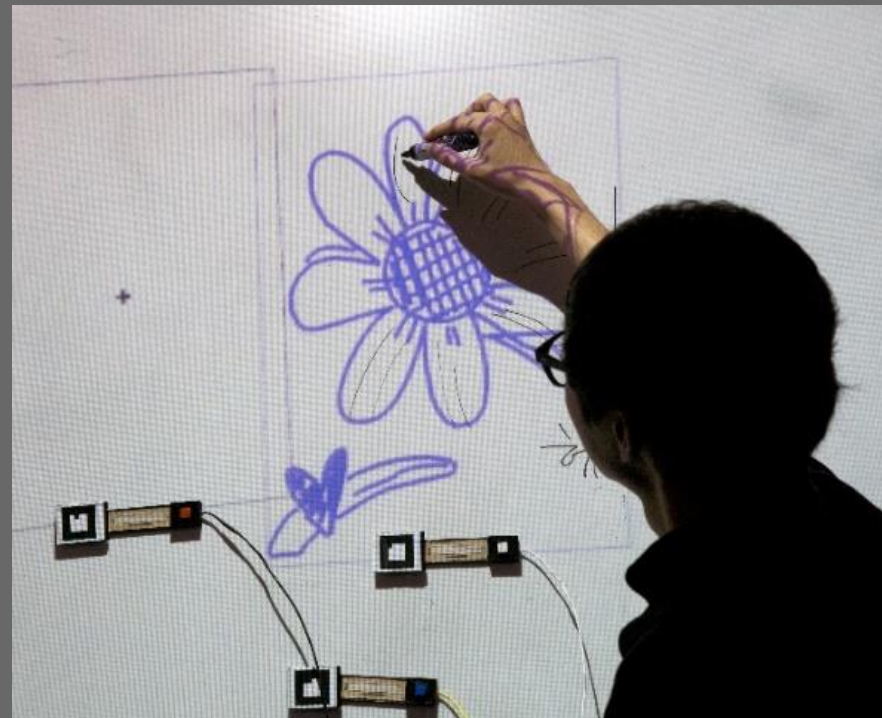
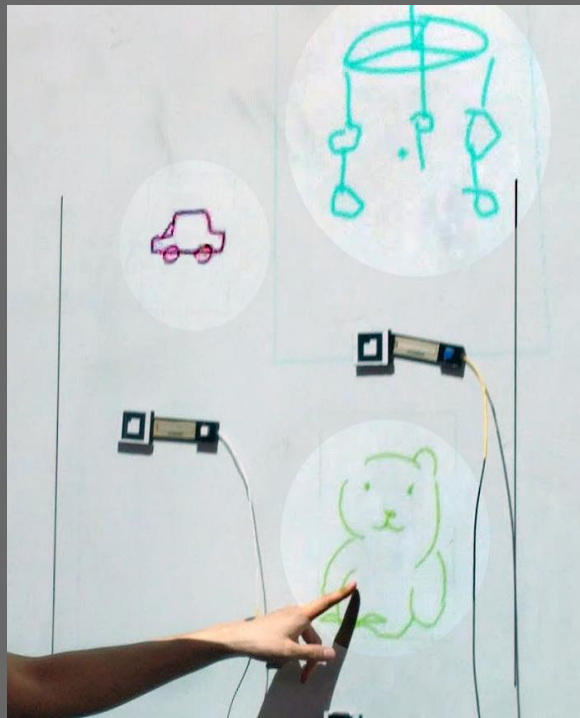
- Three complete ideas for a toy (a car, a bear, a mobile)
- Drawings + Voice chat + hand written text + gesture (moderator)



5. Result

Moderator

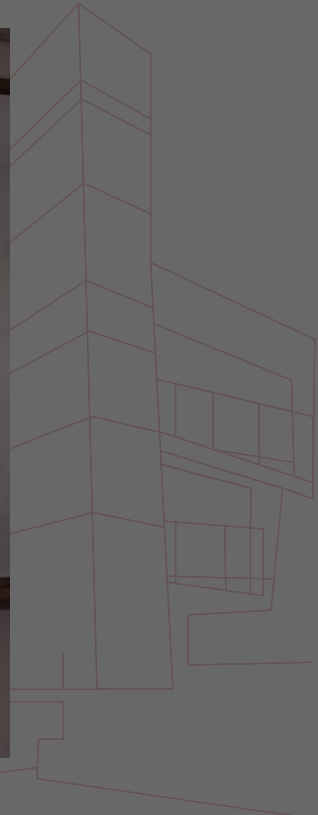
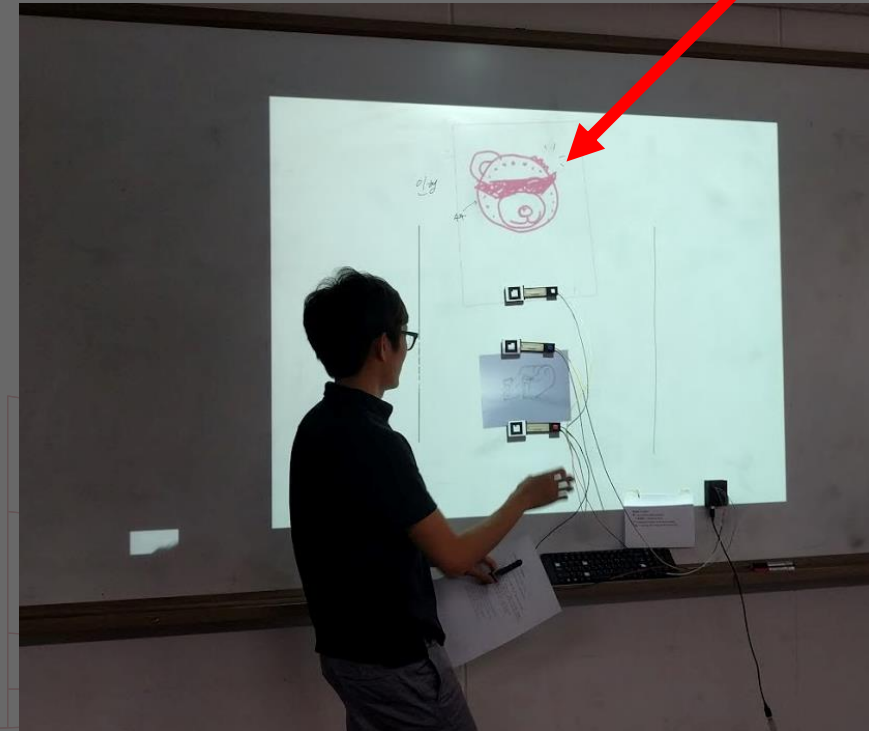
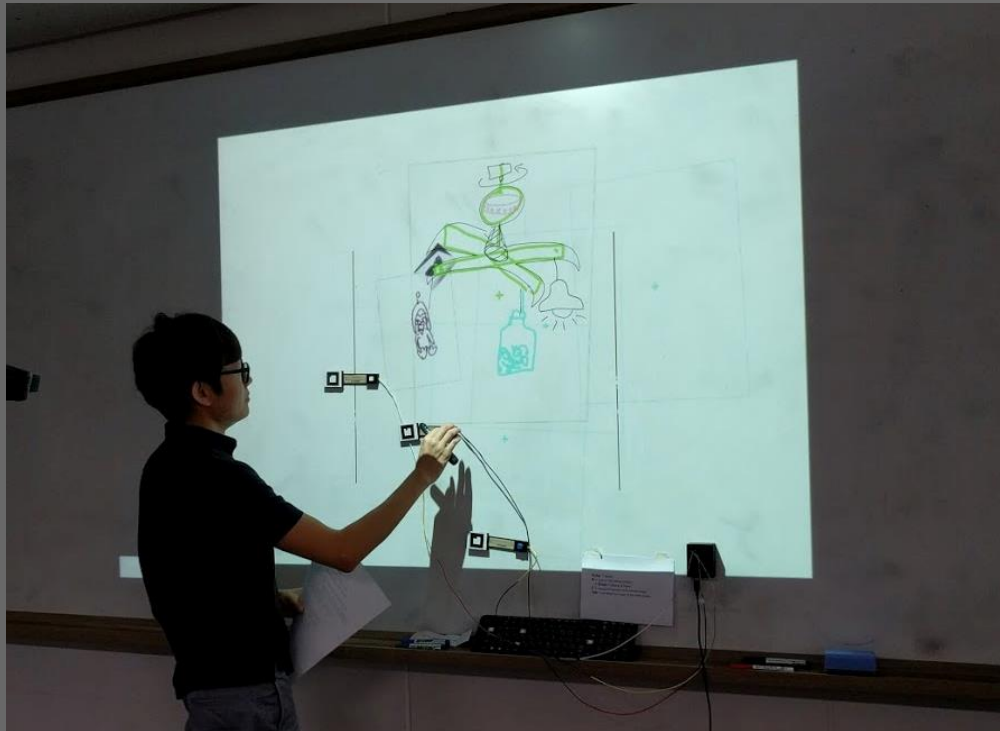
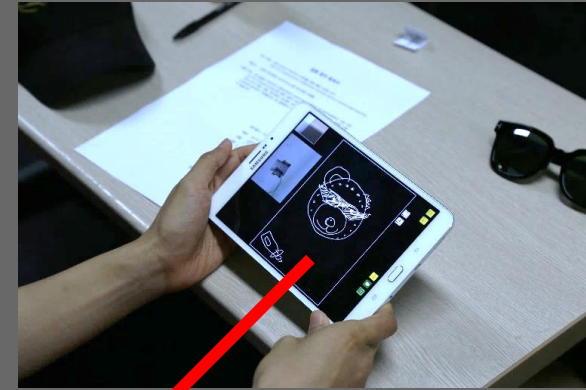
- Collected and compared diverse ideas
- Used a marker pen to draw over projected sketches



5. Result

Moderator

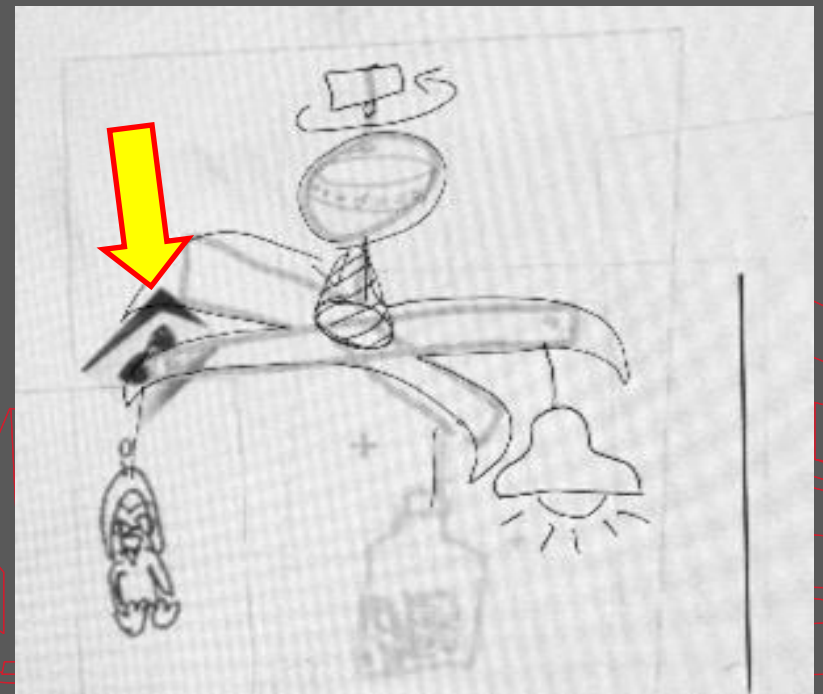
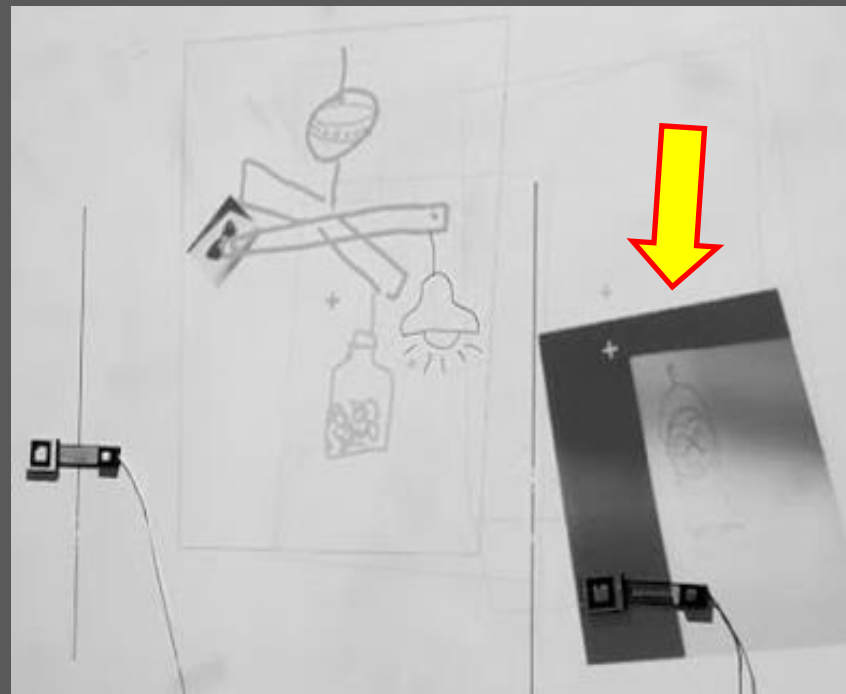
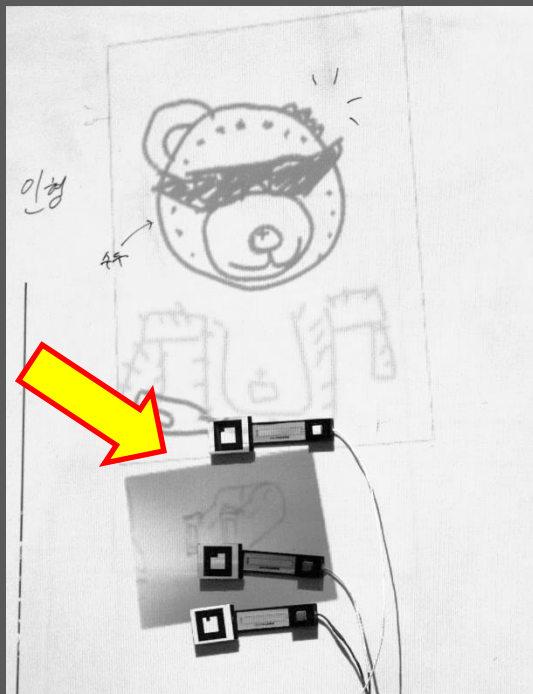
- Superimposed ideas from different participants to add details
- Assigned implicit **roles** to the participants to redraw **specific parts**
- Combined ideas in a single sketch



5. Result

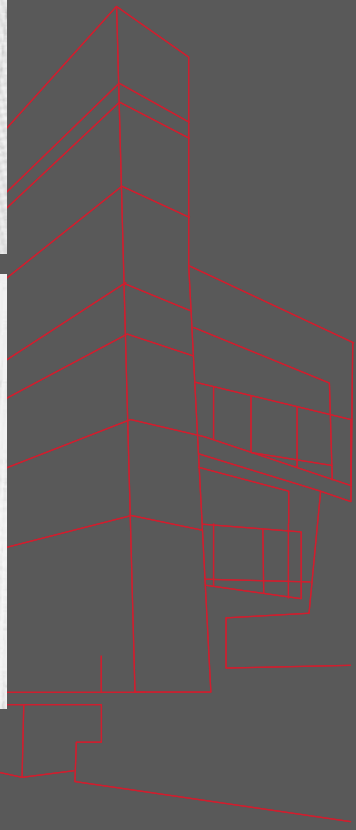
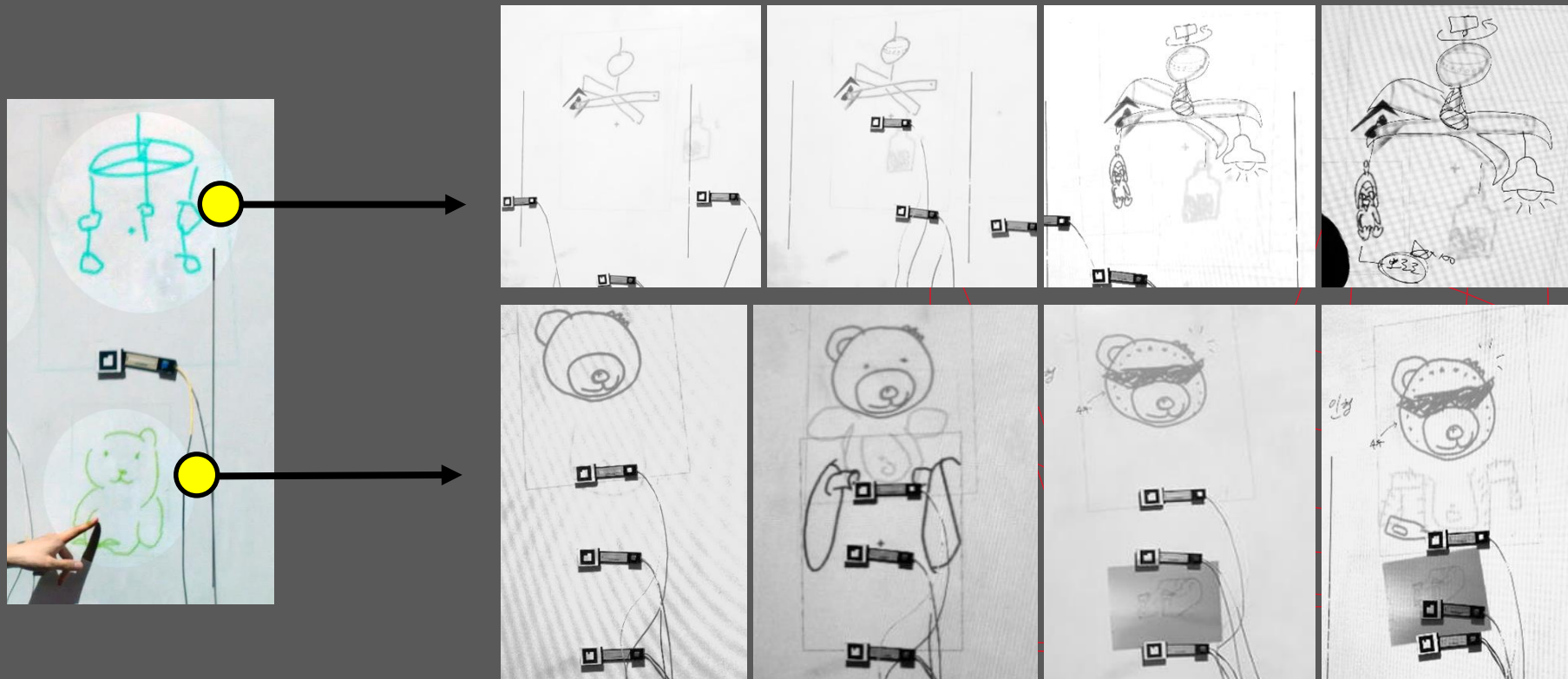
Participants

- One participant sketched on a paper than took a picture to share it.
- The other participant took a picture of a real product and sent it.



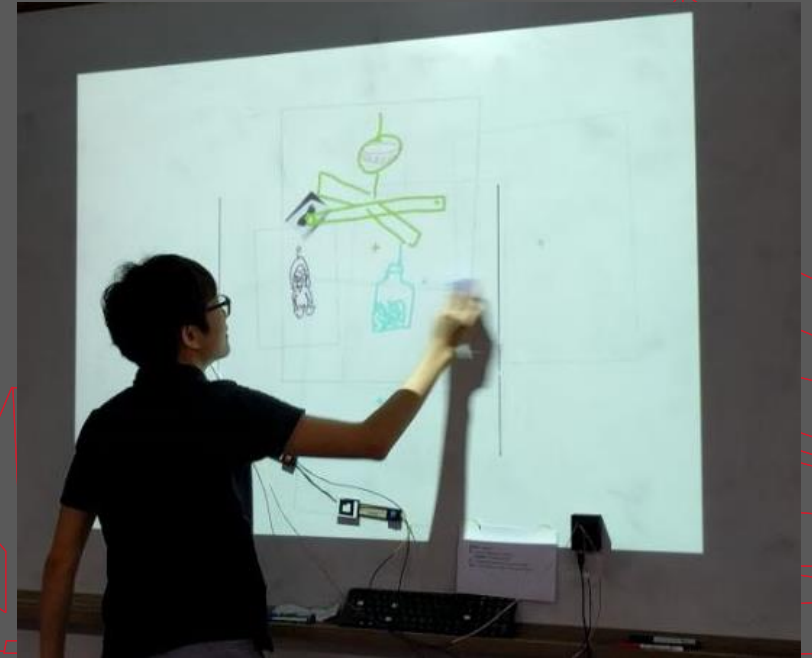
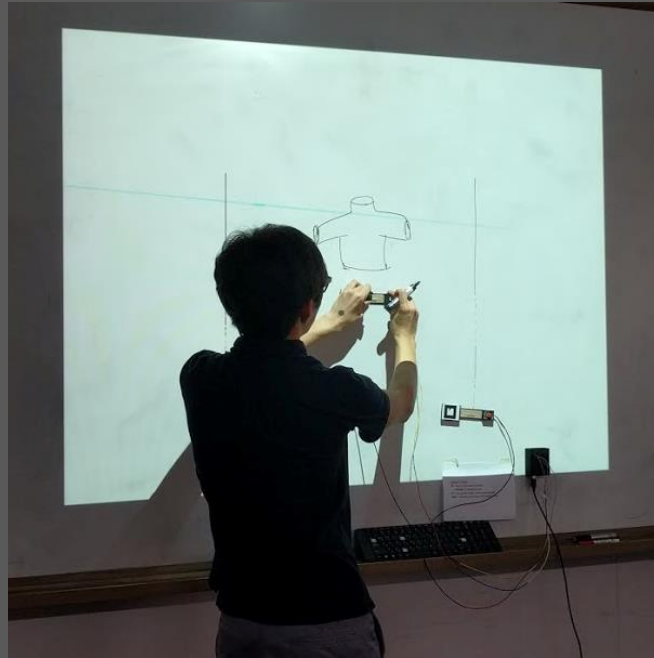
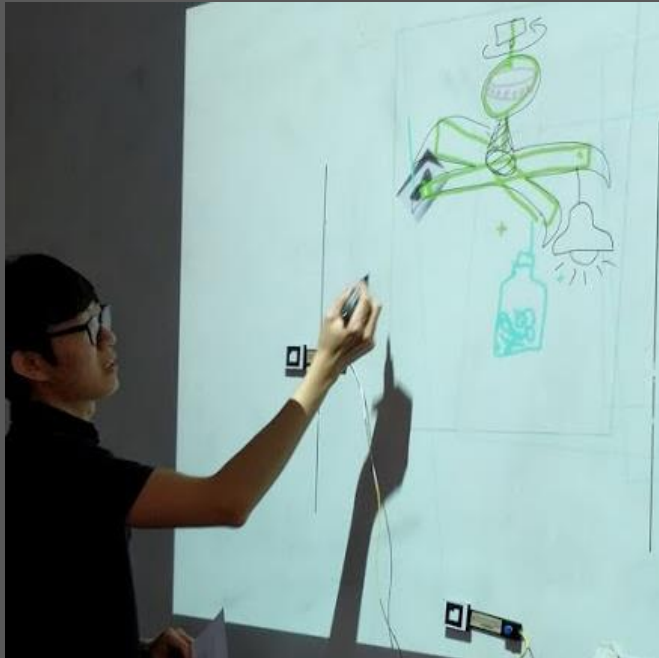
6. Discussion and opportunities for design

- Resembles brainsketching (Wan Der Lugt, 2002)
: **Accumulation** of ideas, Keep adding details



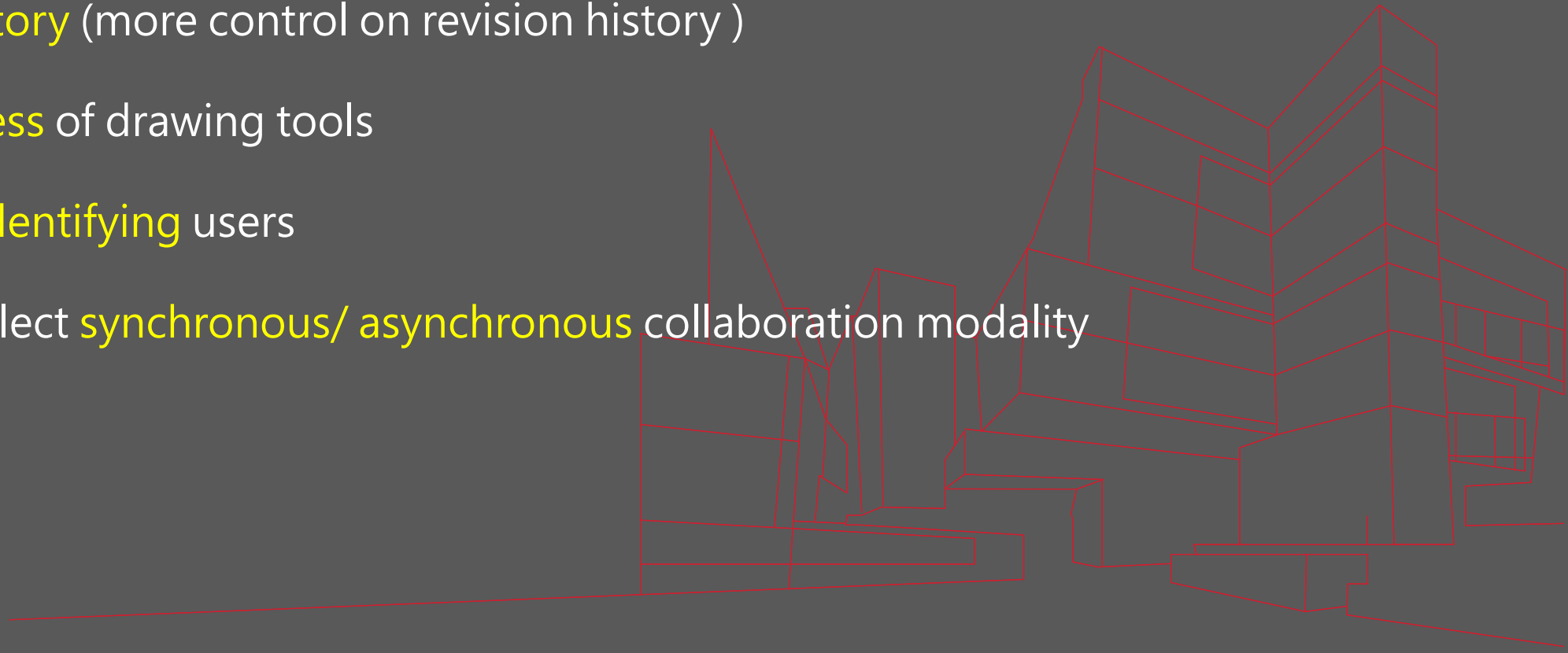
6. Discussion and opportunities for design

- Moderator use mixed tools
: pen, eraser and marker tools



7. Limitation and future work

- Due to the design setting, the moderator **did more than moderating**, a **composer** of an orchestra.
- Working **history** (more control on revision history)
- **Expressiveness** of drawing tools
- Automatic **identifying** users
- Option to select **synchronous/ asynchronous** collaboration modality



Summary

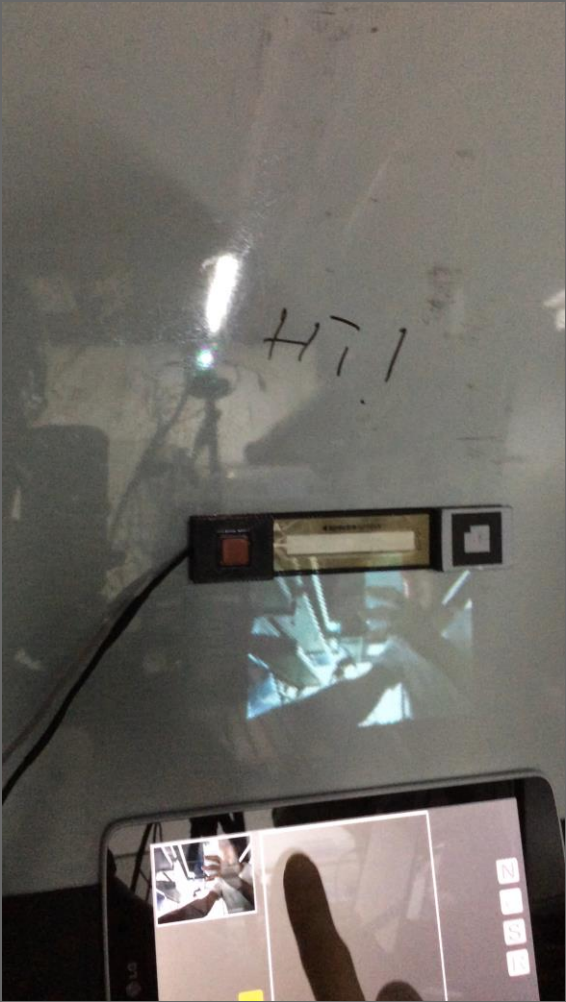
- 1) It is hard to do the **early design** process using **current remote tools**.
- 2) **Good Brainstorming** is **visual and physical** (Kelly et al., 2001)
- 3) A **Moderator** can facilitate idea generation (Oxley et al., 1996; Chan et al., 2016)



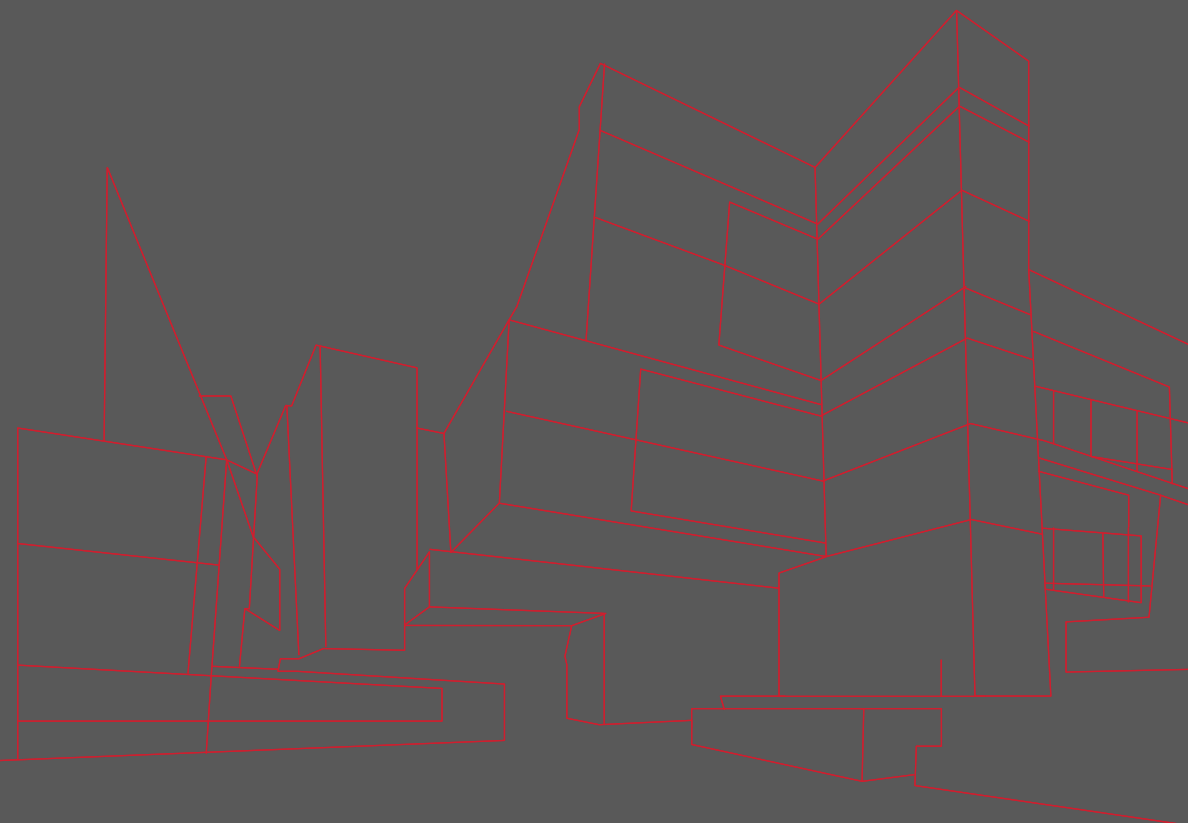
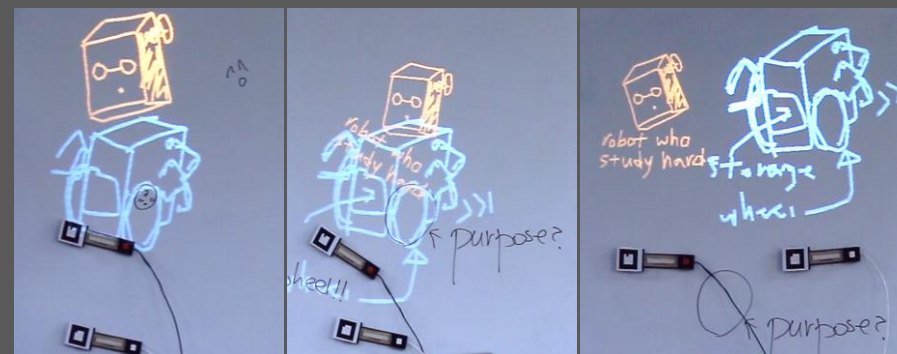
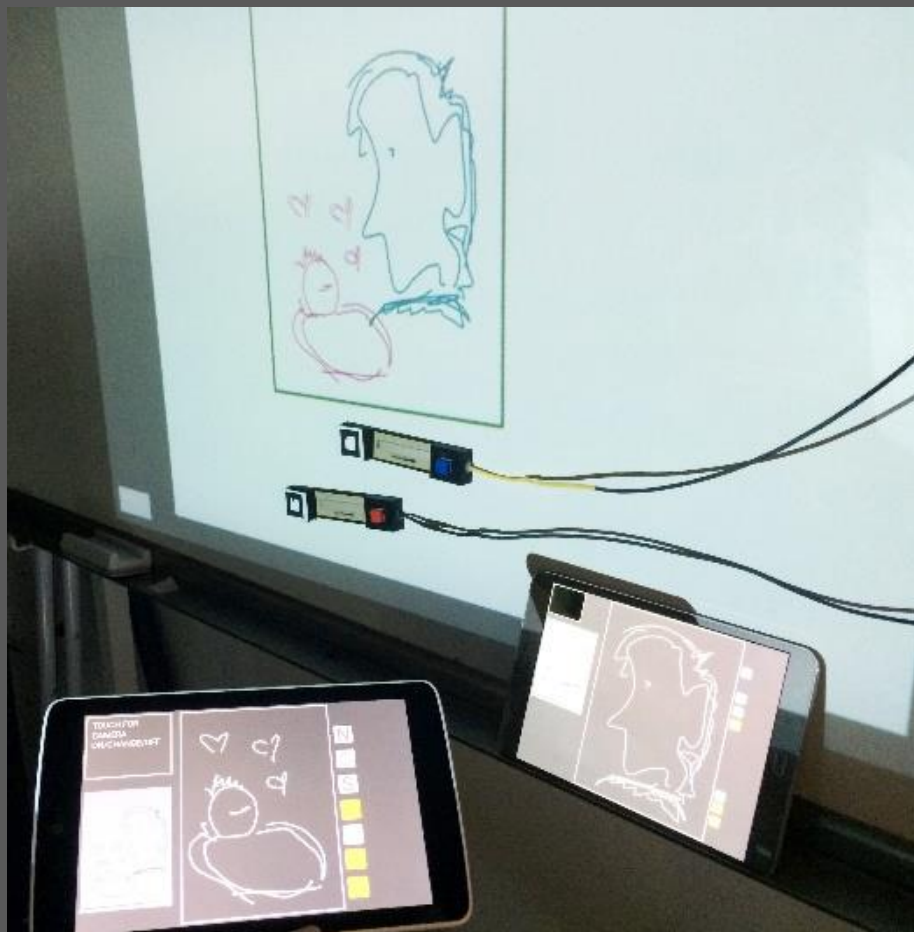
All4One _ remote moderated drawing system
tangible tools for a moderator
tablet for remote participants

Leila Hyelip Lee
hyelip.lee@gmail.com

#Appendix



#Appendix



#Appendix

