

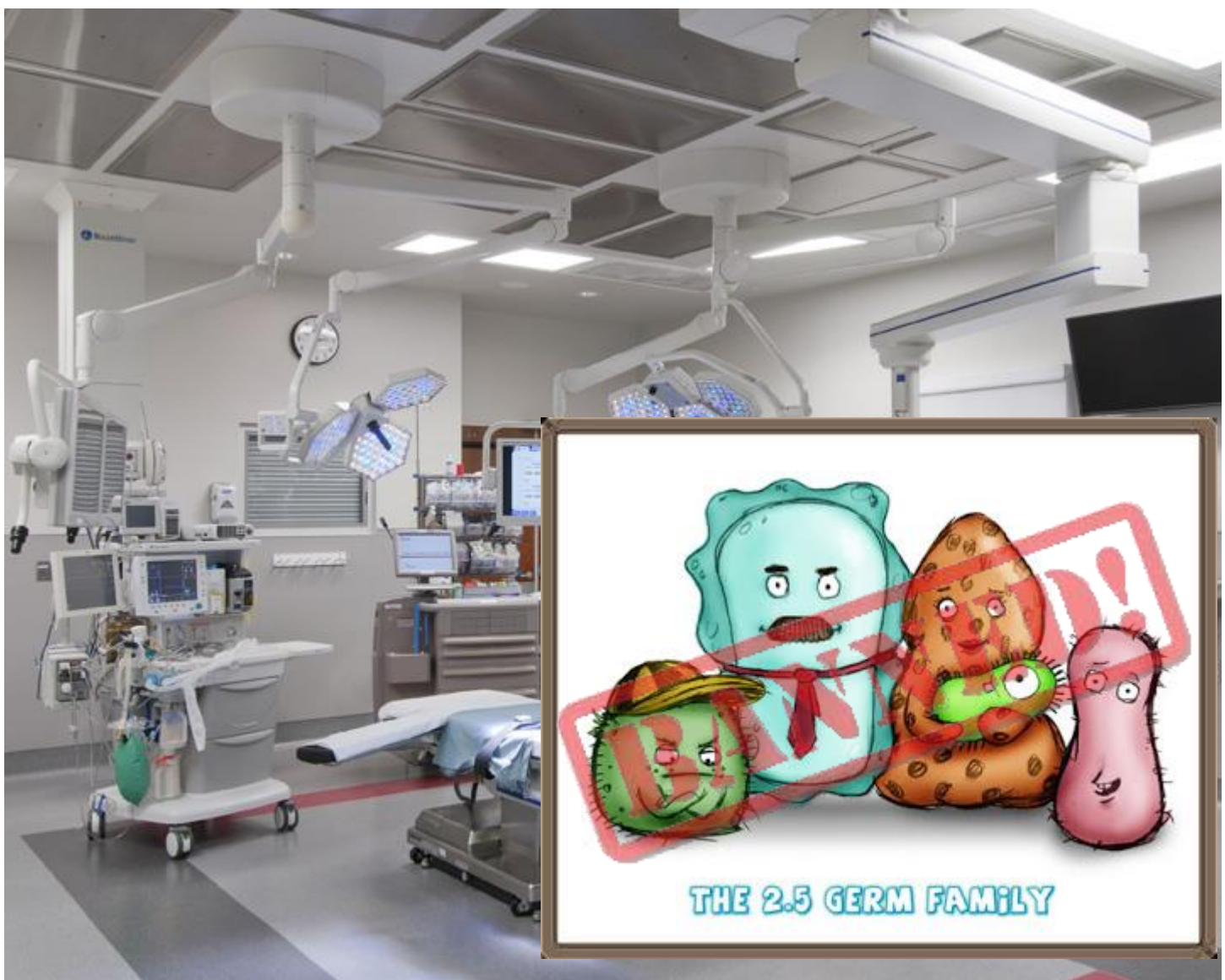
EXPLORATORY USABILITY COMPARISON OF THREE INTERACTION PARADIGMS FOR TOUCHLESS SPATIO-TEMPORAL MANIPULATIONS OF 3D IMAGES USING LEAP MOTION

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EVOLUTION OF INTERACTION DEVICES















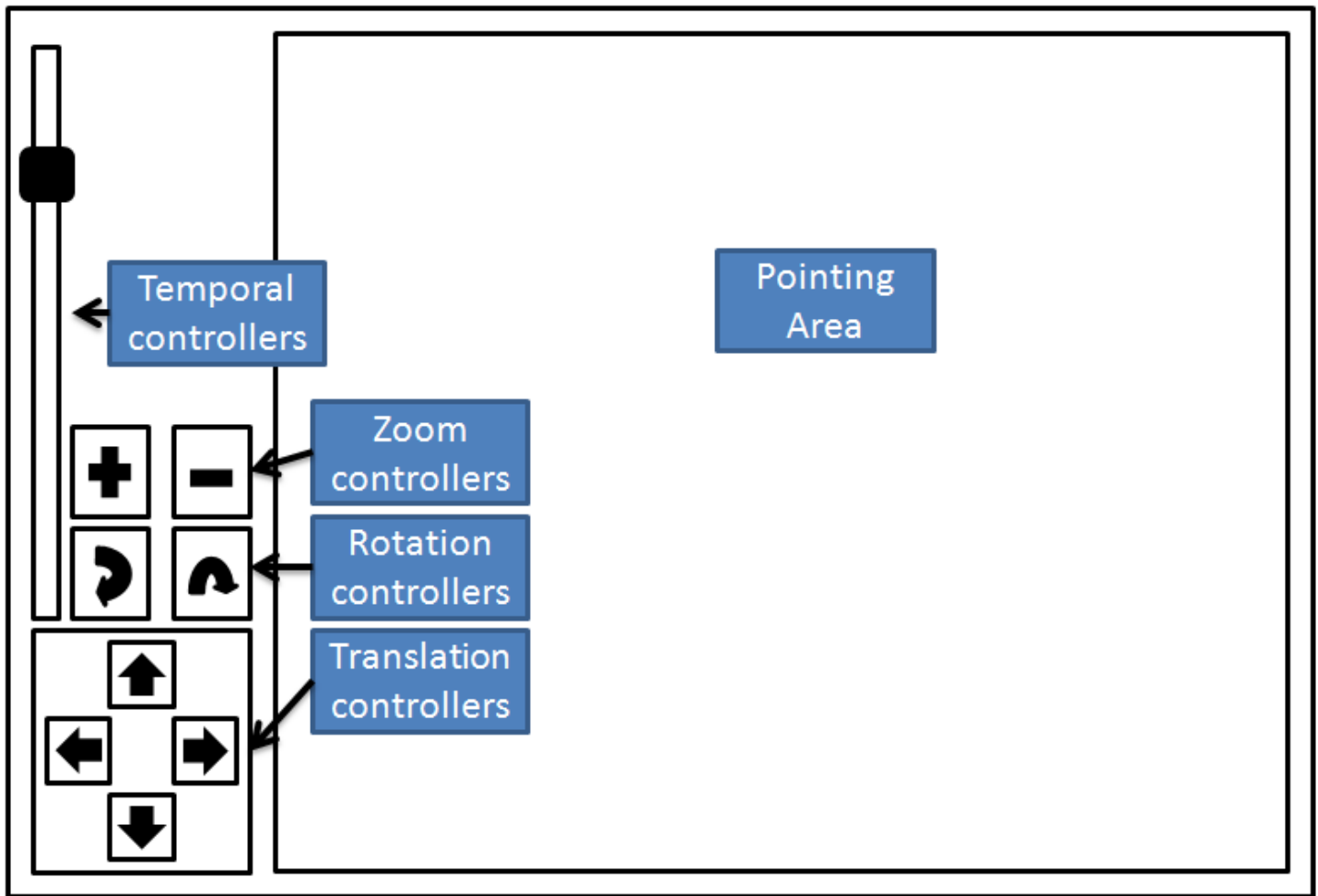
THE LEAP MOTION™

- ▶ Two cameras and three infrared LED
- ▶ The device detects the movement in three axes. The directions, positions, rotation axes as well as moves are transmitted from the API as vectors.
- ▶ Detection space is a cube of about 60cm of sides
- ▶ Precision scale is about 0.01
- ▶ 60 frames per second



INTERACTING WITH HAND BUT HOW ?

	Two hands		One hand	
	Hand	Finger	Hand	Finger
translation				
Rotation				
Selection				



INTERACTION SPACE

IMITATING THE MOUSE

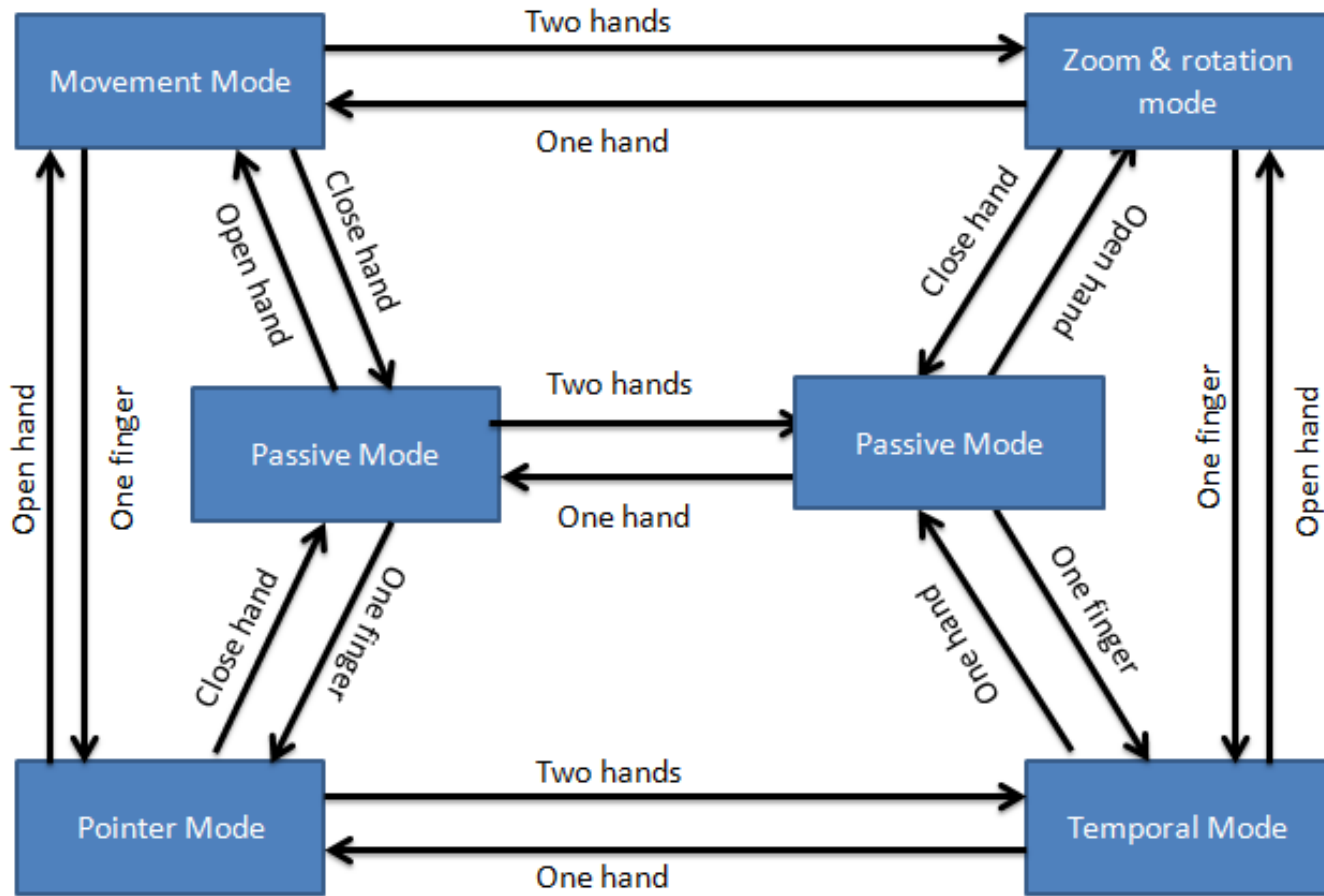


- ▶ **Passive mode:** A close fist is used to enter the detection space. By doing so no specific action is interpreted by the software

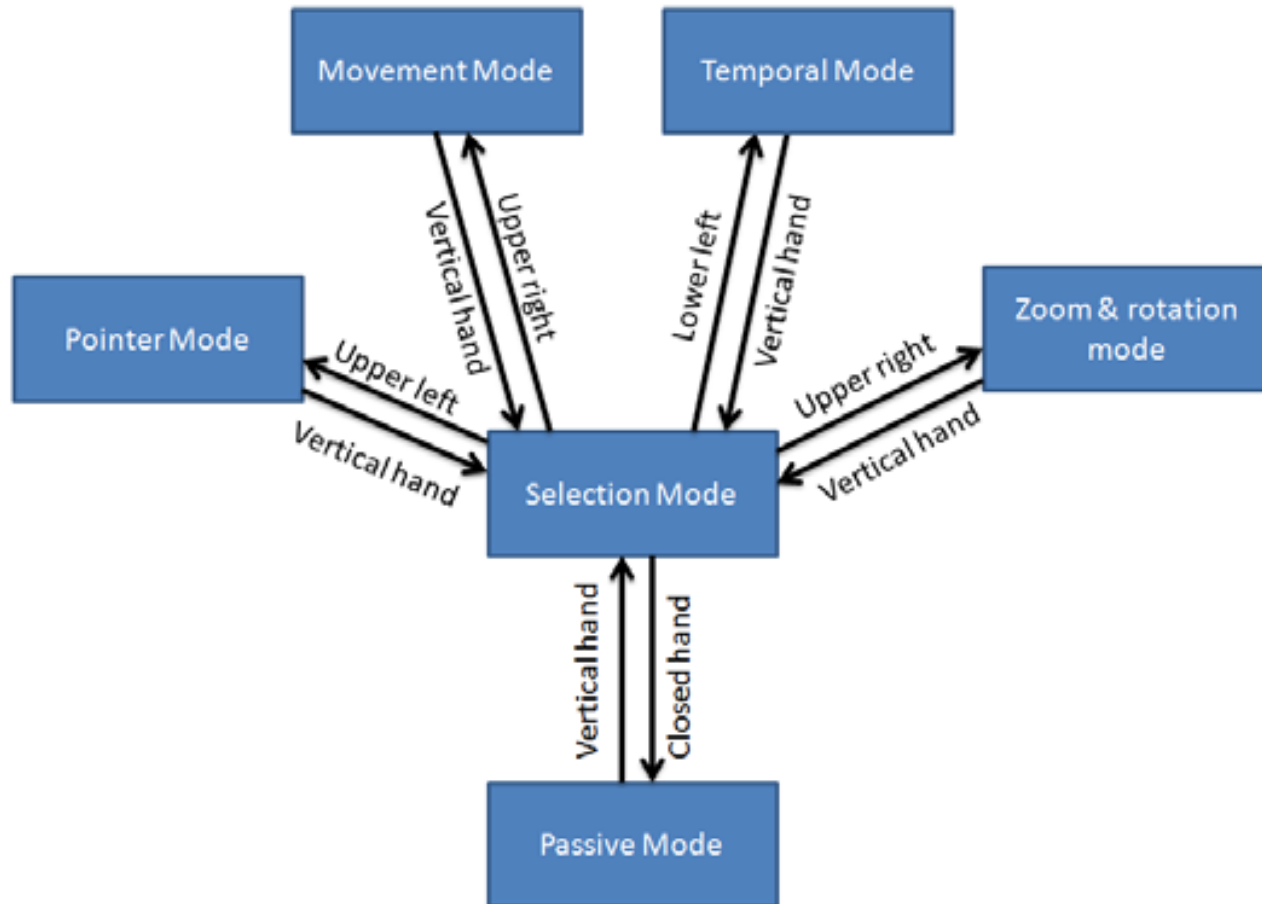


- ▶ **Pointer mode:** By pointing only one finger, the pointer mode is activated. This mode allow to select specific item on the screen





DISTINCTION BY HAND SETTING



ONE ACTION SEVERAL MODE

EVALUATION METHODOLOGY

- ▶ exploratory approach



Bug Bash by Hans Bjordahl

<http://www.bugbash.net/>

FAKING THE MOUSE

- ▶ **Good learnability:** User understood immediately how to manipulate the interface
- ▶ **Weak reliability**
 - ▶ Most of the manipulations very cumbersome
 - ▶ Difficulties to cross large distance
 - ▶ Difficulties to go from one control to another



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ONE GESTURE FOR EACH ACTION

- ▶ **Weak learnability:** Difficulty to remember all the different hand patterns
- ▶ **Weak reliability:** Device sometimes didn't recognize the desired actions and irritated the users.
- ▶ **Weak satisfaction:** Participants showed the poorest satisfaction for this kind of interaction



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ONE GESTURE SEVERAL MODE

- ▶ **Good learnability:** as quickly mastered by participants as the mouse paradigm
- ▶ **Good intuitiveness:** participants quickly understood how to perform the desired action
- ▶ **Good satisfaction:** highest overall satisfaction



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DISCUSSION

- ▶ Many parameters of the interaction paradigm induces advantages and drawbacks
 - ▶ Large moves revealed to offer a better control of the actions but induced a significant fatigue when prolonged use of the system
 - ▶ Small hand gestures were much more convenient but requires more precision and calm to be performed accurately

THE FUTURE IS CLOSE, MAKES IT USABLE ...



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