

DESIGN PRINCIPLES AND NEED FOR  
UNIVERSAL ACCEPTED LANGUAGE OF  
GESTURES FOR TOUCH-FREE HCI

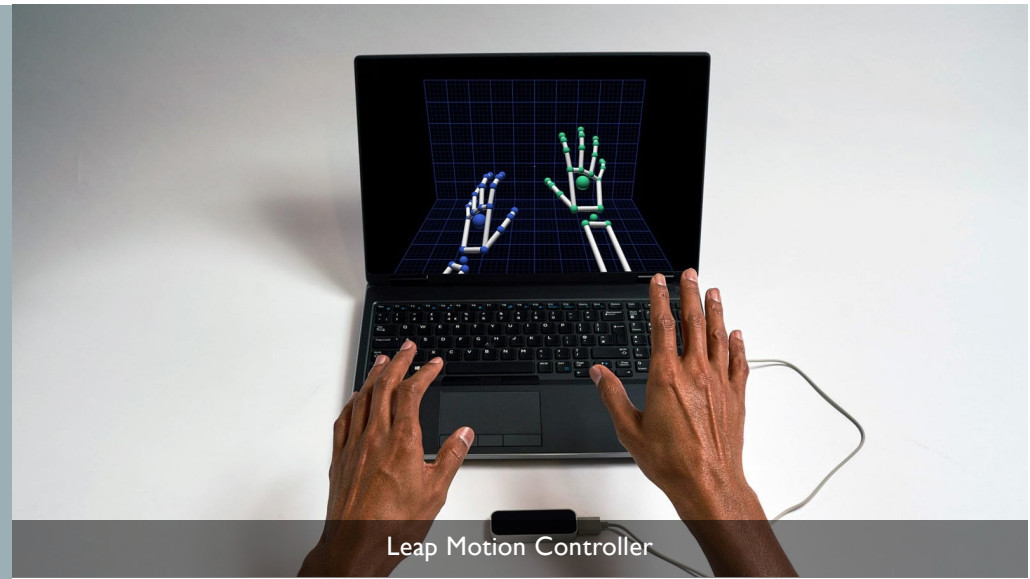


## MODES OF INTERACTION

# NATURAL USER INTERFACE (NUI)



# TOUCH-FREE INTERFACES





## MICROSOFT HOLO LENS

# PROJECT SOLI BY GOOGLE



Google Project Soli

## TYPE OF GESTURES

- Navigational gestures:  
Help users move through product easily (Tap, Scroll, Swipe)
- Action gestures:  
Perform Actions (Long-Press, Swipe)
- Transform gestures:  
Allow users to transform objects (double-tap, pinch)

# FUNDAMENTAL DESIGN PRINCIPLES

- Visibility
- Consistency
- Feedback
- Non-destructive operations
- Discoverability
- Scalability
- Reliability

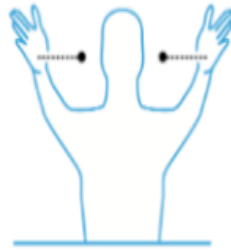
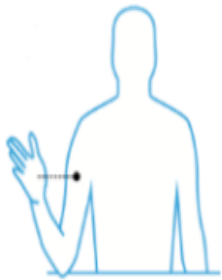


## DESIGN PRINCIPLES

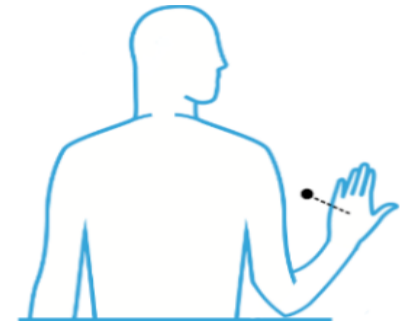
- Stop Considering the WIMP or touch based models.
- Make gestures comfortable for the users unless that is the goal
- Provide realistic and consistent feedbacks.

## DESIGN PRINCIPLES

- Anticipatory design
- Gestures should be appropriate to its function
- Socially appropriate gestures



Swipe, Spread, and Squeeze



Push and Pull

## NEAR MODE GESTURES



Grasp and Release

Twist

## NEAR MODE GESTURES

## NEED FOR UNIVERSAL ACCEPTED LANGUAGE OF GESTURES

For:

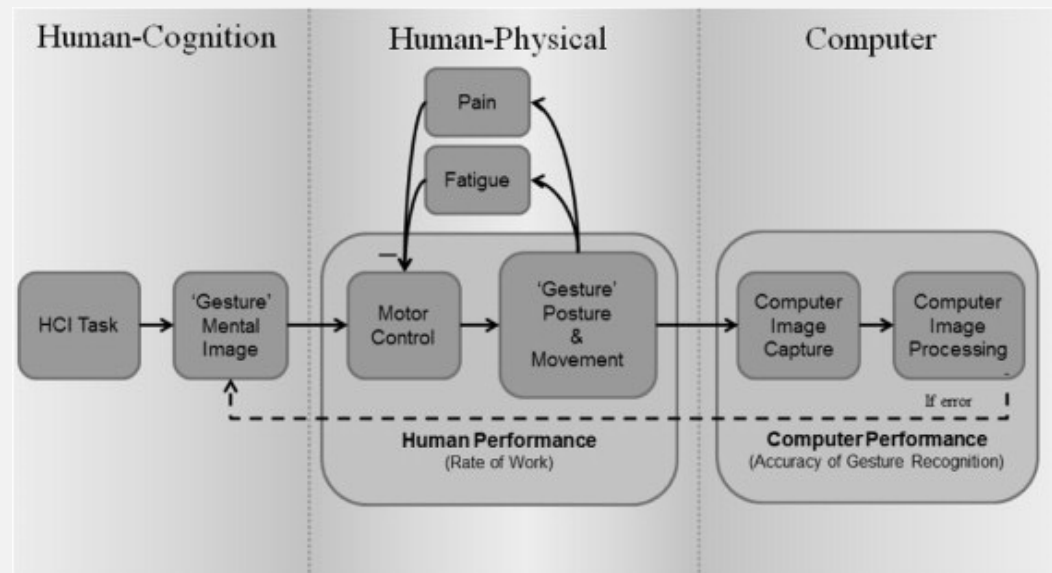
- UI designer
- Company
- User

## DESIGNING GESTURES WITH SIGN LANGUAGE INTERPRETERS

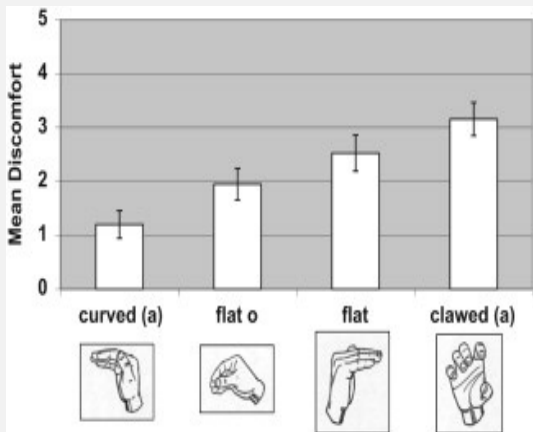
- The discomfort levels of gestures should be considered in the design gesture languages for HCI.
- Need to optimize gesture contrast and recognition.
- Sign language interpreters have extensive and unique experience forming hand gestures.
- Clear associations of discomfort with hand postures were identified.

# MODEL

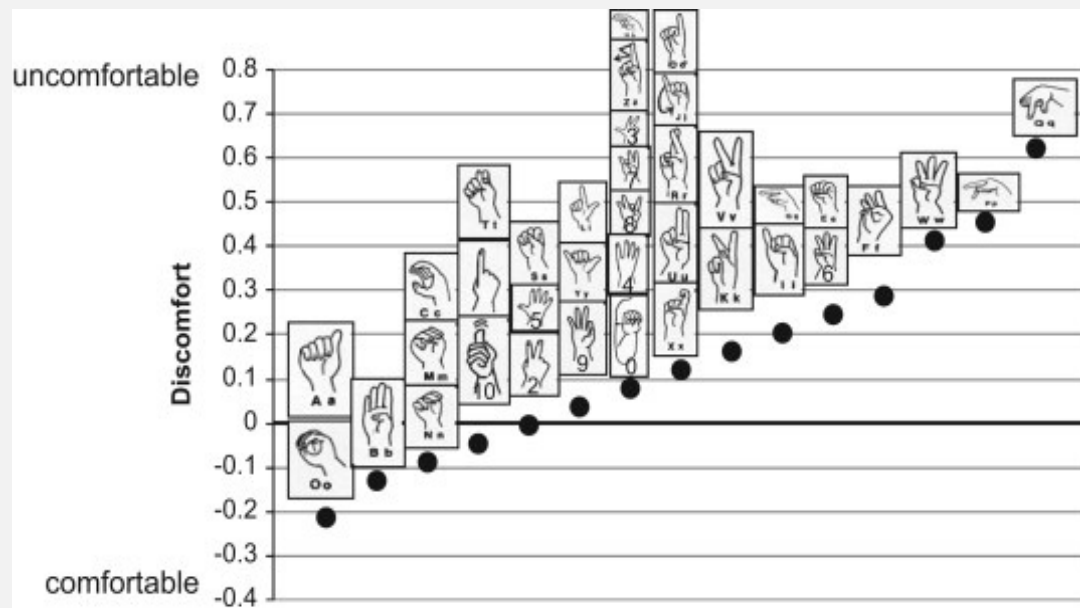
- A model of the relationships between human cognitive and motor processes and computer gesture recognition for completion of an HCI task.



# MEAN DISCOMFORT SCORES

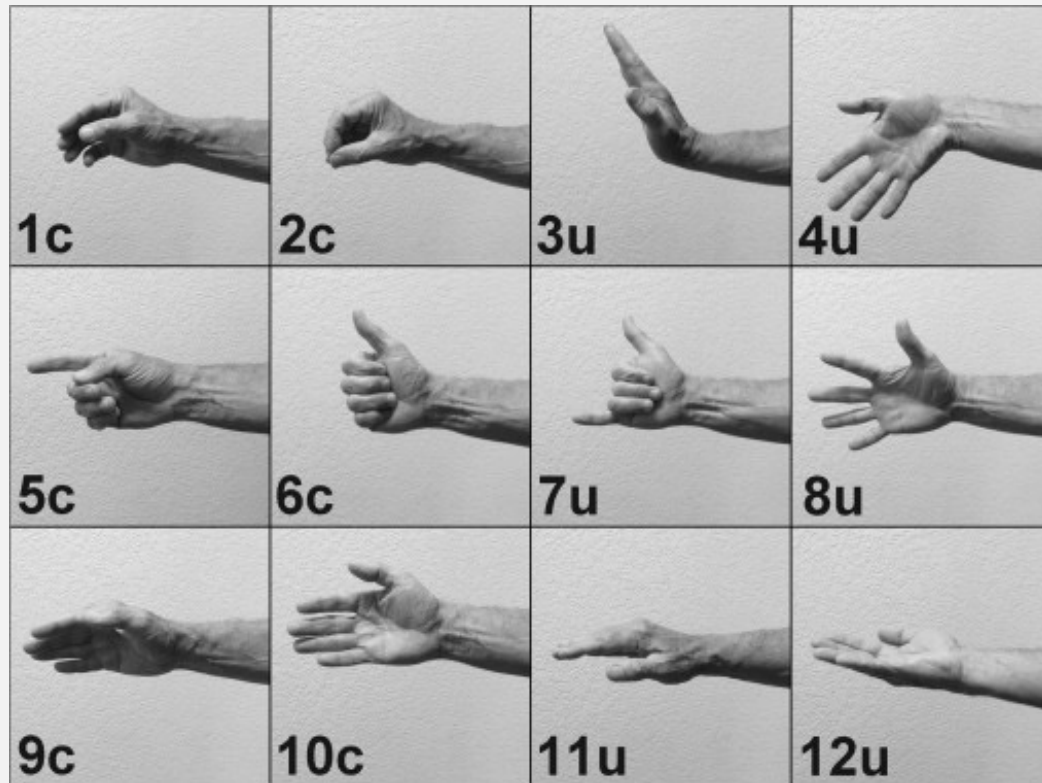


Mean discomfort scores (0=comfortable, 5=very uncomfortable) for hand shapes



Rank order of 37 alphanumeric characters by mean discomfort (I)/comfort (-I) ratings.





## GESTURE EXAMPLES

- **Examples of comfortable (c) and uncomfortable (u) hand postures:** (1c) fingers slightly flexed; (2c) hand in a loose fist; (3u) halt sign with wrist and fingers extended; (4u) wrist in ulnar deviation and fingers extended; (5c) loose hand pointing; (6c) thumb up; (7u) shaka sign with discordant adjacent finger postures; (8u) fingers extended and abducted (spread apart); (9c) forearm rotation to 45 degrees pronation; (10c) forearm rotation in neutral; (11u) forearm rotation to full pronation; (12u) forearm rotation to full supination.

## CONCLUSION

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These design principles help UX designers to create better touch-free gestures.

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We don't have a universally-accepted language of gestures that we can rely on when designing interfaces.

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Sign language interpreters can help guide in the selection of comfortable gestures for HCI.

QUESTIONS

