

Research & Report Writing

original slide made by Prof. Hongbo FU
edited by Pui Chung WONG, Tony

Ultimate Goal

- **Creative work** undertaken on a **systematic basis** in order to **increase the stock of knowledge**, including knowledge of man, culture and society, and the use of this stock of knowledge **to devise new applications** ([wikipedia](#))



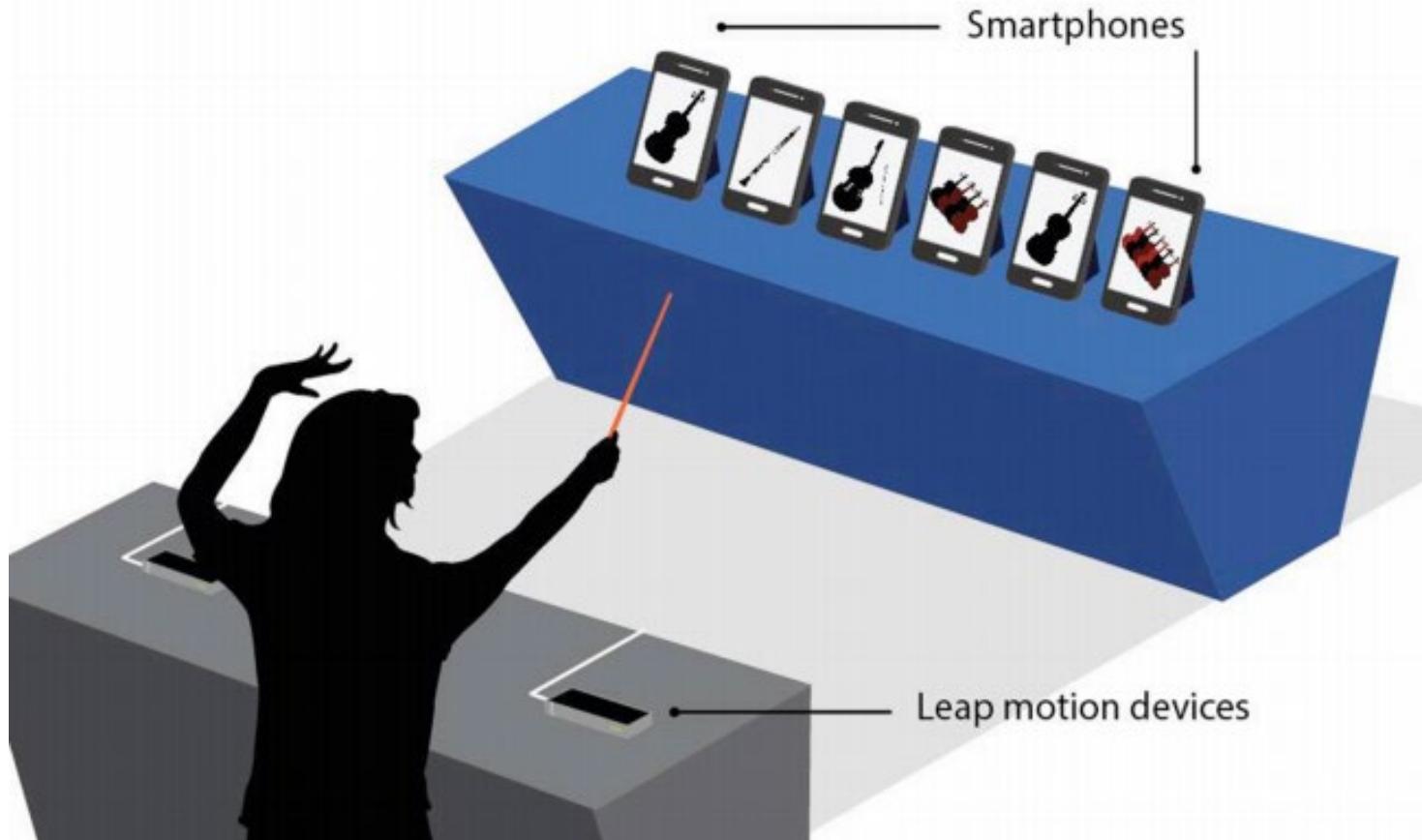
Pointing Device For Interacting with Touch-Sensitive Devices and Related Methods

- **Hong Kong Short-term Patent**
- FYP by David Chung & Carman Lam Hiu Kwan
 - 2013 BScCM graduates



One-Man Orchestra

- Emerging Technologies at SIGGRAPH Asia 14
- FYP by Chun Kit Tsui (Blue) & Chi Hei Law (Tomas)
 - 2014 BScCM Graduates



How?



re·search /rē'rsəch/ (noun) 1 the systematic study of material facts, especially by means of observation and experiment.

A green bracket and arrow point to the prefix **re-**, which is underlined in red. The word **Again** is written in green next to the arrow.

About 2,830,000,000 results (0.54 seconds)

A Step by Step Guide to Executing Your Final Year Project

1. Consider adhering to the following steps to carry out your research **project**:
Choosing Your **Project** Topic. ...
2. Literature Survey. ...
3. Developing Your **Project** Proposal. ...
4. Planning Your **Project**. ...
5. Implementation. ...
6. Testing. ...
7. Re-iterating. ...
8. Preparing Your **Final** Version of the Report.

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[A Step by Step Guide to Executing Your Final Year Project ...](#)



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People also ask

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How do you approach a company for a final year project? ▾

Can we fail in final year project? ▾

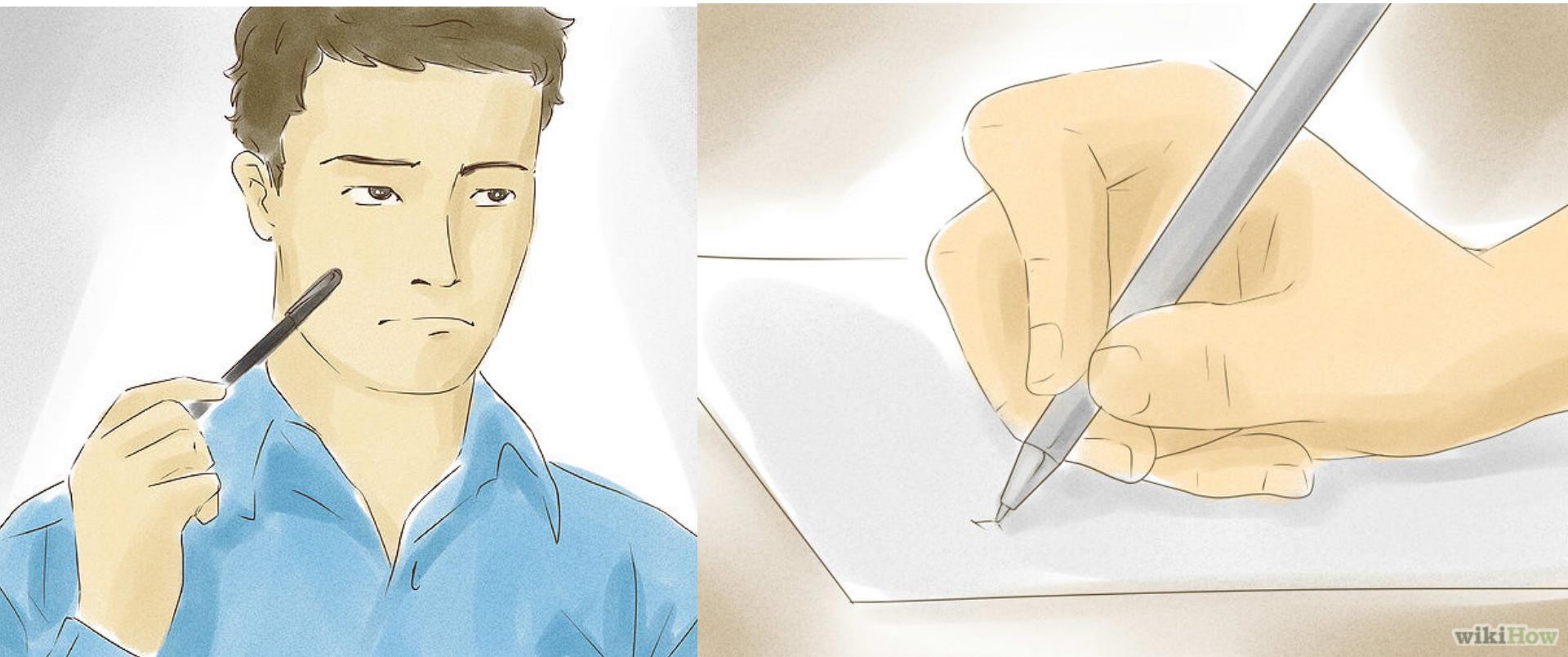
Steps in Conducting Research

1. Define the project scope
2. Literature review
3. Refine research questions
4. Methodology
5. Implementation
6. Evaluation
7. Report/paper writing
8. Submission for peer review
9. Publication/demonstration/exhibition



Defining Project Scope

- **Why this research needs to be done?**
 - clarify who it will help
 - make your motivation clear



Defining Project Scope

- **Define the problem or question at hand**
 - break the question down to basic terms, time periods, and disciplines
 - sub-questions to answer
 - How others solve the problem
 - find a topic which interests and challenges you
 - focus on a specific aspect
- **Select a topic you can manage**
 - avoid subjects that are too technical, learned, or specialized
 - avoid topics with only very narrow range of source materials

Defining Project Scope

- Submit a research proposal
 - The problem; Why it is relevant and important?
How? Expected outcomes?



Defining Project Scope

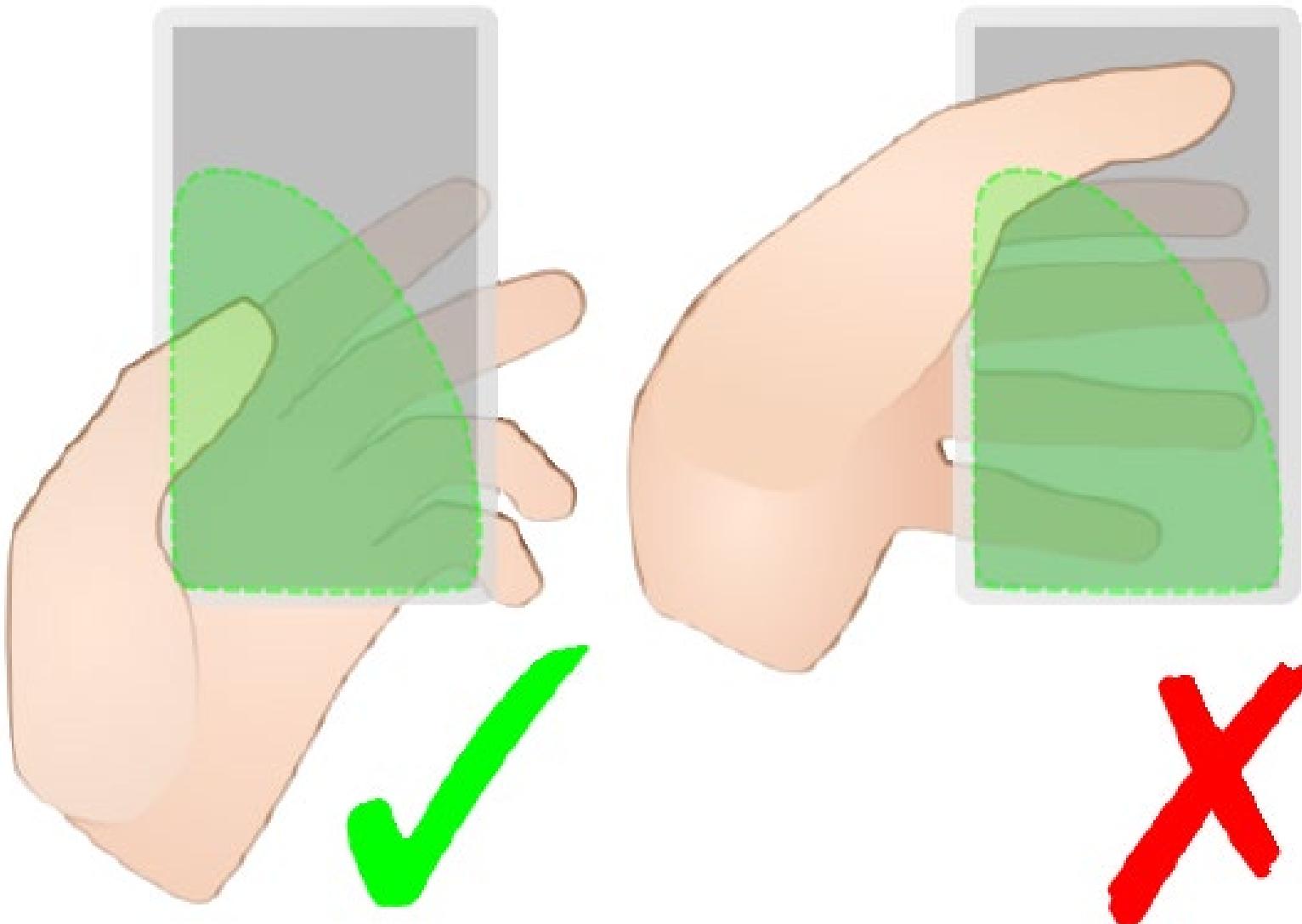
- Project Proposal + Plan
 1. Title
 2. Objectives
 3. Description
 4. Deliverables
 5. Equipment/resource
 6. Plan
 7. Others



Example: Identifying Research Problem



Example: Identifying Research Problem



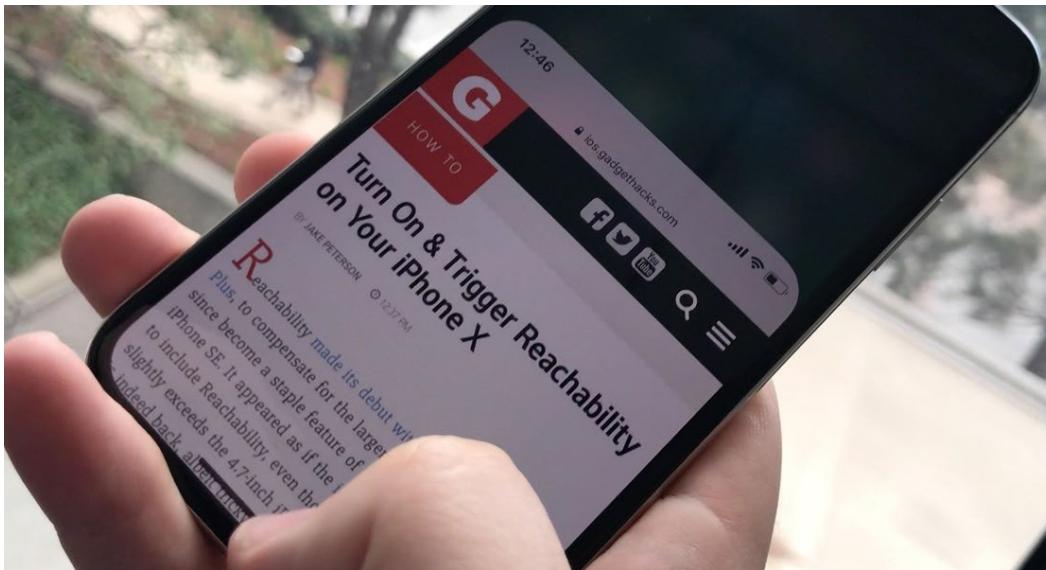
Example: Identifying Research Problem

- **Research problem**
 - Is there any technique that allows the use of one-handed thumb to access a target located anywhere on mobile screen, with a fixed secure grip?



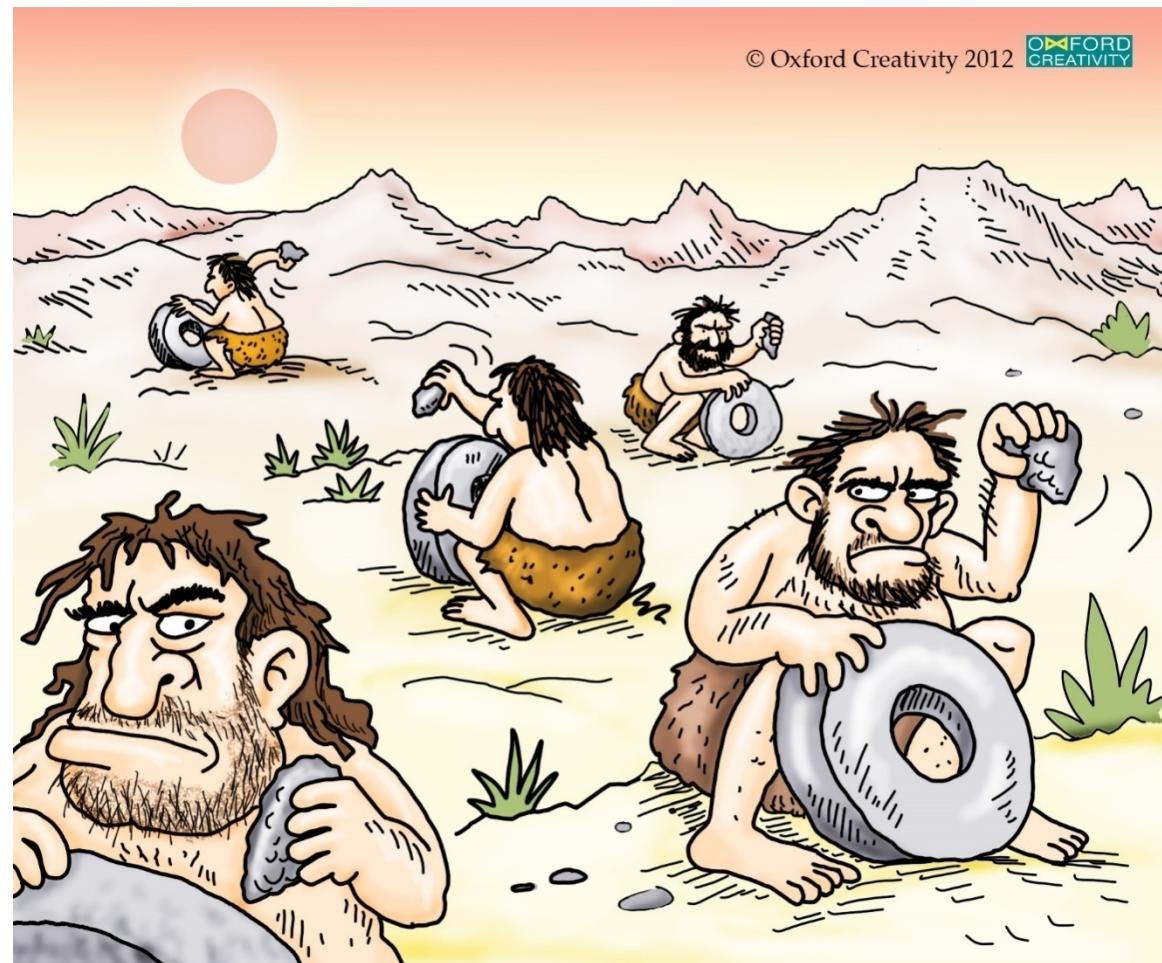
Example: Identifying Research Problem

- **Research problem**
 - Is there any technique that allows the use of one-handed thumb to access a target located anywhere on mobile screen, with a fixed secure grip?



Literature Review

- To find relevant/existing works that have already been done before
- But why?



Literature Review

- To justify why your research is **original/novel**
 - New problems?
 - E.g., virtual fitting
 - New solutions?
 - What's wrong with previous solutions?
 - New findings?



Literature Review

- How? **Go to library**



Literature Review

- How? **Use search engines**



Literature Review

- Example: virtual fitting

YouTube HK

virtual fitting

Filters

About 57,100 results

What to Watch

My Channel

My Subscriptions 54

History

Watch Later 3

PLAYLISTS

- Favorite Technology
- Favorite Music
- Favorites
- Technology - Mobile
- 奶茶
- Liked videos
- Favorite Art
- FYP

SUBSCRIPTIONS

- Thalmic Labs 1
- Google 1
- familyhealthservice 1
- minutephysics 2
- Hao Li 2
- ThePianoGuys 2
- Ishikawa Watana... 5
- QtStudios 1

Kinect Fitting Room for Topshop
by ARDOORMoscow • 3 years ago • 507,644 views
A virtual fitting room for Topshop: augmented reality and Kinect. We would like to thank Topshop for that great opportunity to ...
HD

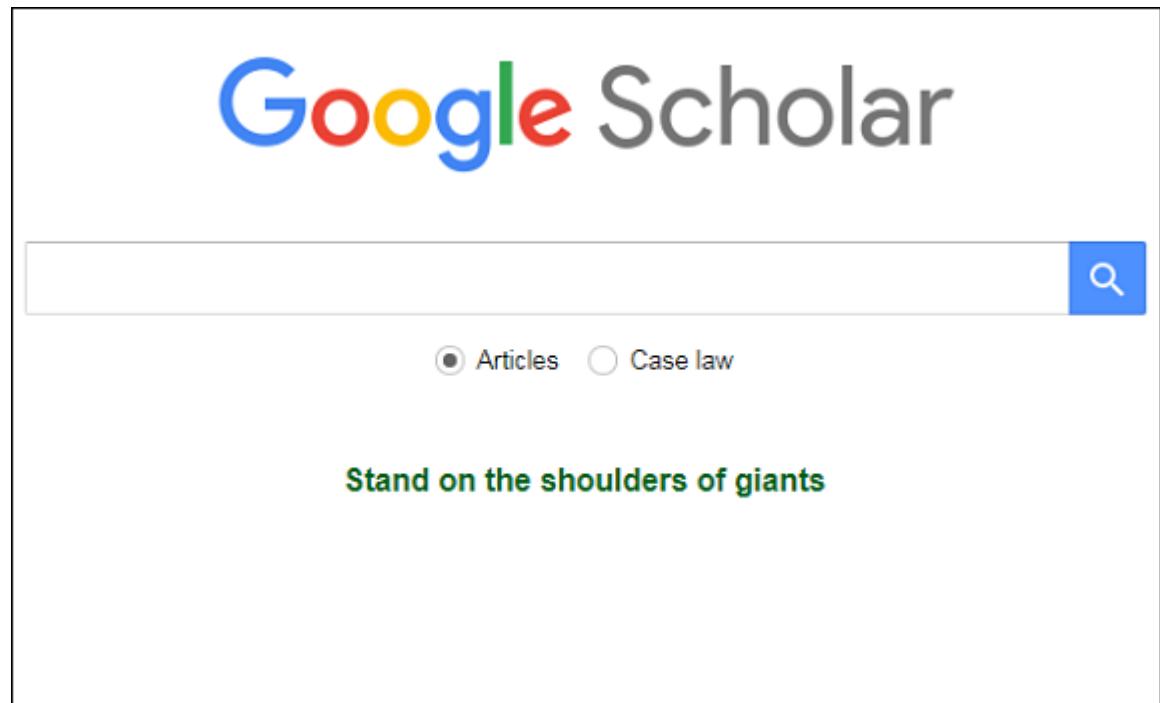
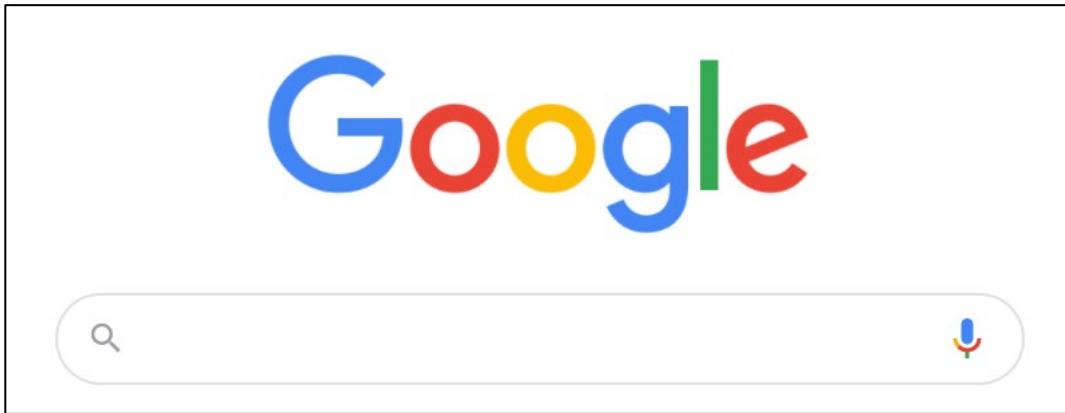
Virtual fitting room - real-time mobile app
by triMirrorTV • 4 months ago • 1,655 views
triMirror introduces the world's first real-time and interactive virtual fitting mobile application. Here we demonstrate the ability to ...
HD

Virtual Dressing Room/Interactive Mirror Kinect
by NicelInteractive • 2 years ago • 25,825 views
Description in Russian here: <http://www.youtube.com/watch?v=94Pnk-IPHcc> More photos: <http://www.nice.ua/portfolio/> ...
HD

Fitnect - Interactive Virtual Fitting / Dressing Room application
by Ádám Horváth • 3 years ago • 210,863 views
Fitnect is an interactive virtual fitting room application built on the most advanced technologies: augmented reality, cloth physics ...
HD

3D Augmented Reality Virtual Fitting Room
by TIC Singapore • 1 year ago • 5,175 views
The Magic Mirror is an independent free standing console with a digital screen, that allows you to "try" on different outfits using ...
1:40

My Favorite Search Engines



Example: Google



one-handed thumb selection smartphone



Web

Shopping

Images

Videos

News

More ▾

Search tools

About 1,480,000 results (0.53 seconds)

one-handed thumb selection smartphone • FastestFox Refinements [x]

FLYGRIP One handed solution for your smartphone ... •

<https://www.indiegogo.com/.../flygrip-one-handed-solution-fo...> ▾ Indiegogo ▾

Use your smartphone with one hand, multitask, and navigate easier. ... thumb to
navigate the entire display, even on the really large touch screens, and completely frees
up one hand ... Just select your design and the body color of your FlyGrip.

[PDF] **LNCS 4662 - ThumbSpace: Generalized One-Handed Input ...** •

<research.microsoft.com/pubs/.../karlson-interact07.pdf> ... ▾ Microsoft Research ▾

by AK Karlson - 2007 - Cited by 67 - Related articles

different device types are converging into the "smartphone": a feature-rich, Internet-enabled one-handed selection of targets within reach of the thumb, further ...

[PDF] **Target Size Study for One-Handed Thumb Use on Small ...** •

<research.microsoft.com/pubs/.../parhi-mobilehci06.pdf> ... ▾ Microsoft Research ▾

by P Parhi - 2006 - Cited by 203 - Related articles

increasing capabilities of smartphones and PDAs, enabling these devices to be used for
... Furthermore, the prevalence of one-handed thumb-based device operation ... single-
target selection tasks for targets between 2-5 mm., Mizobuchi [11] ...

Example: Google Scholar

Google Scholar About 60 results (0.06 sec)

Articles Did you mean: **Thumb Space**: generalized one-handed input for touchscreen-based mobile devices

Case law **ThumbSpace: generalized one-handed input for touchscreen-based mobile devices**

My library AK Karlson, BB Bederson - Human-Computer Interaction–INTERACT ..., 2007 - Springer
Abstract In this paper, we present **ThumbSpace**, a software-based interaction technique that provides general **one-handed** thumb operation of **touchscreen-based mobile devices**. Our goal is to provide accurate selection of all interface objects, especially small and far ...
Cited by 67 Related articles All 13 versions Import into BibTeX Save More

Any time

Since 2014

Since 2013

Since 2010

Custom range...

Evaluating **one handed** thumb tapping on **mobile** touchscreen **devices**
KB Perry, JP Hourcade - Proceedings of graphics interface 2008, 2008 - dl.acm.org
... They also observed that text **input** made some participants slow down while walking, but these participants did not improve their performance by doing so. ... 2.4 Other Research on **One handed** Interactions Recently, AppLens, LaunchTile, and **ThumbSpace**, interfaces to ...
Cited by 65 Related articles Import into BibTeX Save More

Sort by relevance

Sort by date

include patents

include citations

One-handed touchscreen **input** for legacy applications
AK Karlson, BB Bederson - Proceedings of the SIGCHI Conference on ..., 2008 - dl.acm.org
... Shift+**ThumbSpace** either 1st or 2nd, while 0% of participants chose ScrollWheel 1st or 2nd ... touchscreen interaction for **mobile one-handed** computing, we found little performance or subjective evidence that ... The fact that ScrollWheel was the least preferred **input** method is almost ...
Cited by 37 Related articles All 8 versions Import into BibTeX Save More

Example: Google Scholar

Google Scholar About 13 results (0.03 sec)

All versions [ThumbSpace: generalized one-handed input for touchscreen-based mobile devices](#)

AK Karlson, BB Bederson - Human-Computer Interaction–INTERACT ... , 2007 - Springer
Abstract In this paper, we present ThumbSpace, a software-based interaction technique that provides general one-handed thumb operation of touchscreen-based mobile devices. Our goal is to provide accurate selection of all interface objects, especially small and far ...
Cited by 67 Related articles Import into BibTeX Save More

[\[PDF\] ThumbSpace: Generalized One-Handed Input for Touchscreen-Based Mobile Devices](#)
AK Karlson, BB Bederson - hcil2.cs.umd.edu
Abstract. In this paper, we present ThumbSpace, a software-based interaction technique that provides general one-handed thumb operation of touchscreenbased mobile devices. Our goals are to provide controlled and accurate selection of all interface objects, especially ...
Import into BibTeX More

[\[PDF\] ThumbSpace: Generalized One-Handed Input for Touchscreen-Based Mobile Devices](#)
AK Karlson, BB Bederson - 2007 - research.microsoft.com
Abstract. In this paper, we present ThumbSpace, a software-based interaction technique that provides general one-handed thumb operation of touchscreenbased mobile devices. Our goal is to provide accurate selection of all interface objects, especially small and far ...

preferred



Example: Google Scholar

The screenshot shows the Springer website interface. At the top left is the Springer logo. A green callout box contains two bullet points: "University has subscribed almost all major journals" and "Access those journals through university IPs". Below the logo is a search bar with a magnifying glass icon and a gear icon. Underneath the search bar are links for "Home" and "Contact Us". A blue navigation bar features icons for "Look Inside" (with an eye icon) and "Get Access" (with a key icon). The main content area displays a book entry for "Human-Computer Interaction – INTERACT 2007". The book cover is shown on the right, featuring the title, editors (Cecília Baranowska, Mônica Palenque, Júlio Alencar, Silvana Díaz, Jacqueline Barbosa), and publisher information (LNCS 4662, IFIP TC 13 International Conference, Rio de Janeiro, Brazil, September 2007, Proceedings, Part I). The book is categorized under "Part I" and "ifip". Below the book cover are purchase options: a red-bordered button for "Buy chapter" (\$33.95 / €28.5 / £22.95 *), a standard button for "Buy eBook" (\$129.00 / €101.14 / £86.00 *), and a "Look" button with a gear icon. The bottom right corner shows a "Free Shipping" offer.

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Human-Computer Interaction – INTERACT 2007
Lecture Notes in Computer Science Volume 4662, 2007, pp 324-338

ThumbSpace: Generalized One-Handed Input for Touchscreen-Based Mobile Devices

Amy K. Karlson, Benjamin B. Bederson

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- Extremely useful if you work at home
 - Home computers → CityU VPN → Internet
- Use VPN to access Facebook in Mainland China



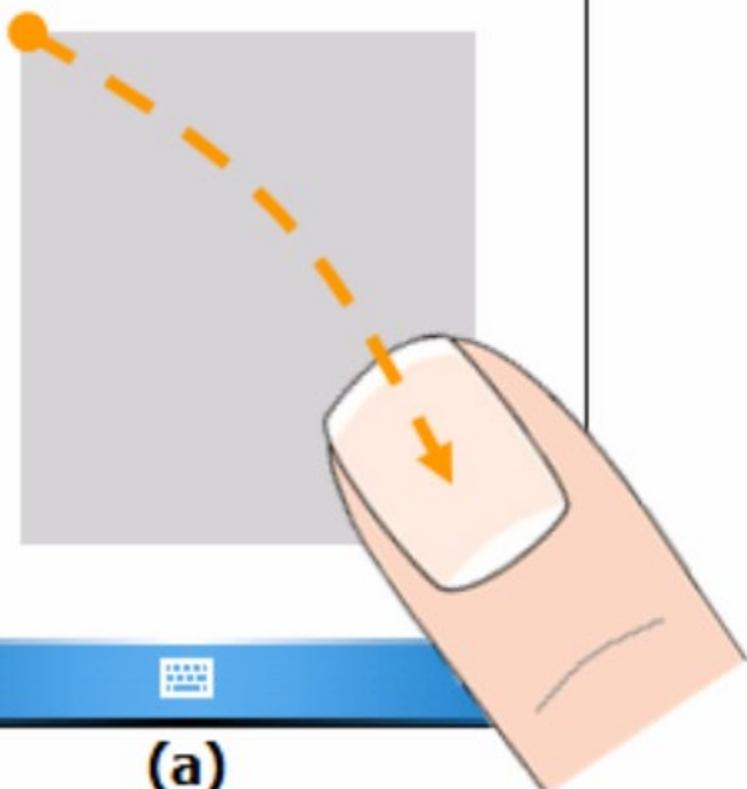
ThumbSpace: Generalized One-Handed Input for Touchscreen-Based Mobile Devices

Amy K. Karlson and Benjamin B. Bederson

Human-Computer Interaction Lab, Department of Computer Science, University of Maryland, College Park, MD 20742

- Look at the abstract carefully to see how it is related to your idea and the target problem.

Abstract. In this paper, we present ThumbSpace, a software-based interaction technique that provides general one-handed thumb operation of touchscreen-based mobile devices. Our goals are to provide controlled and accurate selection of all interface objects, especially small and far targets, which are traditionally difficult to interact with using the thumb. ThumbSpace is designed to provide these benefits independent of the application design, which can free designers to focus on effective presentation, as well as efficient interaction when two hands are available. We present the ThumbSpace design and a comparative evaluation



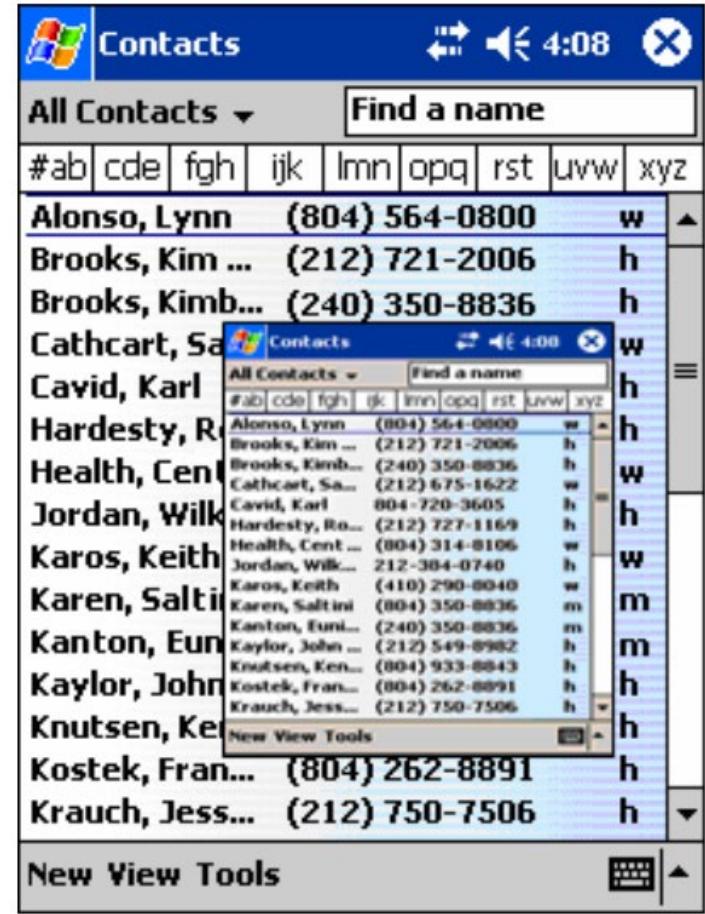
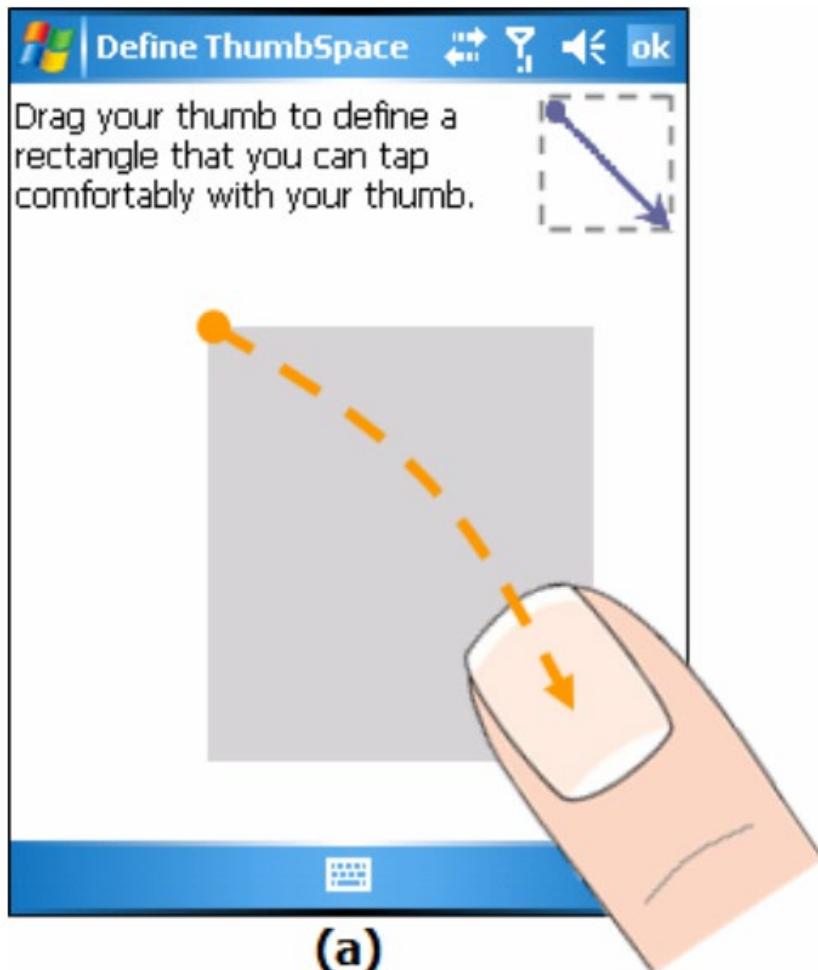
(a)

#	ab	cde	fg	ijk	lmn	opq	rst	uvw	xyz
1	Alonso, Lynn	(804) 564-0800	w						
2	Brooks, Kim ...	(212) 721-2006	h						
3	Brooks, Kimb...	(240) 350-8836	h						
4	Cathcart, Sa...								
5	Cavid, Karl								
6	Hardesty, Ro...								
7	Health, Cent...								
8	Jordan, Wilk...								
9	Karos, Keith								
10	Karen, Salti...								
11	Kanton, Euni...								
12	Kaylor, John...								
13	Knutsen, Ken...								
14	Kostek, Fran...	(804) 262-8891	h						
15	Krauch, Jess...	(212) 750-7506	h						

(b)

- Not an original problem, ☹
- What's wrong with this solution?

- Problems with *ThumbSpace*:
 - Explicit mode switching is needed
 - Visual clutter

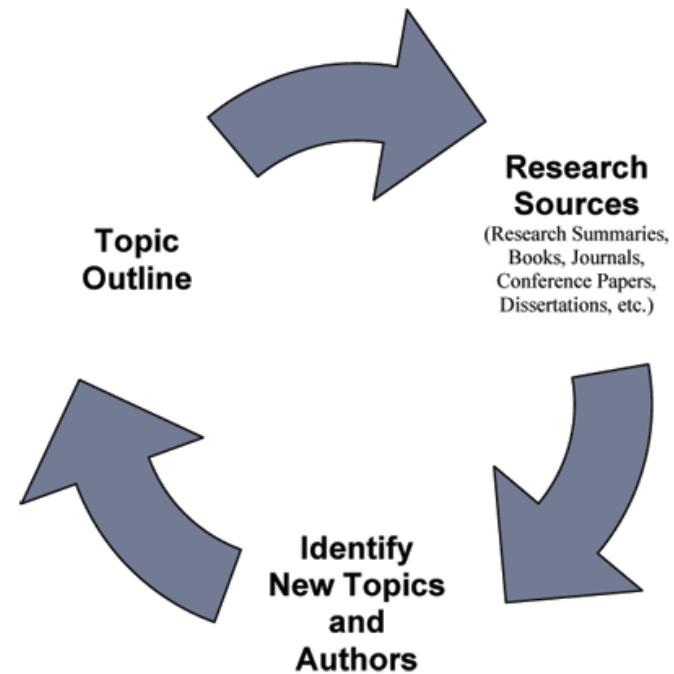


Refining Research Problems

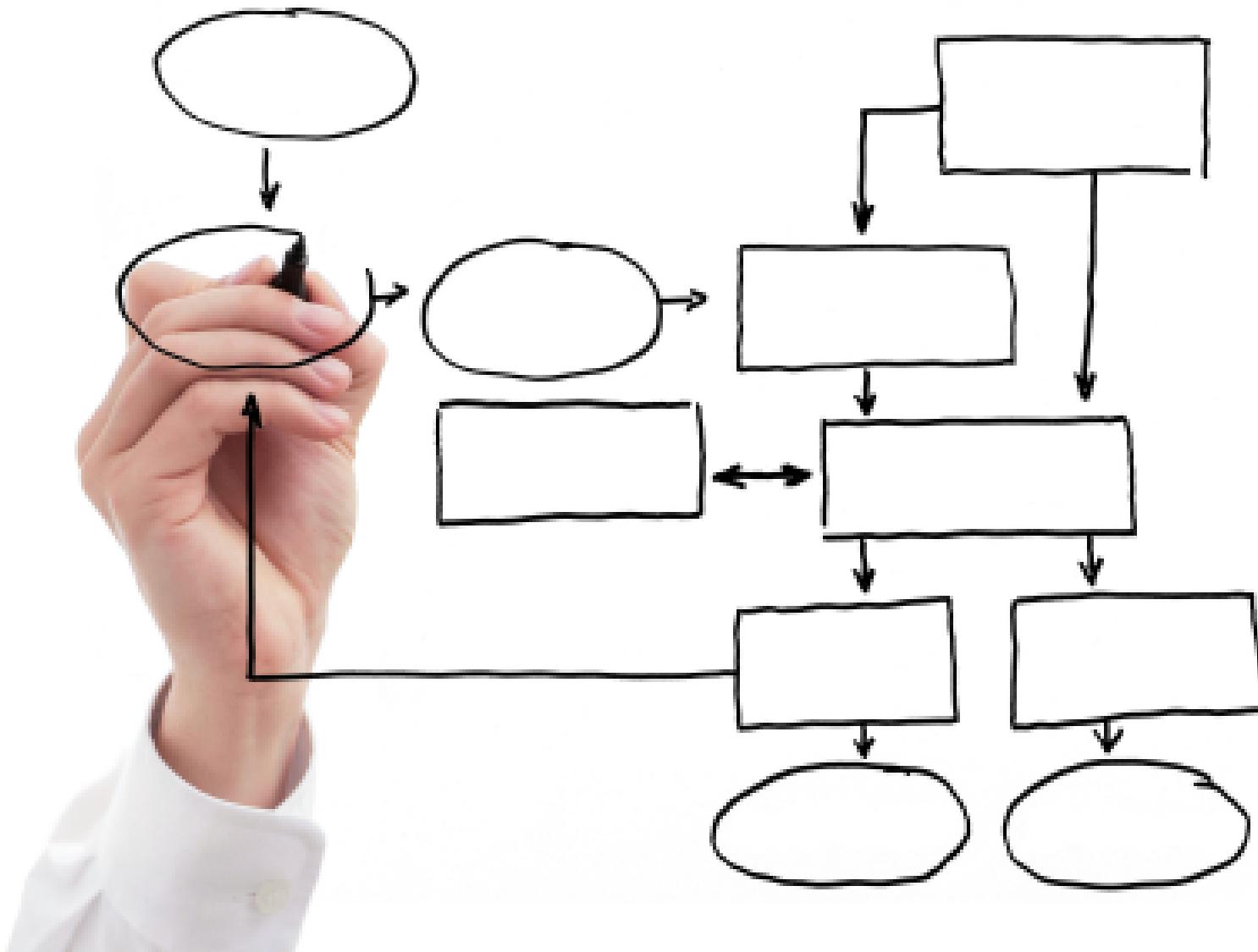
- **Refined problem**

- Is there any technique that allows the use of one-handed thumb to access a target located anywhere on mobile screen, with a fixed secure grip?
 - **Without the need of explicit mode switching**
 - **With minimal visual clutter**

Literature Searching as an Iterative Process

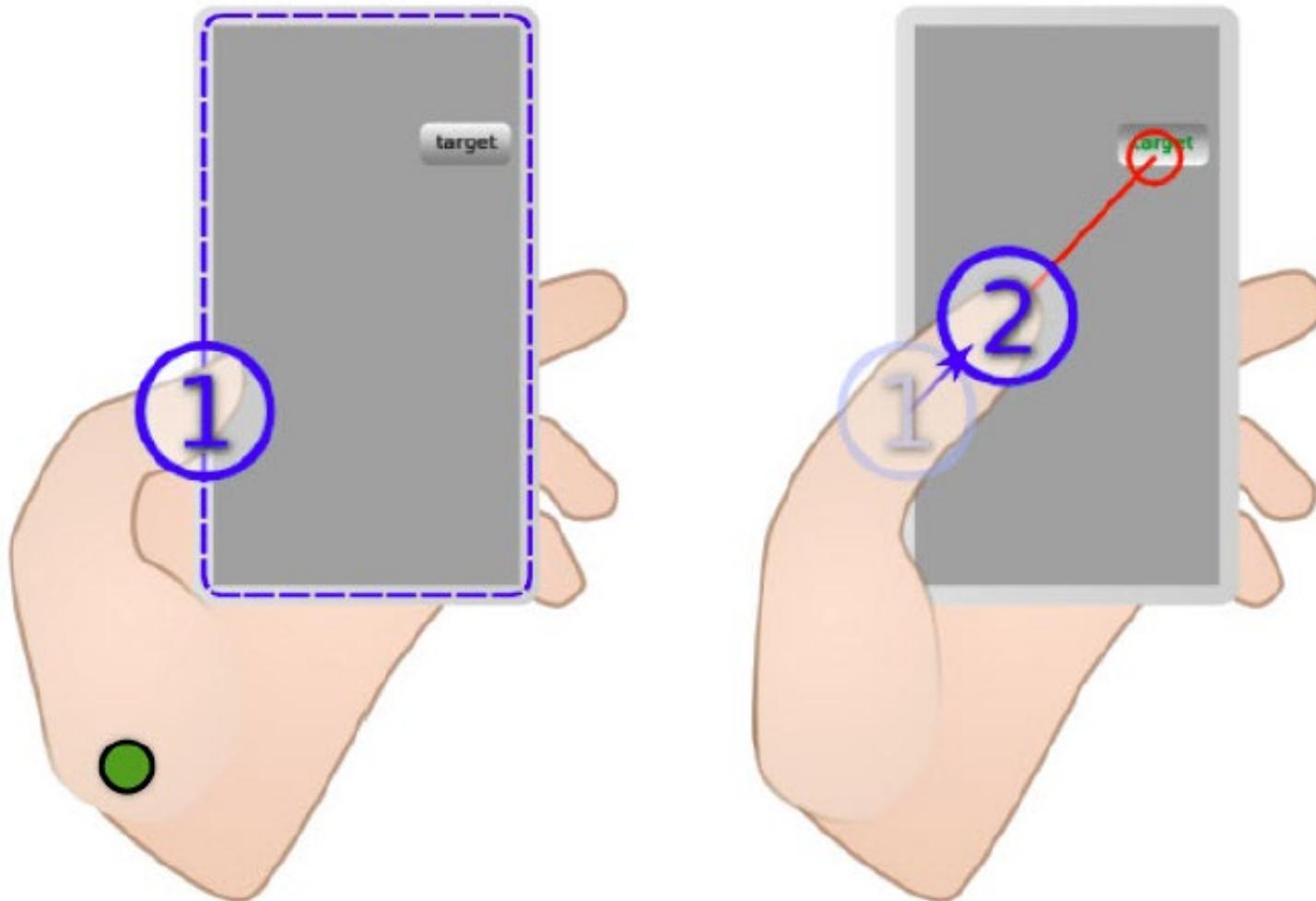


Methodology



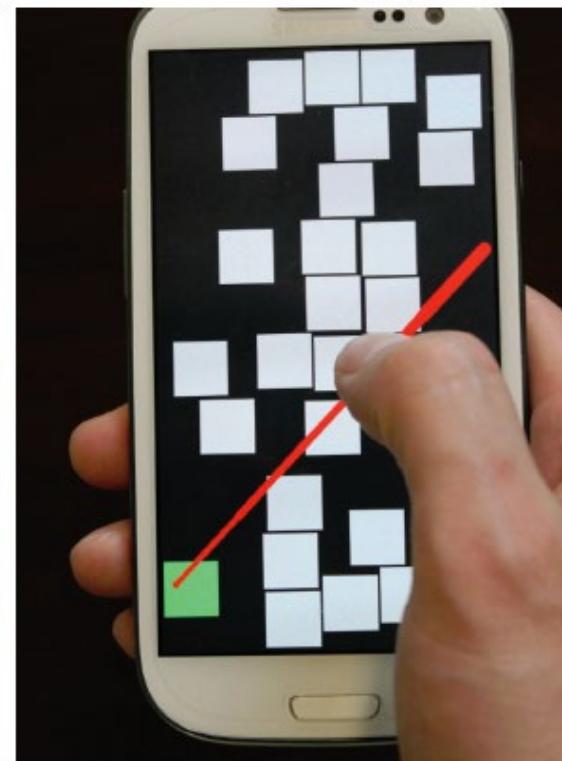
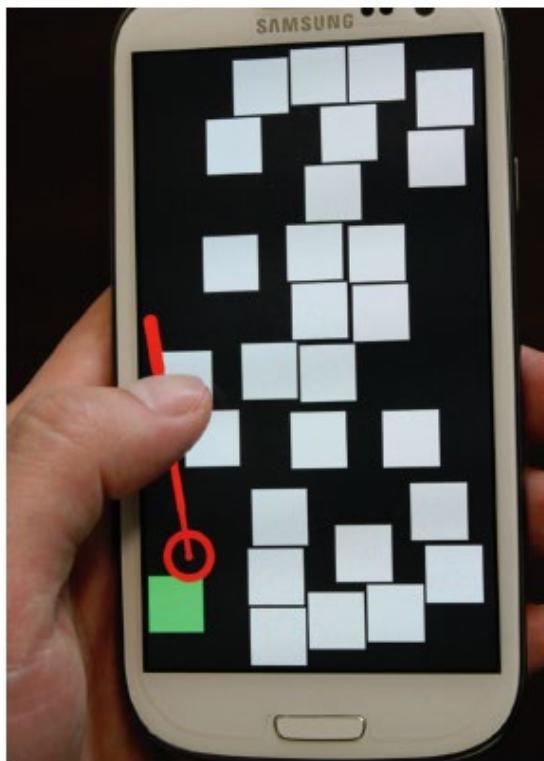
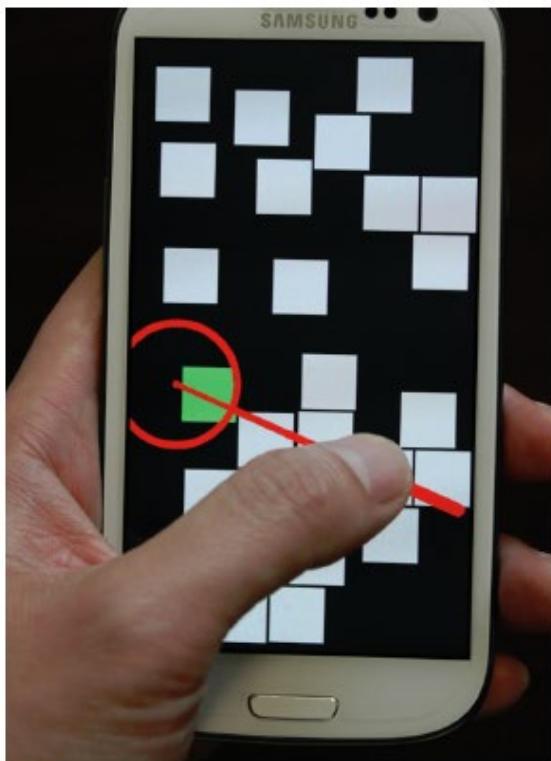
Example: Methodology

- BezelCursor: Bezel-Initiated Cursor



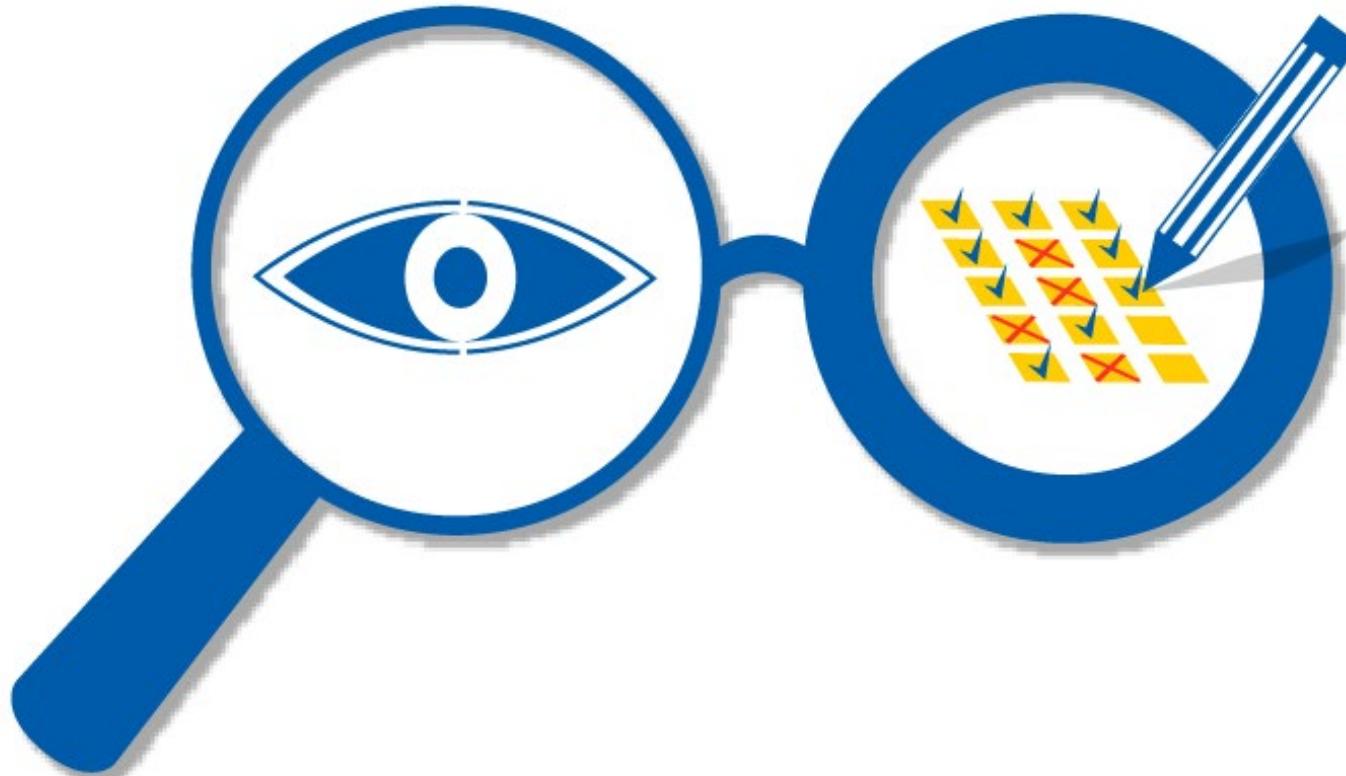
Implementation

- Working prototype
- Whether Android or iOS is used is not important



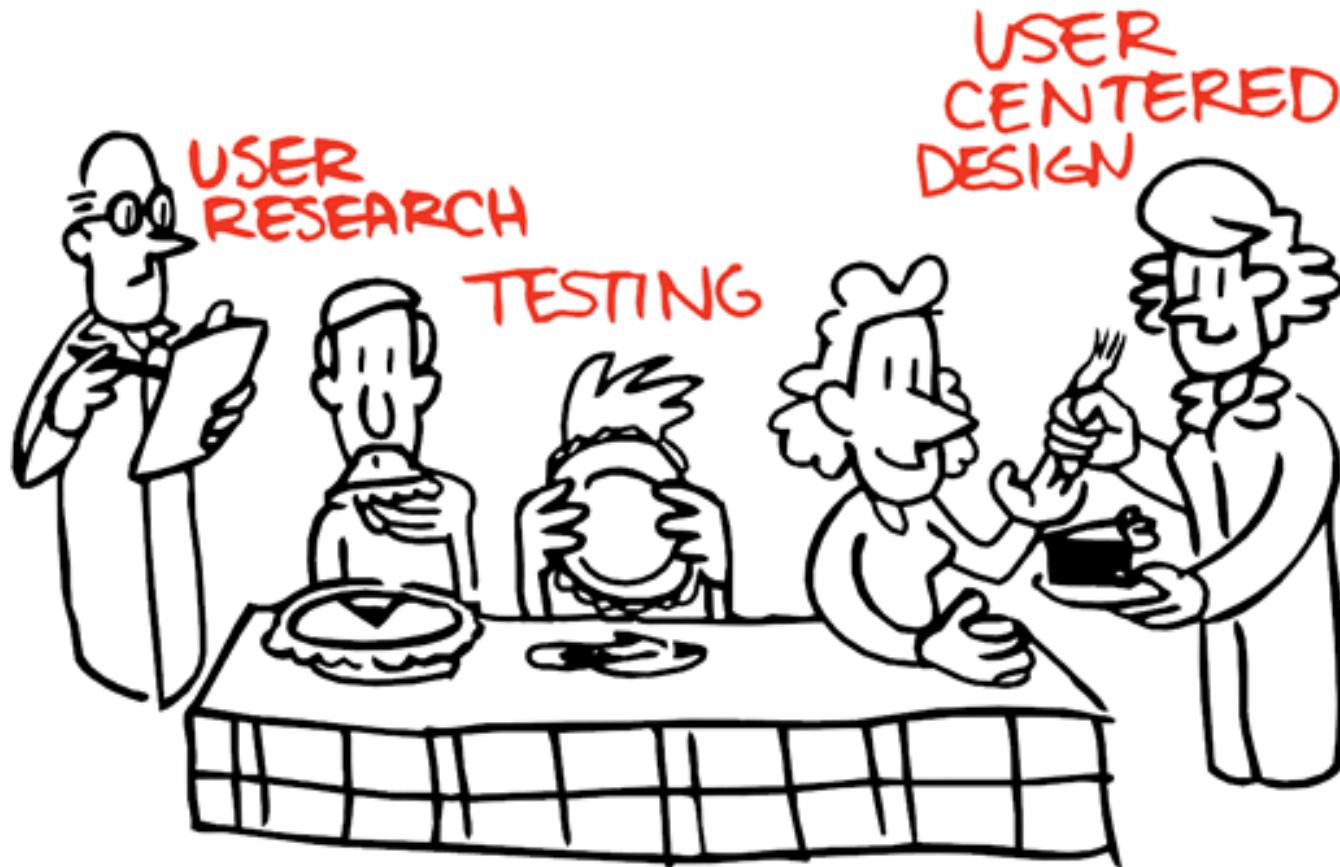
Evaluation

- **Key questions to be answered**
 - Is the invented technology effective?
 - Does it outperform the existing solutions if any?



Evaluation

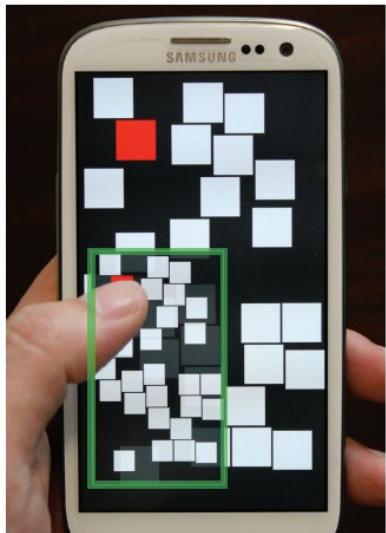
- Usability testing: to evaluate a technique by testing it on users



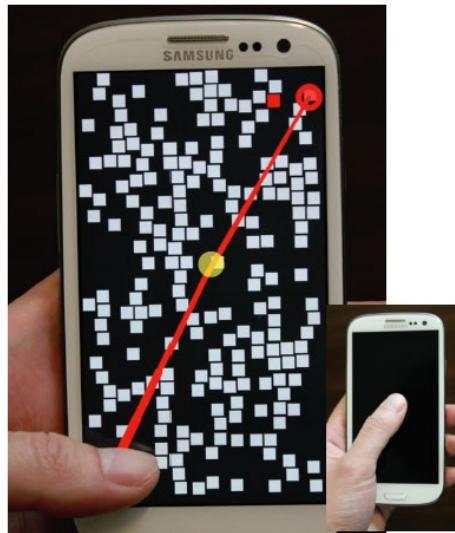
Example: Usability Testing

- Techniques compared:

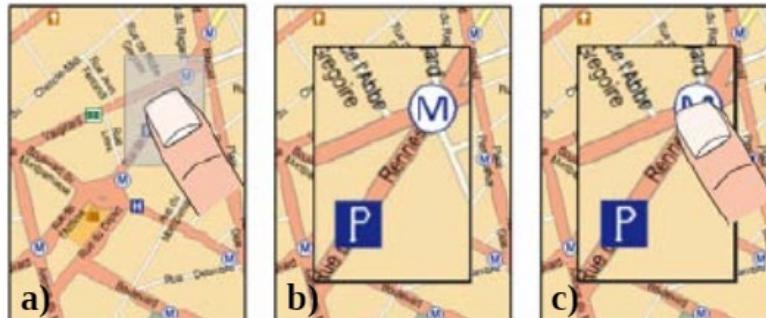
ThumbSpace



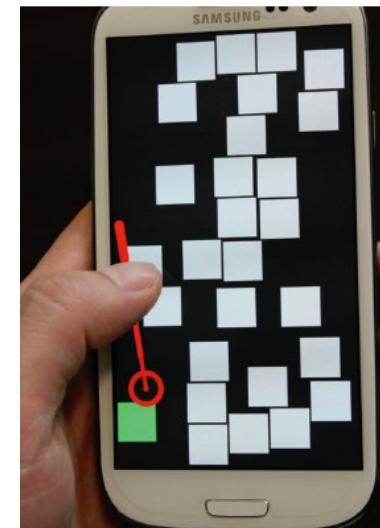
MagStick



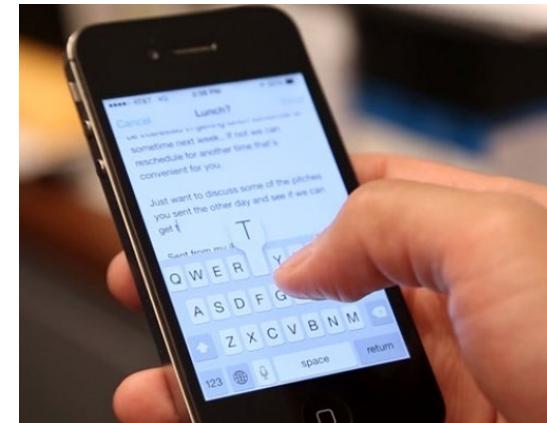
TapTap



BezelCursor



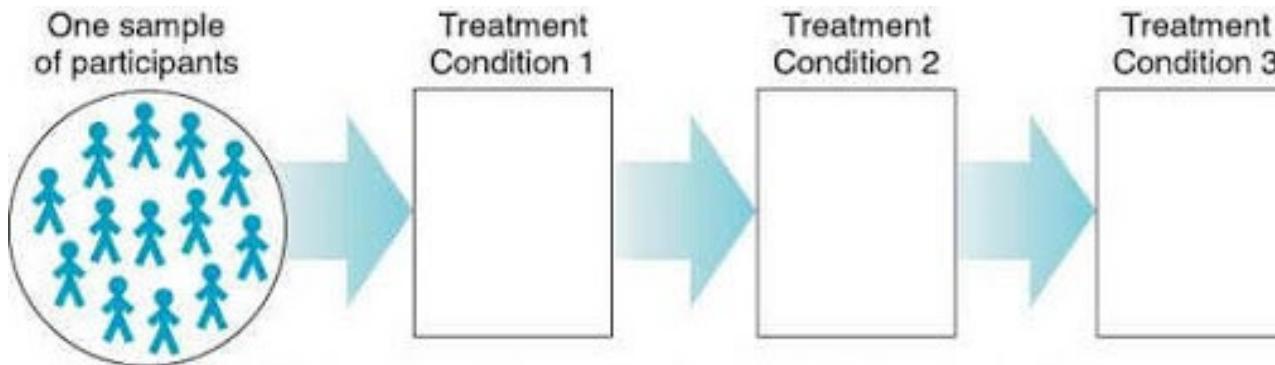
Direct touch



Example: Usability Testing

- Repeated measures design

- Use the same subjects with every aspect of evaluation



- Dozens of participants recruited
 - Each of them was asked to use each of the five techniques to repeatedly select elements of two sizes and from 12 screen areas
 - 360 selection tasks per participant

Counterbalance order

	Treatment Order			
	1	2	3	4
Participant 1	A	B	D	C
Participant 2	B	C	A	D
Participant 3	C	D	B	A
Participant 4	D	A	C	B

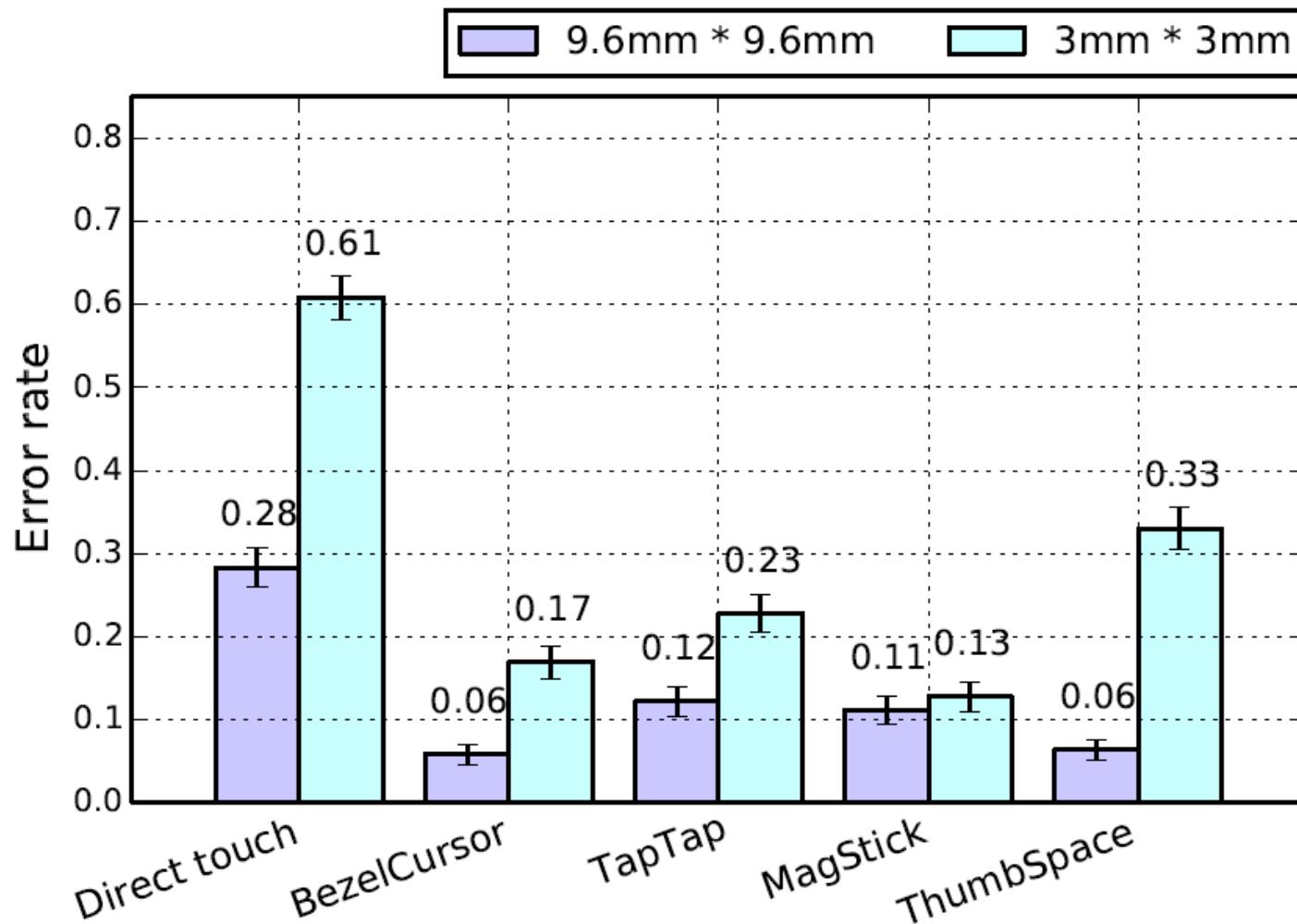
Example: Usability Testing

- Questionnaires



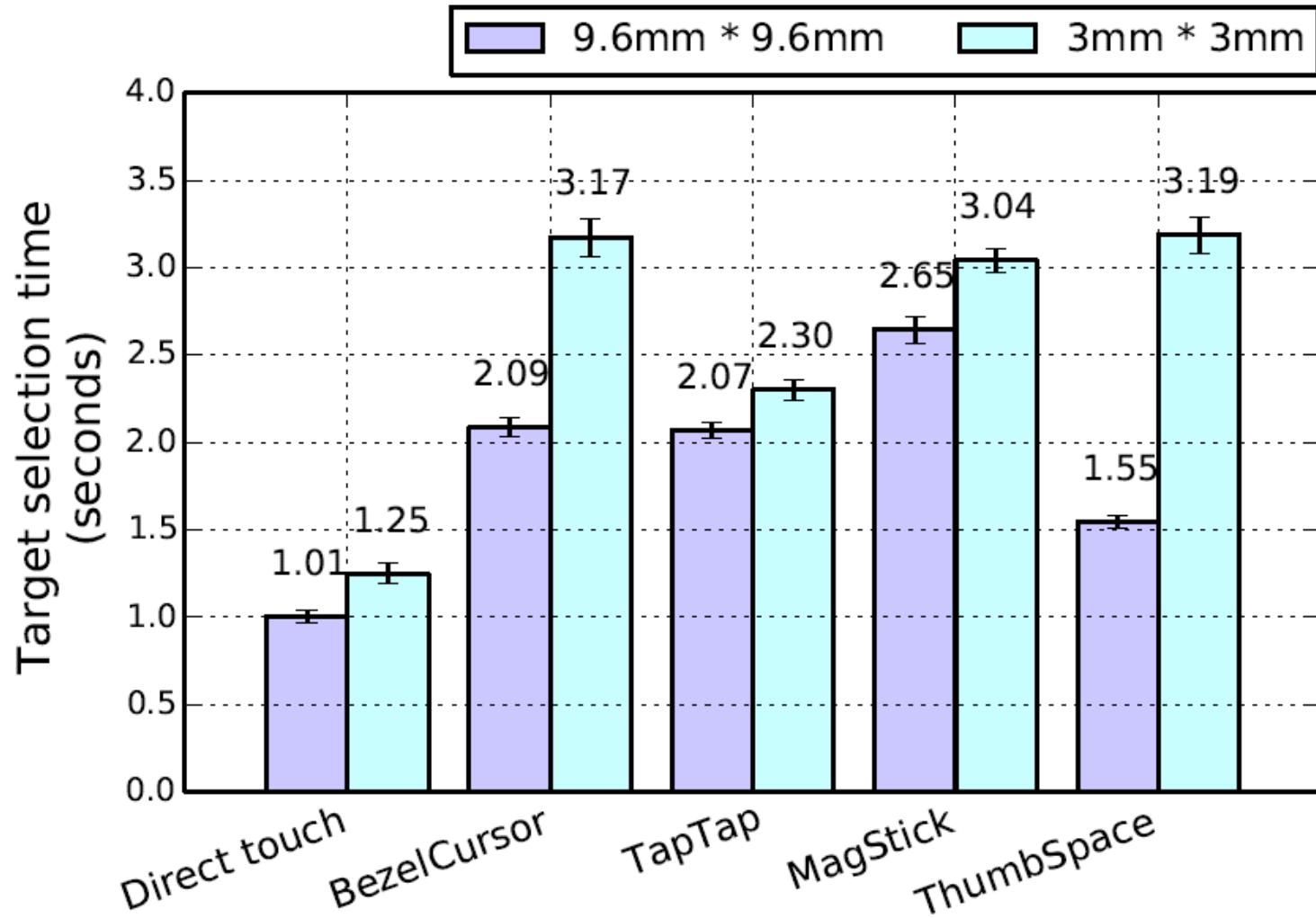
Example: Usability Testing

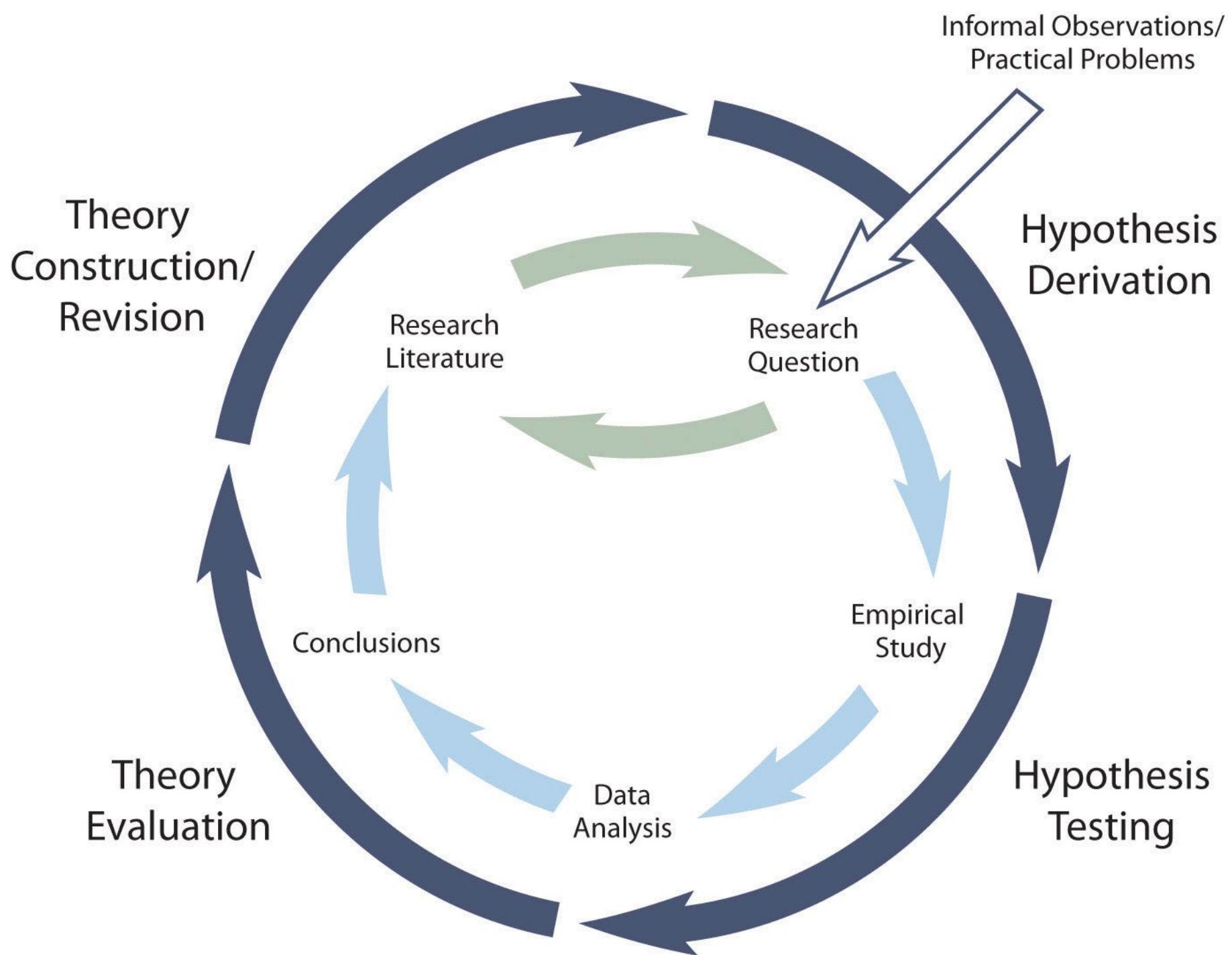
- Quantitative analysis



Example: Usability Testing

- Quantitative analysis





Example: Usability Testing

- After 4 user studies, we concluded that
 - BezelCursor requires less grip adjustment
 - It is more accurate and faster than the existing solutions when using a fixed secure grip



Writing



香港城市大學
City University
of Hong Kong

City University of Hong Kong
Department of Computer Science
School of Creative Media

BScSCM Final Year Project 2014 – 2015 Interim Report

<< Group No. Here (right mouse click the frame and select Edit Text) >>
Check the group no. here: <http://sweb.cityu.edu.hk/sm4602/>

<< Project Title Here (right mouse click the frame and select Edit Text) >>

Student Name/EID :

Student Name/EID :

Student Name/EID :

Programme Code : **BScSCM – SM4701**

Supervisor :

Date :

FYP Interim/Final Report Format

1. Cover & Title Page
2. Table of contents
3. Introduction
4. Objective
5. Deliverables
6. Project schedule
7. Background research/survey
8. Framework
9. Methodology
10. Implementation and evaluation
11. Discussion and analysis/Data collection
12. Concluding remarks
13. Summary
14. Acknowledgements
15. References
16. Appendices

Different projects might have different formats

- Cover & Title Page

BScSCM Final Year Project 2014 – 2015
Interim Report

<< Group No. Here (right mouse click the frame and select Edit Text) **>>**
Check the group no. here: <http://sweb.cityu.edu.hk/sm4802/>

<< Project Title Here (right mouse click the frame and select Edit Text) **>>**

Student Name/EID : _____

Student Name/EID : _____

Student Name/EID : _____

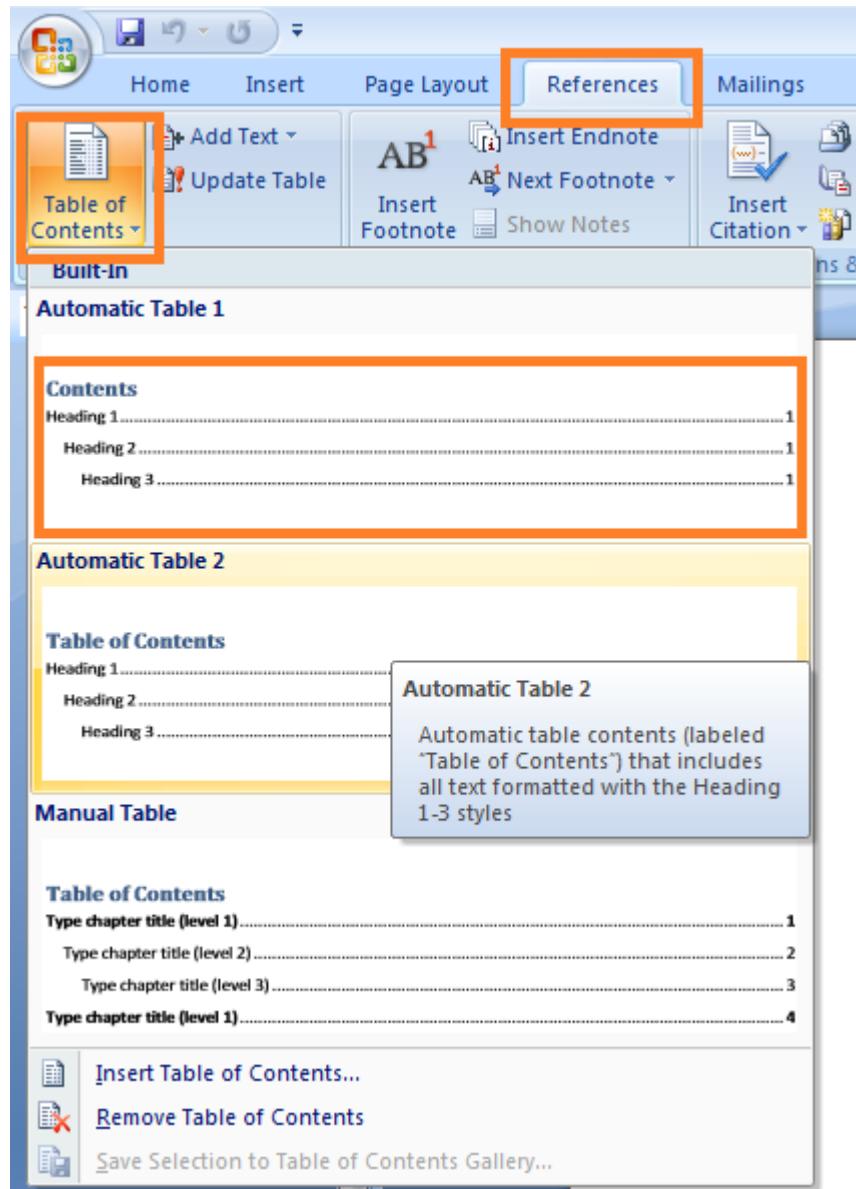
Programme Code : **BScSCM – SM4701**

Supervisor : _____

Date : _____

Table of Contents

- Introduction
- Objective
- Deliverable
- ...
- How to create TOC in Word



Introduction

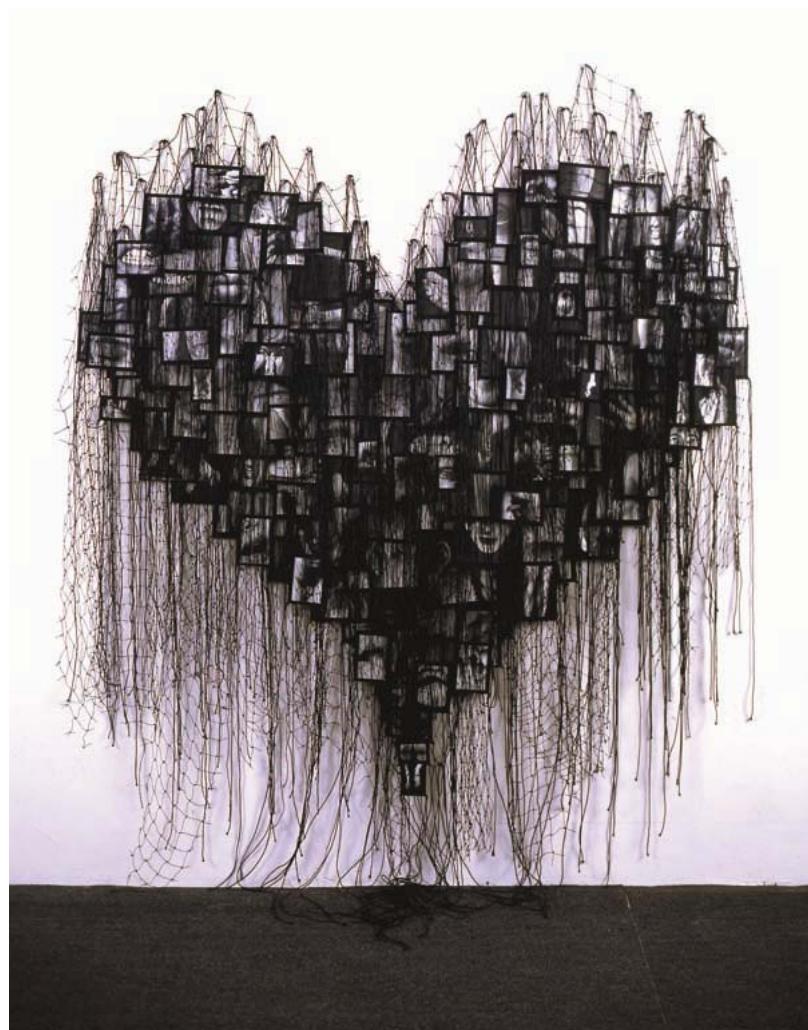
- A brief introduction of your work
- **Each paragraph corresponds to one chapter**, e.g.,
 - 1 paragraph for **the background**
 - *People tend to use a single hand for mobile interaction; mobile screens are getting better...*
 - 1 paragraph for **the problems** with existing solutions
 - *ThumbSpace suffers from the problem of visual clutter ...*
 - 1 paragraph for **the summary of your approach**
 - *Bezel-initiated gestures for target acquisition ...*
 - 1 paragraph for **the summary of your evaluation and results**
 - *BezelCursor is faster ...*

Objective

- Give a bit more detailed description of the background of your research
 - The motivation behind your research
 - Why your research is interesting
- What you would like to achieve
 - Objectives in **point form** preferred
 - Objective 1: to develop a technique for ...
 - Objective 2: ...
 - Objective 3: ...

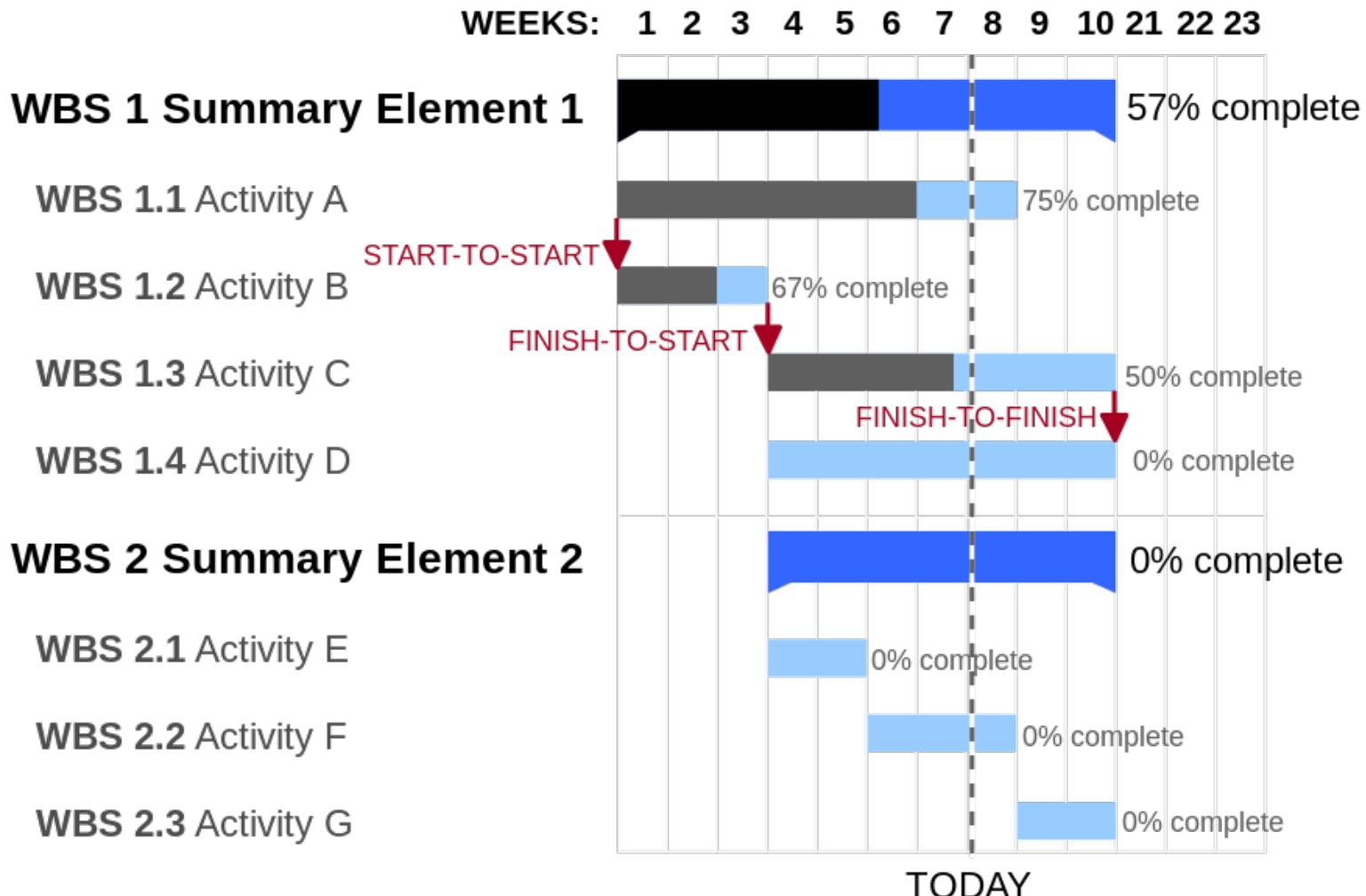
Deliverables

- Research output
 - Hardware
 - Software
 - Games
 - Installation
 - Live performance
 - Animation
 - Visual effects
 - Documentation
 - ...



Project Schedule

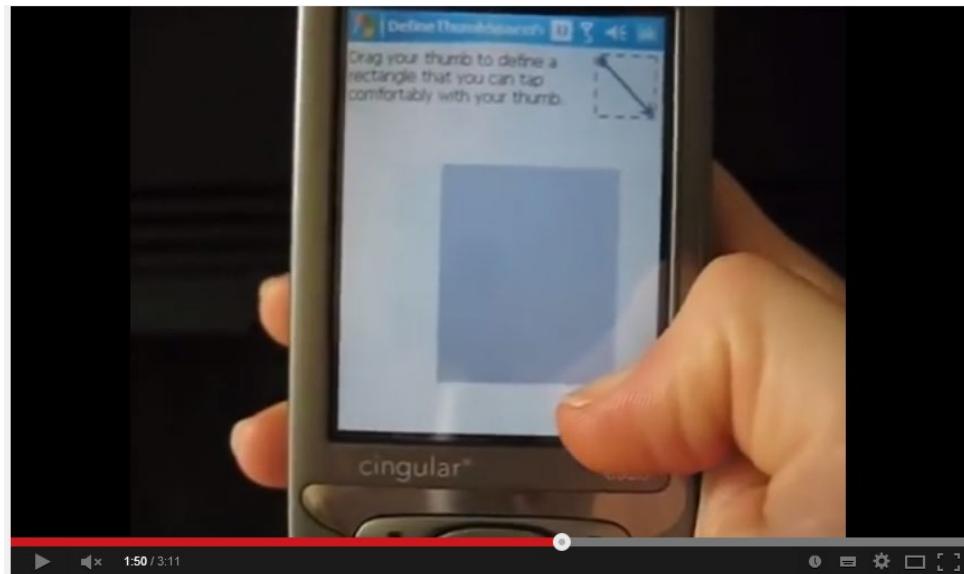
- E.g., Gantt charts



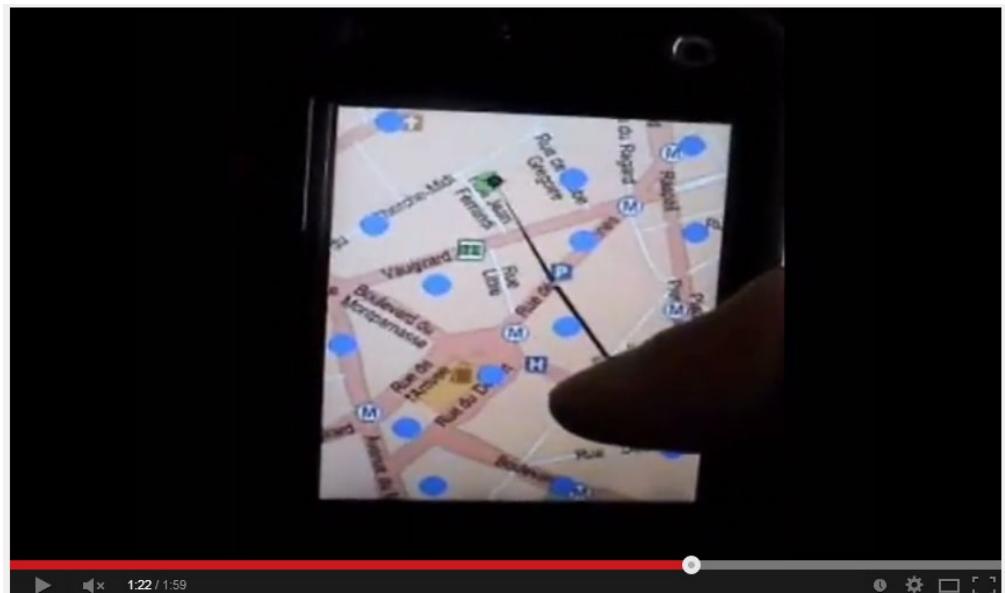
Background Research

- **Screenshots only?**

- Of course not enough!



- ThumbSpace



- MagStick

Background Research

- Discussing relevant problems, solutions
 - To show the **difference/similarity** between your solution and existing ones

Little attempt has been made to the problem of reaching distant objects that are out of thumb reach and thus require grip adjustments for direct access, often causing momentary device instability. Serving as an absolute touchpad superimposed on the screen, **ThumbSpace** proposed by Karlson and Bederson [4] adopts a user-defined thumb reachable area as input space (the rectangle in green in Figure 3 (left)), which is mapped to the entire screen for accessing targets located anywhere on the screen. ThumbSpace offers better screen accessibility but is much slower than direct touch. It is thus suggested to use ThumbSpace with other target acquisition techniques, e.g., ThumbSpace for distant targets and Shift for near objects. However, ThumbSpace requires explicit mode switching and the constant cost of launching ThumbSpace (e.g., pressing the center of a DPad) might make users less willing to use it [7]. In addition, the superimposed input space is visually distracting and its manipulation causes thumb occlusion (Figure 3 (left)).

Background Research

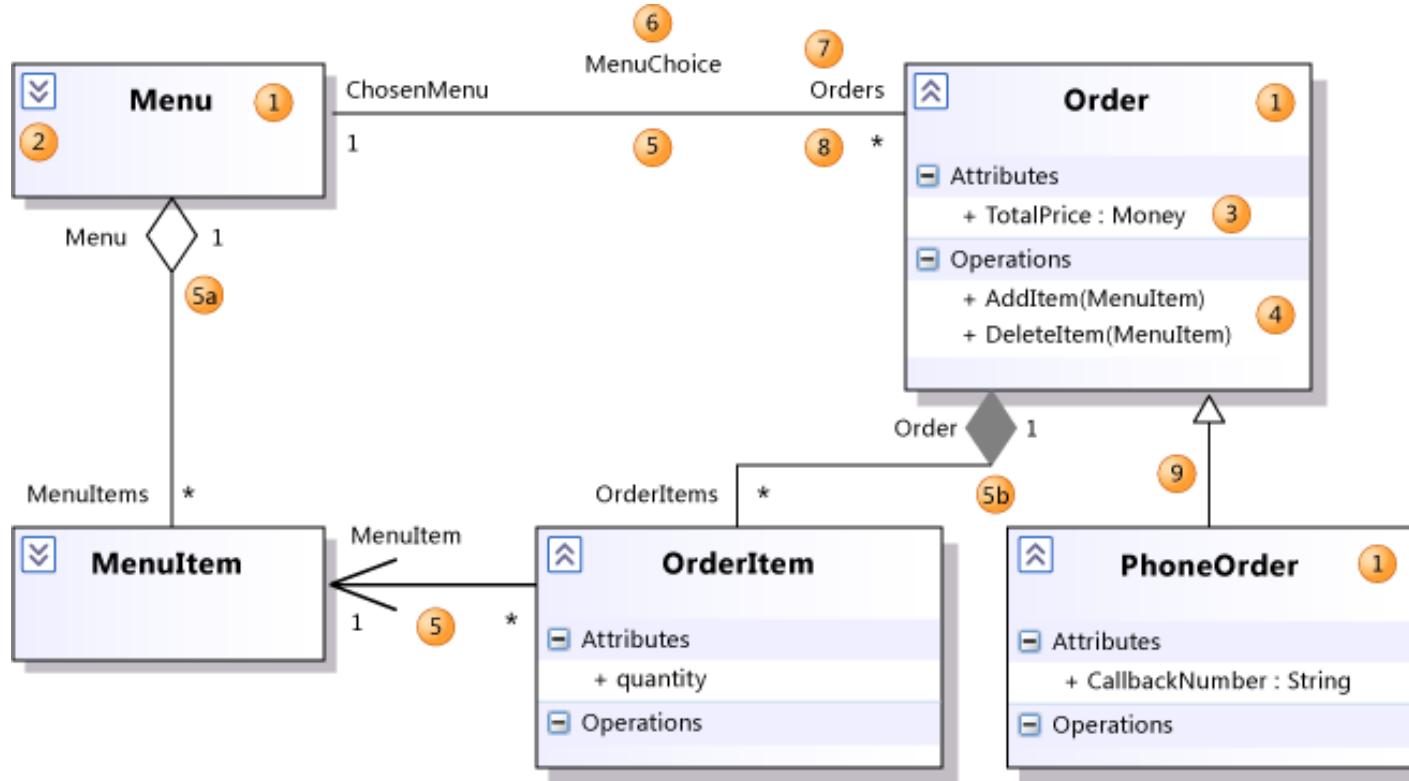
- Making comparison tables if necessary

	Smart Movie	Google+ Awesome Photos and Movie	Instagram	Magisto
Image Editing	Yes	Yes	Yes	Yes
Video Editing	No	Yes	Yes	Yes
Auto Selection	Yes	Yes	Yes	No
Auto Ordering	Yes	Yes	Yes	No
Rendering	Offline (Mobile)	Offline (Mobile)	Offline (Mobile)	Online (Server)
Customization	Yes	Yes	Yes	Yes
Price	Free	Free	Free	Free
Date	Proposed in May 2013	Launched in May 2013	Launched in June 2013	Launched in Sep 2011

Figure 6.5.1: Comparison between Smart Movie and other applications in the market

Framework

- System overview?
- Software framework?



Methodology

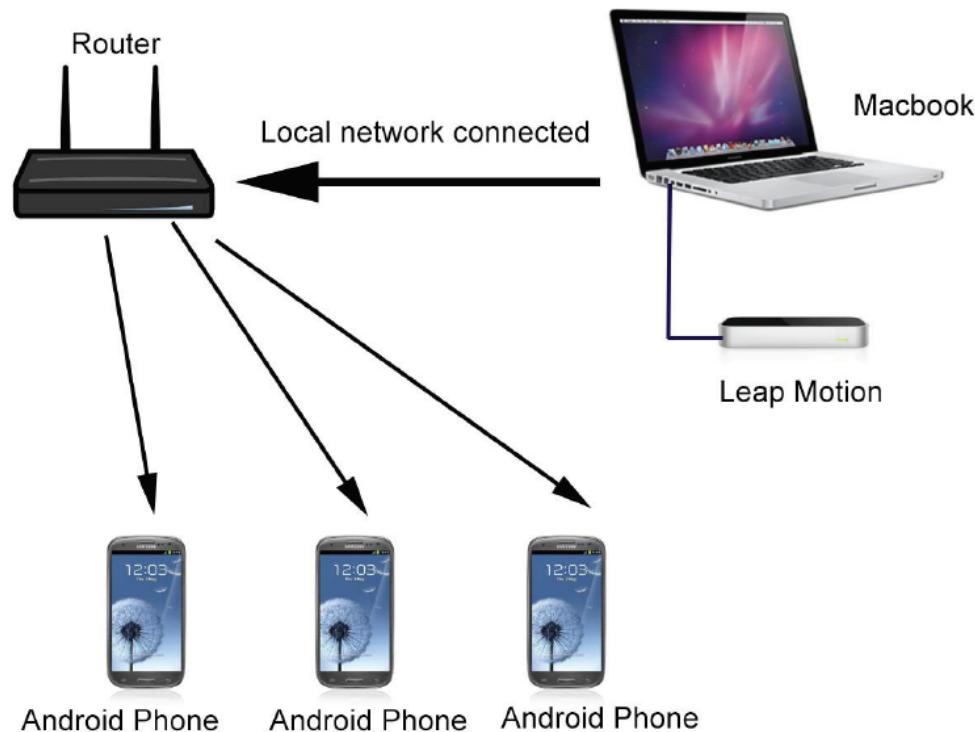
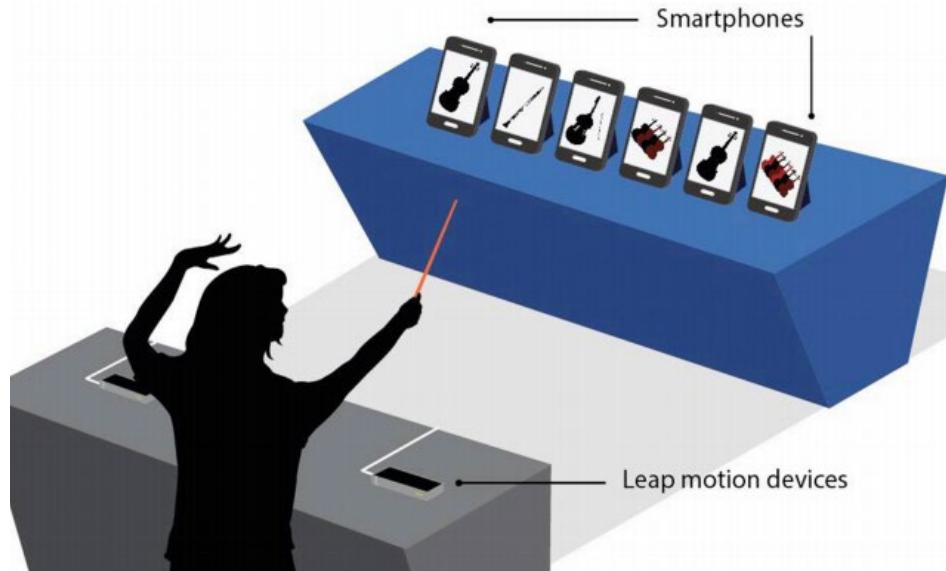
- Describe a series of steps of your method

The bezel of a device is the physical touch insensitive frame surrounding its touch screen, as illustrated in Figure 2 (left), i.e., the dotted rectangle in blue. BezelCursor is invoked by swiping the thumb from the bezel inwards to the screen (see a live demo in the accompanying video). The user then keeps dragging the thumb to drive a cursor towards the target (Figure 2 (right)). BezelCursor can be dismissed anytime by lifting up the thumb, followed by selection validation.

- **Focus on novel ideas only**
- **Don't give every implementation detail here**

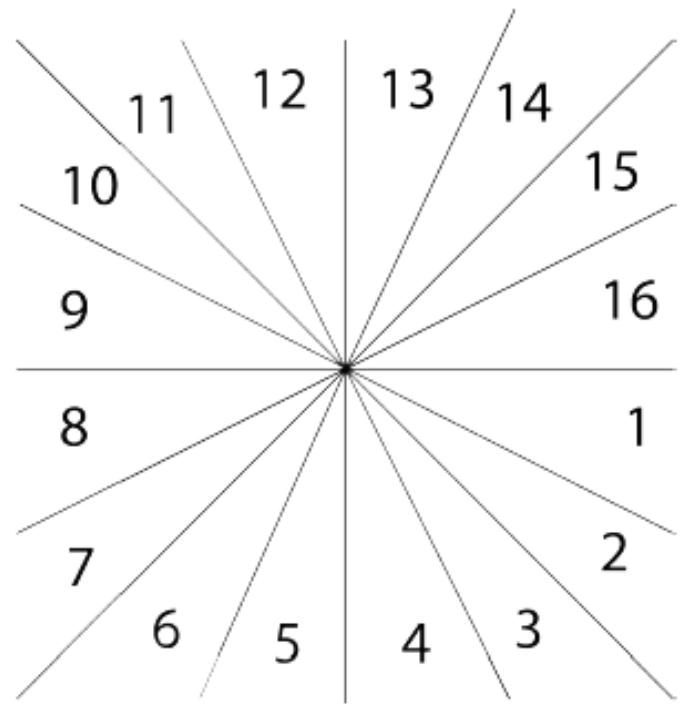
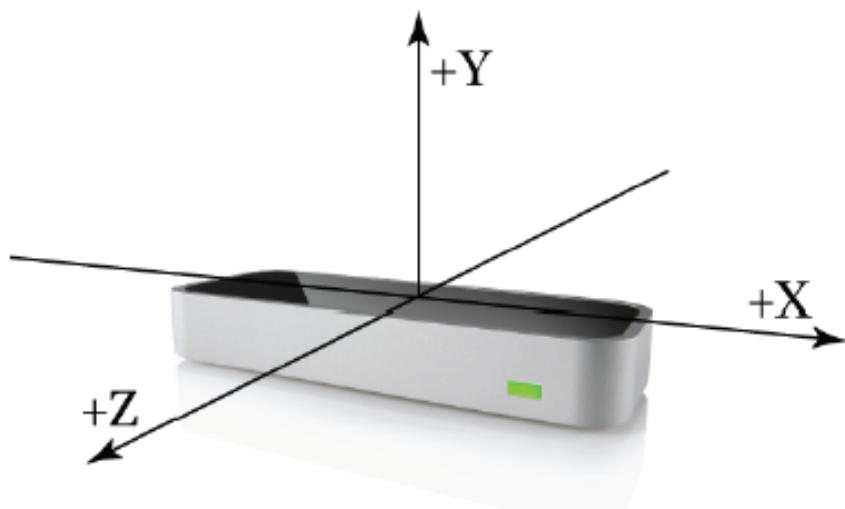
Methodology or Implementation?

- Leap is an important device for one-man orchestra
- Whether using Android or iOS is less important



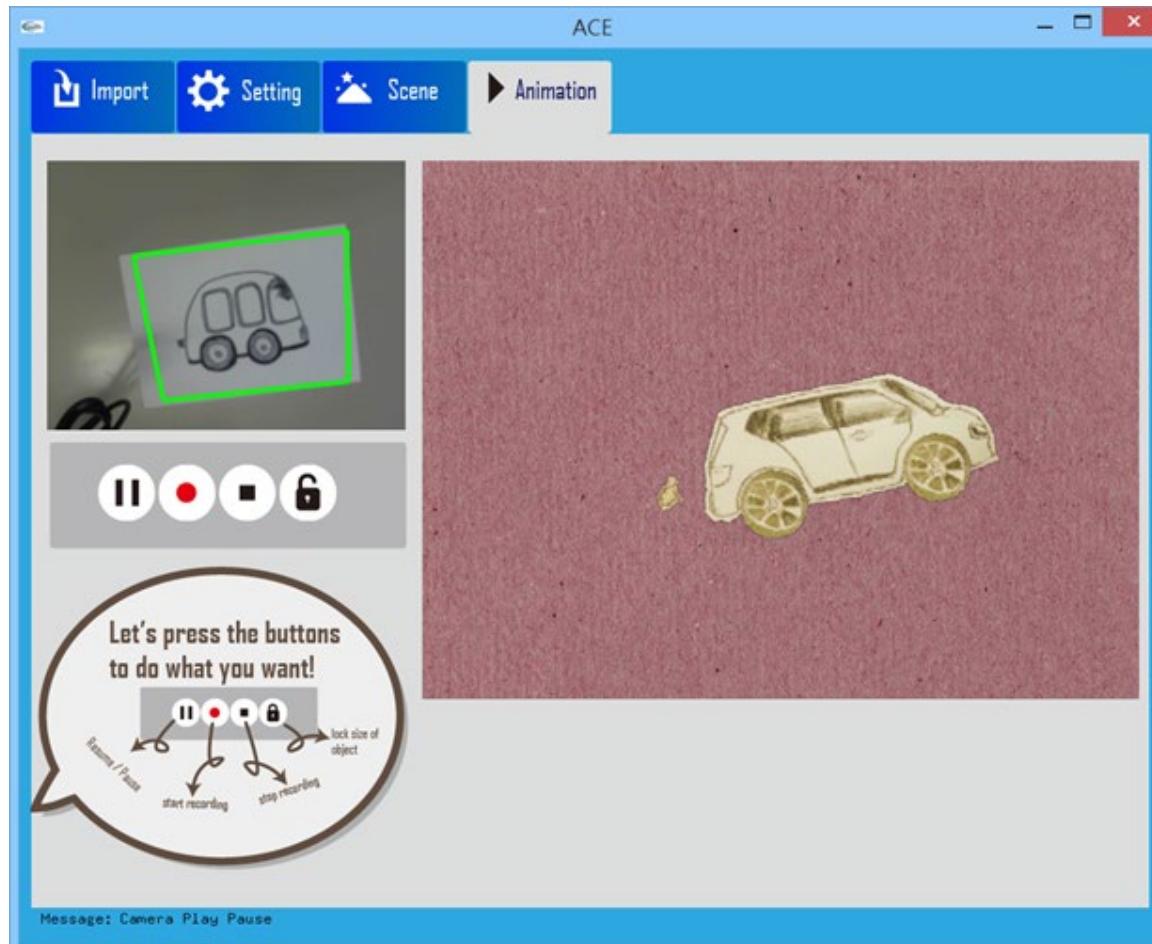
Implementation

- Focus on implementation details that are important to reproduce your work
 - E.g., tricks? Parameter values?



Implementation

- What 3D modeling software used?
- What mobile OS platform used?



Implementation

- Source code is usually not necessary and should not be part of your main report
- Include part of your code only if it is important

```
String instrName = getIntent().getStringExtra("instrument");
AssetFileDescriptor descriptor = null;
if (songNum == "1" || songNum == "2")
    descriptor = getAssets().openFd(
        "music/song" + songNum + "/" + instrName + ".mp3");
else if (songNum == "3")
    descriptor = getAssets().openFd("music/song3/song3.mp3");
// AssetFileDescriptor descriptor = getAssets().openFd(
// "music/v2.mp3");
st = new SoundTouchPlayable(stListener, descriptor, 0, 1.0f,
    0.0f);
songChosen = true;
descriptor.close();
```

```
        descriptor.close();
    } else {
        String fullPath = getFullPath(getIntent()); // my path
        st = new SoundTouchPlayable(fullPath, 0, 1.0f, 0.0f);
        songChosen = true;
    }
} catch (SoundTouchAndroidException e) {
    // TODO Auto-generated catch block
```

The improved version that uses asset to load the audio file.

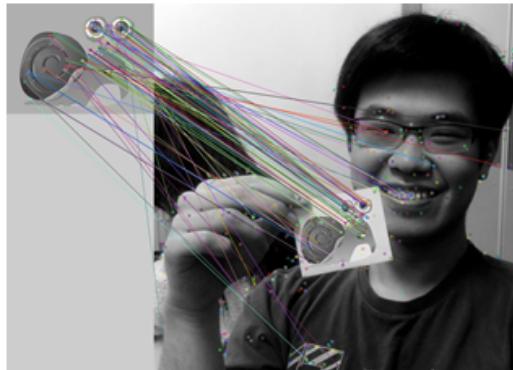
The old version that uses path name to load audio file.

Evaluation

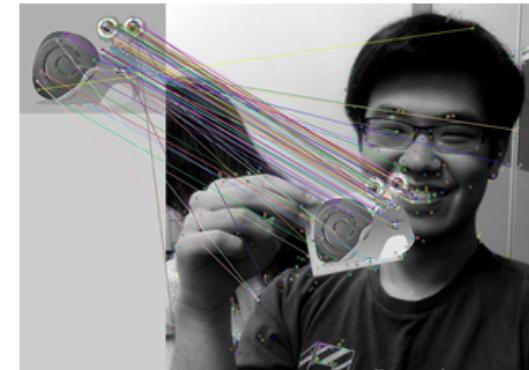
- Pilot studies → refining your ideas

- **Usability testing**
 - For different parameters
 - Comparing other approaches

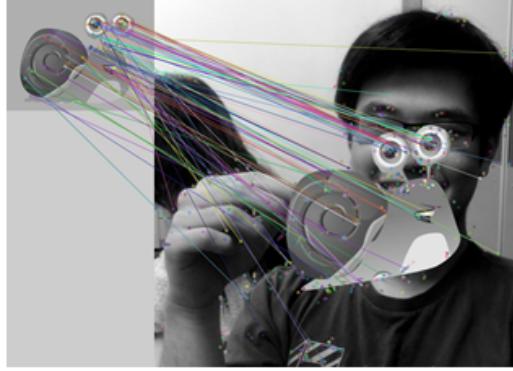
Small model,



Normal model,



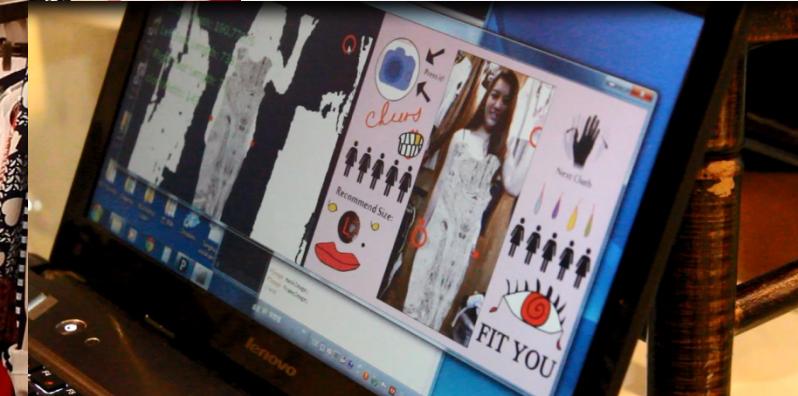
Large model,



Extra large model



Size	Model keypoint	Tested image keypoint	matches point
Extra large	95	722	106
Large	95	640	106
Normal	95	560	106
Small	95	532	106



Evaluation

- Performance

	Attempt 1	Attempt 2	Attempt 3	Attempt 4	Attempt 5
Photo Sets	A	A	B	B	C
Frame Rate	25	25	25	25	25
Number of Photos	15	6	20	7	10
Number of Frame per Photo	10	25	6	12	10
Total Number of Frame	150	150	120	84	100
Total Video Duration	6s	6s	4.8s	3.36s	4s
Total Rendering Time	22s	23s	17s	12.5s	16s

Figure 10.1: Rendering Performances of the video

Discussion

- Limitations
- Interesting findings

10.1. Limitations

The system has several limitations. Firstly, the video composing feature of the application is targeted to a limited group of photos only. The sets of photos that the application cannot handle include portrait photos, photos without date-captured metadata, photos without Geo-tag metadata.

The video produced by the application does not have sound track. The library MP4Parser can be used to mux video and audio together for H.264 MP4 Movies. However, that feature has not been implemented in the latest version of the application, as audio is not the main features of this application.

The video produced by the application using cut off transition only. The application use jcodec to render image sequences to video frame-by-frame, converting Bitmap to jcodec's Picture, and encode

Concluding Remarks & Summary

- Conclusion, future works

We presented BezelCursor, a one-handed target acquisition technique that is fast, simple to implement, easy to learn, compatible with commonly used interaction styles, scalable to screens of large size, and applicable to mobile environments. It is shown by our study that with secure gripping, BezelCursor gave significantly lower error rate than direct touch and TapTap, and BezelCursor was significantly faster than MagStick and significantly more accurate than Thumb-Space for small targets. Since BezelCursor is tailored for selecting out-of-reach targets, it would be interesting to quantitatively evaluate the relative benefits of using BezelCursor together with the techniques designed for selecting targets with reach (e.g., Shift) in the future. In addition, we plan to explore the possibility of applying BezelCursor to multiple target selection, dragging based target interactions, and more importantly, real-world interfaces.

Acknowledgements

- Thank your advisors
- Thank those who help with usability testing and other evaluation tasks
- Thank those who provide financial support

We thank the reviewers for their constructive comments, the user study participants (namely, Victor Dibia, Audrey Samson, Guolei Zhang, Pengfei Xu, Qiaochu Mei, Qingkun Su, Xiaoyan Shen, Wanqi Li, Xiaozhu Zhang, Jiayue Yu, Xiaoyong Shen, Siyu Li) for their time, and Michael Brown for video narration. We are grateful to Flickr for allowing us to download so many images. This work was substantially supported by the Seed Grant from the City University of Hong Kong (No. 7003058).

References

References

- [1] A. Karlson, B. Bederson, J. Contreras-Vidal, Understanding one handed use of mobile devices, Handbook of research on user interface design and evaluation for mobile technology.
- [2] S. Boring, D. Ledo, X. A. Chen, N. Marquardt, A. Tang, S. Greenberg, The fat thumb: using the thumb's contact size for single-handed mobile interaction, in: MobileHCI '12, 2012, pp. 207–208. doi:10.1145/2371664.2371711.
URL <http://doi.acm.org/10.1145/2371664.2371711>
- [3] N. Hirotaka, Reassessing current cell phone designs: using thumb input effectively, in: CHI EA '03, 2003, pp. 938–939. doi:10.1145/765891.766081.
URL <http://doi.acm.org/10.1145/765891.766081>
- [4] A. Karlson, B. Bederson, Thumbspace: generalized one-handed input for touchscreen-based mobile devices, Human-Computer Interaction–INTERACT 2007 (2007) 324–338.

- If you don't include a proper reference list, then you commit plagiarism

References

- **Don't forget to cite these papers at relevant places in main text**
 - **In-text citation**

scenarios, the thumb of the hand holding the device is normally the only available finger for touch input [2, 3]. However, mainly due to biomechanical limitations of the thumb, only a subregion of the touch screen is comfortable to access by the thumb [4], causing awkward hand postures to reach the rest of the screen (Figure 1 (right)). This problem of limited screen accessibility by the thumb deteriorates with screens of increasingly bigger sizes, which, however, are getting more and more popular [5].

- **If you don't include proper in-text citations, then you commit plagiarism**

References

- Another format

Another relevant topic is the vectorization of line drawings, where ambiguities also exist when performing vectorization locally. For clean drawings, the difficulty often lies near junctions, for which automatic non-local solutions [Bao and Fu 2012; Noris et al. 2013] often suffice. For drawings with over-traced scribbles, a possible solution is to first group over-traced line strokes into line groups, for example using Gabor filtering techniques. The Gabor filter used

References

- ARBELAEZ, P., MAIRE, M., FOWLKES, C., AND MALIK, J. 2011. Contour detection and hierarchical image segmentation. *Pattern Analysis and Machine Intelligence, IEEE Transactions on* 33, 5, 898–916.
- BAO, B., AND FU, H. 2012. Vectorizing line drawings with near-constant line width. In *ICIP 2012*.
- BARAN, I., LEHTINEN, J., AND POPOVIĆ, J. 2010. Sketching clothoid splines using shortest paths. In *Computer Graphics Forum*, vol. 29, 655–664.

Appendices

Image texture

Wall: https://www.google.com.hk/search?safe=strict&hl=zh-CN&site=imghp&tbo=isch&source=hp&biw=1517&bih=782&q=wall&oq=wall&gs_l=img.3..0110.1888.2372.0.2668.4.4.0.0.0.0.63.218.4.4.0....0...1ac.1.42.img..0.4.218.E-Tuc4kDNWQ

House: https://www.google.com.hk/search?safe=strict&hl=zh-CN&biw=1517&bih=782&site=imghp&tbo=isch&sa=1&q=house&oq=house&gs_l=img.3..0110.25584.26052.0.26208.5.5.0.0.0.0.78.265.4.4.0....0...1c.1.42.img..1.4.265.sEqsCIRAQaU

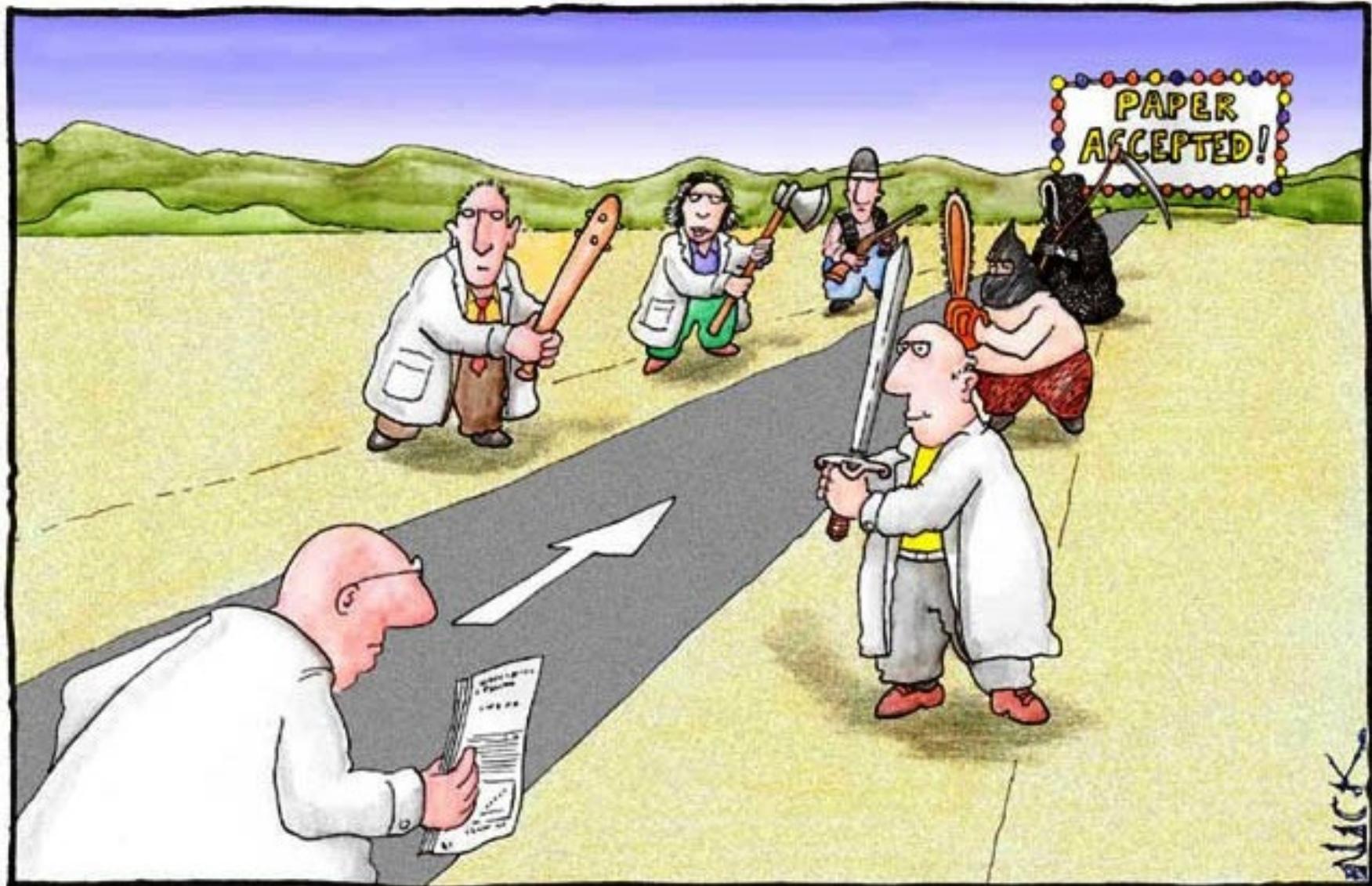
Catapult: https://www.google.com.hk/search?safe=strict&hl=zh-CN&biw=1517&bih=782&site=imghp&tbo=isch&sa=1&q=%E5%BC%B9%E5%BC%93&oq=dangong&gs_l=img.3.0.0i2l10.106365.107067.0.108237.7.7.0.0.0.0.110.565.6j1.7.0....0...1c.1.42.img..0.7.565.Z4bSE3K5KvY

Parchment: https://www.google.com.hk/search?safe=strict&hl=zh-CN&site=imghp&tbo=isch&source=hp&biw=1517&bih=782&q=%E7%BE%8A%E7%9A%AE%E7%BA%B8%E7%B4%A0%E6%9D%90&oq=%E7%BE%8A%E7%9A%AE%E7%BA%B8&gs_l=img.3.2.0i5j0i24l3.1965.5163.0.7332.11.11.0.0.0.0.94.779.11.11.0....0...1ac.1j4.42.img..0.11.779.2RxhgPuN2tY

Submission for Peer Review

- Different venues available dependent on the type of your works, e.g.,
 - Emerging Technologies at SIGGRAPH/Asia
 - One-man orchestra by Blue and Tomas
 - Computer Animation Festival at SIGGRAPH or SIGGRAPH Asia
 - Symposium on Mobile Graphics and Interactive Applications at SIGGRAPH Asia
 - BezelCursor by Andy
 - Ars Electronica

Oh, Yes!

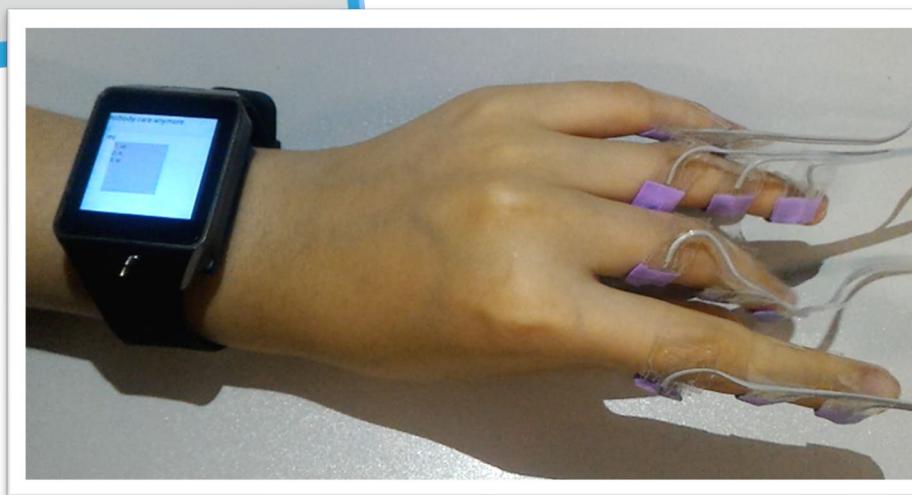
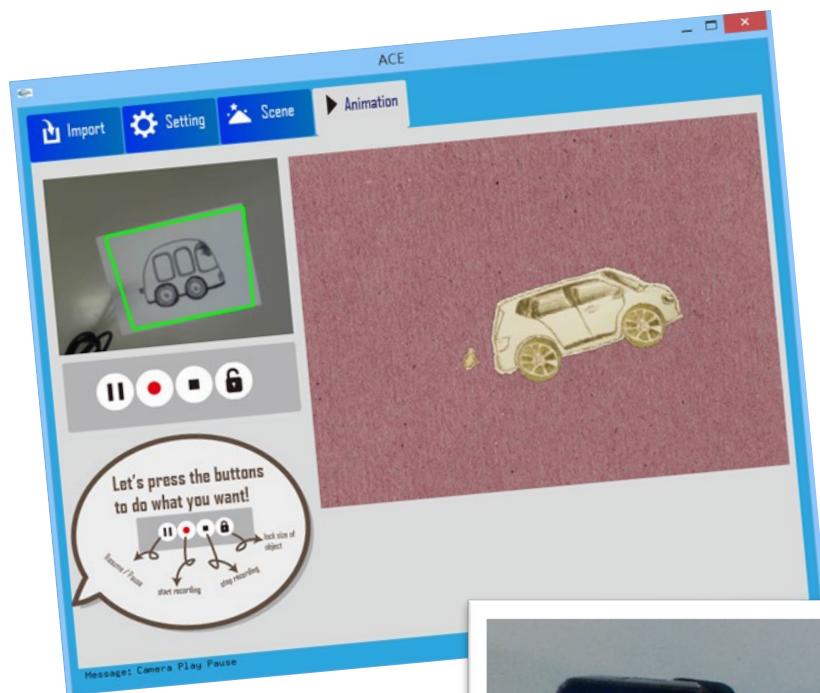


ALICK

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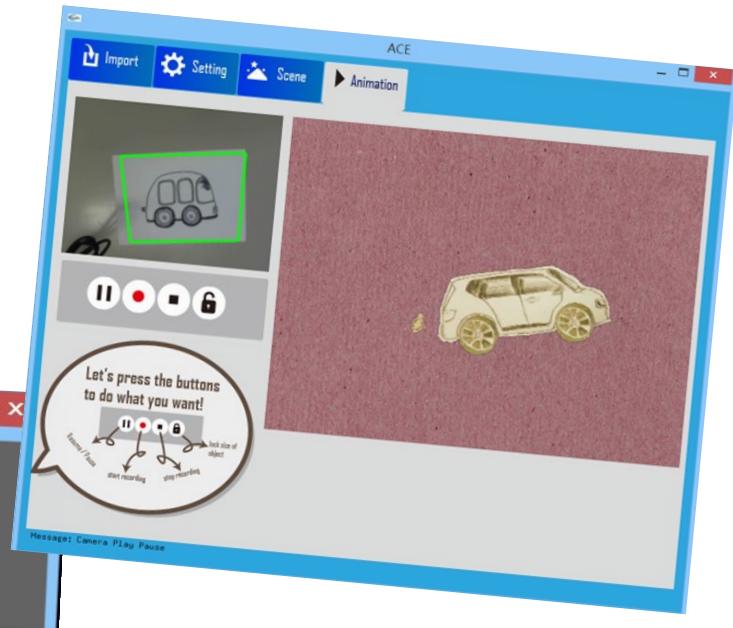
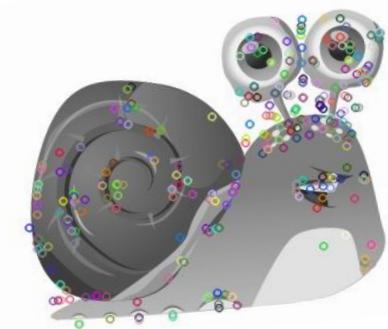
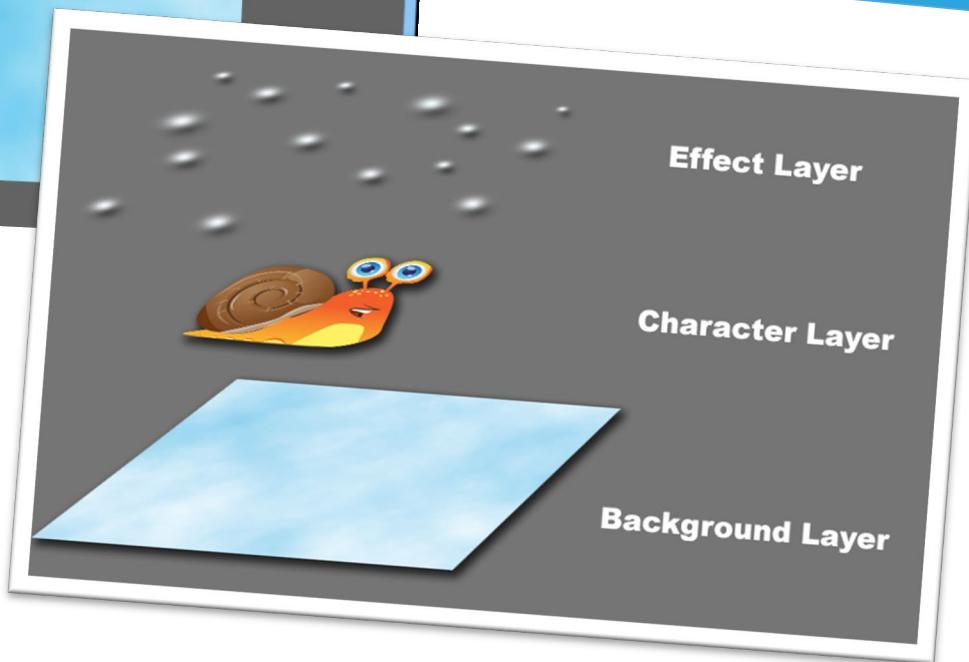
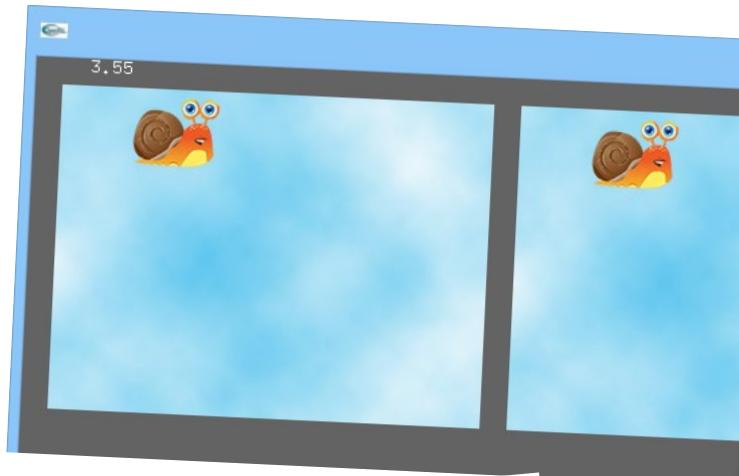
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- [How to Do Research](#)
- [Writing and Presenting Your Thesis or Dissertation](#)
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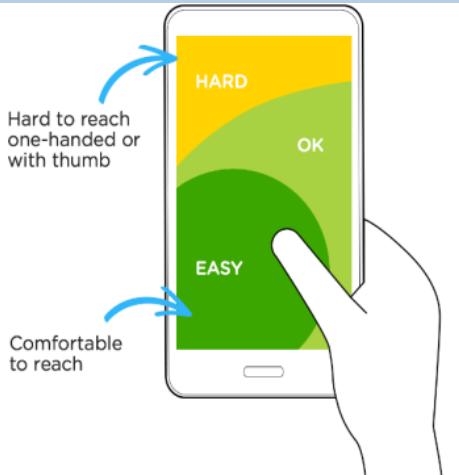


Research Project

Back-Mirror:

single handed input on smartphone back side

Problems to solve:



Reachability problem

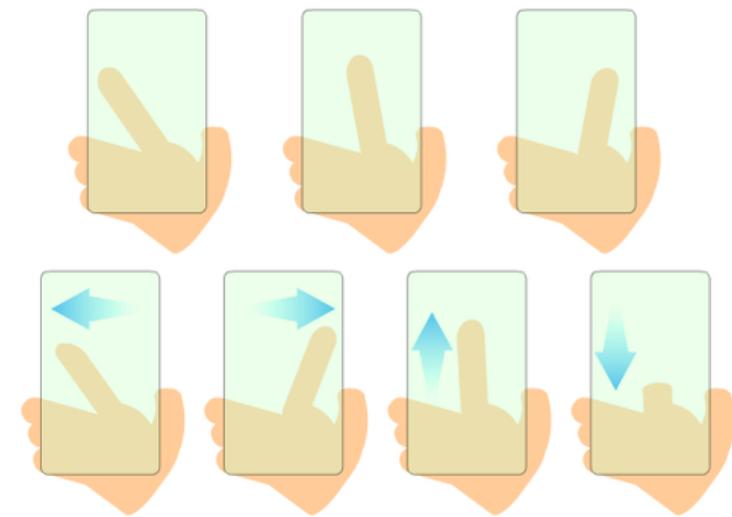
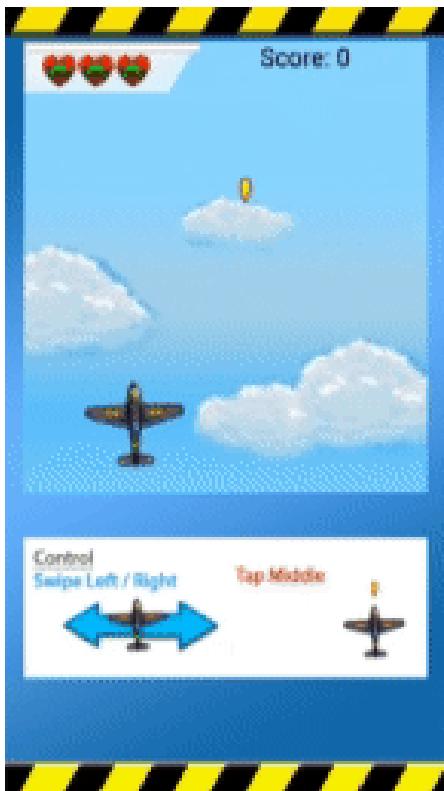


Inaccurate clicks



Research Project

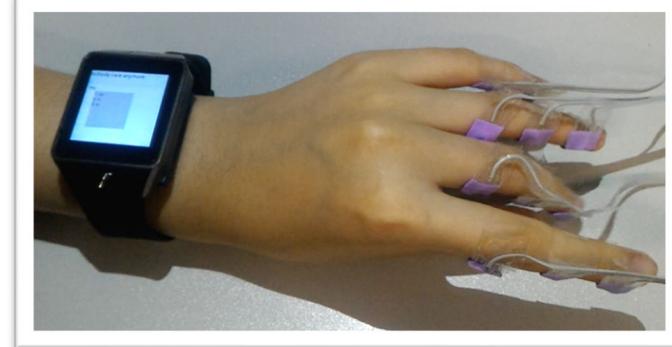
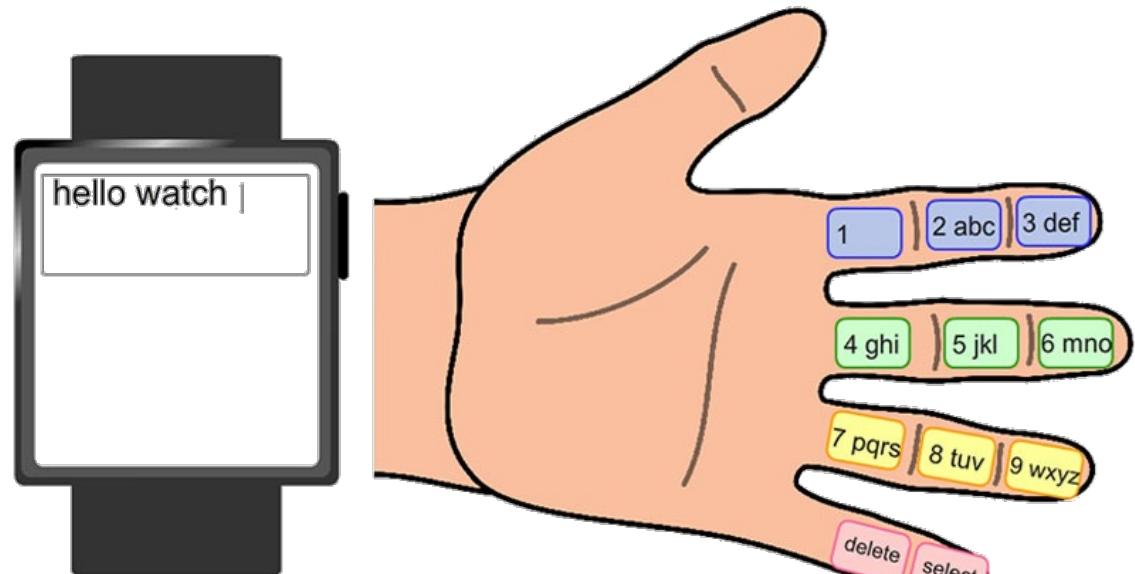
Back-Mirror:



Research Project

FingerT9:

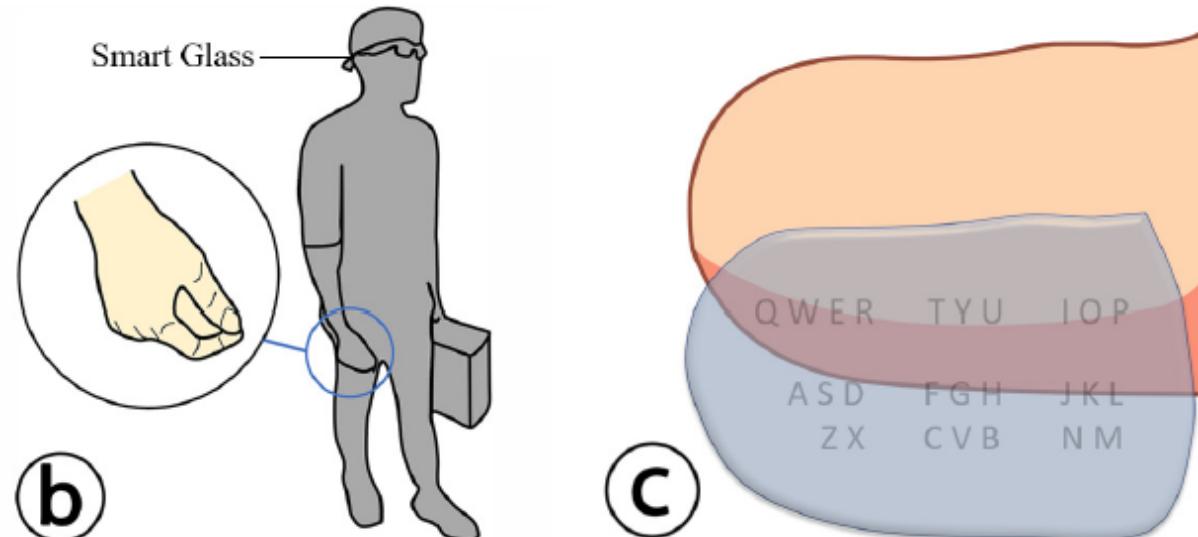
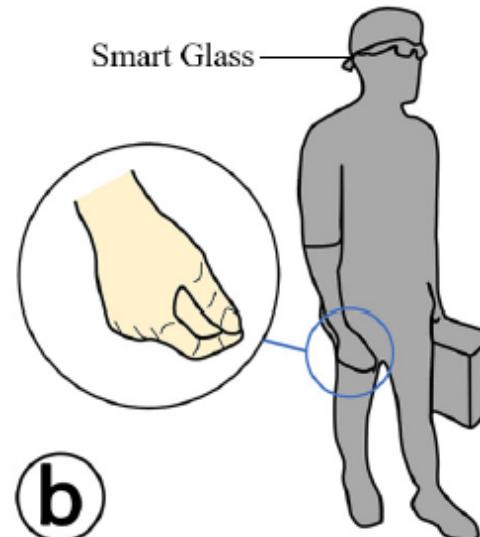
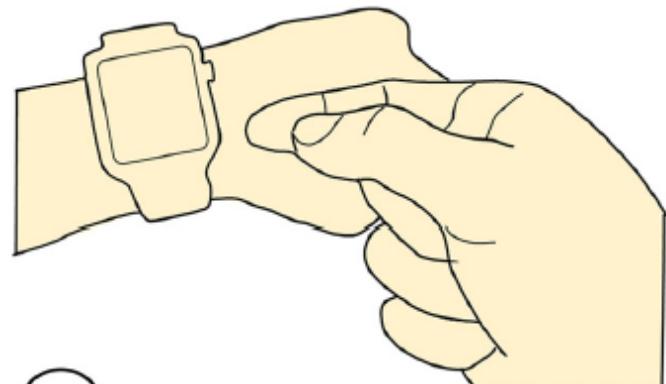
single handed typing on smartwatch



Research Project

TipText:

Eyes-Free Text Entry on a Fingertip Keyboard



Research Project

Exploring Eyes-free Bezel-initiated Swipe on Round Smartwatch



6 Segments



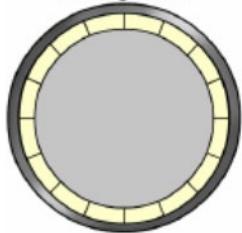
8 Segments



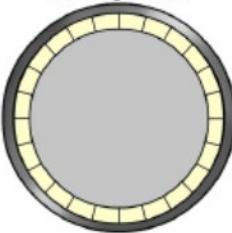
12 Segments



16 Segments



24 Segments



32 Segments

