# MOBILE COMP 2017: ASSIGNMENTS

## *The brief*

Hello, and welcome to the course! In this semester-long assignment, you will have the opportunity to demonstrate the skills learned in class in a hands-on project. The goals of the project are to devise an imaginary future system and to build a medium-scale mobile application (i.e. one that one person alone could not build) that solves a practical problem based on a given brief. In 2017, the brief will be:

*Enabling active decision-making for a safer future*

The brief is purposefully wide in scope, leaving plenty of room for interpretation. The exact problem your group will pick to address is for you to choose. You will address the brief in two assignments: a design fiction and a working application prototype. The deliverables will be:

| ASSIGNMENT | DELIVERABLE | DEADLINE | WEIGHT |
|---|---|---|---|
| 1 | Fictional research paper | 28th of August, 10am | 10% |
| | 10-min video about the research paper | 28th of August, 10am | 10% |
| | Individual peer assessment form | 28th of August, 10am | Score multiplier |
| 2 | 3-min video demonstration of the prototype | 9th of October, 10am | 20% |
| | Git hub repository link | 9th of October, 10am | |
| | Individual peer assessment form | 9th of October, 10am | Score multiplier |

## *The team*

The projects will be conducted in groups of **3 students**. All team members must be registered in the same class of workshops (i.e. either all group members must be enrolled in the Android track or in the iOS track). Both assignments must be completed by the same group.

## *Design Fiction*

The first assignment will be a **fictional research** about a prototype based on a modern topic in mobile computing that addresses the brief above. This assignment will be delivered through two deliverables, both due on the **Monday of Week 6 (28/08) at 10am:**

- A 3000-word fictional research paper (10%)
- A 10-minute video presentation about the research paper (10%)
- Individual assessment of own and others' contributions to the project (score weighting)

This assignment was designed to address Intended Learning Outcomes (ILO's) 1,3, and 4. You will develop a deeper understanding of mobile systems and their challenges (ILO 1) by reading research papers and drafting a fictional paper of your own. You will practice working in small teams (ILO 3) in several ways: by finding and discussing related works; by writing collaborative in a cloud platform; and by jointly preparing and delivering a video presentation (which also addresses ILO 4).

The first step in this assignment is to **choose the research topic**. I have added a list of potential projects, along with examples of works on the topic (see list at the end of the section). This list is not meant to be exhaustive, so feel free to pick a topic that is not on the list. Also feel free to mix and match them, combining different technologies to envision exciting multimodal experiences and ecosystems of devices. If you would like to go beyond the list below, another possibility is to check recent conference proceedings in the ACM Digital Library, IEEE Xplore, and Springer Link.

The second step is to **find more recent work on the topic**. My suggestion is to start with one paper and use it to identify the 3-5 most important works on the topic based on its reference list. Then, search for these papers on Google Scholar and check the 'Cited by' link. This will list recent works that cited those papers. Choose papers published in high quality venues, such as CHI, UIST, Ubicomp, MobileHCI, DIS, Interact, TOCHI, HCI Journal, ISWC, etc. Note that the conferences I listed are biased towards HCI, but feel free to pick good venues in your area of interest.

The third step is to **imagine an application** that builds upon or extends these previous works. Create **diagrams, mockups, scenarios**, or other low-cost designs to illustrate your ideas. This is an opportunity to free yourselves from the constraints of the real-world and really think big. Imagine you have all the money, resources, access to technologies that exist or that don't exist. What would you build with all this? What problems would you be trying to solve? Who are your target users? Note that this application **does not have to be a mobile phone application**. As long as it involves mobile technologies in the broader sense of the word, it is fine.

The fourth step is to imagine the **research process to design and evaluate this application**. Which research methods would you employ to gather your users' requirements? How would you evaluate the application? What data would you collect? How would you analyse these data? What results would you expect?

The fifth step is to write the report. The report should be approximately **3000 words** long (2500 min/3500 max) and should be in the **ACM Extended Abstracts format**. The report should be written in the online platform **ShareLatex**. We are mandating this platform for 3 reasons. First, if you don't already have experience in writing with Latex, this will be a great opportunity to learn it. It really makes it easy to adhere to the template and to format your references. Second, ShareLatex allows simultaneous editing of the document, working like Google Docs. Third, it maintains a record of everyone's contributions to the paper, which allows us to settle any disputes that may arise. For example, if a group member is not contributing, it is very easy to see that in the edit history. The University has a subscription to the pro version of ShareLatex, so make sure to sign up with your unimelb address and activate it. ShareLatex has a template with the right format, which you can find here:

https://www.sharelatex.com/templates/other/chi-extended-abstracts-latex-template

The paper should be **written as if the work has been already done**. Use the past tense and the first person (i.e. We designed the application, we built the system, we collected the data), NOT the future tense (i.e. we would build it like this, we will evaluate it like that). Write in active voice (i.e. "we collected the data", "we built the system"). Avoid the passive voice as much as possible (i.e. don't use sentences like "the data was collected", or "the system was built").

**All members should contribute to the paper writing**. Don't split the tasks so that all of the paper writing is the responsibility of a single person. It is crucial that all group members work together in completing all tasks.

You can find more information about fictional research papers here: Lindley, Joseph, and Paul Coulton. "Pushing the limits of design fiction: the case for fictional research papers (CHI 2016).

You can find an example of a fictional research paper here: Joseph Lindley and Paul Coulton. 2015. Game of Drones. (CHI PLAY '15)

The paper will be evaluated according to the following criteria:

- Does it address the brief?
- Quality of the paper formatting: does the paper follow the format? Are the references in the right format? Is the research appropriately illustrated?
- Quality of the writing: is the paper well-structured and organised? Is it written clearly? Is it engaging? Are there grammar or spelling mistakes?
- Coverage of related work: is the related work appropriately covered? Are there important works missing? Are the works appropriately referenced? Are the works discussed relevant to the proposed research plan?
- Quality of the fictional prototype: is the imagined prototype novel? Does it build upon previous work?
- Quality of the research plan: are the design methods appropriate for eliciting requirements from the chosen user group? Are the evaluation methods appropriate for assessing the prototype? Are the methods described in detail?

The sixth step is to **prepare and record the presentation video**. The presentation should contain a short overview of the related work, focusing on how the proposed prototype is different to or builds upon these past works. It should also contain a visual presentation of what the proposed application would look like and an example of a usage scenario. Make explicit how the application addresses the brief. It should also describe the imagined design and evaluation process. The narration should speak of the research as if it has been completed.

Avoid cluttered slides. The video presentation can be as simple as the screen recording of a power point presentation or as sophisticated as the group wishes. All group members must narrate the video, but they do not have to appear in the video.

The video presentation will be scored against the following criteria:

- Quality of the visuals: do the visual content effectively illustrate the presentation? Does it follow good aesthetic principles?
- Quality of the delivery: are the words clearly spoken? Is the presentation style engaging? Are the pace, language, enthusiasm, and tone appropriate?
- Quality of the discussion: are the works appropriately discussed? Does the discussion bring more value than the individual works alone?

Finally, **each student must submit independently an assessment** of their own contribution and of the contribution of their peers. This will be done via a form in the LMS. The outcome of this assessment will be used as weights for generating individual scores based on individual contributions. This means that despite submitting a single report and a single presentation, the mark that each student will receive will likely be different, depending on how much work they have put into it.

Sample topics for the report:

- Gaze + Watches
    - Esteves, Augusto, Eduardo Velloso, Andreas Bulling, and Hans Gellersen. "Orbits: Gaze interaction for smart watches using smooth pursuit eye movements." UIST 15.
- Gaze + Tablets

    - Pfeuffer, Ken, Jason Alexander, Ming Ki Chong, and Hans Gellersen. "Gaze-touch: combining gaze with multi-touch for interaction on the same surface." UIST 14
- On-Body Robots
    - Artem Dementyev, Hsin-Liu (Cindy) Kao, Inrak Choi, Deborah Ajilo, Maggie Xu, Joseph A. Paradiso, Chris Schmandt, and Sean Follmer. 2016. Rovables: Miniature On-Body Robots as Mobile Wearables. (UIST '16).
- Smart Textiles
    - Nur Al-huda Hamdan, Jeffrey R. Blum, Florian Heller, Ravi Kanth Kosuru, and Jan Borchers. 2016. Grabbing at an angle: menu selection for fabric interfaces. (ISWC '16)
- Skin Interfaces
    - Hsin-Liu (Cindy) Kao, Christian Holz, Asta Roseway, Andres Calvo, and Chris Schmandt. 2016. DuoSkin: rapidly prototyping on-skin user interfaces using skin-friendly materials. (ISWC '16)
- Under the skin interfaces
    - Christian Holz, Tovi Grossman, George Fitzmaurice, and Anne Agur. 2012. Implanted user interfaces. (CHI '12).
- Beauty Technology
    - Katia Vega and Hugo Fuks. 2013. Beauty technology: muscle based computing interaction. (ITS '13).
- Muscle Feedback
    - Pedro Lopes and Patrick Baudisch. 2013. Muscle-propelled force feedback: bringing force feedback to mobile devices. (CHI '13)
- Ring Interfaces
    - Sang Ho Yoon, Yunbo Zhang, Ke Huo, and Karthik Ramani. 2016. TRing: Instant and Customizable Interactions with Objects Using an Embedded Magnet and a Finger-Worn Device. (UIST '16)
- Magic Lenses
    - Michael Rohs and Antti Oulasvirta. 2008. Target acquisition with camera phones when used as magic lenses. CHI'08
- Mobile Map Interaction
    - Michael Rohs, Johannes Schöning, Martin Raubal, Georg Essl & Antonio Krüger: Map Navigation with Mobile Devices: Virtual versus Physical Movement with and without Visual Context. ICMI'07
- Stylus Interaction
    - Pfeuffer, K., Hinckley, K., Pahud, M., & Buxton, B. (2017, May). Thumb+ Pen Interaction on Tablets. In CHI (pp. 3254-3266).
- Bimanual Input
    - Andrew M. Webb, Michel Pahud, Ken Hinckley, and Bill Buxton. 2016. Wearables as Context for Guiard-abiding Bimanual Touch. (UIST '16)
- Around the device interaction
    - Alex Butler, Shahram Izadi, and Steve Hodges. 2008. SideSight: multi---"touch" interaction around small devices. (UIST '08)
- Imaginary interfaces
    - Sean Gustafson, Christian Holz, and Patrick Baudisch. 2011. Imaginary phone: learning imaginary interfaces by transferring spatial memory from a familiar device. (UIST '11)
- Phone + Tabletops
    - Dominik Schmidt, Fadi Chehimi, Enrico Rukzio, and Hans Gellersen. 2010. PhoneTouch: a technique for direct phone interaction on surfaces (UIST '10)
- Interaction with public displays

    - Sebastian Boring, Dominikus Baur, Andreas Butz, Sean Gustafson, and Patrick Baudisch. 2010. Touch projector: mobile interaction through video. (CHI '10)
- Pervasive Games
    - Juha Tiensyrjä , Timo Ojala , Toni Hakanen , Ossi Salmi, panOULU conqueror: pervasive location---aware multiplayer game for city---wide wireless network, Proceedings of the 3rd International Conference on Fun and Games, 2010
- Mobile Projection
    - Karl D.D. Willis, Ivan Poupyrev, Scott E. Hudson, and Moshe Mahler. 2011. SideBySide: ad---hoc multi---user interaction with handheld projectors. (UIST '11)
- Pressure-based interaction
    - Craig Stewart, Michael Rohs, Sven Kratz, and Georg Essl. 2010. Characteristics of pressure---based input for mobile devices. (CHI '10)
- Outdoor Navigation
    - Johannes Schöning, Antonio Krüger, Keith Cheverst, Michael Rohs, Markus Löchtefeld, and Faisal Taher. 2009. PhotoMap: using spontaneously taken images of public maps for pedestrian navigation tasks on mobile devices. (MobileHCI '09)
- Indoor Navigation
    - Faisal Taher and Keith Cheverst. 2011. Exploring user preferences for indoor navigation support through a combination of mobile and fixed displays. (MobileHCI '11)
- Intimate Interactions
    - Hemmert, Fabian, Gollner, Ulrike, Löwe, Matthias, Wohlauf, Anne, and Joost, Gesche 2011. Intimate Mobiles: Grasping, Kissing and Whispering as a Means of Telecommunication in Mobile Phones. MobileHCI '11.
- Eyes-free input
    - Daniel Ashbrook, Patrick Baudisch, and Sean White. 2011. Nenya: subtle and eyes---free mobile input with a magnetically---tracked finger ring. In Proceedings of the 2011 annual conference on Human factors in computing systems (CHI '11)
- Back of device interaction
    - Patrick Baudisch and Gerry Chu. 2009. Back---of---device interaction allows creating very small touch devices. (CHI '09)
- Thermal Interfaces
    - Graham Wilson, Martin Halvey, Stephen A. Brewster, and Stephen A. Hughes. 2011. Some like it hot: thermal feedback for mobile devices. (CHI '11)
- Off-screen interaction
    - Barrett Ens, David Ahlström, Andy Cockburn, and Pourang Irani. 2011. Characterizing user performance with assisted direct off---screen pointing. (MobileHCI '11).
- NFC Tagged objects
    - Robert Hardy, Enrico Rukzio, Paul Holleis, and Matthias Wagner. 2011. Mystate: sharing social and contextual information through touch interactions with tagged objects. (MobileHCI '11)
- New kinds of touch
    - Harrison, C., Schwarz, J. and Hudson S. E. 2011. TapSense: Enhancing Finger Interaction on Touch Surfaces (UIST 11).
- Haptic Feedback
    - Eve Hoggan, Stephen A. Brewster, and Jody Johnston. 2008. Investigating the effectiveness of tactile feedback for mobile touchscreens. (CHI '08).
- Audio Interfaces
    - Michael Rohs, Georg Essl, and Martin Roth. 2006. CaMus: live music performance using camera phones and visual grid tracking. (NIME '06)

- Text Input
    - Niels Henze, Enrico Rukzio, Susanne Boll: Observational and Experimental Investigation of Typing Behaviour using Virtual Keyboards on Mobile Devices, (CHI, 2012)
    - Tomoki Shibata, Daniel Afergan, Danielle Kong, Beste F. Yuksel, I. Scott MacKenzie, and Robert J.K. Jacob. 2016. DriftBoard: A Panning-Based Text Entry Technique for Ultra-Small Touchscreens (UIST '16).
- Developing countries
    - Mohit Jain, Jeremy Birnholtz, Edward Cutrell, and Ravin Balakrishnan. 2011. Exploring display techniques for mobile collaborative learning in developing regions. (MobileHCI '11)
- Foot gestures
    - Jeremy Scott, David Dearman, Koji Yatani, and Khai N. Truong. 2010. Sensing foot gestures from the pocket. In Proceedings of the 23nd annual ACM symposium on User interface software and technology (UIST '10).
- Interfaces for animals
    - Giancarlo Valentin, Joelle Alcaidinho, Ayanna Howard, Melody M. Jackson, and Thad Starner. 2016. Creating collar-sensed motion gestures for dog-human communication in service applications. (ISWC '16)
- Mobile Fabrication
    - Thijs Roumen, Bastian Kruck, Tobias Dürschmid, Tobias Nack, and Patrick Baudisch. 2016. Mobile Fabrication. UIST '16

# *Application Prototype*

The **second assignment** will be the design and implementation of a working application that addresses the brief. This does not have to be related to the design fiction, but it can be.

The assignment will be delivered through three deliverables, all due on the **Monday of Week 11 (09/10) at 10am**:

- A **3-minute video** demonstration
- A link to the **GitHub repository** of the application
- **Individual assessment** of their own contribution and of the contribution of their peers.

The application does not have to be a mobile phone application, but it must be developed for a mobile computing platform. It can be a smart watch app, an Arduino device, a tablet app, an ecosystem of devices, or any other mobile platform. However, please note that if you choose to build something other than an iOS or Android app, the tutors might not be able to offer technical support or advice.

Make sure to document your source code appropriately. We will check if the features presented in the video are also present in your code, so make it easy for us to find them to avoid any penalties.

Regardless of the platform, the project must address these requirements:

- It must address a problem that fits the design brief
- It must fulfil a need, address a problem, or explore an opportunity that benefits a specific user group *other than students*
- It must make use of sensors in the device
- It must make use of the Azure cloud infrastructure

The video must include:

- An **explanation of the problem** the application aims to solve and **a justification of how it addresses the design brief**.
- A description of the application **design process**: make sure to record videos and take pictures of your brainstorming sessions and participant interviews (don't forget the consent forms!) to include in your video.
- A **live demonstration** of the application at work within a usage scenario. Try to make the context as realistic as possible. For example, if the app addresses a problem on trams, it is reasonable to shoot the video on a tram. However, if it is about mountain climbing, you do not have to go climbing to shoot the video. Safety first, please!

We will select the best videos to show to our industry partners for them to pick the winner, who will win a prize. If you would prefer not to take part in the contest, please let us know before the submission date. Selected videos will be shown at the showcase in Week 11.

The project will be assessed according to the following criteria, so make sure to include this information in your video:

- Fit to the brief: Does it address the brief in a creative way? Does it fulfil a real need, solve a real problem or explore a real opportunity? Is it supporting active decision-making? Is the application likely to lead to a safer future?
- User Research: Did the team follow a user-centred design process? Did they go out and interview users other than students?
- User Experience: How is the usability of the application? Does it make good use of aesthetic design principles?
- Sensors: does it make creative use of the sensors available in the device?
- Cloud: does it make creative use of the cloud infrastructure?
- Code: is the code well structured? Is it well documented? Does it implement what is shown in the video?

# *FAQ*

**I am in the iOS track but I would like to form a group with a friend who is in the Android track. Is this ok?**

No.

**Can I have a group of 2 members?**

No.

**Can I have a group with 4 members?**

In principle, no. However, if there are 1 or 2 students without a group, they will have to join another group and create a group with 4 members. Do not form groups of 4 on your own. If there is a need to form a group of 4, the lecturer will do it.

**My team members are not cooperating. What should I do?**

First, try talking to them. Conflict resolution is an important skill to practice. If unsuccessful, ask your tutor to mediate a meeting. If this fails, ask one of the lecturers to mediate a meeting. If all fails, tell us in the peer assessment form submitted with the project.

**I don't like my group members. Can I work on my own?**

No. See advice above.

**I want to switch groups. Can I do that?**

No.

**Can my group for the second assignment be different than for the first assignment?**

No.

**I would like to develop for iOS, but I don't have an iPhone or a MacBook. Can I enrol in the iOS track?**

We will not enforce this, but we strongly advise against enrolling in a track if you will not be able to practice what you are learning on your own device.

**I am enrolled in the Android track, but I would also like to attend the iOS sessions. Can I?**

Yes, but only if there are vacant spaces in the lab. Ask the tutor if it is ok. It is ultimately their decision.

**Can I use [insert name of device, platform, framework, etc here] in my project?**

Yes, but do so at your own peril, as the tutors might not be able to support you. Make sure to discuss this with one of the lecturers or the tutors. Also, avoid using a different technology if the group members do not have roughly the same experience with it. For example, if one member of the group is an expert on React Native, but the others aren't, I wouldn't recommend choosing React Native. This is because not only most of the programming would fall on the shoulders of the person who knows it, but also because the ones that don't will not get the support they need to learn it.

**Will there be programming questions in the exam?**

No. Your programming skills will be assessed solely through the project.

**Is [insert project idea here] a good fit for the design brief?**

Part of the challenge is in figuring this out and justifying your decisions. As a rule of thumb, if you struggle to convince one of your peers, it is probably not a good fit. We will have in-class activities to help you figure this out.

**Is [insert report topic here] a good topic for the report?**

As long as it involves a mobile technology and it inspires you to design an application that addresses the brief, we are happy with it.

**Can I host my code in a repository other than GitHub?**

No.

**Even if it is similar, like BitBucket?**

No.

**Can I use an editor other than ShareLatex?**

No.

**Even if it is similar, like Overleaf?**

No.

**How much are each assessment criteria worth?**

You will find out when you receive your feedback.

**Can we split the tasks so that one group member does the report, one does the videos and one builds the app?**

No. Learning to work together is one of the Intended Learning Outcomes of the subject. Also, this would be a pretty bad idea even if we did allow it.

**Why are you giving us so much work??? Don't you know that we have other subjects to do?**

We told you in the first lecture that this subject is very time-consuming and effort-demanding. If you will not have the time to complete these tasks, it is best to choose a different elective subject.

**Can I have a deadline extension?**

No.