HCI CORE QUESTIONS (student answers 2 of 4)

Q1. Cars are becoming increasingly autonomous, in that more and more of the basic driving functions can be handled by the vehicle itself, without human intervention. Indeed, some cars are already capable of fully autonomous driving, under certain conditions. However, if the sensors and/or automation fail, the car will return control back to the human, thus thrusting the person out of the role of 'passenger" and back into the role of "driver".

A. Pick either Situated Action or Use Distributed Cognition to analyze the problem of transferring the human's role from 'passenger' to 'driver.' to discuss how it could be used as part of the **process for designing** the car-driver interface in future vehicles that include partial or complete automation of the driving task.

B. Can you imagine potential solutions to this problem? Identify the *process* by which you might develop solutions to this problem.

C. How would you know if you got there? Describe a **study to evaluate** whether you have successfully fixed the problem of transferring control back to the user. Be sure to identify the metrics and methods, with citations.

Q2. Early implementations of touch and gestural systems often suffered from input errors. Unfortunately, they also did not provide sufficient user feedback to allow users to associate input with system output. Answer the following questions about what you might consider when designing a user interface that uses touch or gesture-based input techniques.

A.Drawing on the HCI core readings list three important considerations that arise for designers of user interface technologies that rely on touch-based UIs **as opposed to** mouse-based UIs.

B.What considerations should designers of touch-based UIs take into account when designing input techniques?
1)To answer this question, describe (or propose) at least two design **goals related to preventing or eliminating input errors** in single or multi-touch-based systems.
2) What are the challenges you might face in realizing each goal?

C.What considerations should designers of in-air gesture-based UIs take into account when designing input techniques?
1)To answer this question, describe (or propose) one design **goal related to preventing or eliminating input errors** in gesture-based systems.
2) What are the challenges you might face in realizing the goal?

Q4. Your company has received a contract to study mobile phones vs. smart watches vs. eye glass displays using **qualitative methods**. The client would like you to
A.Propose a study to analyze a conversational partner's perception of interruption, specifically in the context of the device user during face-to-face interaction in **both** one-on-one interactions AND a group meeting.

B. Reflect on the strengths and weaknesses of the methodology your client chose.

Q2. The proposed "Cicret" bracelet incorporates a pico-projector and proximity sensors to allow users to project displays onto their own skin and to employ gestures to interact with the device. (video: http://cicret.com/wordpress/). The concept is illustrated in the mockup below:

A.   From what you know about design (Dix et al.,) and wearable computing, what are some of the issues that the designers could expect with this device?

B.   Design a usability study for the Cicret device. Is predictive evaluation useful?

C.   Are there gestures that are typical of capacitive screens that could fail on this type of device? Explain how you might mitigate this if so. What new gestures could be implemented?

INFO VIS QUESTIONS (student answers 1of 2)

Q5. With the growing prominence of "networked" data in the physical, social, and economic sciences, there has been a proliferation in graph visualization applications. However, as the size and complexity of the underlying graph data grows, many representation and interaction challenges arise. Please consider and describe a multivariate, temporal network visualization context of interest/knowledge to you and then answer the following questions:

A. What representation and interaction issues do you need to consider if you want to facilitate top-down (overview first), bottom-up (start with what you know), and middle-out (relevant subgraph) exploration?

B. How do the considerations identified in (a) change when you think about i) different display sizes (small versus large) and ii) different input mechanisms (mouse versus touch)?

Q6. "Big Data" research is all the rage these days.

A. Are there examples of existing visualization research that can be considered to fall in this area? Please describe and explain.

B. In your opinion, will visualization be helpful to big data analysis and understanding? Argue your position and support it with concepts and examples from visualization research.

UBICOMP QUESTIONS (student answers 1of 2)

Q7. Ambient and peripheral displays
It is common in the ubicomp literature to see the term "ambient display" used interchangeably with "peripheral display", but in this question, we are going to want you to consider them as separate, but related, ideas on how to present information to an individual. The answers to parts a-c can be given in a paragraph, and the answer to parts d-should be more extensive and relate to existing literature on the topic.

A. One of the first examples of an ambient display was noted by Weiser through the work by artist Natalie Jeremijenko, called the Dangling String or LiveWire. Briefly explain how that display worked.

B. Based on the operation of Dangling String, define an ambient display in terms of the relationship between the information in the physical world that is to be communicated and the means by which that information is portrayed to someone viewing the ambient display.

C. Weiser wrote about the notion of "calm" computing, describing a world in which information did not constantly scream for attention, but could be made easily available when and if an individual desired. The idea of a peripheral display comes from this idea of an individual being able to easily move some piece of information from the background to the foreground of their attention. Given this definition of a peripheral display, what is the relationship between an ambient display and a peripheral display? Give an example of an ambient display that may or may not be a peripheral display.
 Give an example of a peripheral display that may or may not be an ambient display.

D. Mankoff et al. (CHI 2003) showed how to adapt an existing HCI evaluation technique, heuristic evaluation, to support the specific design challenges of ambient displays. Pick some existing usability evaluation technique and discuss how it could be applied to evaluate peripheral displays. Describe how aspects of the usability technique may or may not need to be adapted to target the relevant features of a peripheral display (e.g., its "calmness").

E. Briefly outline how you would conduct a research study to determine whether your modified usability technique works, in the same way that Mankoff et al. conducted a research study to demonstrate how heuristic evaluation adapted for ambient displays worked.

Q8. Privacy beyond Ubicomp
Marc Lanheinrich details the privacy issues with Weiser's definition of ubicomp and gives examples of how important technologies, such as RF ID, can be handled to better address both privacy and security issues. Today, we have a variety of critical ubicomp technologies in the field. In addition to tagging technologies, such as RF ID, we have widely available outdoor and indoor location technologies, Bluetooth LE beacon

technology and are about to have a wide variety of commercial Internet of Things devices.

A. Is the privacy debate more or less relevant today, in 2016, than it was when Langheinrich wrote his initial privacy and Ubicomp papers in the early 2000's? How is it similar and how is it different?

B. PIck one emerging technology that was not foreseen in Weiser's Scientific American article and explain the specific privacy concerns of that technology. You can choose your own argument or adopt an argument from someone in the research literature.

C. How can the privacy concerns you outlined in your answer to Part b be addressed by modifying the technology itself? What concerns cannot be addressed merely by a technology modification.