Exam on DA274A Internet of Things and People
2017-02-10, 14:15-18:15

Tools

Pen and paper

Instructions

Address at most one assignment per paper sheet, write only on one of the sides, and mark each sheet with your initials. Try too keep your answers as short as you can (usually one sentence is enough). Max number of points on this exam is 44 points. For the grade "Väl Godkänd" you need to acquire at least 33 points (75%) and for the grade "Godkänd" you need to arrive to at least 22 points (50%).

Good luck! /Thomas, Shahram, Ulrik, Radu, Andreas

Question 1 (2 points)

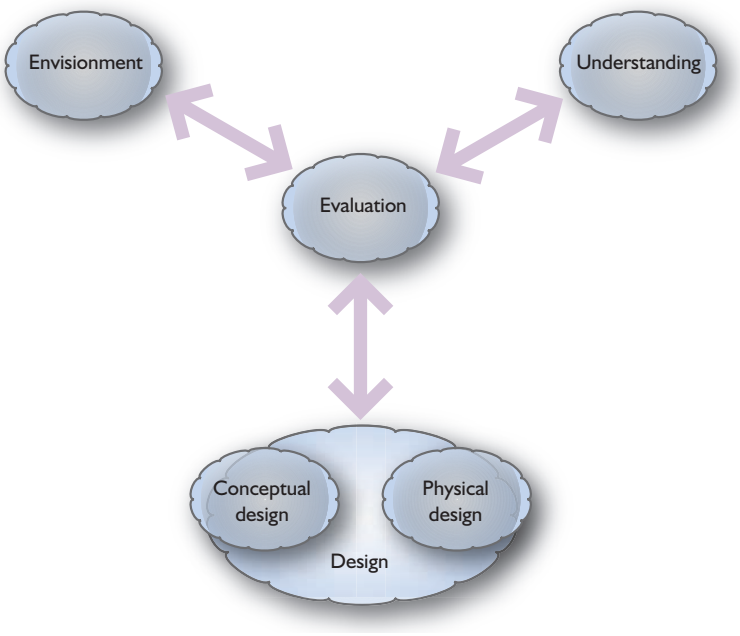
Around the same period as Mark Weiser and his group at Xerox PARC in USA developed a lot of prototypes for Ubiquitous Computing in the early 1990's, Norbert Streitz and his group worked on similar solutions for intelligent buildings and infrastructure at a German research institute.

a) What was the name of that research institute? (1p)

b) How did they name their vision of the "workspace of the future"? (1p)

Question 2 (8 points)

As part of the design process, developers of interactive systems (including Ubicomp systems) tend to iteratively go into different phases where the focus of the activities have specific target outcomes. Benyon (2010) pictures these four kinds of design activities as shown in the figure below:



(Benyon, 2010)

a) For each of the four types of activities, explain with 1-3 sentences the focus of the activity and what the activity aims at determining. (1 + 1 + 1 + 1p)

b) For each of the four types of activities, describe with 1 sentence an effort you made in your group project that corresponds to the specific activity type. (1 + 1 + 1 + 1p)

Question 3 (1 points)

What is the point of the Wizard of Oz prototyping method? (1p)

Question 4 (2 points)

When showing an early prototype of your interactive IoT system to future users, that prototype can for instance depict a future scenario in the shape of a storyboard, or plain text.

a) Explain in 1-2 sentences, a main advantage that the storyboard has over the plain text approach! (1p)

b) Explain in 1-2 sentences, a main advantage that the plain text has over the storyboard approach! (1p)

Question 5 (2 points)

In the context of smart spaces, we talk about "physical mobility" and "logical mobility". Explain with one sentence each what these terms denote. (2p)

Question 6 (2 points)

If association between relevant system components in a smart space cannot be done automatically, a) what fall-back strategy can be used? b) In 1-3 sentences, describe a concrete scenario where this fall-back strategy is used for system component association purposes! (1 + 1p)

Question 7 (2 points)

The interaction dialogue between user and system needs to be different for mobile devices compared to how the same dialogue looks between the user and more classical stationary computers. Give one important reasons for why this is the case and what it is that causes this difference! (2p)

Question 8 (2 points)

Mention two input modalities and two output modalities which makes sense to consider when designing wearable computer systems and which are not so commonly used in the classical WIMP desktop computer interaction paradigm. (2p)

Question 9 (2 points)

Even if we say that today's mobile devices are designed from mobile use, it is debatable whether they can actually be used in *while in motion*. Marshall & Tennent (2013) listed four reasons for why "interaction in motion" is challenging with today's mobile devices. Mention two of them! (2p)

Question 10 (2 points)

So you are considering using lateration for determining the location of objects indoors and want to put ultrasonic transmitters on the things you want to track, similar to how the hands were tracked in the Magic Touch system (Pederson, 2001). How many ultrasonic receivers to you need to place in the environment, as a minimum, if you want to get the position of the object along all three Euclidean dimensions? (2p)

Question 11 (4 points)

Tags can be both passive and active. What is the difference and what are the benefits and drawbacks with either of these tag types? (4p)

Question 12 (3 points)

What are the main steps in a classification problem? Explain each step briefly with an example. (3p)

Question 13 (3 points)

What is the difference between eager and lazy classifiers? Try to explain the difference based on advantages and limitations of each type of classifiers. Do you know any lazy classifier? What about an eager classifier? (3p)

Question 14 (1 points)

What is the meaning of the term "privacy"? (1p)

Question 15 (5 points)

An IoT system is sometimes described as consisting of five layers with different purposes. The naming of the layers may be different depending on author, but the main responsibility is similar. From top to bottom the layers are:

- Business Layer
- Application layer

- Service management or middleware layer
- Object abstraction, transmission or network layer
- Perception, device or objects layer

Describe the purpose of each layer and give at least one example of a typical service or main component for each layer. (5p)

Question 16 (3 points)

What are the advantages and disadvantages of using Cloud-based vs.

Decentralised approach for implementing IoT applications. Illustrate your

points with examples. (3p)