

**The University of California, Irvine
Department of Informatics**

**IN4MATX 148 – Ubiquitous Computing
Winter 2018**

Instructor: Dr. Darren Denenberg
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Class Times: 5:00 – 6:20, T / Th, DBH 1100
Office: DBH 5044
Office Hours: Monday / Wednesday 12:00 – 3:00

Course Description:

Ubiquitous computing, more colloquially known as UbiComp, the Internet of Things or even Industry 4.0, moves technology and computing beyond the model of one person, one device and into a vast, networked world where everything is connected, everything is sharing data, and everything has embedded technology

Learning Objectives

Develop an understanding of the evolution of Ubiquitous Computing, the underlying, foundational issues that serve to enable and support it, and the impact and future development / trends that will likely be seen as the field moves forward.

Handouts / Text

There will be no official text for this class – rather, there will be a series of presentations along with in-class exercises, case studies, and topical research assignments that will further your knowledge and understanding of the topic.

Grading

Each (potential) in-class assignment will be worth 30 points arranged as such:

10 points for the support of your writing, including references to research and media, class discussion/notes, and experimentation.

10 points for the relatedness/completeness of your response/selected topic

10 points for quality of writing (grammar, punctuation, spelling, capitalization, sentence structure, etc.)

Each discussion project / assignment will be assigned on Thursday, and due via hard-copy the following Tuesday in class.

Crosswords

Weekly crosswords covering topics discussed that week in class will be made available on Friday, and will be due by hardcopy (printed) the following Tuesday in class. 20 points each.

Attendance, Make-Ups, and Due Dates

Attendance is expected and will be noted, occasionally for lecture and always for discussion. If your attendance becomes an issue, it will be factored into your overall grade.

All materials are due on the assigned due date and the due date is considered to be an integral part of the assignment.

Miscellaneous

During lecture portions of the class, any electronic devices used for anything other than life support should be turned off. This includes, but is not limited to: cell phones, GameBoys (all types), media players, devices used for communicating with the dead, oscilloscopes, UFO scanners, rocket powered roller skates, unmanned spy planes, sphygmomanometers, robots that serve you drinks, imaginary friends, or anything whose use would be a distraction to the class.

During discussion portions of the class these rules are more lenient, however please keep in mind that cell phone conversations are never allowed, and anything that disturbs another member of the class or is inappropriate must stop.

Academic Misconduct

Don't cheat. The university takes academic misconduct very seriously and considers it a serious offense. If you are found to be cheating on an exam, handing in work that isn't your own, plagiarizing, or otherwise engaging in academic dishonesty, you will receive a zero for that assignment. If the instructor determines that the offense(es) are serious enough, the student will be referred for academic sanctions.

Class Project

This class will consist of two half-quarter projects; the first is a research and evaluation project investigating a current ubicomp topic, and the second will have you developing your own ubiquitous computing device or technology.

Each project will have weekly deliverables to ensure adherence to the project timeline, and to give an opportunity to provide feedback should a serious issue arise.

PROJECT I – Evaluation of Current Technology - Due Feb 13, with deliverables due as follows:

- Describe, in detail, your chosen ubicomp topic.
 - What is it, what its primary function, what are its secondary functions (if any)?
 - Who manufactures it?
 - Are there different models of it (Pro v. Consumer, different software capabilities, different applications, etc.)?
 - Choose two consumer bases to which it would appeal, and explain their differences in use.
 - Are there similar products in the market? If so, compare and contrast them with yours, explaining the pros and cons as they relate to the one you've chosen.
- How does it connect, protocols, what data does it gather, what is done with that data? **(Due Jan. 25)**
 - What are the protocols by which it connects to the Internet? Describe each in detail and describe how they manifest in your device. In other words, how specifically would you connect it to a network or other device?
 - What data does it gather, and what data does it send? How does it use that data to carry out the functions it was designed to do?
 - Why does it send that data? How is that data important in terms of the technology? Where is that data stored? Who has access to that data?
- How is security implemented, or not implemented, in your thing? **(Due Feb. 6)**
 - What security measures are in place to prevent unauthorized access and manipulation of the technology, and to prevent the theft of the data it is generating and sending?
 - On a scale of one to five, how would you rate the security of the technology? Justify your answer, and highlight two areas in which security could be improved, explaining each.

- How could it be redesigned / redeveloped to improve on its design. Be specific. Indicate why you need to fix the things you're fixing. (**Due Feb. 13**)
 - If your thing is a hardware/software hybrid, choose one aspect of the physical interface and one aspect of the software interface that could be improved, and redesign it to make it more useable and more functional. Explain why.

PROJECT II – Designing Your Own - **Due Mar. 15**

- For the second project, your group will need to develop your own Internet of Things technology. Find a function, a device, a purpose around which you could develop that technology.
- Explain why there is a need for what you are developing. What area does it address or improve upon? Are there competitive examples that already exist? How do they lack, and how will yours be different better?
- Sketch out examples of your device from various perspectives, labeling each component including physical interfaces. Be sure its interface is clearly defined. Provide a narrative explaining the device as it is presented in the sketches.
- How will the device be accessed? Sketch out the interface, labelling all the components, describe its functionality, and indicate its uses.
- What will be the security measures put in place to prevent unauthorized access? What data will be collected and transmitted, why, how will data be stored, and where? Will that data be shared?

Each of these bullets should be given careful consideration and discussed in significant detail. If it appears that what you hand in was hastily thrown together three hours before class on the day it was due then it will be graded as such. In other words, very poorly.

The project should be well written, with consideration paid to spelling, grammar, and punctuation. It should be presented professionally, with cover page, in a folder (**No three-ring binders or manila folders**). If I have to extract meaning from what you've written because of poor writing, that will negatively affect your grade.

All group members will have the chance to anonymously evaluate the other members of their group at the project's conclusion. The information I receive in these evaluations will be treated with strict confidence. When grades for the project are given, the evaluations will be very seriously considered.

All projects will be due on their due date, no exceptions.

TENTATIVE CLASS SCHEDULE

<u>Date</u>	<u>Topic</u>
Jan. 9	Intro / Groups
Jan. 11	What is UbiComp / How did we get here?
Jan. 16	History
Jan. 18	History Research / Exercise
Jan. 23	Networking
Jan. 25	Networking Research / Exercise
Jan. 30	Security
Feb. 1	Security Research / Exercise
Feb. 6	Data, Databases and Storage
Feb. 8	Data, Databases and Storage
Feb. 13*	Sensors, hardware, and related issues
Feb. 15	Case study / Discussion
Feb. 20	Wearable computing
Feb. 22	Case study / Discussion
Feb. 27	Health / Home
Mar. 1	Case Study / Discussion
Mar. 6	Social impacts
Mar. 8	Case Study / Discussion
Mar. 13	The Future
Mar. 15	Case study / Discussion