H-566
Experience Design for Ubiquitous Computing

Department of Human-Centered Computing
Indiana University School of Informatics and Computing
IUPUI

Semester: Spring 2016
Section Number: 27251
Thursday, 6pm to 8:40pm, IT 160

Credit Hours: Four credit hours
Course Web Site: http://canvas.iu.edu
Instructor: Francesco Cafaro, Ph.D.
Office Address: IT 579
Email Address: fcafaro@iu.edu

Course Description
An introduction to research topics in ubiquitous and pervasive computing, including sensors, ambient displays, tangibles, middleware, mobility, and location and context awareness. These topics are explored from a user-centered design perspective, focusing on how a situated and embedded model of computing affects requirements gathering, interaction design, prototyping, and evaluation techniques. Students gain expertise with contemporary ubiquitous and pervasive computing technologies and learning to incorporate them into a user-centered research and design process.

Prerequisites
There are no prerequisites for this course.
Contact Information
Francesco Cafaro, Ph.D.
e-mail: fcafaro@iu.edu
Office: IT 579

Office hours
Thursday 4 to 6,
and by appointment

Textbook
None. You will read and analyze 50 research papers from recent HCI and Ubicomp top conferences (see the reading list in the syllabus) –they are freely accessible from the ACM portal (dl.acm.org) at IUPUI.

Learning Objectives:

<table>
<thead>
<tr>
<th>Upon completion of this course, students will:</th>
<th>PGPLs</th>
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</thead>
<tbody>
<tr>
<td>1. Understand how the vision of ubiquitous computing is articulated and continually reinterpreted by a community of researchers and practitioners</td>
<td>1. K&amp;S 2. CT</td>
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<tr>
<td>2. Understand how traditional HCI methods (e.g., requirements gathering, prototyping, evaluation) need to be adapted to ubiquitous computing contexts</td>
<td>1. K&amp;S 2. CT 4. EB</td>
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<tr>
<td>3. Apply critical reading skills to texts with a diversity of disciplinary approaches, including theoretical texts, design texts, and technical texts</td>
<td>2. CT 1. K&amp;S</td>
</tr>
<tr>
<td>4. Apply the design and evaluation methods of ubiquitous computing to the study of a novel or existing ubiquitous computing technology</td>
<td>1. K&amp;S 2. CT 3. EC</td>
</tr>
<tr>
<td>5. Analyze a body of research to identify the contributions that have been made and areas in which additional, novel contributions might be made</td>
<td>2. CT 1. K&amp;S 3. EC</td>
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<tr>
<td>6. Evaluate the strengths, weaknesses, and applicability of ubiquitous computing enabling technologies in a variety of contexts</td>
<td>2. CT 1. K&amp;S 3. EC 4. EB</td>
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<tr>
<td>7. Communicate, via both written and oral modalities, about technology and technical information in ways that will be accessible to people from a variety of backgrounds and experiences</td>
<td>3. EC 2. CT 1. K&amp;S</td>
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</tbody>
</table>

Course Requirements:
During this class, you will: participate in the class discussions; present two research papers in groups of two students; work in a group to identify a research problem, conduct a study, and report the results in a paper; submit written critique to two research papers.
There is not a traditional final exam.

Schedule
All classes will include a combination of research paper presentations (typically, 4 or 5 papers per day) and group work –except for the days of the group project presentations.
<table>
<thead>
<tr>
<th>Date</th>
<th>Details</th>
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<tbody>
<tr>
<td>Wed Jan 20, 2016</td>
<td><strong>Individual Presentation of research idea DUE</strong></td>
</tr>
<tr>
<td>Thu Jan 21, 2016</td>
<td>FOUNDATIONS AND POSITION PAPERS I (UBICOMP); THE BODY AS AN INTERFACE I; [PROJECT] Individual Presentation of Research Ideas</td>
</tr>
<tr>
<td>Thu Jan 28, 2016</td>
<td>PROXEMICS &amp; LARGE DISPLAYS; [PROJECT] Groups Formation</td>
</tr>
<tr>
<td>Wed Feb 3, 2016</td>
<td><strong>Initial Research Presentation DUE</strong></td>
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<tr>
<td>Thu Feb 4, 2016</td>
<td>[PROJECT] Initial Research Presentations</td>
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<tr>
<td>Thu Feb 11, 2016</td>
<td>PROMOTING HEALTHY BEHAVIOURS AT HOME; PERSUASIVE TECHNOLOGIES</td>
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<tr>
<td>Wed Feb 17, 2016</td>
<td><strong>First Paper Draft DUE</strong></td>
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<td></td>
<td>Peer Evaluation 1 DUE</td>
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<tr>
<td>Thu Feb 18, 2016</td>
<td><strong>LEARNING I</strong></td>
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<tr>
<td>Thu Feb 25, 2016</td>
<td>NON-TRADITIONAL POPULATIONS</td>
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<tr>
<td>Wed Mar 2, 2016</td>
<td><strong>User Study (Methodology) Presentation DUE</strong></td>
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<tr>
<td>Date</td>
<td>Details</td>
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<td>-----------------</td>
<td>-------------------------------------------------------------------------</td>
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<tr>
<td>Thu Mar 3, 2016</td>
<td>[PROJECT] Presentation of User Study Methodology</td>
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<tr>
<td>Wed Mar 9, 2016</td>
<td>Intermediate Paper Draft DUE</td>
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<td></td>
<td>Peer Evaluation 2 DUE</td>
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<tr>
<td>Thu Mar 10, 2016</td>
<td>LEARNING II; NOVEL INTERFACES</td>
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<tr>
<td>Thu Mar 17, 2016</td>
<td><del>SPRING BREAK</del></td>
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<tr>
<td>Thu Mar 24, 2016</td>
<td>FOUNDATIONS AND POSITION PAPERS II (EMBODIED INTERACTION); THE BODY AS AN INTERFACE II</td>
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<tr>
<td>Thu Mar 31, 2016</td>
<td>TANGIBLE INTERACTION</td>
</tr>
<tr>
<td>Thu Apr 7, 2016</td>
<td>TRACKING; HUMAN-ROBOT INTERACTION</td>
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<tr>
<td>Thu Apr 14, 2016</td>
<td>ELICITATION STUDIES</td>
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<tr>
<td>Wed Apr 20, 2016</td>
<td>Final Presentation DUE</td>
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<tr>
<td>Thu Apr 21, 2016</td>
<td>Paper Presentations and Group Work</td>
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<tr>
<td>Thu Apr 28, 2016</td>
<td>AUGMENTED REALITY; DESIGNING WITH EMBODIED SCHEMATA</td>
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<tr>
<td>Fri Apr 29, 2016</td>
<td>Final Paper DUE</td>
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<td></td>
<td>Peer Evaluation 3 DUE</td>
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<tr>
<td>Date</td>
<td>Details</td>
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<tr>
<td>Mon May 2, 2016</td>
<td>Final Paper Review DUE</td>
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**GRADES**

**Individual Assignments** (10% of final grade)

- Individual Presentation of research idea **Due** Jan 20 at 11:59pm 2 Points
- Final Paper Review **Due** May 2 at 11:59pm 8 Points

**Team Paper Presentations** (20% of final grade)

- Paper Presentation 1 10 Points
- Paper Presentation 2 10 Points

**Group Project (Research Paper)** (47% of final grade)

- Initial Research Presentation **Due** Feb 3 at 11:59pm 5 Points
- First Paper Draft **Due** Feb 17 at 11:59pm 7 Points
- User Study (Methodology) Presentation **Due** Mar 2 at 11:59pm 5 Points
- Intermediate Paper Draft **Due** Mar 9 at 11:59pm 8 Points
- Final Presentation **Due** Apr 20 at 11:59pm 7 Points
- Final Paper **Due** Apr 29 at 11:59pm 15 Points

**Participation** (23% of final grade)

- Class Participation 10 Points
- In-Classroom Activity 1 2 Points
- In-Classroom Activity 2 2 Points
- In-Classroom Activity 3 2 Points
- In-Classroom Activity 4 2 Points
- In-Classroom Activity 5 2 Points
- Peer Evaluation 1 **Due** Feb 17 at 11:59pm 1 Point
- Peer Evaluation 2 **Due** Mar 9 at 11:59pm 1 Point
- Peer Evaluation 3 **Due** Apr 29 at 11:59pm 1 Point
Grading
Grades will be assigned using the IUPUI grading scale: [http://registrar.iupui.edu/gradecover.html](http://registrar.iupui.edu/gradecover.html)

You will receive a score for each graded assignment or group work. The sum of all points that you can receive during the semester is 100. In order to compute your final grade, you can simply add up all the points that you received during the semester, and convert your score to a letter grade using the table below.

<table>
<thead>
<tr>
<th>Letter grade</th>
<th>Score</th>
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<tbody>
<tr>
<td>A+</td>
<td>&gt;=99</td>
</tr>
<tr>
<td>A</td>
<td>&gt;=93</td>
</tr>
<tr>
<td>A-</td>
<td>&gt;=90</td>
</tr>
<tr>
<td>B+</td>
<td>&gt;=87</td>
</tr>
<tr>
<td>B</td>
<td>&gt;=83</td>
</tr>
<tr>
<td>B-</td>
<td>&gt;=80</td>
</tr>
<tr>
<td>C+</td>
<td>&gt;=77</td>
</tr>
<tr>
<td>C</td>
<td>&gt;=73</td>
</tr>
<tr>
<td>C-</td>
<td>&gt;=70</td>
</tr>
<tr>
<td>D+</td>
<td>&gt;=67</td>
</tr>
<tr>
<td>D</td>
<td>&gt;=63</td>
</tr>
<tr>
<td>D-</td>
<td>&gt;=60</td>
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<tr>
<td>F</td>
<td>&lt;60</td>
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</tbody>
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Attendance
H-566 is a seminar class, in which most of the learning will occur with class participation and discussion. For this reason, **attendance is mandatory**. Attendance itself will directly affect 10% of your final grade. You will be required to check in at the beginning of each class. Please plan to be on class on time.

Your attendance will be graded in the following way:

<table>
<thead>
<tr>
<th>Letter grade</th>
<th>Points</th>
</tr>
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<tbody>
<tr>
<td>Up to 2 absences</td>
<td>A</td>
</tr>
<tr>
<td>3 absences</td>
<td>A-</td>
</tr>
<tr>
<td>4 absences</td>
<td>B</td>
</tr>
<tr>
<td>5 absences</td>
<td>C</td>
</tr>
<tr>
<td>6 absences</td>
<td>D</td>
</tr>
<tr>
<td>7 absences or more</td>
<td>F</td>
</tr>
</tbody>
</table>
READ THE RESEARCH PAPERS BEFORE CLASS! In order to be prepared for class and being able to actively contribute to the discussion, you need to read the research papers that will be presented that week—regardless of whether or not you are leading the discussion that day. You will not be able to successfully complete the in-class activities if you have not read the papers.

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Long Medical Absence (more than two days)
It is your responsibility to promptly notify the instructor promptly if you have compelling medical reasons that prevent you from being in class for more than two days through the semester—so that we can determine additional assignments for the “participation” portion of your grade (20%).

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Late Assignments
Assignments are due at 11:59 pm the day BEFORE class (unless otherwise specified). If you submit an assignment between 1 minute and 24 hours after the deadline, the penalty is 20% of the total score. If you submit more than 24 hours after the submission deadline, the assignment will count 0% towards your final score.

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Group Work and Peer Evaluation
Your group project scores will reflect your contribution to the group. It is not enough to be in a group that delivers good work to get a satisfactory grade in the group project: you need to actively contribute to the group, and your personal contribution needs to be clear during the final presentation. It is your responsibility to promptly notify your instructor (within the first two weeks of the group project) of any unexpected circumstances that require you to be assigned to a different group.

We will conduct a peer evaluation three times through the semester. You will be asked to rate the contributions of your groupmates on a scale from 1 (did not contribute at all) to 10 (contributed as expected).

The first peer evaluation will be with the collected with the initial paper draft submission; it will not affect your score, but you will receive a first feedback from your groupmates.

The second and third peer evaluation will directly impact the score that you will receive for the second and final paper submission, respectively. Points will be computed in the following way: a basic group score will be assigned to your group submission; the average peer evaluation score G will be computed for your group; if the average score that you received from your groupmates is A% below G, your personal score will be adjusted by -A%, while if your personal score is +B% above G, your personal score will receive a B% bonus.

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Paper Presentations
Each student will present two research papers to the class, using the template that will be posted on Canvas. Presentations will be done in pairs, so plan ahead and make sure to coordinate the content and agenda of your presentation with your classmate.

You will be able to select two papers from the reading list during the first day of class. You cannot choose two papers that belong to the same topic.

If you were not in class the first day, it is your responsibility to notify the instructor as soon as possible, and the instructor will assign you two papers.

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UNIVERSITY POLICIES
Campus policies governing IUPUI courses may be found at:
http://registrar.iupui.edu/course_policies.html

Academic Integrity
Please refer to the IUPUI Student Code of Conduct: http://www.iupui.edu/code/ for information regarding penalties and procedures in cases of academic misconduct: cheating, plagiarism, etc.

Plagiarism
Plagiarism will not be tolerated. Plagiarism occurs when using somebody's else work (including, but not limited to sources such as: the Internet, library books, or the work or other students) without proper citations and quotation marks.

IMPORTANT!! In order to avoid plagiarism, remember to put proper quotation marks and a citation when you refer to somebody else’s work.

Title IX - What you should know about sexual misconduct
IU does not tolerate acts of sexual misconduct, including sexual harassment and all forms of sexual violence. If you have experienced sexual misconduct, or know someone who has, the University can help. It is important to know that federal regulations and University policy require faculty to promptly report complaints of potential sexual misconduct known to them to the Deputy Title IX Coordinator(s) on campus to ensure that appropriate measures are taken and resources are made available. The University will work with you to protect your privacy by sharing information with only those that need to know to ensure the University can respond and assist. If you are seeking help and would like to speak to someone confidentially, you can make an appointment with a mental health counselor on campus (contact information available at http://stopsexualviolence.iu.edu/employee/confidential.html). Find more information about sexual violence, including campus and community resources at http://stopsexualviolence.iu.edu/

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RESOURCES FOR STUDENTS

Student Advocate
The Student Advocate Office is located in the Campus Center, Suite 350, and can be contacted by phone at 278-7594 or email at stuadvoc@iupui.edu. For more information, visit the Student Advocate website at http://www.life.iupui.edu/advocate/

Adaptive Educational Services
Students needing accommodations because of physical or learning disabilities should contact Adaptive Educational Services, Taylor Hall (UC), Room 137: http://aes.iupui.edu/

Counseling & Psychological Services
Students who wish to seek counseling or other psychological services should contact the CAPS office by phone at 274-2548 or email at capsindy@iupui.edu. For more information, visit the CAPS website at http://life.iupui.edu/caps/

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READING LIST
(only the name of the first author is included)

FOUNDATIONS AND POSITION PAPERS I (UBICOMP)


THE BODY AS AN INTERFACE I


Chris Harrison. Skinput: appropriating the body as an input surface. http://dl.acm.org/citation.cfm?id=1753394

PROXEMICS & LARGE DISPLAYS


PROMOTING HEALTHY BEHAVIOURS AT HOME

Matthew Kay. Lullaby: a capture & access system for understanding the sleep environment. http://dl.acm.org/citation.cfm?id=2370253

William Gaver. Enhancing ubiquitous computing with user interpretation: field testing the home health horoscope. http://dl.acm.org/citation.cfm?id=1240711

PERSUASIVE TECHNOLOGIES

Sunny Consolvo. Theory-driven design strategies for technologies that support behavior change in everyday life. http://dl.acm.org/citation.cfm?id=1518766

Lane Harrison. Influencing visual judgment through affective priming. http://dl.acm.org/citation.cfm?id=2481410

LEARNING I


Francesco Novellis. How real is 'real enough'? designing artifacts and procedures for embodied simulations of science practices. http://dl.acm.org/citation.cfm?id=1999041


Jennifer A. Rode. From computational thinking to computational making. http://dl.acm.org/citation.cfm?id=2804261

NON-TRADITIONAL POPULATIONS


Matthew Kam. Practical considerations for participatory design with rural school children in underdeveloped regions: early reflections from the field. http://dl.acm.org/citation.cfm?id=1139085

Divya Ramachandran. Social dynamics of early stage co-design in developing regions. http://dl.acm.org/citation.cfm?id=1240790

Yvonne Rogers. Never too old: engaging retired people inventing the future with MaKey. http://dl.acm.org/citation.cfm?id=2557184
LEARNING II


Michelle Lui. Supporting learners in collecting and exploring data from immersive simulations in collective inquiry. http://dl.acm.org/citation.cfm?id=2557162


NOVEL INTERFACES


FOUNDATIONS AND POSITION PAPERS II (EMBODIED INTERACTION)


THE BODY AS AN INTERFACE II

Gabe Cohn. Humantenna: using the body as an antenna for real-time whole-body interaction. http://dl.acm.org/citation.cfm?id=2208330


TANGIBLE INTERACTION


Michael S. Horn. The role of cultural forms in tangible interaction design. http://dl.acm.org/citation.cfm?id=2460643


TRACKING


Xianyi Gao. Elastic pathing: your speed is enough to track you. http://dl.acm.org/citation.cfm?id=2632077

Francesco Cafaro. I see you there!: developing identity-preserving embodied interaction for museum exhibits. http://dl.acm.org/citation.cfm?id=2466252

HUMAN-ROBOT INTERACTION


ELICITATION STUDIES


Francesco Cafaro. Framed guessability: using embodied allegories to increase user agreement on gesture sets. http://dl.acm.org/citation.cfm?id=2540944

AUGMENTED REALITY


DESIGNING WITH EMBODIED SCHEMATA

Anna Macaranas. Bridging the Gap: Attribute and Spatial Metaphors for Tangible Interface Design.  
http://dl.acm.org/citation.cfm?id=2148166

MUSEUMS

http://dl.acm.org/citation.cfm?id=1150100

Jessica Roberts. Interpreting data from within: supporting human-data interaction in museum exhibits through perspective taking.  
http://dl.acm.org/citation.cfm?id=2593974

Sarah D'Angelo. Fishing with friends: using tabletop games to raise environmental awareness in aquariums.  
http://dl.acm.org/citation.cfm?id=2771843

Joyce Ma. Using a Tangible Versus a Multi-touch Graphical User Interface to Support Data Exploration at a Museum Exhibit.  
http://dl.acm.org/citation.cfm?id=2680555

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The Instructor reserves the right to make changes to the syllabus and course schedule, if necessary.