H-566
Experience Design for Ubiquitous Computing

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

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
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Office: IT 579
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Office hours
Monday 5 to 6,
and by appointment
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Textbook
No text book. You will read and analyze research papers from recent Ubicomp and HCI top conferences (see the reading list at the end of the syllabus). They are freely accessible from the ACM portal: http://dl.acm.org at IUPUI, or at https://ulib.iupui.edu/databases/acm-digital-library when you are not at IUPUI. Alternatively, you can use PulseSecure to connect to the IU VPN; see the instructions at https://kb.iu.edu/d/ajrq
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Learning Objectives:

Upon completion of this course, students will:	PGPLs	Assessment
1. Understand how the vision of ubiquitous computing is articulated and continually reinterpreted by a community of researchers and practitioners	1. K&S 2. CT	Paper Presentations Final Paper Review Class Participation Panel
2. Understand how traditional HCI methods (e.g., requirements gathering, prototyping, evaluation) need to be adapted to ubiquitous computing contexts	1. K&S 2. CT 4. EB	Group Project Paper Presentations Final Paper Review Class Participation
3. Apply critical reading skills to texts with a diversity of disciplinary approaches, including theoretical texts, design texts, and technical texts	2. CT 1. K&S	Paper Presentations Final Paper Review Class Participation Panel
4. Apply the design and evaluation methods of ubiquitous computing to the study of a novel or existing ubiquitous computing technology	1. K&S 2. CT 3. EC	Group Project
5. Analyze a body of research to identify the contributions that have been made and areas in which additional, novel contributions might be made	2. CT 1. K&S 3. EC	Paper Presentations Class Discussion Panel Final Paper Review
6. Evaluate the strengths, weaknesses, and applicability of ubiquitous computing enabling technologies in a variety of contexts	2. CT 1. K&S 3. EC 4. EB	Paper Presentations Final Paper Review Class Participation Panel Group Project

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	3. EC 2. CT 1. K&S	Paper Presentations Final Paper Review Class Participation Panel Group Project

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Course Requirements:
During this class, you will: participate in the class discussions; present 2 research papers in groups of two students; participate to 1 panel; 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.

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SCHEDULE
All classes will include a combination of research paper presentations (typically, 3 papers per day) and group work –except for the days of the group project presentations.

Date	Topics
Mon Jan 13, 2020	Introduction to the class. Research Paper Presentations assigned. Review of User Studies and Statistical Background.
Mon Jan 20, 2020	~~NO CLASSES~~ Martin Luther King Jr
Mon Jan 27, 2020	FOUNDATIONS; [PROJECT] Individual Presentation of Research Ideas
Mon Feb 3, 2020	Proxemics and Large Displays
Mon Feb 10, 2020	[PROJECT] Initial Research Presentations
Mon Feb 17, 2020	Indoor Localization & Tracking
Mon Feb 24, 2020	Persuasive Technologies
Mon Mar 2, 2020	Full-Body Interaction: The Body as an Interface; Gestural Interaction
Mon Mar 9, 2020	[PROJECT] Presentation of User Study Methodology
Mon Mar 16, 2020	~~NO CLASSES ~~ Spring Break
Mon Mar 23, 2020	Accessibility; Health Applications
Mon Mar 30, 2020	Tangible and Embodied Interaction
Mon Apr 6, 2020	Ubiquitous Learning Technologies
Mon Apr 13, 2020	Ubicomp for Good
Mon Apr 20, 2020	[PROJECT] Final Presentations
Mon Apr 27, 2020	~~CLASS WILL NOT MEET~~ Group Work + Individual Work on Paper Review
Mon May 4, 2020	~~CLASS WILL NOT MEET~~ Finalize group work for final paper submission

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GRADES

You will collect up to 100 points through the semester. Your points will be converted into a letter grade according to the table below.

ASSIGNEMENTS	POINTS
Research Presentations (in pairs) - 20 points	
Research Presentation 1	10
Research Presentation 2	10
Panels - 4 points	
Panel Presentation and Discussion	4
Participation - 21 points	
Quantity: In-Class Participation 1 - 9	1 each
Quality: Participation Assessment 1-3	4 each
Individual Paper Review - 6 points	
Final Paper Review	6
Group Project (Research Paper) - 46 points	
Individual Presentation of Research Ideas	3
Initial Research Presentation	4
First Paper Draft	7
User-Study (Methodology) Presentation	5
Intermediate Paper Draft	7
Final Presentation	7
Final Paper	13
Peer-Evaluations - 3 points	
Initial Peer-Evaluation	1
Intermediate Peer-Evaluation	1
Final Peer-Evaluation	1

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Grading

Grades will be assigned using the IUPUI grading scale:
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.

Letter grade	Score	Interpretation
A+	>=99	Professional Level Work; Highly Contributed to the Learning Environment and Autonomously Explored Extra-Curricular Areas of Ubicomp
A	>=93	Excellent Work
A-	>=90	Very Good Work
B+	>=87	Good Work
B	>=83	Acceptable Work
B-	>=80	Unacceptable Work at a Graduate Level
C+	>=77	Unacceptable Work at a Graduate Level
C	>=73	Unacceptable Work at a Graduate Level
C-	>=70	Unacceptable Work
D+	>=67	Unacceptable Work
D	>=63	Unacceptable Work
D-	>=60	Unacceptable Work
F	<60	Failed

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Attendance

H-566 is a seminar class, in which most of the learning will occur through class participation and discussion. Not being in class is just like not showing up to work: it means you will not able to fulfill your task (learning), and you will not be able to contribute with your knowledge and expertise to the class activities and discussion (which could impact your fellow students' learning). Thus, attendance is mandatory. If you miss a class, you will not be able to collect any participation point for that class -and those points add up very quickly!

If you are not able to sit in a class, please talk with the instructor in advance and make all the possible effort to participate remotely using Zoom, Google Hangout, or VoiceThread.

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Class Participation
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.

Your class participation will be recorded through the semester. Your class participation to these classes will affect your final grade. You will not be able to successfully participate in those classes 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 prevents 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.

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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. More than 24 hours after the submission deadline, Canvas will not allow you to submit your assignment anymore, and the assignment will count 0% towards your final score.
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Paper Presentations
You will present two research papers to the class, using the template that will be posted on Canvas.

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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Panels
Panels are an opportunity to collaboratively recap the topics covered in class and to lead a conversation on the major themes of Ubicomp. Take them very seriously. You will be able to participate to one panel that you can select from the reading list on the first day of class. If you are not in class the first day of class, you will be assigned a panel.
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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 presentation; 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 your score.

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 y% below G, your personal score will be adjusted by -y%, while if your personal score is +x% above G, your personal score will receive a x% bonus.

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

Administrative Withdrawal
A basic requirement of this course is that you will participate in all class meetings and conscientiously complete all required course activities and/or assignments. **If you miss more than half of the required activities within the first 25% of the course, you may be administratively withdrawn from this course.** *Our course meets once per week; thus if you miss two or more classes in the first four weeks*, you may be withdrawn.
Administrative withdrawal may have academic, financial, and financial aid implications. Administrative withdrawal will take place after the full refund period, and if you are administratively withdrawn from the course you will not be eligible for a tuition refund. If you have questions about the administrative withdrawal policy at any point during the semester, please contact the instructor or visit http://registrar.iupui.edu/withdrawal-policy.html (Links to an external site.)

Important Supplement for IUPUI Syllabi

IUPUI Policy on Disability Accommodations
Students needing accommodations because of disability will need to register with Adaptive Educational Services and complete the appropriate forms issued by AES before accommodations will be given. The AES office is located in Taylor Hall, UC 100. You can also reach the office by calling 274-3241.

IUPUI Policy on Religious Holidays
IUPUI respects the right of all students to observe their religious holidays and will make reasonable accommodation, upon request, for such observances. Students seeking accommodation for religious observances must submit a request in writing to the course instructor by the end of the second week of the semester and should use the Request for Course Accommodation Due to Religious Observance Form. More information on the IUPUI Policy on Religious Holidays is available here:http://registrar.iupui.edu/religious.html.

IUPUI Policy on Academic Integrity:
The IU Code of Student Rights, Responsibilities, and Conduct states that students must uphold and maintain academic and professional honesty and integrity; the code defines academic misconduct as any activity that tends to undermine the academic integrity of the institution.

Students engaging in academic misconduct may therefore receive penalties from their course instructor and disciplinary action from the university. Policies against academic misconduct apply to *all* course-, department-, school-, and university-related activities. Academic misconduct may involve human, hard-copy, or electronic resources and includes but is not limited to the following: cheating, fabrication, plagiarism, interference, violation of course rules, and facilitating academic dishonesty. For definitions of these activities, visit http://studentcode.iu.edu/responsibilities/academic-misconduct.html. For information on how faculty and students are expected to handle cases involving academic misconduct, visit http://registrar.iupui.edu/misconduct.html. Additional information about the rights and responsibilities of IU students is available at http://studentcode.iu.edu/.

Title IX - IUPUI Policy on Sexual Misconduct
As your instructor, one of my responsibilities is to help create a safe learning environment on our campus. Title IX and our own Sexual Misconduct policy prohibit sexual misconduct. If you have experienced sexual misconduct, or know someone who has, the University can help.
If you are seeking help and would like to speak to someone confidentially, please visit http://stopsexualviolence.iu.edu/help/index.html (Links to an external site.) for contact information.
 It is also important that you know that federal regulations and University policy require me to promptly convey any information about potential sexual misconduct known to me to our campus' Deputy Title IX Coordinator or IU's Title IX Coordinator. In that event, they will work with a small number of others on campus to ensure that appropriate measures are taken and resources are made available to the student who may have been harmed.
 Protecting a student's privacy is of utmost concern, and all involved will only share information with those that need to know to ensure the University can respond and assist.
I encourage you to visit stopsexualviolence.iu.edu (Links to an external site.) to learn more about available resources on campus and in the community.

Education and Title VI
Title VI of the Civil Rights Act of 1964 protects people from discrimination based on race, color or national origin in programs or activities that receive Federal financial assistance.

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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)

January 27, 2020   FOUNDATIONS

Mark Weiser. The Computer for the 21st Century. https://www.ics.uci.edu/~corps/phaseii/Weiser-Computer21stCentury-SciAm.pdf

Gregory D. Abowd. Charting past, present, and future research in ubiquitous computing (pages 30-46)

https://dl.acm.org/citation.cfm?id=344988

Gregory D. Abowd. What next, ubicomp?: celebrating an intellectual disappearing act.
http://dl.acm.org/citation.cfm?id=2370222

February 3, 2020   PROXEMICS & LARGE DISPLAYS

Saul Greenberg. Proxemic interactions: the new ubicomp?
http://dl.acm.org/citation.cfm?id=1897250

Saul Greenberg. Dark Patterns in Proxemic Interactions: A Critical Perspective.
http://dl.acm.org/citation.cfm?id=2598541

Jörg Müller. Looking glass: a field study on noticing interactivity of a shop window.

https://dl.acm.org/citation.cfm?id=2207718

February 17, 2020   INDOOR LOCALIZATION AND TRACKING

INDOOR LOCALIZATION AND TRACKING
P. Bahl. RADAR: an in-building RF-based user location and tracking system.
https://ieeexplore.ieee.org/abstract/document/832252/

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

Hanchuan Li. ID-Match: A Hybrid Computer Vision and RFID System for Recognizing Individuals in Groups. https://dl.acm.org/doi/10.1145/2858036.2858209

February 24, 2020   PERSUASIVE TECHNOLOGIES

Sunny Consolvo, Flowers or a robot army?: encouraging awareness & activity with personal, mobile displays.
https://dl.acm.org/citation.cfm?id=1409644

Thomas Fritz. Persuasive technology in the real world: a study of long-term use of activity sensing devices for fitness.
https://dl.acm.org/citation.cfm?id=2557383

Arnold P.O.S. Vermeeren. Design for complex persuasive experiences: helping parents of hospitalized children take care of themselves. https://doi.org/10.1145/2598510.2598548

March 2, 2020	FULL-BODY INTERACTION: THE BODY AS AN INTERFACE; GESTURAL INTERACTION

THE BODY AS AN INTERFACE

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

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

GESTURAL INTERACTION

Fabrice Matulic. Multiray: Multi-Finger Raycasting for Large Displays
http://dl.acm.org/citation.cfm?id=3173819

March 23, 2020	ACCESSIBILITY; HEALTH APPLICATIONS

ACCESSIBILITY

Sarit Szpiro. Finding a store, searching for a product: a study of daily challenges of low vision people.
http://dl.acm.org/citation.cfm?citation.cfm?id=2971723

HEALTH APPLICATIONS

Edward Jay Wang. HemaApp: noninvasive blood screening of hemoglobin using smartphone cameras.
http://dl.acm.org/citation.cfm?citation.cfm?id=2971653

Jean Costa. EmotionCheck: leveraging bodily signals and false feedback to regulate our emotions.
https://dl.acm.org/citation.cfm?doid=2971648.2971752

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

March 30, 2020	TANGIBLE AND EMBODIED INTERACTION

Hiroshi Ishii. Tangible bits: towards seamless interfaces between people, bits and atoms.
http://dl.acm.org/citation.cfm?id=258715

Eva Hornecker. The role of physicality in tangible and embodied interactions
http://dl.acm.org/citation.cfm?id=1925826

Alissa N. Antle. Playing with The Sound Maker: Do Embodied Metaphors Help Children Learn?
http://dl.acm.org/citation.cfm?id=1463754

Tom Moher. Embedded phenomena: supporting science learning with classroom-sized distributed simulations. http://dl.acm.org/citation.cfm?id=1124875

Robb Lindgren. Enhancing learning and engagement through embodied interaction within a mixed reality simulation. https://www.sciencedirect.com/science/article/pii/S036013151630001X

Milka Trajkova. Move Your Body: Engaging Museum Visitors with Human-Data Interaction.

April 13, 2020   UBICOMP FOR GOOD

Jill Palzkill Woelfer. Homeless young people and living with personal digital artifacts. http://dl.acm.org/citation.cfm?id=1979190

Lynn Dombrowski. It takes a network to get dinner: designing location-based systems to address local food needs. https://dl.acm.org/citation.cfm?doid=2493432.2493493

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