Invention Studio 1

Last Updated: Fri, 11/14/2025

Course prefix: ID

Course number: 4071

Section: 1

CRN (you may add up to five):
90062

Instructor First Name: Yixiao

Instructor Last Name: Wang

Semester: Fall

Academic year: 2025

Course description:

This course is a senior Interaction Design studio with a focus on designing “Robotic Environments,” which is an interdisciplinary topic discussed in various academic communities, including Interactive Architecture (IA), Architectural Robotics, Human-Robot Interaction (HRI), Socially Interactive Robotic Environment (SIRE), and Human-Building Interaction (HBI). “Robotic Environments” are built environments embedded with robotic components. They are physical, reconfigurable, interactive, and can be augmented through extended or mixed realities. We will explore the Design of Robotic Environments through various design methods and paradigms (e.g., movement-centric design, scenario-based design, design patterns, etc.) but under the paradigm of Human-Centered Design (HCD) and Research through Design (RtD). The goal is to design and develop innovative robotic environments or robots with environmental impacts through a rigorous design research process. We hope the outcome of this studio will significantly contribute to students’ design and research portfolios, no matter which career path they pursue, either in academia or industry, after they graduate.

Course learning outcomes:

- Development and demo of partially functional robotic environment prototypes and a high-fi prototype (functional enough to serve the purpose of the proposed group project) to tell the story of how the design project addresses one of the UN SDGs.
- Development and delivery of a final report in publishable quality to tell the story of how the design project addresses one of the UN SDGs: logically sound, contently convincing, structurally clear, and well-written (examples and templates will be given in the class).

- Development and delivery of a design diary that details the design process, research process, and decision-making process (examples and templates will be given in the class) of the robotic environmental components that address one of the UN SDGs.
- Development and delivery of a project video that clearly and vividly describes the project, especially how the Human- “Robotic Environment” Interactions may unfold (examples will be given in the class) and how such interactions may promote one of the UN SDGs.

Required course materials:

All required materials are provided by the course instructor in digital format.

- Hoffman, Guy, and Wendy Ju. "Designing robots with movement in mind." Journal of Human-Robot Interaction 3, no. 1 (2014): 91-122.
- Schafer. G, Green, K. E., Walker, I. D., Fullerton, S. K. In Press. Words Become Worlds: The LIT ROOM, a Literacy Support Tool at Room-Scale. In Proceedings of the 2018 Designing Interactive Systems Conference (DIS '18). ACM, New York, NY, USA, 511-522.
- Wang, Yixiao, and Keith Evan Green. “Designing Socially Interactive, Robotic Environments through Pattern Languages.” In Proceedings of Fourteenth IEEE International Conference on Intelligent Environment (IE), 2022.
- Kerlinger, F. & Lee, H. (2000). Foundations of behavioral research, 4th ed. New York: Harcourt. Chapter 1, 2, and 3.

Grading policy:

For students, the course grade is composed of the following key elements: (1) Acquiring IRB Approval, (2) Design Topic Poster and Presentation, (3) Design Diary (relatively large group only), (4) Final Report, (5) Phase I, II, III Presentation + Demo (6) Project video (7) Extra Credits: Case Study + Attending Launch-Pad. The points of each element and submission weeks are outlined in the table below.

For a 3-person group:

Acquiring IRB Approval: 5 pts

Design Topic Poster and Presentation: 10 pts

Phase I, II, III Presentation + Demo: 30 pts

Design Research Report: 20 pts

Design Diary: 10 pts

Project Video: 10 pts

Case Study (Extra Credit): 2

*** Peer Evaluation: 10 pts**

For a 4-person group:

Acquiring IRB Approval: 5 pts

Design Topic Poster and Presentation: 10 pts

Phase I, II, III Presentation + Demo: 30 pts

Design Research Report: 20 pts

Design Diary: 10 pts

Project Video: 10 pts

Case Study (Extra Credit): 2 pts

Final Portfolio: 5 pts

*** Peer Evaluation: 10 pts**

"Case Study" *offers 2 points of extra credit.*

"Attending Launchpad" is required. *The group project should have a poster and a table of robotic prototypes well set up according to the Launchpad Requirement. At least one student in each group should attend Launchpad physically. Failure to do the above will result in a maximum of 3 points deducted from the total grade.*

* *Peer Evaluation Form will be distributed on Canvas and should be submitted as* ***an individual*** *assignment.* ***If you do not submit your peer evaluation form for your teammates on time, you will also lose points in this category.***

The total points will be specified to the second digit after the decimal point. Students' final grades do not need to fit into a normal distribution curve: if everyone is doing excellent, then everyone could get an A. Below is an exemplary grading scale (might be subject to change based on students' general performances and the school grading requirement).

A: **90-100%**

B: 80-89.99%

C: 70-79.99%

D: 60-69.99%

F: <= 59.99%

To clarify, this grading scale should conform to GA Tech's grading rule:

A: Excellent. It means extremely good, outstanding, and usually surpasses my expectations.

B: Good. It means you have done solid work that meets my expectations.

C: Satisfactory. It means mediocre jobs that do not meet my expectations but are still acceptable.

D: Passing. It means an unsatisfactory passing grade, but you still earn credit for this class.

F: Failure. It means not submitting most of the deliverables, skipping most of the classes, not being present in most of the presentations, etc. You will NOT earn credit for this class.

Extra Credit and Grade Dispute Policies and Procedures

Presenting "Case Study" offers 2 points of extra credit. The grade of each assignment on Canvas will be released on Canvas. **Students should email the instructor within 4 days of the grades being posted (including holidays) if they have any questions about the grade. After 4 days, no grade disputes will be accepted.**

Attendance policy:

You are expected to attend each class from week 1 to week 15, and attendance will be taken by the TA or the instructor during the class occasionally. If there is something urgent happens (e.g., family emergency, illness, job interviews, etc.), you should email **BOTH the instructor and the TA** about the situation **the day BEFORE the class**. Any **UNEXCUSED** absence will result in a final grade deduction:

Number of Unexcused Absence: 1 --------- Point deduction from the final grade: 0

Number of Unexcused Absence: 2 --------- Point deduction from the final grade: 1

Number of Unexcused Absence: 3 --------- Point deduction from the final grade: 2

Number of Unexcused Absence: 4 --------- Point deduction from the final grade: 5

Number of Unexcused Absence: >= 5 --------- Point deduction from the final grade: 10

Academic honesty/integrity statement:

Students are expected to maintain the highest standards of academic integrity. All work submitted must be original and properly cited. Plagiarism, cheating, or any form of academic dishonesty will result in immediate consequences as outlined in the university's academic integrity policy.

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit https://policylibrary.gatech.edu/student-life/academic-honor-code

Any student suspected of cheating or plagiarizing on a quiz, exam, assignment, or deliverable will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.