

# CIS 4930 / CIS 6930 Special Topics: Human-Centered Input Recognition Algorithms (HCIRA)

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Course Syllabus, v1.0, last revised 1/3/2023

## Course Logistics

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### Meeting Times & Locations:

- Tuesdays Period 8-9 (3:00pm to 4:55pm, 100 minutes) *Florida Gym (FLG) 0230*
- Thursdays Period 9 (4:05pm to 4:55pm, 50 minutes) *CSE Building (CSE) E121*

## Instructor Information

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### Instructor: Dr. Lisa Anthony, PhD

- E-mail address: [lanthony@cise.ufl.edu](mailto:lanthony@cise.ufl.edu) (put 'HCIRA' in the subject)
- Office hours: TBD
- Office location: CSE Building, E542
- Class Web site: Canvas!

## Course Information

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### Catalog Descriptions:

- CEN 4930 – Special Topics in CISE – Credits: 3.
- CEN 6930 – Special Topics in CIS – Credits: 3.  
Variable content provides an opportunity for in-depth study of topics not offered elsewhere and of topics of current significance.

### Course Overview:

Are you interested in natural user interaction? Do you want to learn more about how computer systems recognize and interpret user input in “natural” modalities, like touch, gesture, speech, and whole-body motion? This course will cover typical approaches in recognition of input in these modalities that are informed by what we know about human input behaviors. Each semester the modality of emphasis may vary. In Spring 2023, the course will cover touchscreen surface-based gesture recognition such as drawing an X or an arrowhead onscreen with a finger or stylus. Selected algorithms that will be covered may include: Wobbrock et al's \$1 recognizer, Anthony & Wobbrock's \$N recognizer, Vatavu et al's \$P recognizer, among others. Class structure will be in a project-based seminar format, in which we will discuss in-class weekly readings of the research papers that introduced these algorithms. Students will implement at least one of these algorithms and test it online in live demos and offline on sample data. Students will also extend at least one of these algorithms and test it in the same ways.

This is a cross-listed undergraduate and graduate course.

### **Pre-requisites and Co-requisites:**

- CIS 4930: COP 3530.
- CIS 6930: COP 3530 or equivalent.

### **Course Components:**

This course involves the following components:

- **Readings** – recent research papers in the area of human-centered input recognition algorithms, and related topics.
- **In-Class Discussion** – class discussion of the algorithms and their performance, as well as other related topics; participation in these discussions will be part of a Class Participation grade.
- **Projects** – two (2) projects will be completed, including (1) implementing and testing an existing covered human-centered recognition algorithm, (2) proposing, implementing, and testing an improvement or extension to an existing covered human-centered recognition algorithm.
  - These projects will be divided into several smaller milestones as per the course schedule.

### **Course Objectives:**

By the end of this course, students will be able to:

- Explain the motivation and impetus for research on human-centered input recognition algorithms.
- Cite multiple examples of human-centered input recognition algorithms for the modality of emphasis in the current semester.
- Understand the factors that could affect performance of a recognition algorithm on human input, including population, context, and modality.
- Understand how to use data visualization to reveal nuances in human input behaviors that could affect performance of a recognition algorithm.
- Explain the process of conducting offline recognition experiments to test the performance of a recognition algorithm.
- Implement and test an existing recognition algorithm based on the related research paper, pseudocode, and (if applicable) reference implementations.
- Propose human-centered extensions to existing recognition algorithms based on the topics covered in the current semester.
- Implement and test a human-centered extension to an existing recognition algorithm.
- Present the results of offline recognition experiments in oral and written form.

## **Course Materials**

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### **Material and Supply Fees:**

- No fees are collected for this course.

### **Textbooks Required and Accessing Readings:**

No textbook is required for this course. Weekly readings in the form of research papers will be posted to the course website at least two weeks prior to the due date. Students will be responsible for accessing the readings and downloading any relevant links provided.

UF students have access to downloads from publisher sites such as the [ACM Digital Library](#) and the [IEEE Xplore Digital Library](#) on-campus on the UF wireless network, or off-campus through the VPN. Students should consult the [UF Computing Helpdesk](#) for assistance if needed.

### Software Required:

Students are **required to bring a laptop to class**<sup>1</sup> to participate in the project working sessions. For the projects, research software including recognition algorithms, datasets, visualization tools, and so on may be necessary to download and install on students' computers. While no problems are anticipated, students are responsible for the computer security of their own machines.

### Additional Recommended Resources:

- TBD

## Course Outline

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Course Schedule & Weekly Readings will be posted to Canvas.

### Presentation Days

As mentioned in the **Course Policies** section on “Attendance”, attendance at presentation and demo days is required, other than for pre-arranged excused absences. Course presentation days are scheduled for:

- **Project 1 Demos:** March 21<sup>st</sup> & 23<sup>rd</sup>
- **Project 2 Proposals:** March 28<sup>th</sup> & 30<sup>th</sup>
- **Project 2 Demos:** April 18<sup>th</sup> & 20<sup>th</sup>

## Grading

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The following items will contribute to students' grades in this course:

- Class Participation 15%
- Project 1 60% *includes several mini milestones, each worth 10%*
- Project 2 Proposal 5%
- Project 2 20%
- Extra Credit opportunities:
  1. CISE HCC Experiment Pool 2%
- No mid-term or final exams

More details on the projects, milestones, deliverables, grading, and expectations will be made available closer to the due dates.

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<sup>1</sup> Consistent with UF College of Engineering computer requirements: “The University of Florida requires students to have access to a computer. The College of Engineering further requires that students have access to and on-going use of a laptop/mobile computer.” For more information, see <http://www.eng.ufl.edu/students/career-resources/computer-requirements/>

**CISE HCC Experiment Pool:** *The human-centered computing (HCC) research faculty in the CISE department may recruit periodically throughout the semester for participants in their research studies. Each study participated in will be worth 1-2%, and students can earn up to 2% extra credit on their final course grade. Participation in the studies is optional, but strongly encouraged. A replacement extra credit activity of a 500-word report on a human-centered input recognition algorithm not otherwise covered in this course will be worth 1% (up to 2 essays can be submitted). It is possible that no extra credit opportunities will be available this semester if no studies are recruiting.*

Please note: no partial credit will be awarded for extra credit submissions.

### **Grading Scale:**

- 100-92 A, 91-90 A-
- 89-88 B+, 87-82 B, 81-80 B-
- 79-78 C+, 77-72 C, 71-70 C-
- 69-68 D+, 67-62 D, 61-60 D-
- 59-0 E

All final course grades will be rounded to the nearest whole number. Canvas estimates of final course grades are not to be considered accurate until I announce it. I recommend you do your own math to verify final grades. The Canvas system has a “What If” tool to help you estimate your final grade.

This course will use the Canvas e-Learning course management system to post grades and to communicate with class members. If you have a question about the course that other students could benefit from hearing the answer, please post to the appropriate discussion thread on Canvas rather than sending individual emails to the instructor/TA.

### **Undergraduate Grading Scale Note:**

A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grading policies, please visit: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### **Graduate Grading Scale Note:**

Graduate students need an overall GPA of 3.00 truncated and a 3.00 truncated GPA in their major (and in the minor, if a minor is declared) at graduation. For more information on grading policies, please visit: <https://gradcatalog.ufl.edu/graduate/regulations/> (click on Graduate Academic Regulations → Grades)

### **Expectations for Graduates vs. Undergraduates in this Course:**

Graduate-level sections of this course involve more advanced material and more in-depth study than the undergraduate sections. Graduate students enrolled in this course **must**:

- Do Project 1 and 2 individually (undergraduates will do course projects in pairs).
- Collect a dataset from 3 to 5 users to use in testing Project 2. More details will be provided with Project 2.

Undergraduate students who are interested may do the additional work as extra credit. **See the instructor beforehand to arrange this.**

### **Honor Code & Collaboration:**

High level questions, syntax topics, and algorithms can be discussed amongst each other and amongst the groups. Not allowed in this course include the following:

- 1) **plagiarism** (misrepresenting others' ideas as your own),
- 2) **copying code**,
- 3) **social loafing** (e.g., for group work), and
- 4) **work offensive to others**.

As for other courses in CISE in the past, offenders will be held to the UF Honesty Policy (see below) including reporting incidents to the Dean of Students. The results of this have included failing grades, ethic lectures, and a permanent mark in records (which can lead to expulsion).

## **Course Policies**

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### **Late Assignments:**

All assignments will be assessed a late penalty of -10% for each day late. After 3 days, students will receive a 0. The only exception to this rule is if students contact the instructor **in writing** to make arrangements for lateness. Only excused absences will be accepted (see next section).

### **Attendance and Make-Up Policy:**

Attendance will not be graded. Engagement in class discussions contributes to class participation, however, so if students must miss class, the instructor recommends increasing participation on the other days. If a student is sick or will be absent for a significant period of time, please contact the instructor to work out a way to catch up. **Attendance and participation is required for all project presentations and demo days.** If a student cannot attend, make-up work may be required at the instructor's discretion.

Excused absences must be consistent with university policies in the Undergraduate Catalog (<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>) or the Graduate Catalog (<https://catalog.ufl.edu/graduate/regulations>) and require appropriate documentation.

### **Incompletes:**

Incompletes will be granted for only the most extreme circumstances, e.g., medical or family reasons. To be considered for an incomplete, the student **must** 1) let the professor know at in advance of the end of the semester that they are seeking an incomplete, and 2) provide documentation to support the request.

### **Classroom Expectations:**

To be courteous to your fellow students, please:

- Turn all cell phone ringers to silent and step outside to take calls.
- Turn off all audible notifications on laptops and phones.
- Refrain from texting during class.

- Use laptops only for taking notes or looking up relevant information (no Facebook, YouTube, Twitter, etc.).

## Undergraduate ABET

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### ABET Outcomes:

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	Medium
3. An ability to communicate effectively with a range of audiences	Low
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	High
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Medium
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	High
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

## University Policies and Resources

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### **Students Requiring Accommodations:**

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

### **Course Evaluation:**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

### **In-Class Recording:**

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### **University Honesty Policy:**

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following

pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### **Commitment to a Safe and Inclusive Learning Environment:**

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, [jpennacc@ufl.edu](mailto:jpennacc@ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

### **Software Use:**

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### **Student Privacy:**

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>



## Campus Resources:

### Health and Wellness

#### **U Matter, We Care:**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**Counseling and Wellness Center:** <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

#### **Sexual Discrimination, Harassment, Assault, or Violence**

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, [title-ix@ufl.edu](mailto:title-ix@ufl.edu)

#### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

### Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

**Career Connections Center**, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus:** <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

**On-Line Students Complaints:** <https://distance.ufl.edu/state-authorization-status/#student-complaint>.

***Revisions to this document:***

- v1.0 – original version, 01/03/2023
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