

Generating Expressiveness in Intelligent Agents and Avatars

CAP 4xxx Section 1234

Class Periods: MWF, Period 3, 9:35am-10:25am

Location: Classroom location

Academic Term: Fall/Spring NNNN

Instructor:

Eakta Jain

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352-294-6653

Office Hours: Th, Period 4, Zoom or by appointment

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

- TBD

Course Description

Methods to create expressiveness in physical and virtual agents; Anthropomorphism and interactivity in human-robot interaction; Intent versus intelligence; Affect, emotion and personality; Expressiveness in human-like agents versus non-human-like agents; Uncanny valley effect. (3 credits)

Course Pre-Requisites

COP 3530 Data Structures and Algorithms (C)

Course Objectives

At the end of this course, students will be able to define notions of expressiveness, compare and contrast the constraints and affordances for expressiveness in physical versus virtual intelligent agents, human-like versus non-humanoid agents, discuss literature, and design and implement an expressive intelligent agent.

Materials and Supply Fees

List if applicable

Relation to Program Outcomes (ABET):

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	High
3. An ability to communicate effectively with a range of audiences	
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	Medium
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	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
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.

Required Textbooks and Software

Instructor-curated articles and book chapters made available through course reserves. Course notes created by instructor as applicable.

Programming assignments will use MATLAB (available through UF IT) and Python.

Recommended Materials

Computer Graphics: Principles and Practice, Foley, van Dam, Feiner, Hughes (Second Edition in C)

Affect and emotion, R. Picard. Affective Computing, MIT Press, 1997

Embodied Conversational Agents, edited by Justine Cassell, Joseph Sullivan, Scott Prevost, Elizabeth Churchill, MIT Press, 2000

Designing Sociable Robots, Cynthia Breazeal, MIT Press, 2004

Course Schedule

- Week 1: What is expressiveness?
- Week 2: Psychological and perceptual basis
- Week 3: Modalities of expression in physical and virtual agents
- Week 4: Intent versus Intelligence
- Week 5: Explicit interactivity
- Week 6: Implicit interactivity
- Week 7: Sensing the user
- Week 8: Responding to the user
- Week 9: Expressing affect and emotion
- Week 10: Creating personality
- Week 11: Anthropomorphism and biological inspiration
- Week 12: Humanoid agents
- Week 13: Uncanny Valley
- Week 14: Applications: virtual agents, e.g., embodied conversational agents
- Week 15: Applications: physical agents, e.g., social robots

Attendance Policy, Class Expectations, and Make-Up Policy

Class attendance is expected. Excused absences are consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

Late policy: -1 point for every day past deadline, for example, if an assignment is due on Thursday at 4:05pm, then any submission timestamped in the range from Thursday 4:06pm to Friday 4:05pm will receive -1 point, and any submission from Friday 4:06pm to Saturday 4:05pm will receive -2 points, etc.

Excused absences will be taken into account when computing the late penalty. So, for example, if an assignment is due on Thursday at 4:05pm, and you have a doctor's note for Monday and Tuesday, then your assignment can be submitted on Saturday at 4:05pm without any late penalty.

Evaluation of Grades

Assignment	Deadline	Total Points	Percentage of Final Grade
Homework mini-projects (2)	Friday of Week 4 and Week 8, 5pm	2x15 = 30	30%
Research Presentation I (topic in literature)	In class during Weeks 7-10, based on sign up sheet	10	10%
Research Presentation II (topic relevant to student's project)	In class during Weeks 11-14, based on sign up sheet	10	10%
Group Project	Design presented in class during Week 6; Final presentation in class during Week 15; Intermediate check point presentation in Week 10-11.	50	50%
			100%

Brief Description of assignment types:

- 1) There will be two homework mini-projects involving programming assignments. For example, a homework could involve (re) creating Heider and Simmel's animated shapes where the triangle appears to be menacing and the circles appear to be scared of it¹.
- 2) Each student will give two 10-minute class presentations, one taken from a list of foundational papers provided by the instructor, and one which is relevant to their area of interest. Students will be provided a presentation template, for example, one slide for title, one slide for motivation and problem statement, one slide for method, one slide for experiments/participants, one slide for data analysis/results, and one slide for implications for student project/future directions inspired by this paper.
- 3) The student will work on a group project based on their interest. This project activity will involve design, literature review, implementation and evaluation.

While students will get individual grades in the mini-projects and class presentations, they will get a group grade for the group project. This grading scheme reflects real-life work where you are essentially graded with respect to how your team performs. For example, if a product has to be shipped, ultimately your "grade", i.e., end of year bonus, is almost entirely dependent how well your team comes together to ship it. The group project provides an opportunity to learn and practice these life skills. A sample rubric is provided below.

¹ <https://blogs.scientificamerican.com/thoughtful-animal/animating-anthropomorphism-giving-minds-to-geometric-shapes-video/>

Activity	Good	Intermediate	Needs work
Design (10pts)	(9-10pts): Contains a motivation of the problem, a concept diagram of the proposed idea, the potential impact of these findings. Visuals are used to enhance the take-away message.	(5-8pts): Missing some of the above points, for example, missing motivation and potential impact but describing the particulars of the proposed idea.	(0-4pts): Missing the above points, or points are provided but not coherently connected. Missing a concept diagram of a proposed idea.
Literature review (10pts)	(9-10pts): Provides a summarization of 3-5 most related papers, with 1-2 papers representing foundational work and 2-3 papers representing state of the art; strikes a good balance between providing relevant details as well as abstractions to communicate the state of the art and how they relate to the previously presented Design.	(5-8pts): Any one or two of the following conditions -- less than 2 papers presented; missed either foundational work or state of the art; not striking a balance in the review of the literature, i.e., either getting stuck in detail or being so high level as to miss relevant context; not relating literature to previously presented Design.	(0-4pts): Missing the above points, or points are provided but not coherently connected.
Implementation Intermediate (10pts)	(9-10pts): Intermediate check point presentation shows a working demo / screen capture of a working system; Team discusses 'gotcha' moments and justifies any changes to the original design.	(5-8pts): Intermediate check point presentation does not show anything working (e.g., shows a screenshot of code or a Jupyter notebook); Team has reflected on progress and strategized a plan going forward.	(0-4pts): Intermediate check point presentation does not show anything working (e.g., shows a screenshot of code or a Jupyter notebook that does not compile); Team has not reflected on progress or strategized a plan going forward.
Implementation Final (10pts)	(9-10pts): As part of final presentation, team shows a working demo; Team reflects on demo and original design.	(5-8pts): Team shows a screen capture of a working system; Team neglects reflections and/or does not connect final system with original design	(0-4pts): No working system; Team has made little or no progress since intermediate check point presentation
Evaluation (10pts)	(9-10pts): As part of final presentation, team identifies a reasonable straw man or baseline; proposes one or more metric to compare straw man with proposed idea; shows comparison and reports actual metric values	(5-8pts): Straw man is not a reasonable comparison; metrics are proposed but do not capture the value add that the proposed idea brought to the motivating problem in the previously presented Design	(0-4pts): Evaluation is considered unnecessary; evaluation involves opinion but without systematic and reproducible subjective response gathering

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00

70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

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.ua.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.ua.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/policies/student-honor-code-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
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, 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 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: <http://www.counseling.ufl.edu/cwc>, 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](mailto:title-ix@ufl.edu), located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, 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 Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.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://care.dso.ufl.edu>.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.