SPRING 2019

MAS.SXX Democratizing AI through K-12 AI Education for All.
Day Mondays 3—5pm
Units (2-0-7)
Instructor: Cynthia Breazeal (co-list with Hal Abelson)
Limit: 12 (for-credit participants)

Overview:

How can we prepare non-university students with knowledge, skills, and attitudes for future careers that increasingly rely on AI technologies? Otherwise, we risk leaving far too many people behind in the emerging AI-economy – causing significant societal stress and divisiveness rather than enabling transformative opportunity where everyone can participate in, benefit from, influence our future with AI. Inequity of education remains a key barrier to future opportunities and jobs where success depends increasingly on intellect, creativity, and the right skills. While AI is already entering the education system to support students, teachers, or school administration – it is not currently offered as a topic to be learned until the university level. Just as learning to code has become recognized as a new literacy for the 21st century, students need to also learn about AI given its growing prevalence across industries, institutions, and society on a global scale.

This weekly project-based class explores the question of “how do we empower children, from preschool to high school, to learn about AI in a collaborative, hands-on way?” Students taking this course will collaborate in teams to develop constructionist tools and activities to introduce preK-12 learners to important concepts, practices and design principles of artificial intelligence – i.e., how machines think and learn and how to design them in an ethical way. An important objective of class projects is to effectively integrate ethical design concepts and practices into their proposed activities and curriculum so that preK-12 students appreciate issues in bias, fairness, transparency, etc. in the AI-enabled projects they create in an age appropriate way. Example projects can take the form of developing an AI curriculum module that covers a core AI concept and associated practices through hands-on projects based on scratch, app inventor, Jupyter notebooks, etc. with integrated cognitive services or open source libraries (machine learning, computer vision, NLU, etc.). Existing research projects could be translated into compelling hands-on projects that introduce younger students to exciting AI methods and abilities. Other projects can explore how to effectively prepare and train mentors to support students as they learn about AI, including the development of personalized AI mentoring agents to help scale this knowledge and training.

Grading
40% design reviews and critiques
20% class attendance and participation
40% final project (no exam)

Website Coming soon
**Draft syllabus/meeting schedule: Will be supplemented with guest lectures.**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>Feb 11</td>
<td>preK-12 AI Goals, Background, Prior work</td>
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<tr>
<td>Feb 18</td>
<td>Group brainstorm: What might an K-12 AI curriculum look like?</td>
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<td>Big Ideas Framing</td>
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<td>CITI certification done</td>
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<td>Feb 25*</td>
<td>Ethical AI Design Practices.</td>
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<td>Team brainstorm 1: Hands-on projects to learn AI concepts &amp; practices</td>
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<td>March 4</td>
<td>Team brainstorm 2: Hands-on projects to learn AI concepts &amp; practices</td>
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<tr>
<td>Mar 11</td>
<td>Students present &quot;final&quot; project plans</td>
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<td>Mar 18</td>
<td>Design Critique: existing examples (cozmo, popbots, etc)</td>
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<td>Finalize COUHES submissions</td>
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<td>(final submission date = Mar 21 for Apr 11 meeting)</td>
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<tr>
<td>Mar 25</td>
<td>No class (spring break)</td>
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<tr>
<td>Apr 1</td>
<td>Team Project Progress Report</td>
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<td>Apr 8</td>
<td>Design Critique: existing examples (calypso, MLforKids, etc.) Working session</td>
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<tr>
<td>Apr 15</td>
<td>Team Project Progress Report</td>
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<td>Apr 22</td>
<td>No class (MLS members meetings)</td>
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<td>Apr 29</td>
<td>Submit draft write-up without results individual meetings with group feedback</td>
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<td>May 6</td>
<td>Final Project Presentations &amp; Discussion</td>
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<td>May 13</td>
<td>Final Project Presentations &amp; Discussion</td>
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Draft Reading List
(subject to change, and also students will be asked to find additional readings related to their chosen projects):


Brennan, K. (2014). Beyond right or wrong: Challenges of including creative design activities in the classroom. Journal of Technology and Teacher Education.


Druga, S., (2018) Growing up with AI – Cognimates: from coding to teaching machines. S. M. Media Arts and Sciences, Massachusetts Institute of Technology.


Williams, R. (2018) PopBots: Leveraging Social Robots to Aid Preschool Children’s Artificial Intelligence Education. S. M. Media Arts and Sciences, Massachusetts Institute of Technology.


Coding Platforms for Kids:
- Scratch: https://Scratch.mit.edu
- Snap: https://snap.berkeley.edu/
- App Inventor: https://Appinventor.mit.edu
- BeAMaker for Jibo: https://www.jibo.com/be-a-maker/
- Blockly: https://blockly-games.appspot.com/
- Scratch Jr: https://www.scratchjr.org/

Coding Platforms to Create Projects with AI Capabilities:
- Cognimates Studio: https://mitmediallab.github.io/cognimates-website/about/
- PopBots: https://www.media.mit.edu/projects/pop-kit/overview/
- Machine Learning for Kids: https://machinelearningforkids.co.uk/
- ECraft: https://ecraft2learn.github.io/ai/
- Tensorflow Playground: https://playground.tensorflow.org/
- Calypso for Cozmo: https://calypso.software/

AI Curriculum for Kids:
- NVIDIA Digits: http://aiinschools.com/resources/
- Apps for Good Machine Learning Course: https://www.appspotsforgood.org/courses/machine-learning

Machine Learning for Middle School: http://blog.stephenwolfram.com/2017/05/machine-learning-for-middle-schoolers/