

**Brooklyn College**  
**Department of Computer and Information Sciences**

**CISC 3650 [54] Innovative Approaches to Computer-Human Interfaces**

3 hours; 3 credits

Overview of computer-human interfaces with an emphasis on innovative approaches. Principles of computer-human interaction. Ubiquitous computing and tangible interfaces. Interfaces employing speech recognition and computer vision. Sensor technologies. Computer supported cooperative work. Virtual and augmented realities.

**Objectives:**

Computing is becoming more and more ubiquitous: we are finding it in our automobiles, our television sets, and even our homes. This course focuses on alternative computer-human interfaces that use state-of-the-art technologies.

- Students will demonstrate an understanding of the principles of computer-human interaction.
- Students will demonstrate an understanding of the technologies and issues associated with interfaces that incorporate ubiquitous computing, speech recognition, computer vision, sensor technologies, computer supported cooperative work, and virtual and augmented realities.
- Students will master skills needed to design and rapidly prototype applications employing innovative computer-human interfaces such as speech, vision, and sensors.

**Syllabus**

- Week 1:** Introduction to computer-human interaction. Overview of interaction paradigms, including command languages, menu interfaces, and direct manipulation. Ubiquitous computing as a trend.
- Week 2:** Interface design methodologies. Usability engineering approach. Storyboards, scenario development, requirements analysis, rapid prototyping, and iterative development. Review of multimedia authoring tools.
- Week 3:** Multimedia representations of information. Effective use of graphics, animation, audio and text in computer-human interfaces. Feedback and dialog design.
- Week 4:** Usability testing. Analytic versus empirical methods of evaluation. Test design and analysis.
- Week 5:** Introduction to tangible interfaces. Sensor technologies and micro-controllers. Applications including senseTable, media blocks, programmable bricks, and middle-tech toys.
- Week 6:** Incorporating sensor technologies into computer-human interfaces.
- Week 7:** Tangible interface issues. Wired and wireless communication from objects to

the computer.

- Week 8:** Introduction to audio interfaces. Speech processing issues and challenges. Command-based dialogs versus natural language. Speech synthesis versus recorded samples.
- Week 9:** Incorporating voice input/output into computer-human interfaces.
- Week 10:** Introduction to vision interfaces. Computer vision issues and challenges. Approaches to using mono and stereo vision, gesture interfaces, eye tracking.
- Week 11:** Incorporating vision into computer-human interfaces.
- Week 12:** Virtual reality. Level of detail models, dead reckoning, and other approaches to reducing complexity. Simulator sickness and other issues of virtual reality interfaces.
- Week 13:** Augmented reality. Mobile and wearable computing. Interface design issues for small screens and heads-up displays.
- Week 14:** Computer supported collaborative work. Approaches to supporting distributed work, join strategies. Whiteboards and other sharable workspaces.

### **Bibliography:**

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- A. Druin (editor), *The Design of Children's Technology*, Morgan Kaufman Publishers, Inc., San Francisco, CA, pp. 52-72, 1999.
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- H. Ishii and B. Ullmer (1997). "Tangible Bits: Towards Seamless Interfaces Between People, Bits and Atoms", *Proceedings of CHI'97*, 234-241.
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