COS 597B: Interactive Music Systems
TOPICS AND READINGS

COS 597B readings and discussion will focus on the following topics & questions, as well as others determined by student interest.

Human-Computer Interactions in Real-time Music Performance

- *New music performance paradigms*
  What new types of musical performance does digital technology enable? E.g., new digital musical instruments, networked performances by people distributed around the world, laptop and mobile phone ensembles, human improvisation with autonomous musical agents, augmented acoustic instruments, live coding, computer accompaniment and conductor following… What are the computational methods used to create these complex systems? What are the challenges to making them usable in practice—that is, learnable, accurate, robust, low-latency, appropriately interpretable by an audience… ?

  What does—and should—the term "interaction" really mean, in the context of humans making music with technology?

- *Design and implementation of new musical instruments and interfaces*
  What hardware, software, and computational methods are used to build new instruments? In particular, how can human gesture be sensed, analyzed, and translated into real-time control over sound synthesis? How do the physical form of an instrument and its mapping from gesture to sound impact the nature of music that one can play? What design principles or musical goals are embedded in various digital instruments? How are these interfaces evaluated?

Human-Computer Interactions in Music Creation, "Consumption," and Scholarship

- *Music composition and production*
  What software and computational methods are used to compose and produce music? What is the state of the art in research on tools for instrument designers, for sound collection search and visualization, for automated editing and mixing, … ?

- *Music search and recommendation*
  How can machine learning and signal processing methods be used to implement music search and recommendation systems? What new approaches to music listening, consumption, and engagement can these systems support? How can human input be used to improve recommender systems?

- *Music scholarship and pedagogy*
  How can gesture and audio analysis be used in studying and teaching conducting or instrumental technique? What sorts of new musical knowledge can be gained from digital information about music—e.g., scores, manuscripts, sensor measurements from conductors and audience members, …? What new tools might be developed to support new approaches to musical scholarship by musicologists, or by the broader public?

Music and the Larger Landscape of Human-Computer Interaction

- *Technologies for use in creative applications*
  What sort of human-computer interactions should "creative" applications support? How can we possibly evaluate whether a system for creative work is any good? (Or better than an alternative?)

- *Embodied interaction*
  What is embodied interaction? Why do people design and use physical or gestural interfaces? How can designers of systems and tools better take advantage of users' embodied expertise and ways of acting? What might conventional acoustic instruments and associated musical practices teach digital systems designers and researchers about embodied expertise and gestural control?

- *"Usability" of computational techniques*
  How do tools used by musical systems designers determine which musical systems are easy to create, and who can easily create them? How can computational methods for gesture analysis, instrument building, programming, digital humanities scholarship, etc. be made more accessible to musicians and other non-computer scientists, and more appropriate to creative work?

Preliminary Reading List
Subject to change.

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[6] G. Wang and P. R. Cook, "ChucK: A concurrent, on-the-fly audio programming language," in *Proceedings of the International Computer Music Conference (ICMC)*, 2003.

[7] N. Collins, A. McLean, J. Rohrhuber, and A. Ward, "Live coding in laptop performance," *Organised Sound*, vol. 8, no. 3, pp. 321–330.

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[14] R. Fiebrink, P. R. Cook, and D. Trueman, "Play-along mapping of musical controllers," in *Proceedings of the International Computer Music Conference (ICMC)*, 2009.

[15] R. Fiebrink, D. Trueman, C. Britt, M. Nagai, K. Kaczmarek, M. Early, M. R. Daniel, A. Hege, and P. R. Cook, "Toward understanding human-computer interaction in composing the instrument," in *Proceedings of the International Computer Music Conference (ICMC)*, 2010.

[16] R. Fiebrink, P. Cook, and D. Trueman, "Human model evaluation in interactive supervised learning," in *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, pp. 147–156, 2011.

[17] A. Hunt and R. Kirk, "Mapping strategies for musical performance," in *Trends in Gestural Control of Music* (M. M. Wanderley and M. Battier, eds.), IRCAM—Centre Pompidou, 2000.

[18] A. Hunt and M. M. Wanderley, "Mapping performer parameters to synthesis engines," *Organised Sound*, vol. 7, no. 2, pp. 97–108, 2002.

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[20] F. Iazzetta, "Meaning in musical gesture," in *Trends in Gestural Control of Music* (M. M. Wanderley and M. Battier, eds.), Ircam - Centre Pompidou, 2000.

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the IEEE, vol. 92, no. 4, pp. 632–644, 2004.

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