Computational Thinking and Music Performance

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Everyone likes music
Most just listen, but many play:
Music Merchants: $8B, 5M instruments (US, 2006)
Sound reinforcement: $1.5B (US, 2006)
Audacity Audio Editor (Dannenberg & Mazzoni): 1M/month

Computation can enhance the musical experience by providing automated, live, musical partners
The Performer

- Real-time performance synchronized to human musicians
- Assumes quasi-steady tempo
  - research: characterize tempo variation in human performance
- Uses foot-tapping to give the beat to the computer
  - research: interfaces and methods for tempo acquisition and cues
- Uses pre-recorded audio (20 instruments in real time)
  - research: high-quality, low-latency, time-variable, ensemble time stretching
The Performer in Concert

Carnegie Mellon Jazz Ensemble + strings, directed by Dave Pellow, “Alone Together” arranged and conducted by Dr. John Wilson, strings recorded at Carnegie Mellon School of Music
Future Work

- Interface, interface, interface
- Sensing
- Display
- Computational Thinking and the Digital Music Stand
  - Tablet PC and smaller platforms (Kindle? Cell phones?)
  - Capture music notation as digital photos
  - Record all rehearsals
  - “Learn the music” for page turns, etc.
  - Feedback: location, intonation, cues