Welcome
2017 Faculty Summit Attendees

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Augmentative and Alternative Communication (AAC)

- AAC ➔ Any tool to replace or supplement spoken and written communication [ASHA]
  - **Input:** symbolic or typing
  - **Output:** synthesized speech, text (SMS, email); may be used for computer access

- About 2 million current AAC users in US (~0.8% of population) [Beukelman]
Who benefits from AAC?

- Physical disabilities (e.g. cerebral palsy, ALS)
- Linguistic disabilities (e.g., aphasia)
- Cognitive and intellectual disabilities
- Autism spectrum disorders
...
- Typically functioning adults (e.g. learning new languages, texting)
How AAC impacts people’s lives

• Support independent access to work, school, travel

• Maintain ties with family and friends

• Support expression of independent social identity
  aka.ms/expressiveaac
Impact

“Until there is a medical treatment or cure [for ALS], technology can be a cure”
–Steve Gleason
The potential of AI for communication support

- AAC (and other communication support tools) present exciting opportunities for AI+HCI

- Underexplored research area with large potential impact
Human-computer interaction challenges for AAC

• Support real-time communication about any possible topic

• Enable rapid communication despite slow input (20 wpm eye-typing vs. 180wpm spoken conversation)

• Authentic communication: do I sound like myself? (phrasing, pronunciation, emoting)

• Key is understanding context and predicting what the user might wish to talk about (and how they would say it)
Contextual factors in communication

• **Speaker:** current and recent activities, conversational goals, personal communication style(s)

• **Conversation partner:** relationship, interests, prior communications

• **Environment:** location, activity, conversation partner, conversation flow, nearby objects
Can we use humans in the loop?

- Private/sensitive information (talking to spouse, discussing health information)
- Low latency is key (conversational speech is ~180wpm)
- Use technology to support independence
Context-aware communication support

- **TalkAbout**: user-defined contextual communication

- **SceneTalk**: Leveraging computer vision for context detection
Location & group context
TalkAbout (2012) [shaun.cat/aphasia]

- Tablet-based communication aid for people with aphasia
- Developed through participatory design
- Allow users and caregivers to set up conversational contexts based on location & speaking partner
- Limitations: Requires manual configuration; assumes conversations will match context
Local environment as context
SceneTalk (2017) [aka.ms/scenetalk]

- Conversation support for eye-gaze typing
- Developed for (and with) people with ALS
- Use image recognition to identify nearby objects and suggest relevant conversation topics (using Microsoft Cognitive Services)
Current state of the art

- Research shows promise for integrating more context into communication aids

Significant challenges remain

- Matching environmental understanding to appropriate language model
- Data collection – slow output, very few phrases
- Assessment – small improvements could have a big impact over time, but can be difficult to measure
Opportunities for AI research

• Increasing awareness of location and activity
• Fusion of contextual data sources
e.g. nearby objects + location
• Authentic communication: how would this person comment about the current context?
• Assessing interventions with limited data
Thank you
Human-computer interaction challenges for AAC

• Support rapid, real-time communication
• Enable communication about a wide range of topics while minimizing input requirements
• Word & phrase prediction
• Understanding context (conversation, location, event)
• Supporting error-prone input
• Combining pre-prepared with live content
• Expressivity
AI Support for Communication Disabilities

Shaun Kane
University of Colorado Boulder
Challenges for end users

• Speaking and writing (for those who cannot speak or write independently)
• Vocabulary support for unknown or forgotten words
• Supporting real-time communication with a variety of conversational partners