New AAC Technologies to Enhance Communication and Participation

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THE NEED

- **More than 4 million Americans and 97 million people worldwide have complex communication needs**. This includes individuals with
  - developmental disabilities (e.g., autism spectrum disorder [ASD], cerebral palsy, Down syndrome)
  - acquired conditions (e.g., aphasia, TBI, spinal cord injury)
  - degenerative conditions (e.g., ALS, dementia)

- These individuals cannot rely on natural speech to communicate and are severely restricted in participation in education, employment, healthcare, and community living

- Development of augmentative and alternative communication (AAC) technologies offers significant potential to
  - enhance communication
  - increase participation
  - improve quality of life

- Traditionally AAC technologies have utilized isolated picture symbols organized in grid displays. These are difficult to learn and use for
  - young children with developmental disabilities [1]
  - older beginning communicators with severe disabilities [2]
  - adults with acquired language limitations [3]

TECHNOLOGY SOLUTION

The **Rehabilitation Engineering Research Center on Augmentative and Alternative Communication (RERC on AAC)** developed and evaluated new technology to enhance communication and participation for these individuals

- **Visual Scene Displays (VSDs)**
- **Video Visual Scene Displays (Video VSDs)**

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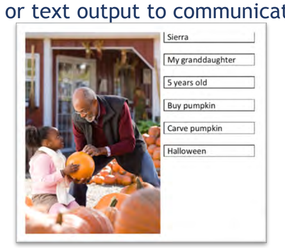
VISUAL SCENE DISPLAYS

- **Visual Scene Displays (VSDs) support communication about personally relevant events**
  - capture photos of meaningful events, including people and activities
  - add relevant vocabulary as hotspots or as adjacent text
  - select hotspot and retrieve speech or text output to communicate messages

Trevor is 16 months old and uses VSD technology to communicate about his favorite activities. He might touch the hotspot of his dog to retrieve the speech output of his dog's name [4]



Lamar had a stroke and relies on VSD technology to interact with family and friends about his activities, such as buying a pumpkin with his granddaughter [5]

BENEFITS OF VSDs

- Capture events in which language is learned and used
- Provide context to support communication more effectively
- Preserve functional and proportional relationships between people and objects
- Chunk key content and reduce working memory demands
- Capitalize on rapid visual cognitive processing of scenes

RESEARCH EVIDENCE, TECHNOLOGY TRANSFER, & IMPACT

- Research demonstrates that VSD technology supports the communication and participation of
  - young children with complex communication needs [6-8]
  - older individuals with severe disabilities [9,10]
  - adults with acquired conditions [11]

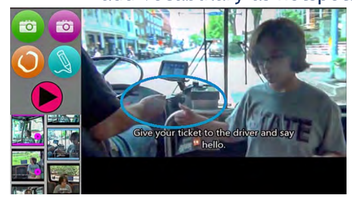
- VSD technology has significant positive effects, including increases in
  - frequency of communicative turns
  - number of unique concepts expressed
  - active participation in vocabulary selection and programming
  - communication across a range of environments

- **Visual Scene Display technology has been successfully transferred to all major AAC manufacturers**

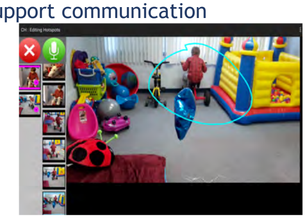
- Stakeholders have demonstrated uptake and adoption of VSDs
  - more than 231,000 stakeholders visited website for training in early intervention using VSDs at http://aackids.psu.edu
  - more than 26,000 stakeholders viewed webcasts for training in use of VSD technology with
    - children with developmental disabilities
    - adults with acquired disabilities

VIDEO VISUAL SCENE DISPLAYS

- **Video Visual Scene Displays (Video VSDs) support participation and communication** [12]
  - capture video of important activities (e.g., community, employment/volunteer, recreation)
  - pause video at any point to automatically create VSD
  - add vocabulary as hotspots to support communication



Lena uses Video VSD technology to greet the bus driver and take the bus to her job at the print shop [13]



Charlie uses Video VSD technology to tell his teacher and classmates about his favorite activity - riding his bike [14]

BENEFITS OF VIDEO VSDs

- Provide contextual support for communication
- Capture not only visual cues but also temporal cues for communication
- Provide powerful video models to support participation
- Capitalize on motion to attract visual attention

RESEARCH EVIDENCE, TECHNOLOGY TRANSFER, & IMPACT

- Research demonstrates that Video VSD technology results in significant increases in
  - participation in vocational and community activities by adolescents and adults with ASD, Down syndrome, and intellectual and developmental disabilities [13,14]
  - communication about past events by school-aged children with ASD [15]
  - communication and social interaction by preschoolers and school-aged children with complex communication needs [16-18]
  - partners' recognition and understanding of the communication of individuals with multiple disabilities [19]

- **Video VSD technology has been successfully transferred to Attainment Company, released as *GoVisual* in January, 2018**

CONCLUSION

The silence of speechlessness is never golden. We all need to communicate and connect with each other – not just in one way, but in as many ways as possible. It is a basic human need, a basic human right. And more than this, it is a basic human power. (Williams, 2000; p. 248)

References and additional information available at RERC-AAC.PSU.EDU/NIDILRR-40th/