



## Access technologies for children and youth with complex disabilities

Children with severe physical disabilities who do not have functional speech or reliable movement may be unable to communicate daily expressions and personal preferences in relation to care or about their daily life. Access technologies, such as those innovated by scientist Dr. Tom Chau and team in the Bloorview Research Institute at Holland Bloorview Kids Rehabilitation Hospital, can help these children participate in activities through the creation of a robust pathway to communication.

## Introducing the Hummer

The vocal cord vibration switch, also known as the “Hummer,” is an access technology that converts vocal cord vibrations into binary control signals for augmentative and alternative communication (AAC), environmental control, and computer access. This novel device—currently used by dozens of children with severe disabilities and complex access needs—is well suited for individuals who are unable to form words but can still produce vocalizations.

The versatile Hummer easily adapts to many environments. Unlike regular voice-based switches, it works well in loud environments such as classrooms as it is not sensitive to surrounding noise and only responds to the user’s vocalizations. Additionally, since the Hummer detects a full range of periodic vocal cord vibrations from soft to loud, it requires less effort than a microphone-based switch.



The “Hummer” sensor

## How it works

A sensor containing a dual-axis accelerometer is held on the user’s throat by means of a wearable neckband. The sensor signal is sent via a Bluetooth transmitter to an iPod, which uses a custom app to detect the periodic vibrations associated with vocalizations. The app also filters out sounds caused by bodily functions, like coughing and swallowing, as well as extraneous head movement. When a vocalization is detected, the iPod sends an activation signal to a relay box, translating it into a usable output that can be connected to a user interface, such as an AAC device or a computer. Individuals can then control a variety of activities—such as turning on music, playing a game, or typing messages on a keyboard—opening up a world of choice and communication.

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