TiC- Tongue Interface Communication: Assistive Technology for Severe Impairments

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The World Health Organization reports that globally over a billion people have some form of disability and between 110 and 190 million have significant limitations in functioning. Worldwide, people with disabilities are vulnerable to inadequate healthcare and assistive technologies as a result of cost and inaccessibility. There exists a need for research, development and support of all types of assistive technologies with an emphasis on affordable devices. This novel investigation was conducted to develop a low-cost, non-invasive, tongue-operated, customized and programmable USB HID keyboard with interface circuitry, known as TiC (Tongue Interface Communication), an Assistive Technology device with Augmentative and Alternative Communication capabilities for individuals with ALS, MS, and spinal cord injuries to effectively communicate and control a computer cursor through tongue-button-presses. TiC was developed using a mouthguard, tactile switches, ethernet cable and a NXP LPC1347 development board with an ARM based 32 bit Cortex M3 microcontroller platform. Hardware and software fabrication involved programming USB HID keyboard software, which monitors GPIO activities (including button clicks) associated with button presses and then translates into programmable keystrokes. Through product testing, completion time of various computer tasks i.e. typing words, was measured and surveys based on the Likert Scale were done. Over time, users improved their ability to use the buttons to move the cursor significantly. TiC meets the needs of users as being highly efficient, inexpensive, safe and non-invasive. At a price less than 10 dollars, TiC provides those with communication deficiencies and physical limitations the opportunity to participate fully in society.

Awards Won:
Third Award of $1,000