Our project seeks to address communication challenges for individuals with neurological conditions. ALS patients rely on slow, labor-intensive eye-based communication methods which limits their ability to speak at only 5 wpm as opposed to typical conversational speeds of 150 wpm. We aim to enhance efficiency of communication through a 4-pronged approach: predictive text enhancement, personalized communication, auditory input/output, and swipe-to-text eye control.

The clinical problem we are addressing is Amyotrophic Lateral Sclerosis (ALS), a progressive neurodegenerative condition leading to the gradual breakdown of nerve cells in the brain and the spinal cord. Motor neuron deterioration leads to a loss of voluntary motor control throughout the body. However, neural control of eye movement is preserved until the disease reaches advanced stages.

Many communication solutions for ALS patients are open-source, however, they do not meet the specifications for efficient communication. Many of these softwares also target various aspects of the communication problem such as eye-tracking and swipe-to-text. Unfortunately, there does not exist a solution that puts together all the parts of the puzzle. For this reason, we have developed an open-source software that streamlines communication and tackles this problem.

Our Approach

01 - Sentence Prediction

OptiKey + Eye Tracker is used to type with eye
ChatGPT predicts what sentence is trying to be said
Displays 3 choices for sentence on the GUI
Selected choice is spoken by the computer

02 - Conversation History

In addition to simply speaking the user’s selected text via the computer’s onboard speaker, our device features the option to utilize the onboard microphone to inform the user’s output options. This feature improves the options presented to the user, allowing for more conversational outputs. This feature is especially useful when the user is asked a question and it allows them to respond in a timely fashion.

03 - Auditory Input/Output

Eye-based Control
Conversational Communication
Fast Response Generation
Seamless Integration

04 - Swipe-to-Text Eye Control

Our Approach

Introduction

OcuSpeak: Streamlining communication for patients with ALS

Saardhak Bhrugubanda and Bharath Heggadahalli
Johns Hopkins University | Whiting School of Engineering | Baltimore, MD

Stop Typing, Start Speaking

The Problem

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Next Steps

We would like to thank Dr. Sathappan Ramesh for his support and guidance.