OcuSpeak: **Streamlining communication for patients with ALS**

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Stop Typing, Start Speaking

Introduction

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 Problem

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.

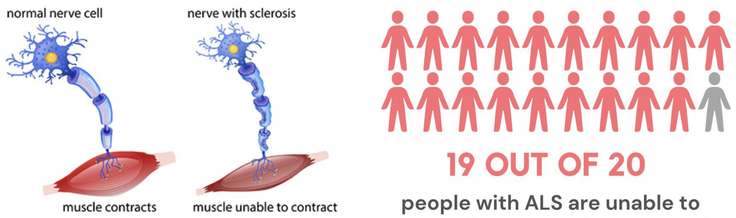
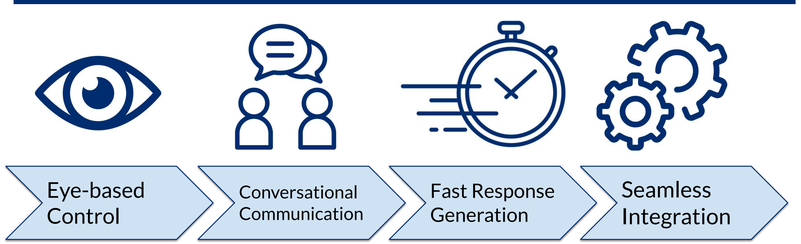


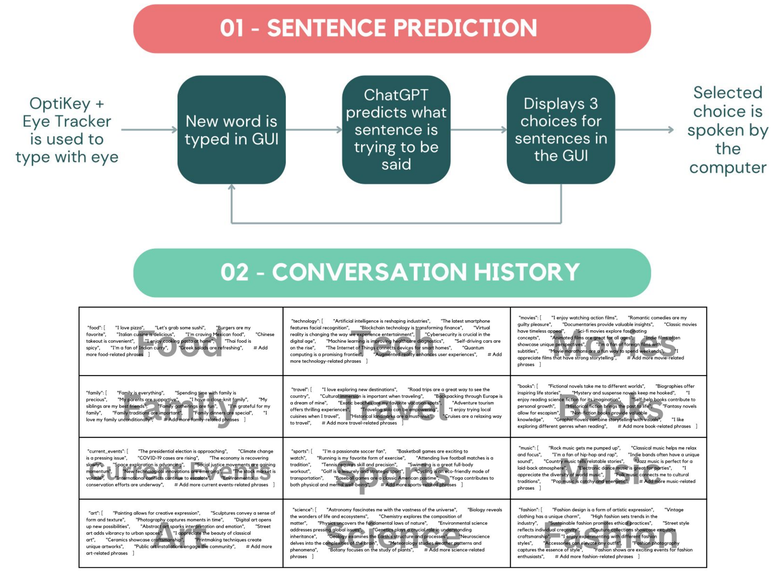
Fig. 1: Motor neuron deterioration

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.,

Design Criteria



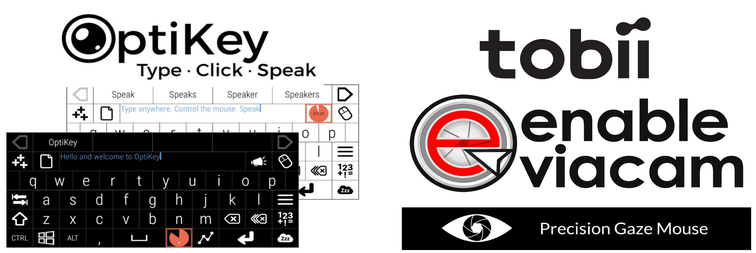
Our Approach



03 - AUDITORY INPUT/OUTPUT

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.

04 - SWIPE-TO-TEXT EYE CONTROL



Integration

The heart of our project lies in the seamless integration of the features we've implemented. Our software serves as the glue between several novel technologies and enhances the overall workflow by using keywords to generate complete sentences, stores conversation history, and uses real-time conversation audio input to streamline the communication experience.

Competitive Landscape

	OCUSPEAK	OPTIKEY	TD-I Series	Eyegaze Edge
Eye-Tracking to Speech	✓	✓	✓	✓
Eye Swipe-to-Text	✓	✓		
Sentence Prediction	✓			
> 20 WPM	✓			

Next Steps

Bug fixes and improve user interface

Continue to fine tune GPT sentence prediction model

Publish our project on Github, making it open-source!

Acknowledgements

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