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BioVariable Fonts: Novel Human-Computer Interaction Methodology for Font Interaction using Eye Movement Data, with Computer Vision.

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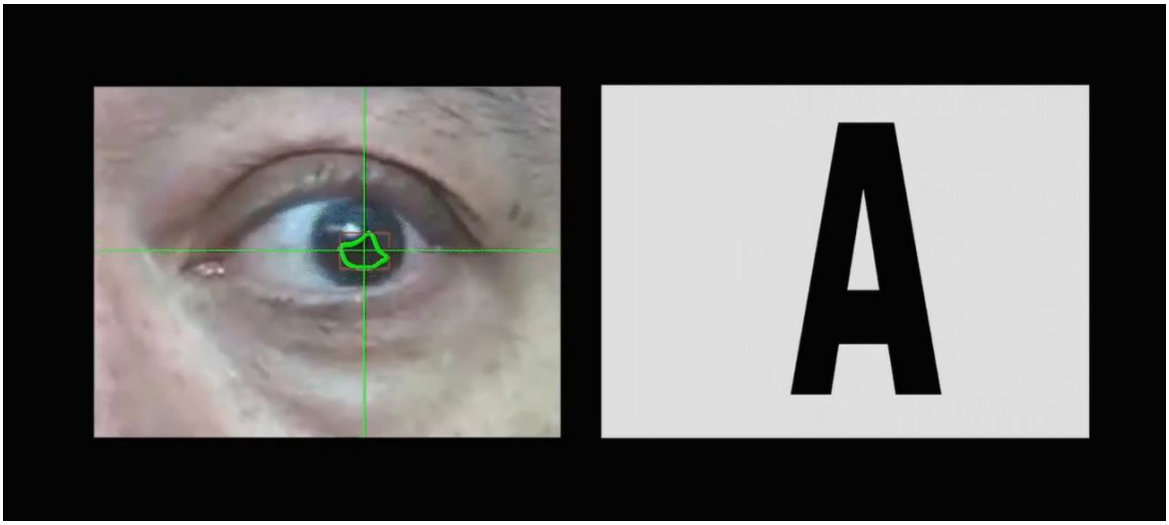
Introduction:

"What if Interfaces had senses? What if they could See, Hear or Feel Human Interaction? Would they be able to understand us and, would that understanding lead to a better ability to serve us? Could Fonts perhaps make themselves more readable of they sensed we were in a hurry or, had low vision or were just exhausted?" This project set out to explore these ideas. "BioVariable Fonts: Fonts that can See, Hear and Feel" is an independent project I proposed to the University of Utah's Undergraduate Research Opportunities Program that was accepted in May of 2020. The premise of the research aims to explore the Future of Interactive Interfaces and Artificial Sensory Cognition. The project exists in three parts to imitate sensory abilities (Sight, Hearing and Touch): A.) Machine Vision B.) Machine Hearing C.) Machine Feeling. This portion will focus on the processes and steps taken to prototype towards Machine Vision. As we slowly graduate from human-computer interaction and towards human-computer integration via augmented reality and haptic technology, there lies the opportunity and inevitability of personalized communication systems and the Typefaces to communicate them. This personalized communication system can take shape through the integration of Biosensor technology and Virtual/Augmented Reality development platforms.

Methodology:

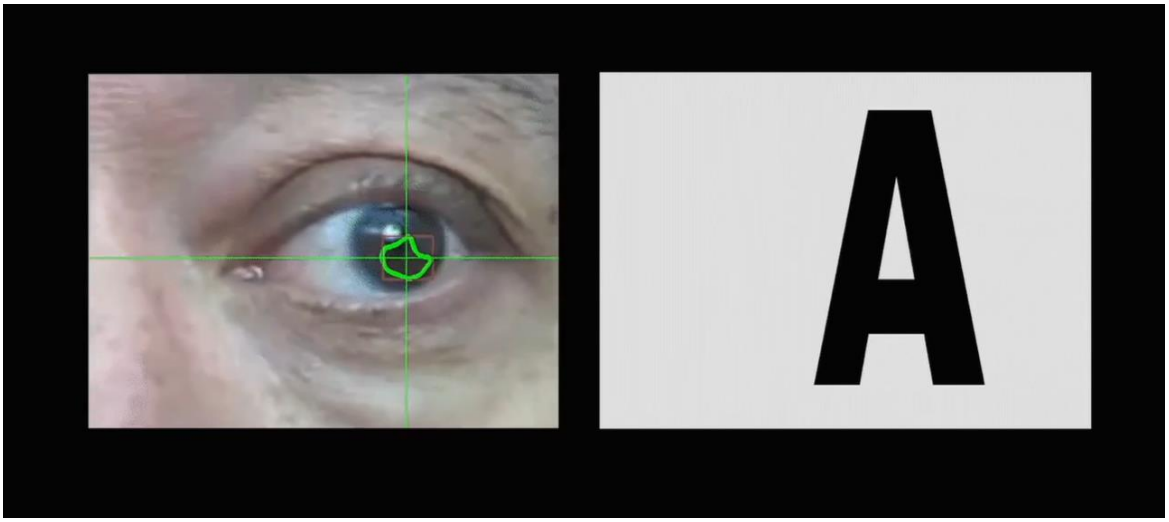
Using Python's Computer Vision Library, several computer programs were written to extrapolate Eye Movement data from captured footage. Another set of programs were written with JavaScript, the main object-based language for the Web. Within JavaScript was written a program in which a Font's Variables were assigned Data. Once data was captured from Python, it was broadcast over a WebSocket to be translated onto a Font to be Interpolated via JavaScript. In Summary, the Font moved concurrently with the user's eyes once the programs communicated with each other. Initial tests explored color mapping wherein the color of a Canvas changed as the user's eyes moved.

Results



Session Snapshot: Font Interpolation when Computer Vision Program extrapolated Eye Movement to the Center.

Session Snapshot: Font Interpolation when Computer Vision Program extrapolated Eye Movement to the Left.



Session Snapshot: Font Interpolation when Computer Vision Program extrapolated Eye Movement to the Right.

Conclusion:

In Conclusion, I have determined that Eye Movement and Font Interpolation can be achieved using an array of programming languages prove true. This Research Project aimed to test the current state of Human-Computer Interaction tools, and frameworks to test the precision and accuracy of Biosensing Datasets for Interpolation across User Interface and User Interaction Assets. Further explorations look towards integrating this pipeline to other dimensions of Biosensable Data on the other three measurable senses(Touch, Smell, Hearing)