Project Title:

Design and Development of a Tool for Eyetracking-and-Speech Synthesis for Aphasia Patients

A Senior Project

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Problem Statement:
Each year, a good number of Americans suffer brain and other traumatic injuries that lead to speech impairment of varying degree. In the scientific literature, one of these conditions is called Aphasia – of many levels of severity. For aphasia, the condition or injury leaves the individual's intelligence in-tact, except the loss of word-finding, agrammatism, word-substitution, and sometimes complicated by apraxia (difficulty of orienting the lips, tongue, and the mouth articulation). The idea is to find a technology-based solution, a tool that could assist such individuals in regaining or recovering most their speech loss.

The Goal of the Project:
The overarching goal of the project is to develop an App-based, iOS tool for improving the speech production and day-to-day activities of people with limited or speech deficiency, a condition called aphasia. The ubiquity of iOS/iPhone devices and the plethora of libraries for iOS-based development provide a conducive and impactful environment to implement such a project. An app-based eyetracking-speech synthesizing capability could be a viable solution in that the user could scan the words in a text on a hand-held device. The tool would then generate the corresponding speech of each word in the text, and subsequently have the user reproduce/echo the words into a form of reading and self-expression. Oftentimes, individuals with aphasia condition benefit from music-intonation (MIT) technique as well, which could also help in word articulation and overall reading. With time, such an integrated tool could become a neuroplastic corrective tool for speech therapy.

The Development Toolset:
Developing a tool that combines eyetracking-speech synthesis with MIT (using concurrent code) could provide an integrated platform to further enhance the speech, reading, conversation, and self-expression of its users. Swift language and its libraries, and its interoperability with Objective-C, could provide the co-existence of Swift libraries and Objective-C libraries to further expand the functionality the iOS eyetracking-speech synthesizer.

Project Problem Components:

Design and Development Timeline and Deliverables:

Gantt Chart (Task/Outcome & Dates)
Exploratory Research Phase (Sources/Resources, Tools and Device Acquisition, Platform Setup)
Phases (Subtask – Design, Development Distribution; Deliverables & Integration)
Reporting (Documentation – incremental)
Meetings (Major milestones

Literature:
Speech Synthesis | Apple Developer Documentation – more on iOS, Swift, Programs, Resources, Technologies, etc.
Swift - Apple Developer
eye-tracking/ARSCNViewController.swift at master · chrishoste/eye-tracking · GitHub – sample Swift code