

Opti-Speech: A Visual Biofeedback System for Speech Treatment  
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We will present information on the design and development of the Opti-Speech system that incorporates data from the Wave Speech Motion Capture System into software that provides a real-time, three-dimensional representation of a patient's tongue within an animated avatar oral cavity, jaw, and head. The system has the potential to improve the efficiency of speech intervention in the following ways:

- 1) Opti-Speech provides real-time feedback for both the patient and the therapist. Opti-Speech provides the first 3D, real-time, multi-perspective view of the tongue, jaw, and head during speech production. The human head avatar shows tongue movement relative to internal anatomical landmarks that are otherwise unseen by the therapist and patient, allowing them to better guide exercises and more easily demonstrate desired movements for the patient.
- 2) Opti-Speech can create objective, customizable targets for therapeutic exercises. Opti-Speech provides highly customizable tongue position targets to guide articulatory therapy. Targets can be adjusted in size, position, or number to change the level of difficulty, allowing for progressive training of articulatory movements.
- 3) Opti-Speech combines built-in visual and auditory playback for therapeutic guidance and clinician collaboration. Clinicians can use playback to slow-down, pause, and isolate movements that they want a patient to focus on. Clinicians can also collaborate more easily when assessing a patient since sessions can be shared offline with clinicians who were not at the therapy session.
- 4) Opti-Speech collects quantitative data for longitudinal studies and generalization to future patients. Opti-Speech can collect data during therapy, allowing the therapist to quantitatively track patient progress. Collected data can also be used in research studies to significantly contribute to the field's understanding of tongue shape/position during correct and incorrect sound production.