

An AI-assisted, user-in-the-loop framework for quantitative analysis of laryngeal videostroboscopy

- **Laryngeal videostroboscopy** is an endoscopic means of visualizing laryngeal function during speech
 - Vocal fold motion, closure, and vibration
 - Presence/absence of lesions
- **The problem:** Current analysis is subjective and descriptive: adjectives like “good”, “fair”, and “poor” are not standardized
 - Varies across observers, or even within the same observer across different exams
 - Lack of objective ‘gold standard’ for measurement creates a problem in assessing voice quality
 - Stroboscopy doesn’t always align with patient self-report, expert listener ratings, or acoustic analysis
- **The potential solution:** Machine learning algorithms can aid analysis of laryngeal videostroboscopy, allowing for a currently subjective patient care tool to be made objective
 - Potentially a ‘game-changer’ clinically – patient care needs an objective measure
 - A tool this nature will be widely adopted into clinical practice and has potential for commercialization

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Videostroboscopy



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- **What Students Will Do:**
 - Characterize an existing tool for annotation of videostroboscopy
 - Identify shortcomings of the existing tool, especially regarding correlations with self- and expert-reported outcome
 - Develop solutions to these shortcomings
 - Collaborate with Drs. Akst and Brodsky to annotate some of our laryngeal stroboscopy datasets
- **Deliverables:**
 - Minimal: A clear characterization of a currently available tool
 - Expected: Association of quantitative scores with clinical outcome measures and identification of shortcomings on our in-house data
 - Stretch: An improved AI-assisted tool for quantitative analysis of videostroboscopy → extend from initial project of capturing lesions and motion to evaluating vibration

Adamian, N., Naunheim, M. R., & Jowett, N. (2021). An Open-Source Computer Vision Tool for Automated Vocal Fold Tracking From Videoendoscopy. *The Laryngoscope*, 131(1), E219-E225.

Parker F. Brodsky MB, Akst LM, Ali H. Machine Learning in Laryngoscopy Analysis: A Proof of Concept Observational Study for the Identification of Post-Extubation Ulcerations and Granulomas. *Ann Otol Rhinol Laryngol*. 2020 Aug 14:3489420950364. doi: 10.1177/0003489420950364. Epub ahead of print.

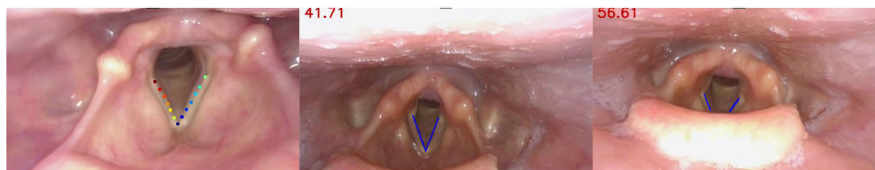
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- **Size group:** 2 would be ideal, we can consider 1 or 3
- **Skills:** Python, PyTorch, ideally some UX, ML experience
- **Mentors:**
 - Mathias Unberath: unberath@jhu.edu
 - Lee Akst: lakst1@jhmi.edu
 - Marty Brodsky: mmbrodsky@jhmi.edu

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