

**IMPROVING ELECTROLARYNX OUTPUT USING MACHINE LEARNING ON  
ACOUSTIC AND VISUAL**

**HISTORICAL ANALYSIS OF BIAS IN MEDICINE TOWARDS PEOPLE OF  
COLOR AND WOMEN**

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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## **Sociotechnical Synthesis**

A common treatment for throat cancer is a laryngectomy, which includes the removal of the voice box. The consequences of this surgery include the inability to produce vocal speech resulting in detriments to quality of life and patient-doctor relationships. To increase a patient's ability to communicate with their loved ones, my technical project focuses on using machine learning algorithms to improve the clarity of the electrolarynx, which is a device used by these patients to produce mechanical speech. Our project has analyzed audio and visual data from recordings of electrolarynx and non-electrolarynx patients reading *The Rainbow Passage*. Although our project was largely unsuccessful from the audio standpoint, we have created a neural network to analyze the visual data to accurately track four spots on the subject's lips within five pixels to recognize different lip movements. Using the failures from our audio data, we have also outlined how our advisors can recollect data to create a better model.

My STS thesis, on the other hand, focuses on the bias in healthcare. In my paper, I have reviewed how the lack of data from minority populations, specifically people of color and women, due to a history of malpractice, fear, and distrust results in worse diagnosis and prognosis of patients. Marion Sims' experimentation on black women, the Tuskegee Syphilis study, and events about pain in women are outlined in this section, and some new methods that have been implemented to combat the resulting issues are analyzed. Using unintended consequences, this paper explains the drawbacks of newly implemented methods because of the underlying fear and distrust.

The lack of data from my technical project has highlighted some of the concerns for why there is a lack of data around minority populations as I researched for my STS thesis. It is hard to find people with diverse backgrounds, but it is vital for having results that represent the whole

population rather than a subset. Additionally, the research for my STS thesis taught me more about the invisible barricades in healthcare that limit access and quality. Social constructs such as insurance, which was created to help patients pay for their medical expenses, has forced some from being able to afford essential treatments and medicines. These restrictions are important to consider when projects like my technical project are ready for consumer use.

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