INDUSTRIAL SOLUTIONS LABORATORY

Company Information

Company Name	Advanced Respiratory and Sleep Medicine	**Date Submitted**	*11/29/2023*
Project Title	*Design of a Process to Produce Palate Stabilization Devices (ADVANCED_PALATE)*	**Planned Starting Semester**	*Spring 2024*

Senior Design Project Description

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills.

Discipline	Number	Discipline	Number
Mechanical	4-5	Electrical	
Computer		Systems	

Company and Project Overview:

Advanced Respiratory and Sleep Medicine, PLLC is a private pulmonary and sleep medicine clinic and research center with offices in Huntersville and Hickory, NC. Since opening our doors in 2010, we have cared for more than 15,000 patients. Advanced Respiratory and Sleep Medicine (ARSM) partners with pharmaceutical and medical device companies to research new products and technologies that may someday impact peoples' lives. The ARSM team includes Thomas Stern, MD, MS; Asha Stern, MD, MPH; Todd M. Thompson, PA-C; and Felix Kurniawan, MS. Studies conducted at Advanced Respiratory and Sleep Medicine, PLLC include trials that have contributed to the approval of medications such as Breo, Trelegy, Stiolto, Breztri, Sunosi, Xywav, Wakix, and Lumryz to name a few. Medical services provided include:

- Lab-based sleep testing
- Home sleep testing
- Pulmonary function testing

- Electrocardiography
- Clinical laboratory
- Psychological and psychometric testing

Project Requirements:

Snoring is a sound produced by vibration of the soft palate and is caused by increased resistance in the upper airway. It is estimated to affect close to 50% of adults and prevalence increases with age. Snoring can cause discomfort in the upper airway of the snorer and also disrupt the sleep of a bed partner.

Snoring may be a symptom of obstructive sleep apnea. People with obstructive sleep apnea are at increased risk of cardiovascular events. In the US, people that are diagnosed with sleep apnea are eligible under medical insurance for effective treatments such as continuous positive airway pressure (CPAP). People who snore but do not have obstructive sleep apnea, which will be referred to a primary snorers, are not eligible for CPAP through medical insurance.

Current treatments for primary snoring include weight loss, treating nasal congestion, mandibular advancing devices, surgical resection of the upper airway and positional therapy to name a few. The goal of these treatments is to increase patency of the upper airway. None of these treatments are as effective as CPAP.

To date, there is no therapy for primary snoring that is directed at stabilization of the soft palate. In theory, stabilizing the soft palate and therefore reducing vibration, could decrease the sound of snoring. Decreasing the vibration of the soft palate and the sound of snoring could improve sleep quality of both the primary snorer and the bed partner.

The anatomy of the upper airway is quite variable. A device that is going to stabilize the soft palate would require a patient specific design. The objective of this senior design project is to identify a process by which a personalized soft palate support can be designed to treat primary snoring.

Expected Deliverables/Results:

- Method to capture relevant patient anatomy required to manufacture device
- Method to manufacture custom palate devices
- Testing and verification of both methods
- Full documentation of both methods

Disposition of Deliverables at the End of the Project:

Students are graded based on their display and presentation of their team's work product. It is mandatory that they exhibit at the Expo, so if the work product was tested at the supporter's location, it must be returned to campus for the Expo. After the expo, the team and supporter should arrange the handover of the work product to the industry supporter. This handover must be concluded within 7 days of the Expo.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Biomedical Engineering concentration