CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)
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Project Number
S1001

Project Title
Development of a Low-Cost Mobile Respiratory Analysis Device Integrating FeNO Testing, Pulse-Ox and Secured Bluetooth

Abstract

Objectives/Goals
Alternative, inexpensive approach in the development and structure of a portable compact respiratory analysis device. Include FeNO, pulse-oximetry, and heart rate in addition to the spirometer functionality.

Methods/Materials
Developed prototype with a 3d-modeling software for 3d-printing/CNC, schematic and PCB programs, electronic components, Bluetooth development kit, Android SDK. Tested using a Bluetooth debugger and devices off the market to compare accuracy.

Results
The error rate of the prototype is 3% and has a variation of .14 L, complying to the American Thoracic Society's standards.

Conclusions/Discussion
The device is able to effectively and accurately record fractional exhaled Nitric Oxide, spirometric data (FEV1, FVC, PEF), and heart rate and blood oxygen levels and complies to market standards. My prototype is easy to use, cost-effective and portable.

Summary Statement
I developed a 3d-printed device that measures and analyzes respiratory function using an Android application for personal use for asthmatics and individuals with respiratory disorders.

Help Received
I researched, designed and built the prototype. I reviewed sensor data sheets and the prototype functionality with my mentor.