

Asthma Monitoring for Increased User Compliance

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Background: Improved peak flow monitoring can help asthma patients better manage and understand their condition and enable doctors to better prescribe medicine and dosages. Improved peak flow monitoring can have a wide impact, as asthma is a common respiratory disease, estimated to affect 20 million Americans. Severe asthma attacks account for approximately 5000 emergency visits per day and can have much more fatal consequences. Many of these emergency visits are considered largely preventable. Peak flow can be a very useful metric for monitoring asthma conditions, but many patients do not regularly monitor. Even those that do may occasionally get low readings due to low effort, since the peak flow maneuver depends on effort.

Solution: A peak flow meter that is easy to use and has feedback to encourage the user to take accurate measurements will increase user compliance. An on-board microcontroller records data and uses Bluetooth to send the data to a phone, where it is processed and displayed. In order to address the effort dependency of peak flow measurements, an algorithm was used to calculate a metric for effort based off of waveform shape. In order to address user compliance, an app was developed to automatically record device data, displays trends intuitively for the user, and give recommendations based off of nationally recommended standards.

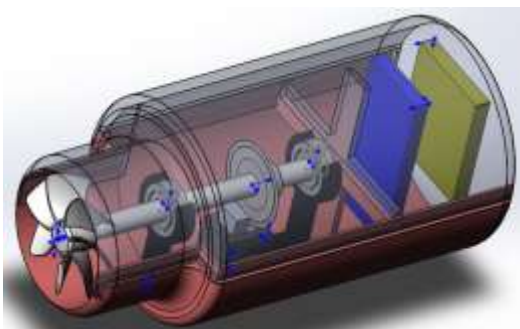


Figure 1. Chassis of peak flow meter.

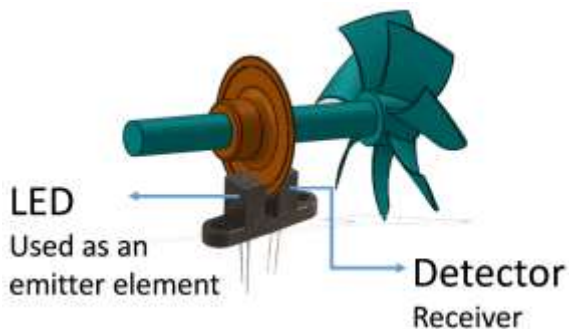


Figure 2. Peak flow sensor.

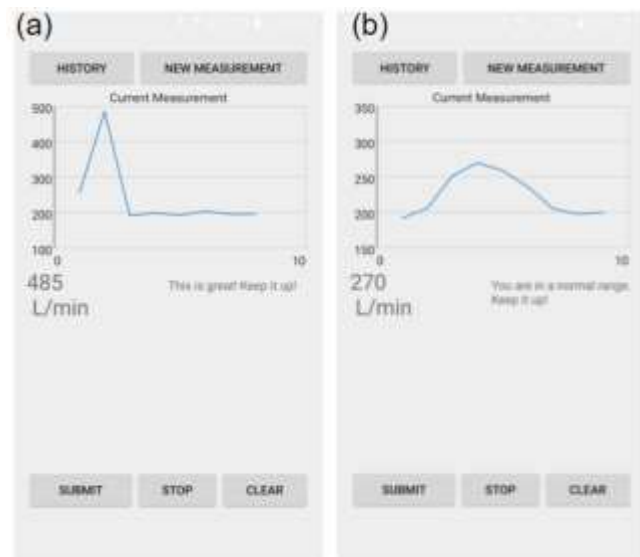


Figure 3. Asthma App. The app displays the current measurement, and provides feedback to the patient. It also stores historical data, which can be shared with the patient's doctor.

Conclusion: This project has three merits. (1) Effort calculations, which combined with messages in the app steer the patient towards effort independent readings. (2) Bluetooth connection between peak flow meter and phone all. And (3) Automatic tracking of data. These three factors combined help make peak flow meters more useful for asthma patients monitoring their symptoms.