

Open Thesis / Project

Reference-free Microphone Calibration to Measure Inhalation Efficiency

Motivation

Increasing popularity of inhaled therapy stimulates research on smart devices. A major concern is the variability of the drug dose delivered to the lungs from the inhalation devices due to differences in the patients' inhalation profiles. In this project we are interested in using microphones embedded in modern smartphones to accurately monitor the patient's inhalation manouvre. The major problem here is how to avoid extensive microphone calibration and yet provide accurate measurements of the air flow. In this thesis, we would like to use deep learning methods to achieve the goals and implement a smartphone app as a proof of concept. You will need to gather data with several smartphones of different types and experiment with various inhalers. Your goal is to make accurate inhalation efficiency measurements possible with zero effort. We have some ideas how to achieve this, but you will get a lot of experimentation freedom!

Interested? Please contact us for more details!

Target Group

Students in ICE and Computer Science.

Thesis Type

Master Thesis (Duration: 6 months).



Image source: <https://bit.ly/2XzI5TN>

Goals and Tasks

- Prepare a setup to measure air flow from an inhaler with a smartphone (we'll provide you with everything you need);
- Run experiments, gather data with different inhalers and smartphones, understand the impacts of different sources (*e.g.*, a smartphone cover, direction) on accuracy of the measured air flow;
- Pre-train a deep learning model (a Generative Adversarial Network) to translate acoustic measurements taken with a specific microphone into a hardware-independent domain;
- Implement a smartphone app which integrates the final model and supports its light re-training on a new hardware;
- Present a demo and summarize the results in a written report.

Requirements:

- Creativity, interest in mobile deep learning;
- Programming skills in Python, Java or C++.

Used Tools & Equipment

- A smartphone and a laptop;
- You need to own a phone which you can use for development and testing (no root access needed, no jailbreaking).

Contact Person

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