**Continuous Monitoring for Asthma Control**
Lida Acuña-Huete, Cassandra Thomas, Jesse Wang
*Advisor*: Professor Thomas Yen
*Client*: Dr. Sameer Mathur

In 2008, it was reported that about 12 million people in the United States had an asthma attack, but it could have been prevented (Centers for Disease Control and Prevention, 2011). Asthma is a syndrome which constricts the airways and airflow. The preventative medicines an individual is able to take depends on various parameters, such as age and symptoms. However, the effectiveness of the medicine relies on a patient's effort. Doctors work with their patients to set up a personalized Action Asthma Plan (AAP) which helps the patient subjectively monitor their symptoms. There are about 25 million people in the U.S. that have been diagnosed with asthma who would benefit from a device to continuously monitor their asthma symptoms for asthma control. Current devices on the market measure different parameters utilizing breathing rate sensors; however, these are used to analyze athletes in high performance environments. These athletic performance devices are sold for $400; the cost for producing a device specific for detecting asthma symptoms is currently $300. However, due to the nature of the device, it is possible that a patient's health insurance would pay for this device, and decrease an individual's out-of-pocket payments. This device will differ from its competitors as it will only focus on individuals with asthma. Furthermore, with the software that will be implemented in this application, the only pertinent output information is the detection of asthma symptoms.

For the initial prototype, the target population will consist of adult males who have already been diagnosed with asthma and have consented to participate in this study. In the future, the prototype would be modified for females as well as all age groups. The current prototype incorporates stretch bands spanning across the chest and electret microphones to measure changes in respiratory volume and the concurrent detection of coughing or wheezing. Ultimately, the device will be able to send information periodically to a clinic for monitoring. If a patient shows symptoms which indicate an asthma exacerbation, the clinic will be notified immediately. Preventative measures will be taken as directed by the physician, which will decrease the likelihood of exacerbation or hospitalization. The collected data will be compared to the average respiratory rate for validation and used to identify the prominent asthma symptoms that will be essential for the physician when determining a patient's action plan. This device will be able to increase the time of detection for asthma exacerbation symptoms. Currently, it may take a person up to 2 days to detect any changes. Thus, by the time they contact their physician, preventive measures may not impede an exacerbation. The increased time it takes to detect asthma symptoms will decrease medical costs for patients and help clinicians set gold standards for this device. This device could also be integrated with a smartphone application which can help increase the person's' effort to track their symptoms and help a broader audience.