Pillagnose

BMEN 3151 *Medical Device Practicum*

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Clinical Problem

Our clinical problem is to detect and monitor nocturnal ailments at home instead of at the hospital. We will be focusing on sleep apnea, nocturnal seizures, and drug-induced breathing depression.

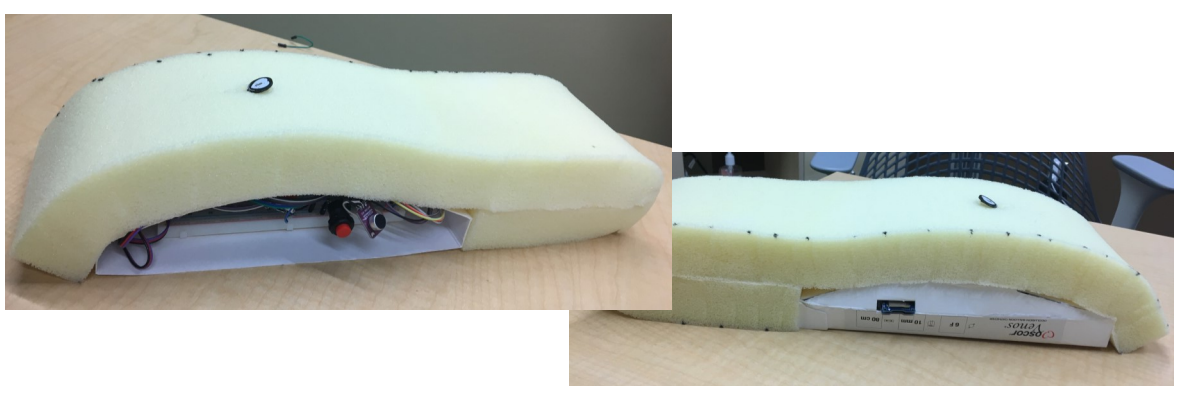
Disorders that interrupt patient sleep can greatly impact quality of life. With diagnosis of these problems, a patient can get medication or medical attention needed to address these issues. Many sleep disorder issues like sleep apnea require an overnight medical exam known as a sleep study. This can be expensive and time consuming. Many major forms of insurance cover a sleep study. However, different insurance companies have different standards about whether or not a sleep study is medically needed resulting in costs potentially being covered by patient. This conflicts with patient expectations of having their care covered.

Needs Statement

Increase simplicity and reduce cost in diagnosis and monitoring of sleep disorders.

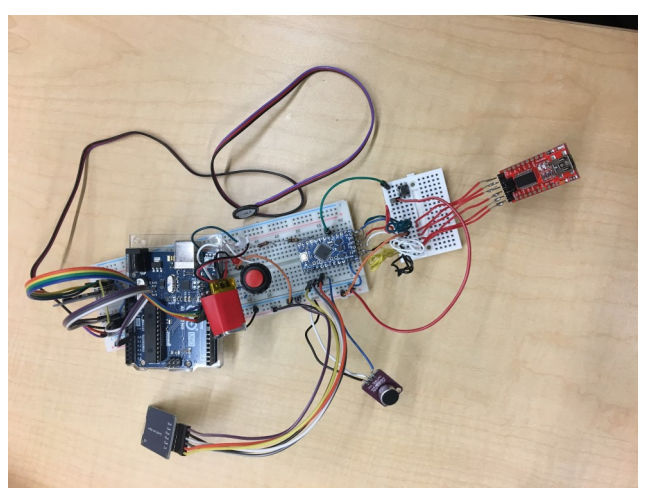
Market Analysis

Our medical device is for home use for patients who have or suspect that they have a sleep disorder. Seventy million Americans are impacted by sleep disorders. One in twenty-six Americans will experience seizures in their lifetime and sleep disorders can occur at any age. Since the prevalence of sleep disorders is growing the market for monitoring devices is also growing. Sleep disorders are difficult to detect yourself and often require another person to observe irregularities during a sleep study in a hospital to detect them.



Medical Device Solution

A medical device solution to address this problem is a pillow that monitors heart rate and breathing rate, in order to assist in detecting and diagnosing sleep issues. All components that are used to monitor heartrate and breathing pattern are incorporated into a pillow which make it easy to use and is suitable for all ages. The pillow has two components, a heartrate sensor and a microphone, and both of which are controlled by Arduino. Heartrate is monitored with a heartrate sensor on the surface of the pillow. A battery powered microphone collects data from the side of the pillow to store breathing in an audio file. Data from the sleep is stored on the micro SD card, and then the data is imported into Matlab and integrated to diagnose sleep disorders. Instead of holding sleep studies in the hospital and wracking up large bills, doctors may send the patient home with the pillow to collect data during their sleep, and then analyze the data when the pillow is returned. Data should be reviewed with a physician to confirm results.



Team Photo