Project Statement & Specifications

Seizure Monitor- Entrepreneur Project
TEAM # 23
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Project for Entrepreneurial Senior Design Project

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Statement of Need

Sleeping can be a dangerous activity for people who suffer from epilepsy. Epilepsy is a brain disorder involving repeated, spontaneous seizures of any type which affects more than three million Americans\(^1\). A seizure is a sudden surge of electrical activity in the brain. This causes a person to become confused and begin convulsing among many other things. Currently, there are surgical procedures that can cure epilepsy, however only 3,000 to 4,000 patients receive this treatment. Most opt for medications due to the price of surgery, but medication does not always diminish the frequency of the seizures or resolve the issue altogether\(^2\). Thus, patients are still at risk of epileptics seizures any time, especially when sleeping, which greatly threatens their safety.

Introduction and Overview

The device will be worn by patients suffering from epilepsy to monitor seizures. Seizures which go unnoticed while a patient’s asleep can be extremely detrimental to one’s health, resulting in loss of consciousness, exhaustion, nausea, vomiting, and inadvertent injury\(^3\). In the event of a seizure, the device will transmit a warning to signify to the caregiver that a seizure is in progress. The ideal product will be a small, wristwatch-like accessory which can and should be worn 24 hours a day. The monitor will catalog the time, duration, and severity of the seizure for evaluation by one’s doctor. The monitor will have Bluetooth communication for a close proximity auditory and visual warning system. This would allow the caregiver to recognize an onset of a patient’s seizure. The device will also provide real time information transfer for doctor or caregiver’s handheld accompanying device. The seizure monitor will

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\(^1\) https://health.google.com/health/ref/Epilepsy
\(^2\) http://www.umdnj.edu/umcweb/marketing_and_communications/publications/umdnj_magazine/hstate/win98/epicure.html
function on rechargeable batteries to reduce waste. The size and wireless capacity of the device is unusual and differs significantly from current seizure monitors which lie under the patient’s mattress. The seizure monitor will also display the time and date to a screen on the front of the monitor.

**Realistic Constraints**

In terms of economic restraints, the funding for the project is limited and thus the design must not be extravagant. Although the benefits of the device are revolutionary to the caregiver of an epileptic person, the team will have huge liability in ensuring the device properly monitors seizure activity. Therefore, in terms of ethical constraints, it is necessary to carry out an extensive trial in which the team will evaluate the effectiveness of the product before it becomes available to the market. This requires a large test group with varying severities of seizures. In terms of environmental constraints, the team plans to utilize reusable batteries rather than disposable batteries.

**Other Data**

Project found: NSF 2006 Engineering Senior Design Projects to Aid Persons with Disabilities

The team will create a business plan in collaboration with MBA students with the intention of marketing the final product. This will involve serious modifications once the market analysis is performed.
Questions

- What is a realistic size and weight for the monitor?
- How much memory can the monitor store?
- Which muscles will be measured for contractions? Will the wrist be sufficient as a choice of location?
- What is the battery life?
- What materials will the product be made of?
- How many supporting devices will be necessary for the system to function correctly?
- Can seizures be measured using an accelerometer to detect muscle movements?
- Can seizures be measured using electrodes?
- Which is more applicable - Bluetooth or wireless (cell phone communication)?
- Can one use LabView to program Bluetooth?
- Would it be useful to analyze data from the recorded seizure if it could be sent to a physician’s computer? If so, which physiological parameters would be most useful in the analysis?