

ANALYSIS OF SENIOR PROJECT DESIGN

Title: Wireless Sensing of Epileptiform Activity

Student Name: Wade Barnes

Signature:

Advisor's Name: Dr. Prodanov

Advisor's Initials:

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Summary of Design

This project analyzes signal patterns associated with epileptiform activity using Matlab, describes modern medical sensing techniques, and implements a wireless sensing system to work with an existing system.

Primary Constraints

The primary constraints were power consumption and size of the device. It needed to be small in order to fit inside of the skull, and maintain low power consumption so that it could be powered wirelessly.

Economic

Part	Unit Price (\$)	Number	Total Price (\$)
390 Ohm Resistor	0.10	1	0.10
1 nF Capacitor	0.10	2	0.20
5082-2835 Schottky Diode	0.08	2	0.16
CD4007UBE IC	0.25	1	0.25
Roll of Copper Tape	9.37	1	9.37

Task	Estimated Time (Hours)	Actual Time (Hours)
Research	30	50
Coding	40	50
Design	30	40
Construction/Troubleshooting	10	20
Testing	10	10
Report	30	50
Total	150	220

Environmental

There aren't large environmental impacts. Biologically, the patient could be exposed to larger amounts of radiation and increased infection rate; further biological testing is required to analyze this.

Manufacturability

The most difficult part for large scale implementation is being able to manufacture this in a way that the device will work in people with very different biological conditions.

Sustainability

This project would get rid of a permanent hole left in patients' skulls. Sending power wirelessly will put more strain on the battery, so it will have a shorter life span. Upgrading the current system would require additional brain surgery for the patient.

Ethical

This project's primary purpose is to improve the patient's quality of life by eliminating the need of a permanent hole in the patient's skull. However, if the system were to somehow be infiltrated, it could be used to send harmful electrical impulses to the brain.

Health and Safety

As mentioned above, further testing needs to be taken on to analyze how much radiation is absorbed by the brain in this application.

Social and Political

Implanting a device in the brain requires a large amount of safety testing, and most of the testing would come from the health standards imposed by law.

Development

I learned about many new techniques and ideas throughout this project including: nonlinear analysis, the behavior of neurons, RFSim99, and planar inductors.