# FID Frequency Extraction Engine

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FieldLine

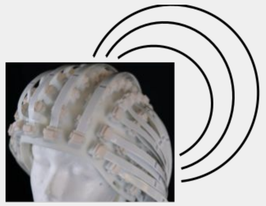
## Introduction

**Current brain imaging methods:**
- Measure brain activity indirectly
- Patients have to stay still for long periods
- Limited in time resolution
- Magnetic shielding costs $2 million

We are helping FieldLine address these issues by developing a data analysis system for their MEG product.

**Magnetoencephalography (MEG):**
- Measures brain currents directly
- Patients can move around
- Outputs information in real time

FID (Free Induction Decay) Magnetometer Sensor developed by FieldLine

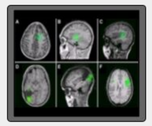


Interface with patient via helmet

Measure the magnetic field produced by currents in the brain

Create analog signal

Analyze frequency data



## Our Product

The FID Frequency Extraction Engine extracts the frequency of the FID Magnetometer at a high resolution.

**Functions:**
- Digitizes analog signal input at 160MHz with 16 bit resolution
- Apply Zero Crossings algorithm on digitized signal
- Acquire and plot frequency in real time

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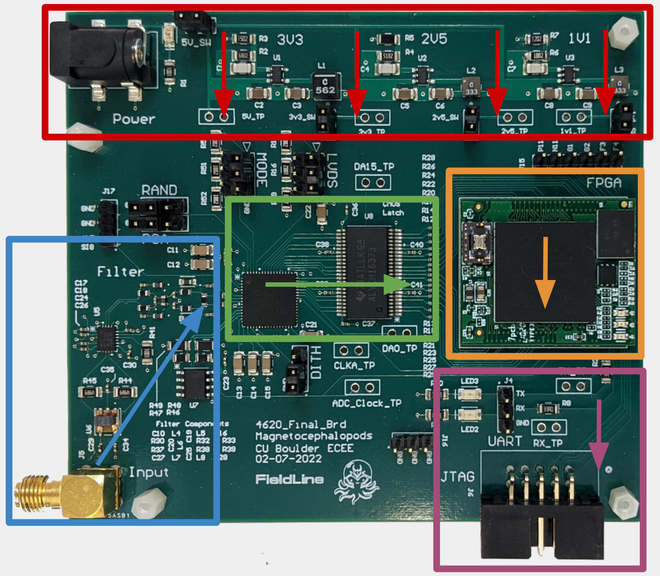
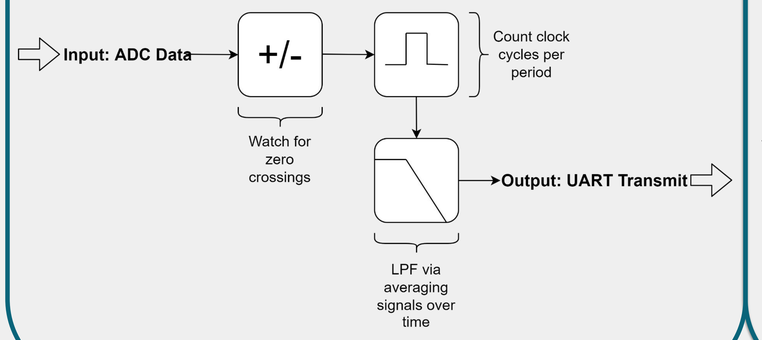
## System Design




| | |
|---|---|
| Power | Provides power to system. Supplies 5V, 3.3V, 2.5V, 1.1V |
| Signal Input | Take in analog signal from FID system |
| Analog to Digital Converter (ADC) | Converts analog signal into digital signal |
| Field Programmable Gate Array (FPGA) | Cyclone VE FPGA, 40MHz Oscillator Computes frequency |
| UART Connector, JTAG Connector | Connect FPGA to laptop |
| → | Indicates Data or Power Path |

### Zero Crossing Algorithm

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