FTL Pitch Document

- **Title:** Fourier Transform Library (FTL)
- **Members:**
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- **Brand:**
  - **Name:** FTL
  - **Tagline:** "The profound study of nature is the most fertile source of mathematical discovery." ~ Joseph Fourier
  - **Bio:** FTL seeks to create a robust library containing multiple Fourier and Fourier-adjacent Transformations on 1D data. We will create an intuitive application to allow users to interact and experiment with Fourier transforms, to allow educators and professionals to create their own demonstrations, and to allow for users to transform their own data.
- **Summary:** Our initial goal is to build a new library in C# containing all the methods necessary to input and transform a sound wave into its constituent frequencies. We will create a front-facing application that utilizes this library with widgets that the user can activate. With these widgets, we will construct a Polyphonic Tuner that will demonstrate the steps of a transform from raw signal to its constituent waveforms.
- **Motivation:** Potential applications: Data compression, Signal processing/filtering, open-source access. Maui Blazor is a new technology so it would benefit us to have experience with it as we enter the job market. There is not currently a widely available Fourier library for C# so implementing this would give access to mathematicians/developers/educators not interested in creating their own.
- **Resources:** C#, Maui Blazor, .NET, Bootstrap, and other sources to research the mathematics
- **Timeline:**
  - **January:** Application structure and data flow. Solidify Walsh-Hadamard algorithm.
  - **February:** Implement Walsh-Hadamard Transform and get data from user through FTL in application.
  - **March:** Add FFT and get audio data stream working.
  - **April:** Create Polyphonic tuner using application.
  - **Stretch Goals:**
    - Users can choose which widgets to display.
    - Ability to generate waveforms.
    - Additional transforms: Wavelet, Convolution, Compression, Multiplexing
    - Image compression