Oscilloscope 004-1: The GO-Scope

Our team set out with the goal of making an oscilloscope that is lightweight and portable, while still being functional and user friendly. Dubbed “The GO-Scope”, our system features a 100KHz sampling rate, 2 channel display, and multi format file saving capabilities (.csv and .wav). Our original aim was to create an oscilloscope for audio visualization and engineering.

One of the biggest hurdles our group encountered was trying to achieve a sampling rate of 1MHz. Originally, we planned on using an arduino microcontroller, but the internal clock of the arduino lacks the clock speed to achieve the desired sampling rate. So, instead, we decided to use the Teensy 4.0 microcontroller. With the Teensy, we were able to achieve a sampling rate of 1MHz on its own, but when we combined this code with our user input reading code, our sample rate was bogged down to 0.1MHz (100KHz).

Another large hurdle came with programming the signal visualization with all of the functionality we needed. Many of our group members worked on code for individual blocks, and it was difficult to integrate all of the code together.
Although we initially intended for audio signal visualization, the audio jack input does not allow for a clear signal. Much of the signal that comes through the input is unintentionally filtered out and difficult to read. A future design could incorporate an amplifier to make the signal more legible.

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<tr><td>Timeline due</td><td></td><td>Design peer review</td><td></td><td>Final pcb design review</td><td></td><td></td><td></td><td></td><td>Elevator pitch presentation</td></tr>
<tr><td colspan="3">Create basic design/block diagram</td><td colspan="2">Create PCBs</td><td colspan="2">Test and manufacture PCBs</td><td colspan="3">Integrate design blocks</td></tr>
<tr><td></td><td colspan="4">Create minimum viable design to allow for display</td><td colspan="3">Work to meet customer and self imposed requirements</td><td colspan="2">Test and rework design</td></tr>
<tr><td colspan="3">Research possible hardware and software to use</td><td colspan="2">Purchase and test hardware and software</td><td></td><td></td><td></td><td></td><td></td></tr>
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Key lessons: We learned a lot about working as a team for an engineering project. We learned how to go through the design process and integrate all of our individual engineering blocks together. We also learned about time management; how to understand the scope of a project and plan for designing and testing.