Creating a Biosignal Acquisition Platform for Medical Research



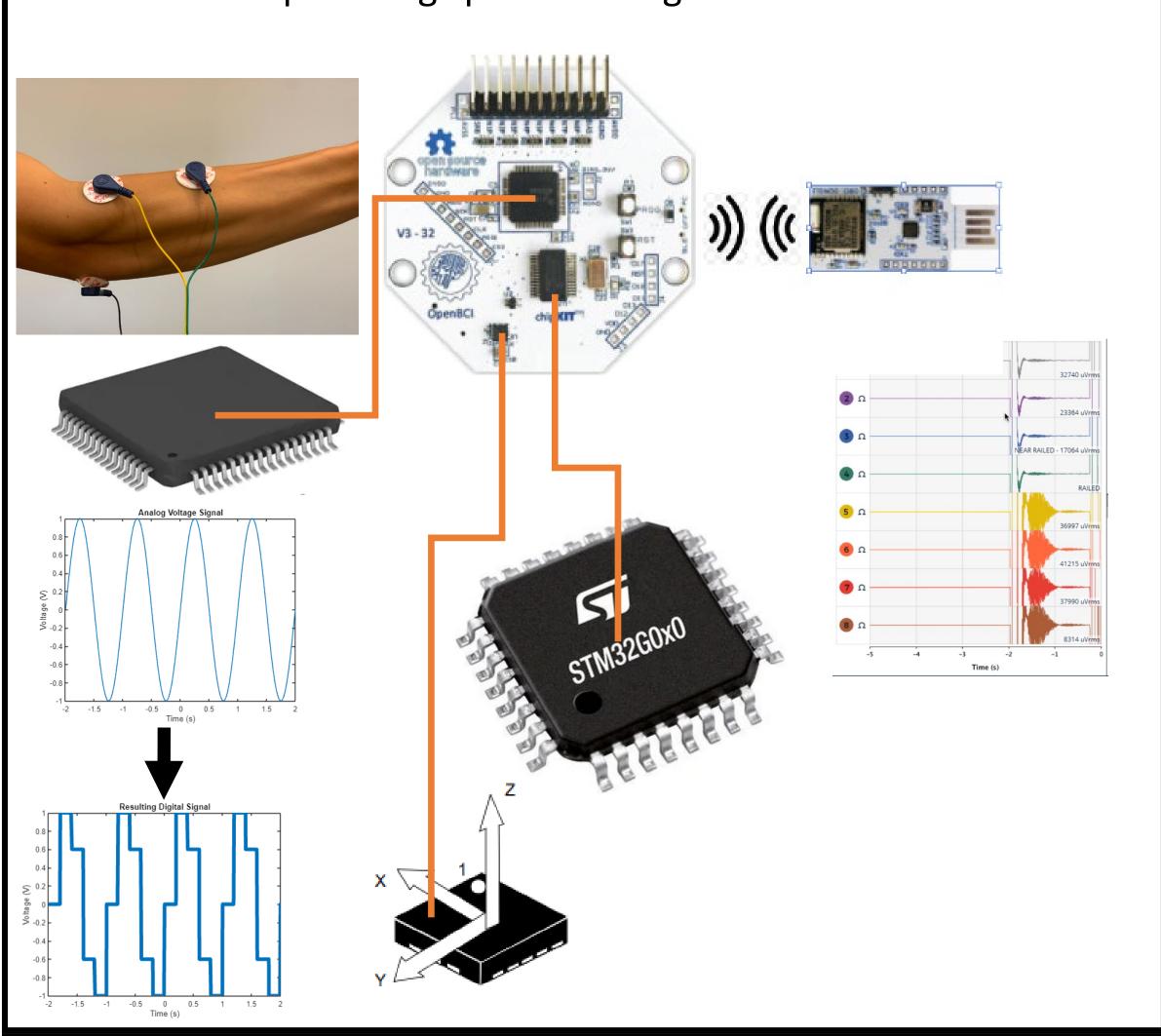
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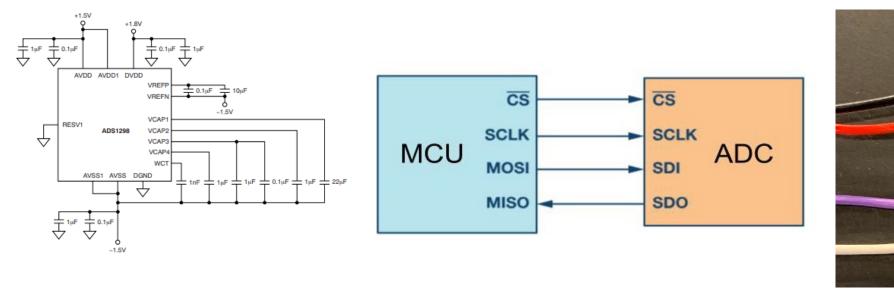
Context

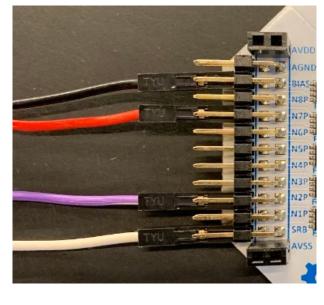
- Biomedical signal devices allow us to monitor patients EEG, EMG, and ECG signals
- Cyton Board has been used in previous projects for wearable devices
- Improving the form factor problem
 - Keeping essential components
 - Optimizing space in design



Part Selection & Circuit Design

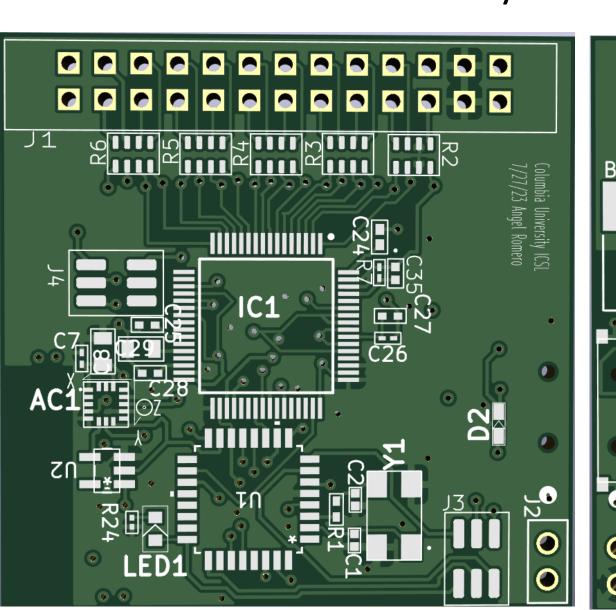
- Selecting components similar to original design
 - Parts in original board no longer available
 - New parts should have same functionality
- Connecting and programming appropriate pins
 - Supply, same power requirements
 - Communication bus creation
 - Sufficient Input/Output pins for data

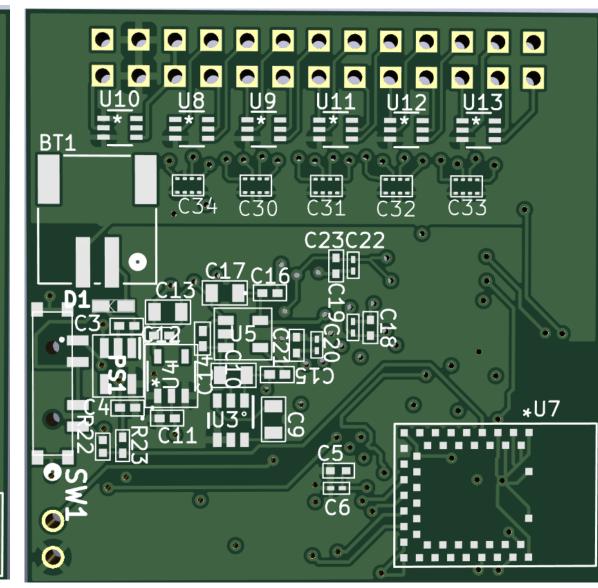




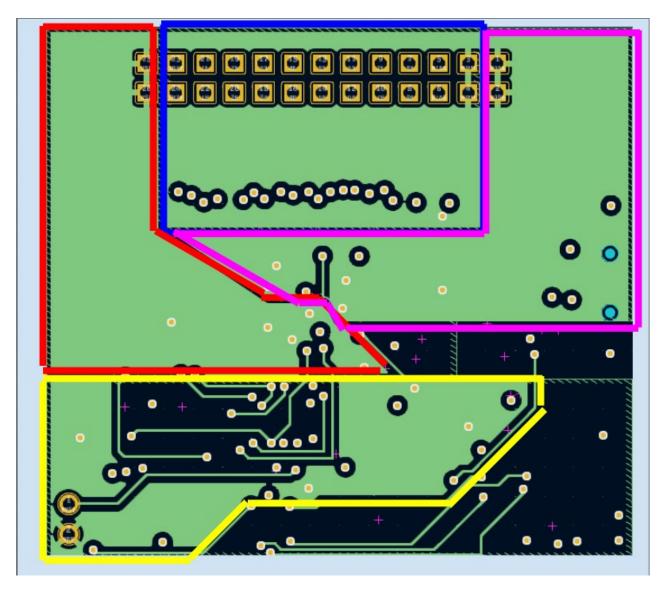
PCB Design & Soldering

- Designing the PCB on KiCad by arranging and adjusting components as necessary
 - Tracks & Vias route connections
 - Clearance Rules
 - Copper Zones
- Soldering the components onto the PCB ensuring proper connections
 - Surface Mount
 - Land Grid Array

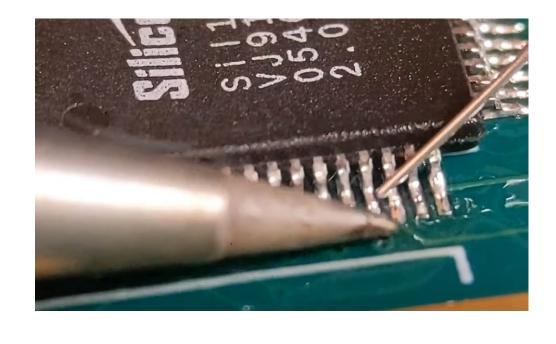




40x40mm design Front and back



Secondary copper layer with copper zones

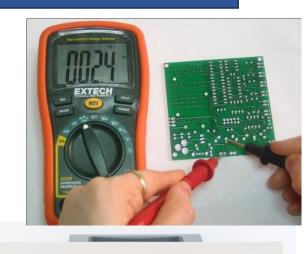


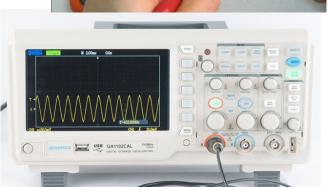


Soldering techniques for different packages

Validation

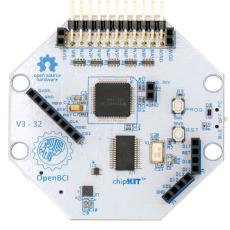
- Testing the board
 - Measuring voltage of components
- Program the board
 - Connecting to pins and using component software
- Compare ADC measurements to Cyton Board

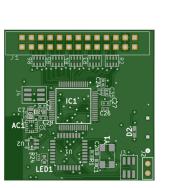




Results

- Two PCB designs both with decreased form factor
- Board was made with parts that are still
- Board is compliant with constraints from PCB manufacturer
- Board area has been decreased by 46%

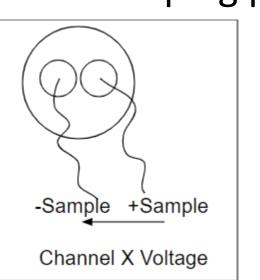


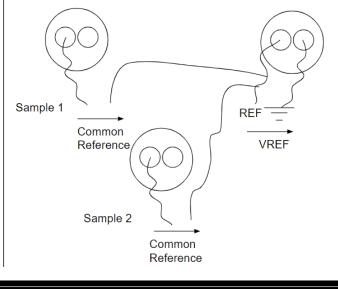




Future Work

- Implementing EEG signal sampling
- Optimizing component selection for size
- Flexible PCB designs
- Developing plug and play software







Acknowledgements

would like to thank Columbia Amazon SURE for sponsoring my research this summer. I am grateful to Columbia ICSL for giving me a space to learn and develop my project. This project was done in parallel with the work of Emily and Liwen. I also thank Qijia Shao for his work with the Cyton Board.