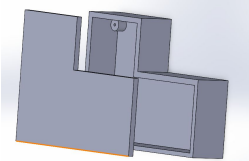


School of Electrical, Computer, and Energy Engineering

Introduction

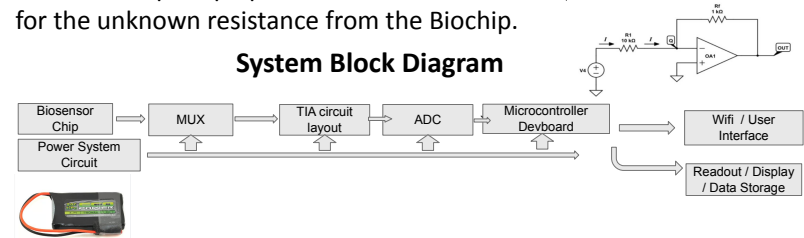
Team 54 designed a handheld biosensing system that incorporates a biochip with 32 sensing channels. The design will detect resistance changes throughout the 32 channels and sends the data via WiFi. The circuit was printed onto a PCB and placed in a custom 3D printed enclosure.



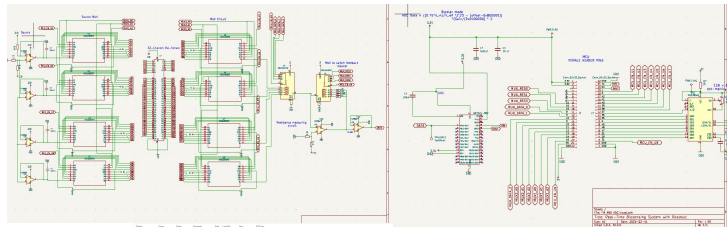
Concept and Theory

The resistance measurement is made in a Trans-Impedance Amplifier Circuit (TIA). The measurement is made using an equation derived from basic Op-amp operation that takes the voltage V_{out} and solves for the unknown resistance from the Biochip.

System Block Diagram



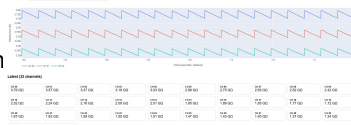
Results and Final Schematic



Schematic Results

Resistor R (Ω)	Feedback R (Ω)	Value (V)	Error (%)
10kΩ	10kΩ	0.949	0.16
100kΩ	10kΩ	1.045	0.947
100kΩ	10kΩ	1.054	0.7
100kΩ	10kΩ	1.045	0.47
1G	100kΩ	1.0488	2.40

WiFi
information
Interface



Conclusion

Final PCB Layout

- ★ PCB layout is complete with no issues
- ★ Resistance measuring circuit is operational as well as code for MCU/Muxes

Future Considerations

- ★ The team is committed to completing the prototype
- ★ Creating a circuit to allow accurate measurements at the 10 giga-ohm range
- ★ Mux layout could be optimized for size by using less

