TEXAS STATE
INGRAM SCHOOL OF ENGINEERING

E2.05 - Flextivity

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TXST Sponsor: Dr. Maggie Chen

FLEX TIVITY

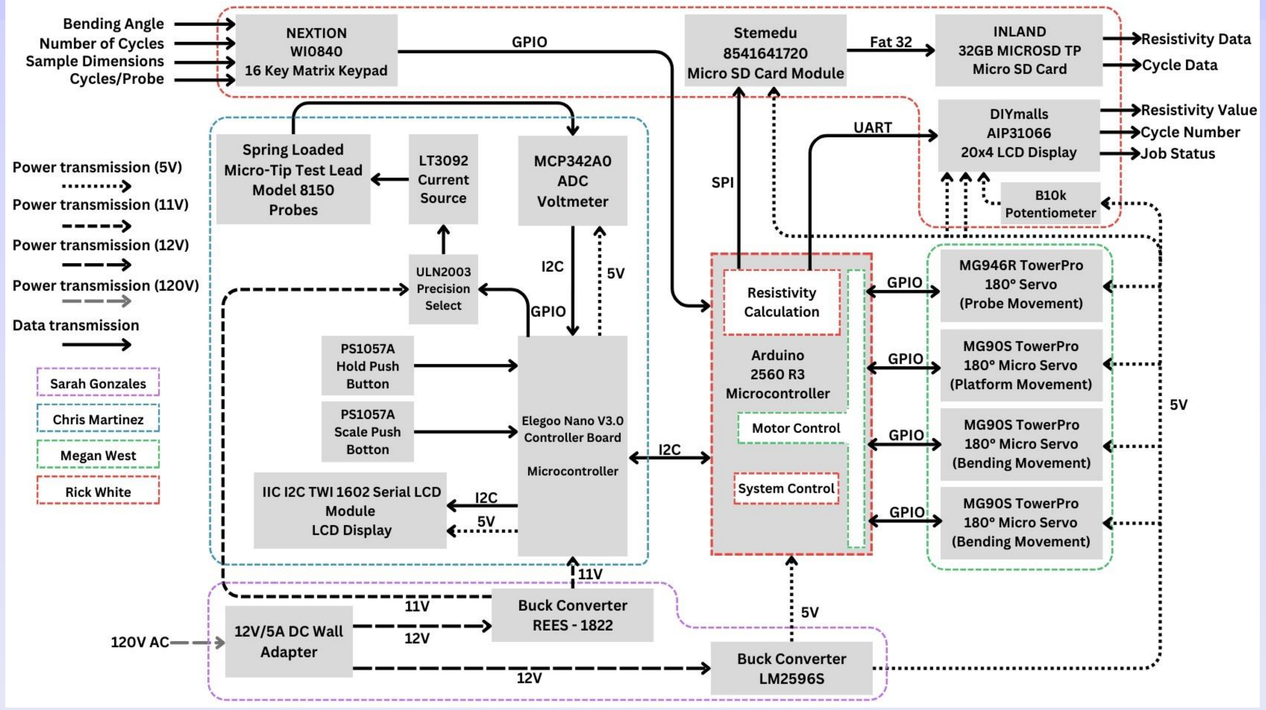
Project Overview

Our project is a bending apparatus that characterizes mechanical and electrical properties of conductive materials, to aid in the production of flexible electronics. Cyclic bending will aid in determining device sustainability while resistivity/conductivity measurements will aid in performance analysis.

Requirements	Results
Control bending Angle 0-180° within +/- 1°	45° +/- 1.188° 90° +/- 2.142° 135° +/- 21.47° 180° +/- 9°
Bend Sample For Inputted User Cycles (0 – 10,000)	100% Cycle Inputted = Bends Achieved
Measure conductivity in real time	Decreasing conductivity (normalized), when probing every 5, 10, 20 cycles for 1000 bends.
Store angle/cycle vs conductivity	Memory writing operations validated up to 1000 cycles

Chris Martinez | Rick White | Sarah Gonzales | Megan West

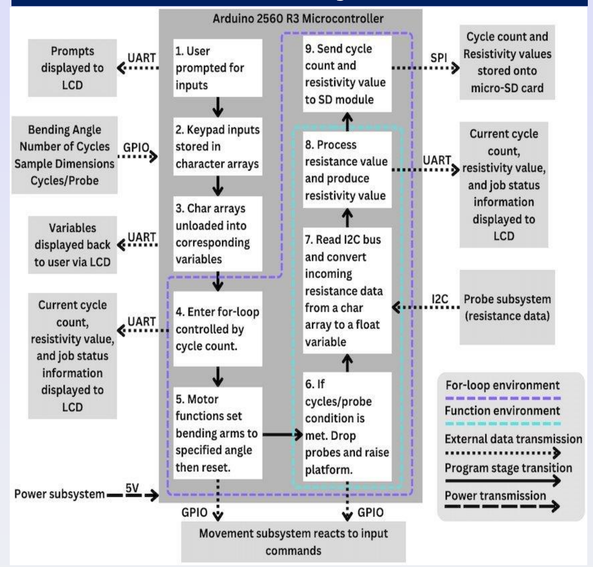
Top Level Block Diagram



Features

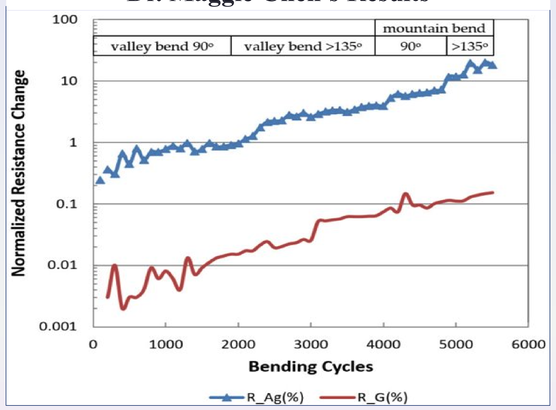
- 0° to 180° degree tension bending.
- 4-Point Probe resistance measurements
- Resistivity/conductivity calculations
- Accepts user inputs and displays real-time data to user interface.
- Stores data on micro-USB for external data analysis

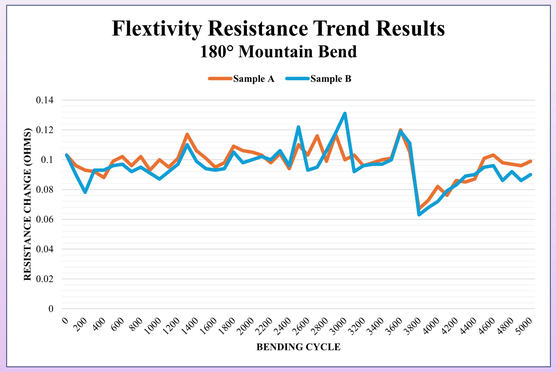
Control System

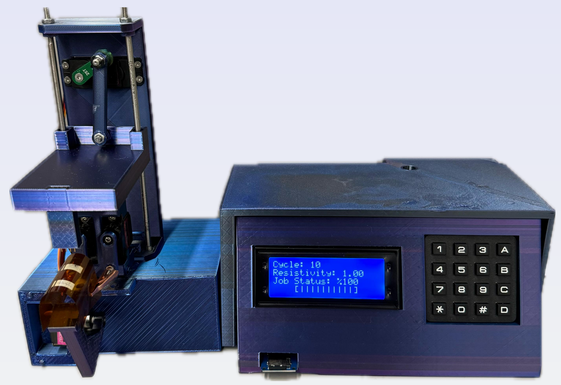


Resistivity Trends

Dr. Maggie Chen's Results







Probes Testing

Supply Current to Probes	156mA 0.1mΩ scale 15.6mA 1.0mΩ scale 1.56mA 10.0mΩ scale
Read Resistance	Utilizing a 10Ω resistor 9.8763Ω 0.1mΩ scale 9.876Ω 1.0mΩ scale 9.88Ω 10.0mΩ scale
Transfer Resistance to System Control	Character Array transmits resistance values from input resistance.
Calibration	12.475Ω 0.1mΩ scale 100Ω 1.0mΩ scale 1000Ω 10.0mΩ scale

Power Specification	Measured Voltage vs. Measured Current Draw	Power Requirements
Probes: 7V - 12V	7V - 12V 56mA - 209mA	11V .5A
Motor Subsystem & UI Module: 5V	4.99V 1.83A	5V 3A

Acknowledgements

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