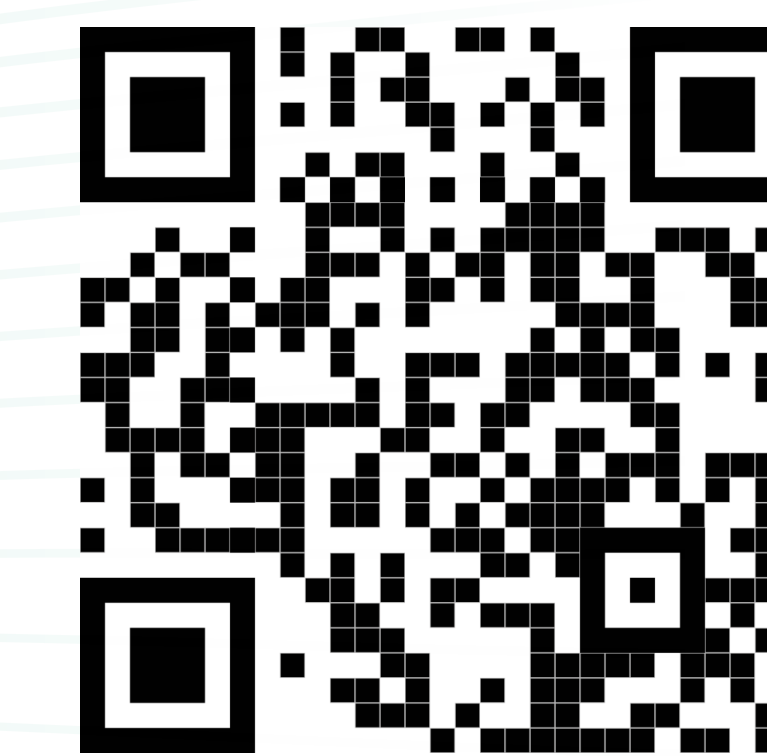# COSMIIC

CLEVELAND OPEN SOURCE MODULAR IMPLANT INNOVATOR'S COMMUNITY

cosmiic.org

KL Kilgore, B Smith, CA Chestek
MJ Fu, NS Makowski, TL Vrabec

Case Western Reserve University | Cleveland, OH
MetroHealth System | Cleveland, OH
University of Michigan | Ann Arbor, MI

CASE WESTERN RESERVE UNIVERSITY EST. 1826   MetroHealth

We developed the most advanced modular implant system for human use... and now we're giving it away!

SPARC
Open Source Human Implant
Funded by NIH SPARC
U41 - NS129436

COSMIIC OPEN SOURCE COMMITMENT

- Available for any purpose, including commercialization
- Available for any modification
- Modifications can be protected and commercialized
- Please acknowledge COSMIIC

COSMIIC PLATFORM SYSTEM
Initial Specs

28 electrical stimulation channels
14 biopotential recording channels
8 accelerometers/thermisters

FUNDED FUTURE EXPANSION

HIVE MODULE
- 64 channel recording
- 32 channel stimulation

SWARM MODULE
- Remote powered intertial measurement unit

LIFELINE
- Health monitor
- Sensorized cable

NECTAR MODULE
- 20KHz electrical nerve block

WING
- Wireless Link for wearable sensors
- Battery charger
- Surface stimulator
- Evaluation Kit

TIMELINE

April 24, 2023
- cosmiic.org open to the public

August 31, 2023
- Complete suite of COSMIIC open source licenses published
- Initial Early Feasibility Investigational Device Exemption documents released

August 31, 2024
- COSMIIC grant writing assistance
- COSMIIC Platform System - full document set (with minimal customer support)

August 31, 2025
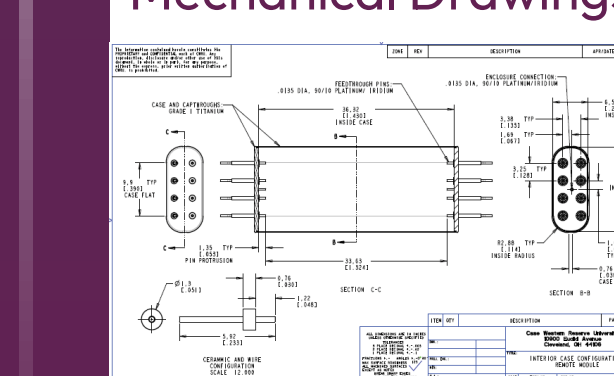- COSMIIC Evaluation Kit

February 2026
- COSMIIC Platform System full document set released
- COSMIIC Pre-clinical System available for purchase
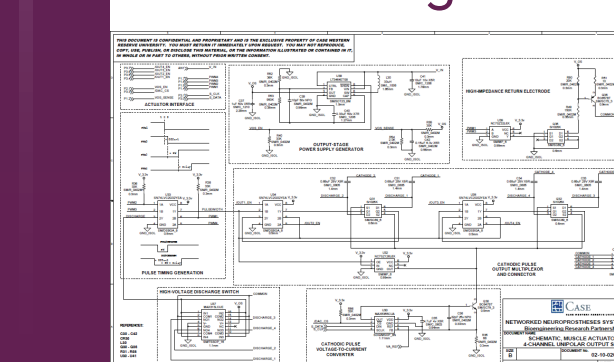
February 2027
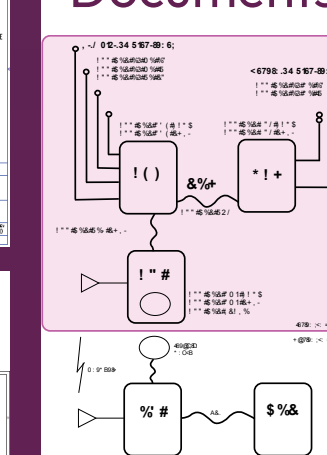- COSMIIC Advanced System full document set released

DOCUMENT SETS

Mechanical Drawings
Regulatory Documents
Circuit Diagrams

POWER MODULE
- 600mAh Li-ion recharge
- 32-bit ARM-7
- MedRadio
- 4MB memory
- Accelerometer
- Thermistor

BIOPOTENTIAL RECORDING MODULE
- 2 independent channels
- Myoelectric signals
- Gain 150 - 7500
- 8 bit ADC resolution
- 2KHz sampling
- Software signal processing
- 8-bit AVR

NETWORK CABLE
- 2 conductor
- Power & communication
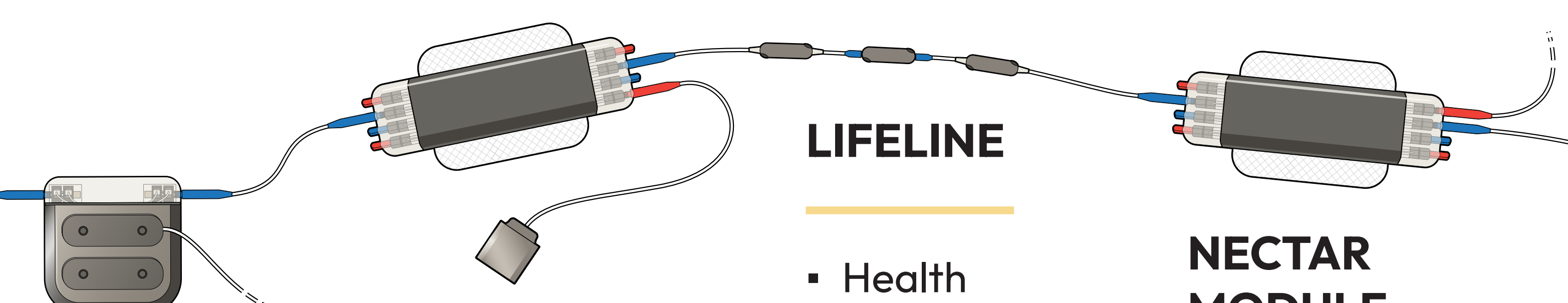- Controller Area Network (CAN) protocol

MODULAR SYSTEM ARCHITECTURE
- 8+ modules
- Mix/match any style
- Distributed processing
- Centralized rechargeable power
- Future expansion

PULSE GENERATOR MODULE
- 4 independent channels
- 0-256us
- 0-20mA
- 1-50Hz
- Common anode
- Accelerometer
- Thermistor
- 8-bit AVR

ELECTRODES
- Monopolar
- Bipolar
- Nerve cuff

COSMIIC PLATFORM IN USE!

5+ years human experience (ongoing)

Based on the "Networked Neuroprosthesis" (NNP) modular implant system developed in Cleveland

Active Early Feasibility IDE

HIVE
LIFELINE
SWARM
NECTAR
biopotential recording module
pulse generator module
electrode
nerve cuff
network cable
power module
WING
Button1 Button2