Executive Summary - Phase I of NIRIS

A Flagship Module of Synthetic Repair Systems (S.R.S.)

Overview

NIRIS is a modular, open-source neuro-repair system designed to assist in the regeneration and functional recalibration of the human nervous system-starting with spinal cord, peripheral nerve, and trauma-linked neurocircuitry. It uses a blend of AI, bio-nanotech scaffolding, adaptive feedback mechanisms, and trauma-aware modulation protocols to restore neurobiological integrity in patients suffering from degenerative, traumatic, or psychosomatic conditions.

Primary Objectives

- Build a functional neuro-AI interface for real-time monitoring and modulation of neural states
- Develop and test 3D-printed microchannel scaffolds for axonal regrowth
- Create closed-loop biocompatibility systems responsive to real-time immune and electrical activity
- Embed optional trauma-sensitive emotional feedback calibration for holistic healing environments
- Position the system for long-term deployment in clinical and decentralized health environments

Core Components in Phase I

1. ENCP (Embedded Neuro-CoProcessor): Personalized, on-device AI agent mapping and modulating neural signals
2. T-NMA (Targeted Neural Microchannel Arrays): Biocompatible 3D-printed scaffolds with stem cell seeding potential
3. RT-BCC (Real-Time Biocompatibility Calibration): Live physiological state monitoring and

responsive modulation protocols

4. AFDMP (Affective Feedback Modulation) (Optional): Facial/emotional biofeedback loop integration for trauma-informed treatment

Phase I Timeline & Milestones (6-9 Months)

Month 1: Finalize hardware architecture and AI stack (Pi/Nano + OpenBCI)

Month 2: Develop ENCP + RT-BCC for initial neural feedback loop test rig

Month 3: Begin early scaffold fabrication using PEG or bio-printing compounds

Month 4-5: Launch trauma-informed sensing protocol integration (AFDMP)

Month 6-7: First system integration: prototype test rig functional

Month 8-9: Begin formal reporting, academic whitepapers, and grant finalizations

Target Use Cases

- Patients with spinal cord injuries or peripheral nerve trauma
- Early-stage neurodegenerative disease management (ALS, MS, etc.)
- Chronic pain and PTSD modulation via adaptive AI feedback systems
- Low-resource environments via portable biofeedback modules

Technical Stack (Phase I)

Hardware: Raspberry Pi, Jetson Nano, OpenBCI EEG, Arduino Biosensors

AI/ML: TensorFlow Lite, Edge Impulse, Scikit-Learn

BioFab: PEG-infused scaffolds, 3D printers, stem cell labs (partnered)

Emotional Feedback: Affectiva DB, MindFlex, OpenFace API (optional tier)

Estimated Initial Budget

Prototyping (EEG, microcontrollers, biosensors): $7,500 - $12,000

AI/Software Development (open-source models + integration): $10,000 - $20,000

Legal/IP and Ethics Review: $5,000

Access to BioLab/Test Environment: $3,000 - $10,000

Grant Application & Operational Prep: $1,500 - $2,500

Total Estimate: $27,000 - $49,500

Ethical & Regulatory Readiness

- IRB Prep: In contact with university partners for ethics onboarding
- Open Source Strategy: Core protocols to remain open under GPL/MIT
- Human-Centered Design: Emphasis on trauma-informed, consent-first architecture
- Future FDA/ISO Compliance: Design language aligned with emerging MedTech standards

Deployment Vision

NIRIS is designed to function as a modular system-starting in labs and clinics but ultimately evolving into portable, home-accessible healing nodes integrated into the full S.R.S. architecture.

Prepared by: Nathan L. Broniman, in collaboration with ChatGPT (OpenAI), Gemini, and the Pantheon Initiative

In service to compassionate, systemic healing