# NeoAGF Technical Guide

## Open-source brain training device

The world's first neural copilot that combines brain stimulation with cognitive training. Built by brain hackers, for brain hackers. At $80, it offers the same capabilities as $500+ closed devices while maintaining complete transparency and user control.

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## Device overview

The [NeoAGF (Artificial General Focus)](#) represents an advancement in accessible neurotechnology. This open-source device combines transcranial direct current stimulation (tDCS) with real-time EEG monitoring and cognitive challenges.
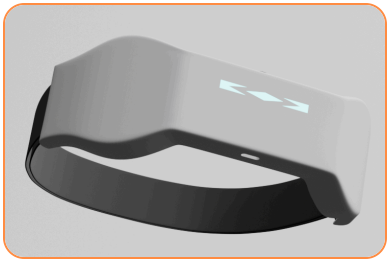


| | |
|---|---|
| **Price Point** | **$80**<br>vs $500+ closed devices like Muse |
| **Current Output** | **0-2mA**<br>safety limited with protection |
| **EEG Sampling** | **250Hz**<br>real-time neural capture |
| **Processing Unit** | **ESP32C3**<br>wireless microcontroller |
| **Signal Resolution** | **12-bit**<br>high-precision neural patterns |
| **Session Duration** | **20 minutes**<br>optimized training periods |

# How it works: three-step neural enhancement

The NeoAGF operates through a scientifically-backed three-step process that maximizes neuroplasticity and cognitive enhancement.

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## ACTIVATE: Brain stimulation

*Begin your neural journey with targeted brain stimulation*
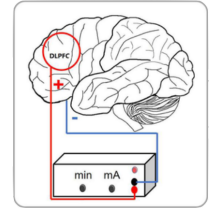
Gentle transcranial direct current stimulation (tDCS) at 0-2mA current activates targeted brain regions for enhanced focus, attention, and cognitive performance. The device uses safe, controlled electrical stimulation that has been validated across thousands of research sessions worldwide.

**Technical implementation:** ESP32C3 wireless chip processes signals in real-time with multiple safety features including current limiting, overcurrent protection, and continuous monitoring to ensure user safety throughout each session.

**Clinical evidence:** Home-based tDCS at 2mA showed 9.41 point improvement vs 7.14 point sham improvement with high safety profile. Over 33,200 sessions in published research show no serious adverse events at 0-2mA parameters (Nature Medicine 2024, multiple peer-reviewed studies).
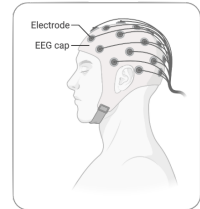
## TRACK: Real-time EEG monitoring

*Monitor your brain patterns with precision*

Advanced EEG sensors capture every neural fluctuation at 250Hz sampling rate with 12-bit resolution. Multi-channel analysis provides continuous behavioral state monitoring and real-time feedback on your brain activity, allowing for precise tracking of neural changes during stimulation.

**Technical implementation:** Multi-channel EEG analysis with behavioral state tracking, artifact rejection algorithms, and continuous monitoring capabilities. The system processes neural signals wirelessly via Bluetooth with low-latency transmission.

**Clinical evidence:** EEG-neurofeedback training shows promising evidence for enhancing executive functions in healthy adults. Studies demonstrate significant improvements in attention, working memory, and cognitive control (PMC 8459257 2021).

## PLAY: Cognitive challenges

*Active cognitive engagement during stimulation*

Engage in chess puzzles, mathematical problems, and focus exercises while receiving brain stimulation. This unique combination maximizes neuroplasticity by pairing stimulation with active cognitive engagement, creating optimal conditions for neural adaptation and learning.

**Unique advantage:** NeoAGF is the only device that combines both brain stimulation and active cognitive challenges in a single system, creating synergistic effects for enhanced neural training outcomes.

**Clinical evidence:** tDCS targeting dorsal attention network improved attention performance by enhancing executive effect (p=0.037). Multi-session protocols show 100% effectiveness in parallel-group studies (PMC 11338793 2024, PMC 10813480 2023).

# Technical specifications

Complete technical details for the NeoAGF neural enhancement system.

| Component | Specification | Description |
| --- | --- | --- |
| Microcontroller | Seeed XIAO ESP32C3 | RISC-V Microcontroller with Wifi and Bluetooth LE connectivity |
| ADC | ADS1015 12-bit | I2C interface, default address 0x48, high-precision analog-to-digital conversion |
| EEG Acquisition | BioAmp EXG Pill | Professional-grade EEG signal acquisition with electrodes |
| Stimulation DAC | GP8413 (GP8xxx family) | DAC module for prototype signal generation |
| tDCS Driver | GP8302 DAC | DAC driver for tDCS current control and stimulation |
| I2C Configuration | Wire.setPins(7, 8) | I2C wiring per board configuration in firmware |
| Current Output | 0-2mA regulated | Safety-limited with overcurrent protection |
| EEG Sampling | 250Hz Continuous | Real-time neural pattern capture |
| Power Supply | Rechargeable Li-ion | 5-hour battery life, USB-C charging |
| Connectivity | Bluetooth 5.0 | Low-latency wireless data transmission |

# Clinical research & safety data

The NeoAGF is built on a foundation of peer-reviewed research demonstrating both safety and efficacy of brain stimulation technologies.

## Key research findings

### Safety profile (Nature Medicine 2024)

Home-based tDCS at 2mA demonstrated excellent safety with 9.41 point improvement vs 7.14 point sham improvement. No serious adverse events reported across comprehensive clinical trials. **Read full paper**

### Neurofeedback effectiveness (PMC 8459257 2021)

EEG-neurofeedback training shows promising evidence for enhancing executive functions in healthy adults, including improvements in attention, working memory, and cognitive control. **Read full paper**

### Attention enhancement (PMC 11338793 2024)

tDCS targeting dorsal attention network improved attention performance by enhancing executive effect ($p=0.037$), demonstrating significant cognitive improvements. **Read full paper**

### Multi-session effectiveness (PMC 10813480 2023)

100% of parallel-group tDCS studies showed effectiveness, with 92.8% using multi-session protocols for optimal results. **Read full paper**

### Comprehensive safety data

The comprehensive safety review states: "To date, the use of conventional tDCS protocols in human trials (≤40 min, ≤4 mA, ≤7.2 Coulombs) has not produced any reports of a Serious Adverse Effect or irreversible injury across over 33,200 sessions and 1,000 subjects with repeated sessions." **Read full paper**

# Safety information & guidelines

Important safety information for proper use of the NeoAGF device.

### Current limiting technology

Device is engineered with multiple current limiting circuits to maintain 1-2mA output for optimal safety. Overcurrent protection automatically engages if limits are exceeded.

### Intended use parameters

Designed specifically for focus enhancement and meditation support in healthy adults aged 18-65. Not intended for medical treatment or therapy.

### Medical disclaimer

This device is not intended to diagnose, treat, cure, or prevent any medical condition. Consult healthcare professionals before use if you have any medical conditions.

### Research-backed safety

Safety profile established through over 33,200 documented sessions in peer-reviewed research with no serious adverse events reported at specified parameters.

## Important safety guidelines

- Session limits: 20 minutes max, 4 hours between sessions
- Current range: 0-2mA (automatically limited)
- Do not use if you have implanted electrical devices
- Do not use if pregnant or nursing
- Discontinue use if you experience any discomfort

# Brain hacker community & support

The NeoAGF is built for the growing community of brain hackers who believe in open-source neurotechnology, privacy-first brain data, and democratized access to cognitive enhancement tools.

### Open source philosophy

Complete hardware schematics and software code available for modification and enhancement. Fork the project, contribute improvements, and build upon the existing foundation.

### Hackable by design

Built specifically to be modified and customized by the community for diverse applications. Modular architecture supports hardware and software extensions.

### Privacy-first approach

Your brain data stays private and under your complete control. No cloud storage requirements, no data sharing without explicit consent, no corporate surveillance.

### Community workshops

4-day intensive workshops available for hands-on learning, device assembly, and advanced modification techniques. Expert-led sessions with practical applications.

# Getting started guide

Complete pathway to begin your neural enhancement journey with the NeoAGF system.

**1**

### Order your open-source kit

Get your complete NeoAGF kit for $80 including all components, documentation, and assembly instructions. Compare this to $500+ closed devices with similar capabilities. Access the open-source project at [GitHub](#) and view the documented PCB design at [OSH Lab](#).

**2**

### Download complete documentation

Access the comprehensive technical assembly guide, usage instructions, safety protocols, and troubleshooting resources. All documentation is open-source and community-maintained.

**3**

### Attend intensive workshop

Join a 4-day hands-on workshop for guided assembly, calibration, and advanced usage techniques. Expert instructors provide personalized support and training.

**4**

### Connect with the community

Join our [Discord](#) with 100+ brain hackers sharing knowledge, improvements, and research findings. Contribute to ongoing development and benefit from collective expertise.

## Contact information

[ROHIT KORRAPOLU](#) | [MASSIMO BARDETTI](#) | [PATRIK ŠLACHTA](#) | [SHREERAM RAVIKANNAI](#)