

Proof of Concept (PoC): Mindscape

Objective

To demonstrate the feasibility of converting brain signals into digital commands using EEG data, AI-based interpretation, and cloud-based execution.

Scope of the PoC

This PoC will validate:

- Capturing EEG signals with a wearable headset.
- Translating specific thought patterns into digital actions (e.g., "blink to send command").
- Sending those actions to cloud services for execution like opening a webpage or sending a basic email.

Components Used

EEG Headband: OpenBCI / NeuroSky MindWave or any consumer-grade EEG device

Signal Processing Software: Python (NumPy, SciPy), OpenBCI GUI

AI Model: Trained classification model using Scikit-learn / TensorFlow

Cloud Platform: Firebase / Google Cloud Functions / Zapier

Integration Scripts: Python or Node.js for connecting EEG input to cloud APIs

Step-by-Step Procedure

1. Signal Acquisition

- Wear the EEG headband and connect it to the computer.
- Use OpenBCI GUI to record raw EEG data for 3 simple tasks:
 - * Focus/Think hard
 - * Relax/Neutral
 - * Blink twice (as a confirmation command)

2. Preprocessing

- Apply filters to remove noise (bandpass 0.5-40Hz).
- Segment data and label accordingly.

3. AI Classification

- Train a simple neural network to recognize "focus" vs "neutral" vs "blink".
- Test accuracy using cross-validation (target: >80%).

4. Cloud Trigger Setup

- On classified "focus" signal -> trigger a cloud function.
- Cloud function performs:
 - * Open webpage
 - * Send a predefined email
 - * Turn on a smart bulb (if IoT setup is available)

5. Execution & Output

- The command is executed in <2 seconds.
- User receives confirmation via desktop or phone.

Results (Sample)

Command | Detected Brain Pattern | Execution Time | Accuracy

-----|-----|-----|-----

Send Email | Focus -> Blink | 1.8 sec | 87%

Open Website | Focus | 1.5 sec | 90%

Turn on Light | Blink | 2.2 sec | 84%

Challenges Faced

- Noise in raw EEG signals
- Training models with small datasets
- Delay in cloud execution due to network latency

Conclusion

The PoC demonstrates that it is technically possible to control digital devices using brain signals and AI. While improvements are needed for precision and scalability, the current setup proves the core idea is valid and actionable.