

What is MiDro?

MiDro is an application that marries neuroscience and engineering through electroencephalography (EEG), Bluetooth, and Android.

It is an extension of the mind as a controller for your mobile device.

It is a nod to portable-EEG developers everywhere.

It is a way to make smartphones even smarter.

It is our hands-free future!

A series of blinks could make an important call, open certain websites, or even display your GPS location. **It's up to you!**

Why MiDro?

We aim to:

- Create a platform for Android operation to be hands-free and speech-free.
- Expand the developer opportunities for portable neuroscience research.
- Encourage inexpensive EEG analysis for the average consumer.
- Make a mobile device more conveniently functional.

Research Challenges

- ❑ Understanding misfiring and identifying the externalities that may cause them. Certain actions may have the same representation as "noise," which is misleading to the program function.
- ❑ Finding hands-free and voice-free functions that may not already be implemented in today's technology.
- ❑ Identifying the possible triggers with a simple one-channel headset.

Acknowledgement

We would like to thank Dr. Dario Pompili and Dr. Hariharasudhan Viswanathan for their guidance. We also thank NeuroSky for developing the Mindwave Mobile headset.

Implementation (How Did We MiDro?)

- ❑ Spectroscopy – Visualizing the frequency tendencies of certain environmental conditions helped determine how to understand a person's reaction to their environments:

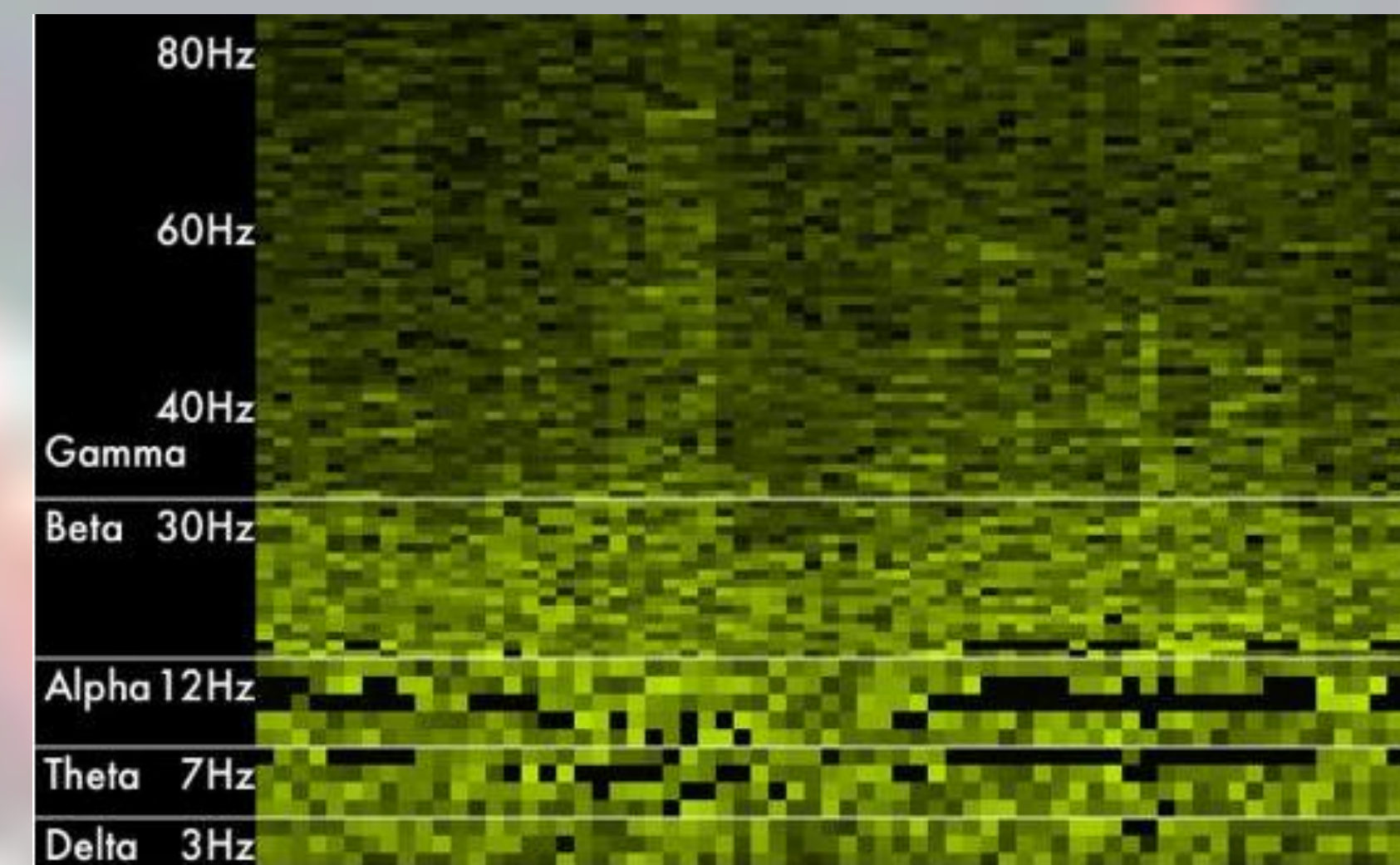


Figure 1 – Spectrogram of a person walking

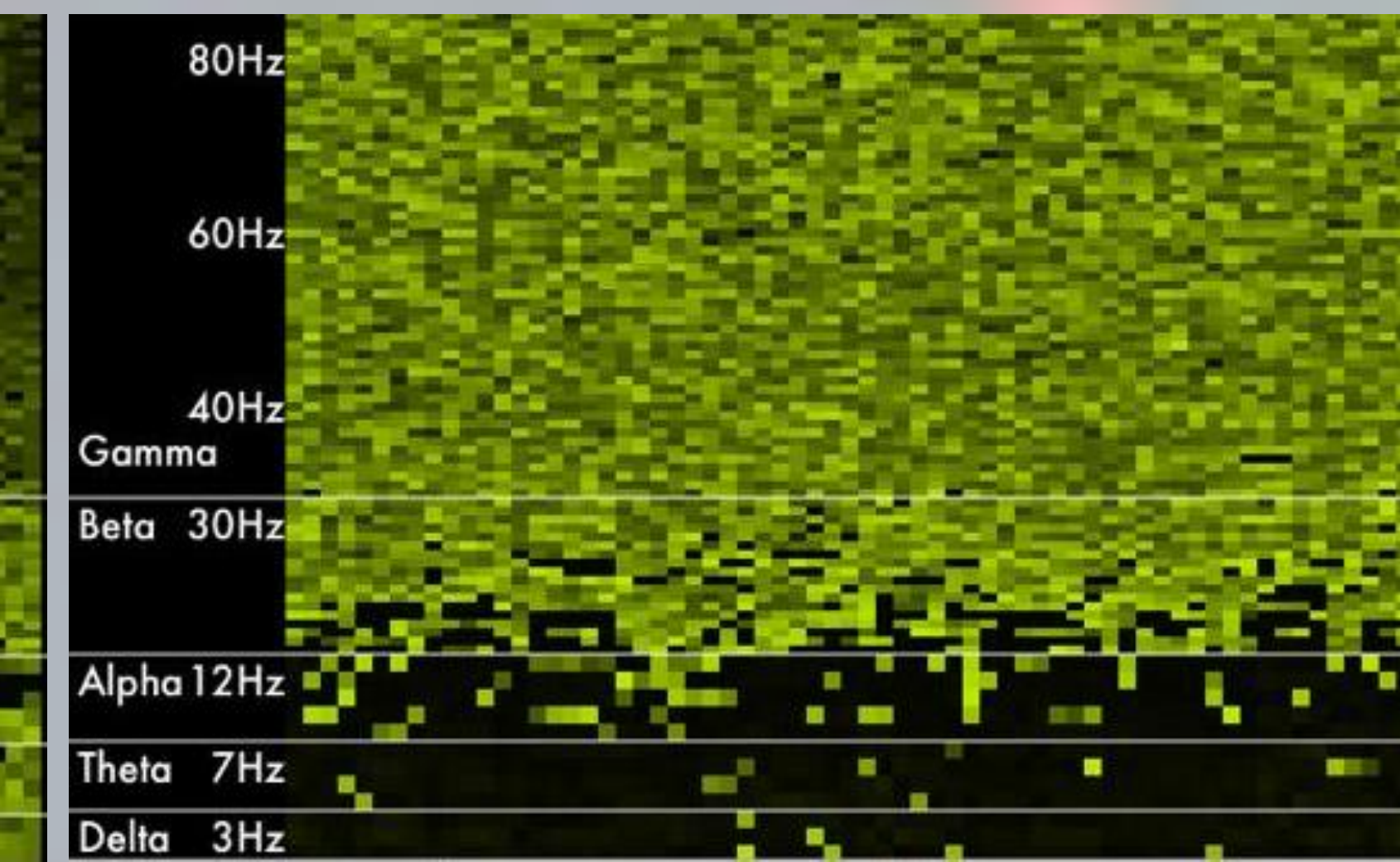


Figure 2 – Spectrogram of slow blinking

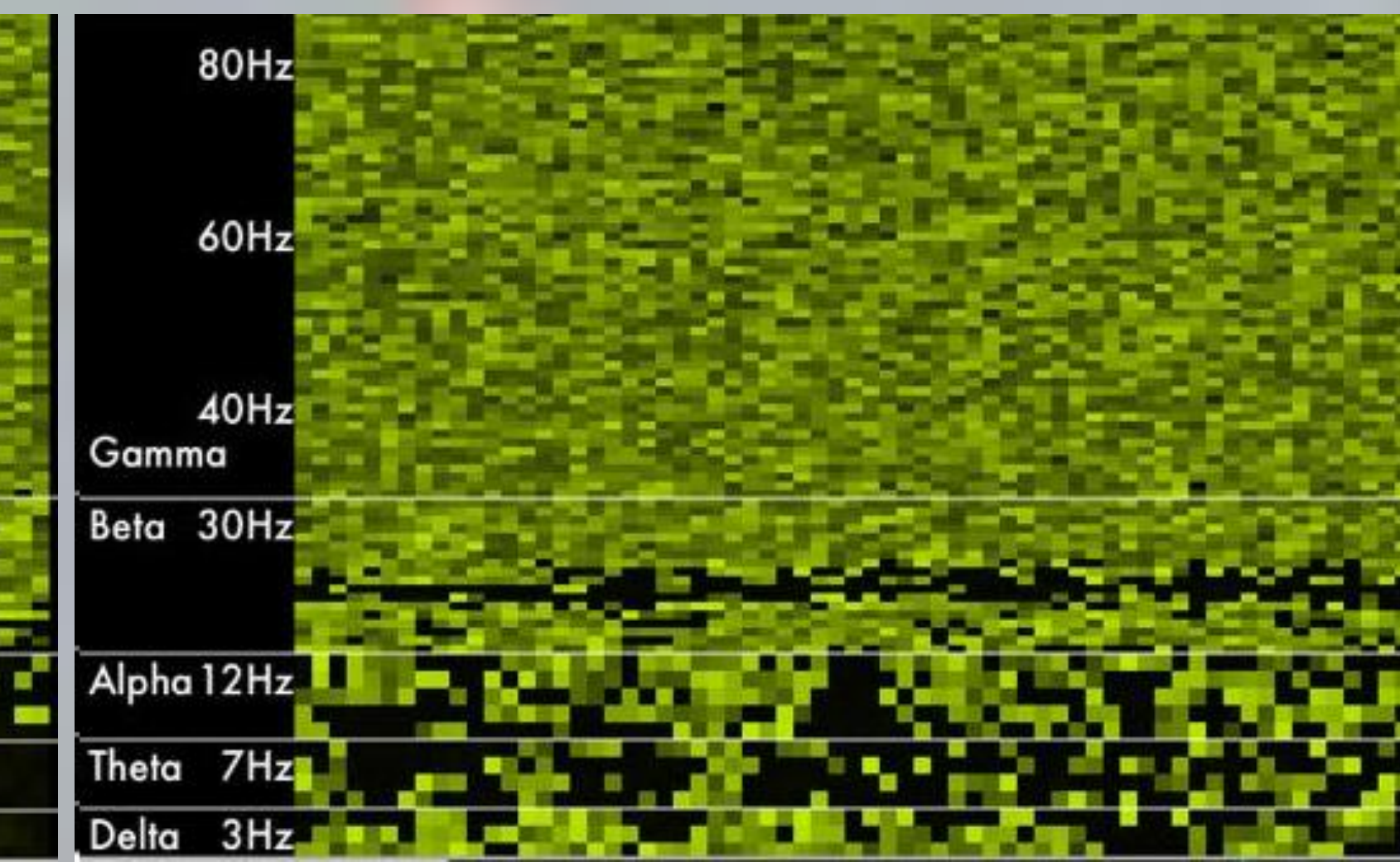


Figure 3 – Spectrogram of eyes closed, resting

- ❑ Event-Related Potential (ERP) – After understanding the background works, getting a raw feed from the headset let us see the relative voltage drops from highly deliberate actions such as:
 - ❖ Blinking a number of times (3, 5, 7)
 - ❖ Eye movement up or down
 - ❖ Concentration
 - ❖ Meditation

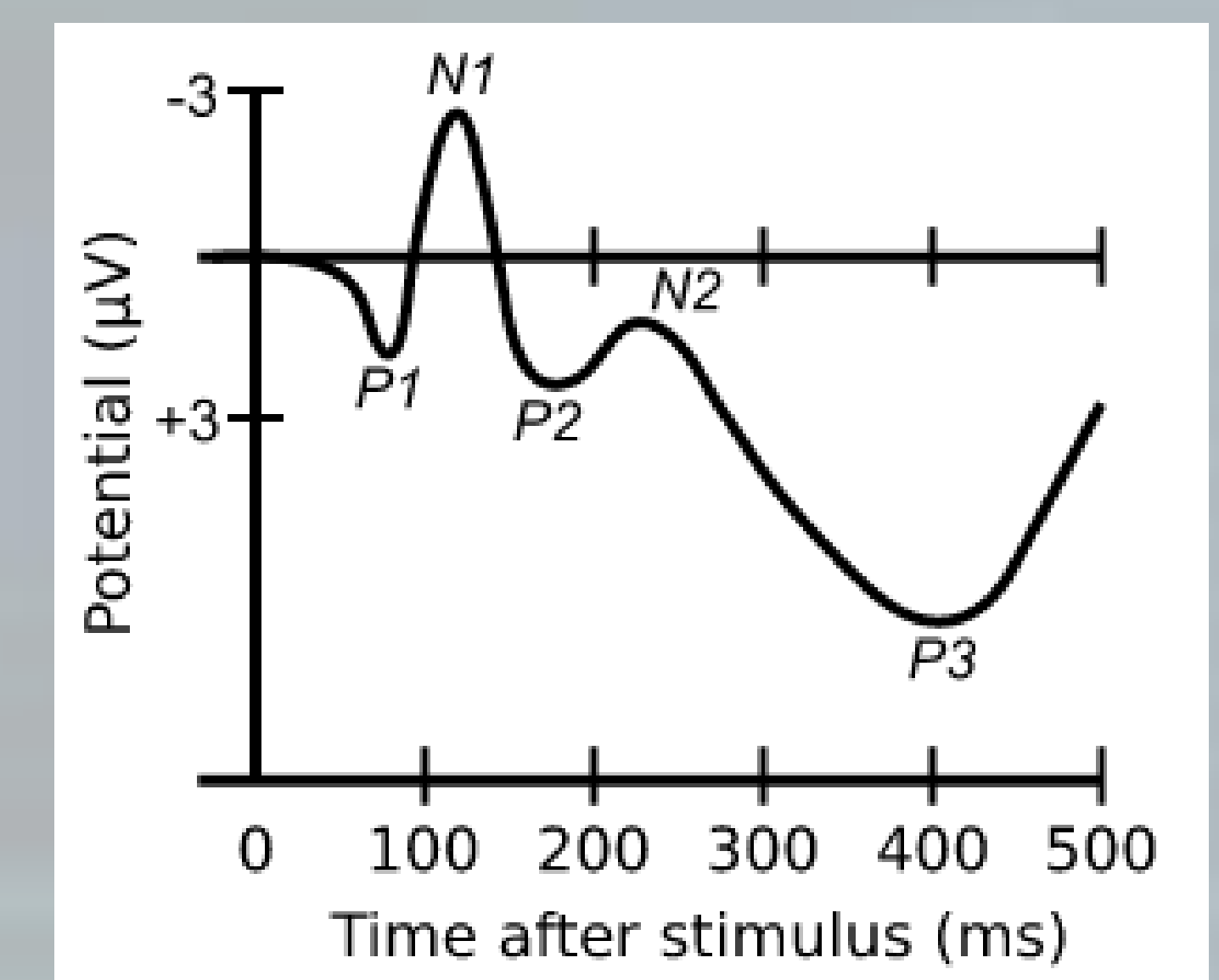


Figure 4 - ERP reaction to a stimulus [2]

Result and Future Work (When Will We MiDro?)

Results: Just look at it!

We would like to see progress from others as well as ourselves to achieve:

- ❑ A wider range of actions that involve the phone: shooting video, setting an alarm, viewing a slideshow, etc.
- ❑ An iOS counterpart that features the same, if not more, functionality.
- ❑ Attain flexibility with other headsets that boast wireless capability.
- ❑ Give users complete customization of what commands they wish to implement.

References

- [1] Background picture from Dr. Najafizadeh's lectures in Advanced Signal Processing.
- [2] Wikipedia page on Event-related Potential.