Mi Dro: The Mind-activated Android Application
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What is Mi Dro?

Mi Dro 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 Mi Dro?

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.

Implementation (How Did We Mi Dro?)

- 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](image1)
  ![Figure 2: Spectrogram of slow blinking](image2)
  ![Figure 3: Spectrogram of eyes closed, resting](image3)

- 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

Result and Future Work (When Will We Mi Dro?)

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.

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References

[1] Background picture from Dr. Najafizadeh’s lectures in Advanced Signal Processing.