

# Mind-Controlled Robotic Arm Using Wearable EEG Headset

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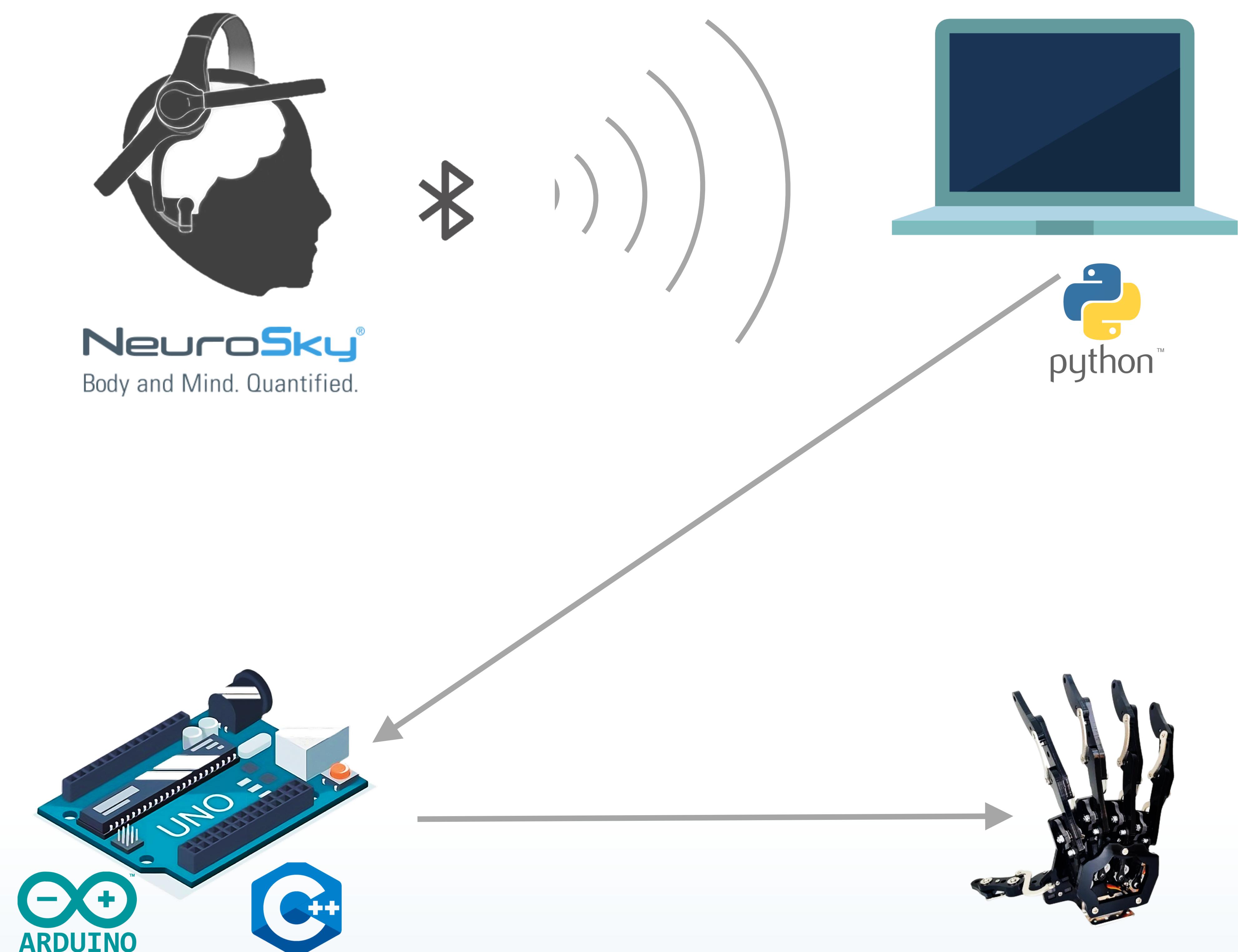
## Objectives

- Develop a prototype of a brain-computer interface.
- Design a mind-controlled robotic arm using EEG headset
- Aim to bridge communication barriers among individuals with different abilities.
- Demonstrate the capability to mind control basic movements of the robotic arm within the project scope.
- Explore future applications for disabled individuals, allowing them to control the robotic arm using their mind.
- Investigate the feasibility of translating intentions into sign language gestures through the robotic arm.

## Abstract

- The EEG Headset reads brain waves and communicates to the computer via Bluetooth
- The MindReader program running on computer receives this EEG data
- The MindReader program is designed and developed to process and detect blink and attention data from the raw EEG data
- The program then connects to the microprocessor (Arduino board) via the COM port of the computer and sends commands (1 to 5 or 99)
- The Arduino code, HandController in the microprocessor is designed and developed to move the robotic hand based on the commands received from the MindReader program running on the computer
  - Commands 1 to 5 is mapped to showing the respective number of fingers on the robotic hand
  - Command 99 is mapped to make a sinusoidal wave motion on the robotic hand

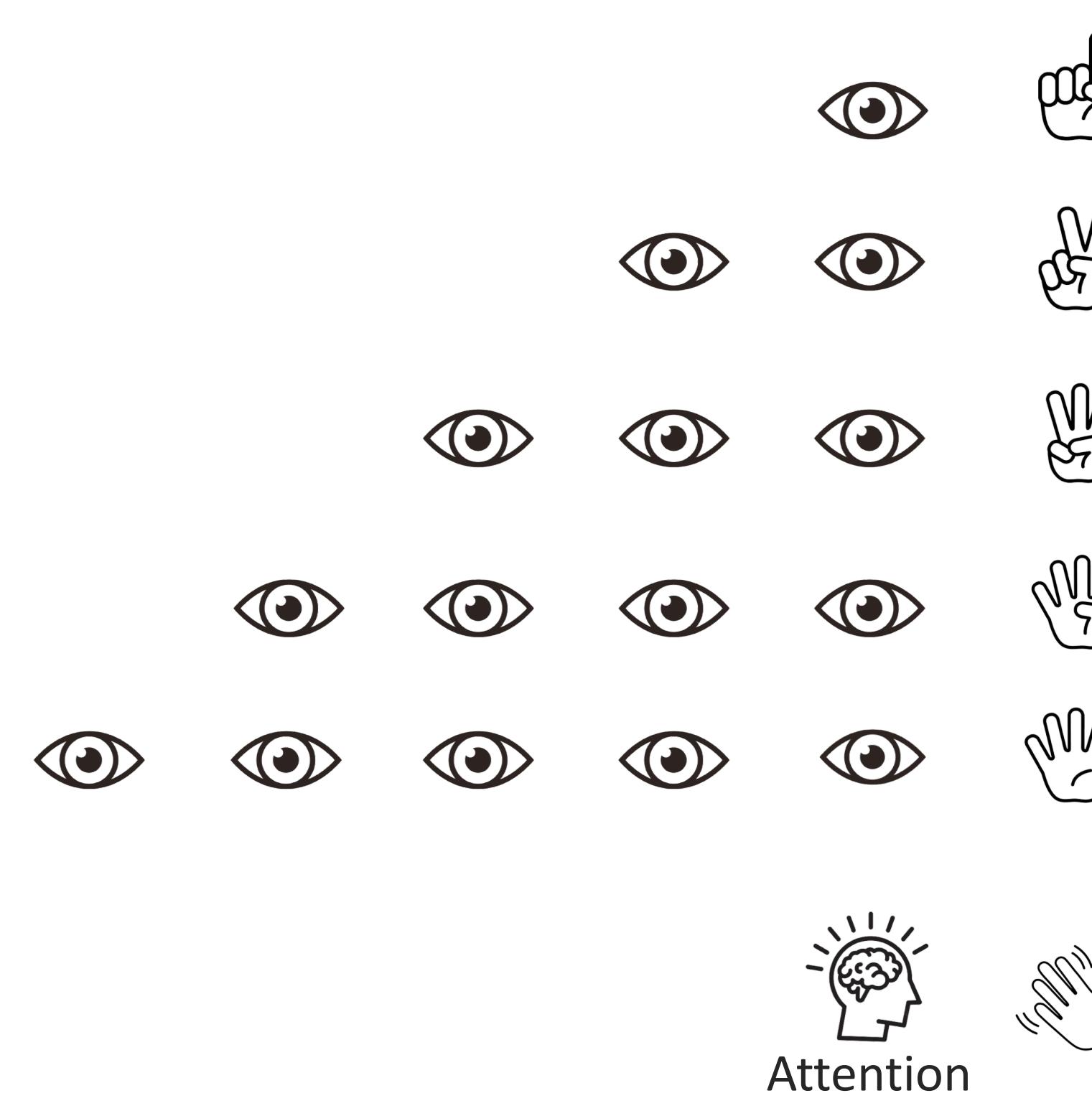
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## Usage

- The user wears the headset
- They then blink a few times
- Watch the robotic hand show the number of blinks
- The user then can concentrate their minds on any object
- Observe the hand move in a wavy pattern

## Blinks



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## Software Developed

- C++ Arduino program (Arduino board)
- Python controller program (laptop)

## GitHub Code



<https://github.com/rithvikpkx/MindControlRoboticArm>

## Materials and Software Used

- NeuroSky Mindwave Mobile 2 EEG Headset
- Arduino UNO microprocessor
- Arduino IDE
- ThinkGear SDK by NeuroSky
- Robotic arm with individual finger servo motors
- Solderless wires
- Breadboard
- Miscellaneous materials for construction
- Laptop/PC

## Conclusion / Future Considerations

- With more in-depth and accurate brainwave data and with potentially using AI to interpret the raw brain signals, this brain-computer interface can be extended to achieve a greater extent of communication between differently abled individuals, (Ex : ASL)

