# EEG-Controlled Reconnaissance Robot

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## Abstract

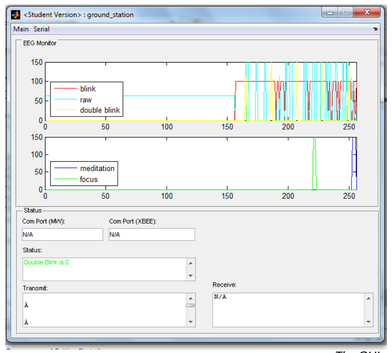
This project applies the NeuroSky MindWave EEG Headset in concert with a tri-axis accelerometer to control a reconnaissance robot. The robot can interact with its environment by moving, grabbing items (with a claw) and changing color to reflect the user's concentration/meditation levels, as measured by the EEG. The device gives the user the ability to interact with the environment hands-free and has many potential applications for any user suffering from or "locked-in syndrome."

## Challenge and Objectives

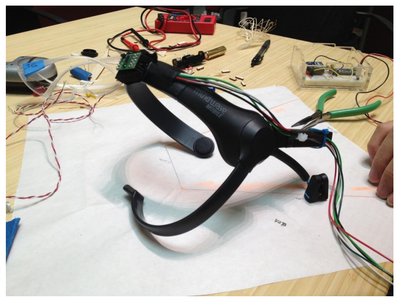
Our project sought to characterize the NeuroSky EEG headset and apply it to the control of a mechanical device that could be reliably and safely used by a first-time user.

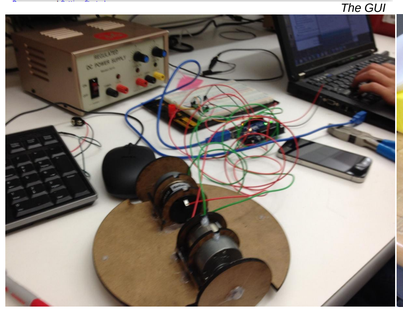
## Accomplishments

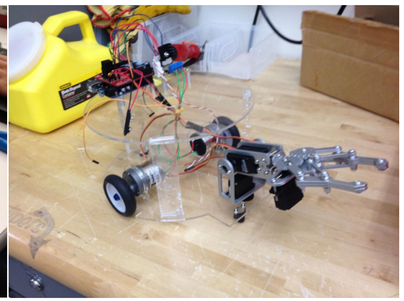
- Characterized the outputs of the NeuroSky and developed a GUI that sends signals to the robot and feedback to the user
- Incorporated accelerometer and used it to control robot motion
- Developed wireless transmission protocol for transmitting controls
- Built and tested the reconnaissance robot



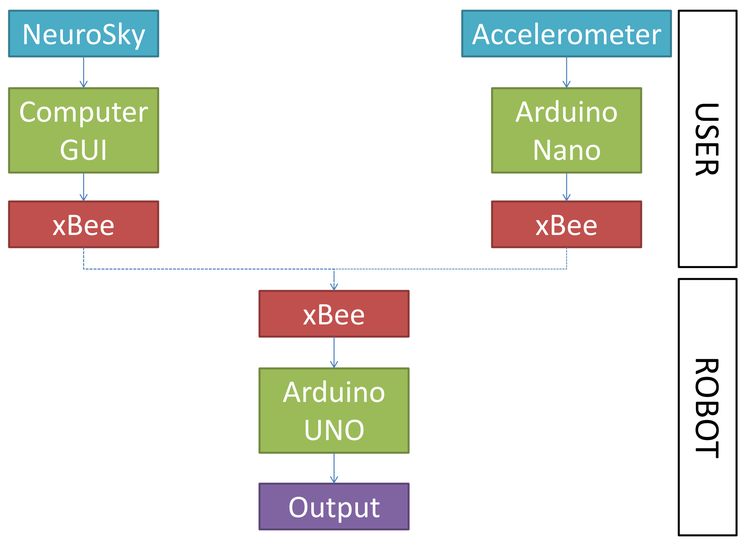
*The GUI*


*Headset with Accelerometer*


*Prototype Robot Chassis*


*The Final Design*

## System Schematic




## play with it!

Double Blink to Switch

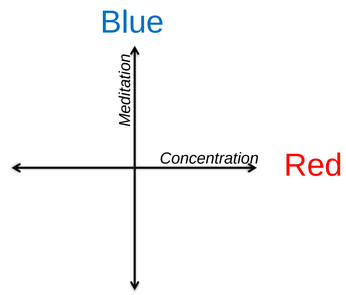
**Drive Mode**

**Tilt Forward/Backwards** to drive forward and backward
**Tilt Side to Side** to turn

**Claw Mode**

**Tilt Forward/Backwards** to pan up/down
**Tilt Side to Side** to grasp

### colors




## Future Steps

This project demonstrates the viability of hands-free control of a complex mechanical device. Future projects could develop novel control algorithms from the unfiltered EEG data that the MindWave collects, and use that output to control the robot without the accelerometer in real time. Furthermore, this approach could be applied to controlling larger devices, such as an electric wheelchair.