INTRODUCTION SPRING 2019

A transcranial bug stimulation helmet that recreates insect vision for humans. Sensors located around the helmet detect sound as input and outputs it as LEDs blinking in reaction to sound.

It mimics transcranial magnetic stimulations [TMS], a study that was adopted as the first 'non-invasive' procedure to curing depressive episodes in people. It's a neuroscience that evolved from trying to find a prescription-free method of treating depression. Researchers for this neuro--study call it a non-invasive procedure that uses magnetic fields to stimulate nerve cells in the brain, claiming it is most effective if the patient has no prior experience with depressive treatments.

left to right:
helmet by DIT tDCS [diytdcs.com/tag/depression/]
setinelandenterprise [youtube.com/watch?v=W39qExjSIe4]
DIY-BAS rodrimen [hackaday.io/project/20810-diy-bas/details

The subject, after signing off an agreement to a long list of TMS side effects and whatnot, gets an electromagnetic coil strapped to their forehead, which sends out magnetic pulses that stimulate nerve cells of that specific region [totally noninvasive]

Unlike ETC [electroconvulsive therapy], TMS doesn't cause seizures or reqquire sedation with anesthesia* but there are some side effects like headaches, spasms, light-headedness. And on RARE OCCASSIONS, it can still cause seizures. But it still causes less seizures than ETC, which is what they are trying to emphasize. It can also cause hearing loss.

*these risks increase if: you're taking medication history of seizures, have mental disorders in family, and/or previous brain damage.

HOW TO PREPARE FOR TBS* PROCEDURES

*transcranial bug stimulation

TMS procedures:
You sit in a chair
Put on the machine
Wait 40 minutes

TBS procedures:
You sit in a chair
Put on the machine
Wait as long as you want

DISCLAIMER: THE DEVICE DESCRIBED HERE IS THE MOST DANGEROUS THING TO BUILD THAT I HAVE POSTED INSTRUCTIONS FOR SO FAR. LARGE CAPACITORS ARE HELD AT MORE THAN A THOUSAND VOLTS, AND THE DEVICE RUNS ON A MODIFIED OVEN TRANSFORMER WITH A SECONDARY VOLTAGE OF SEVERAL LTS. TOUCHING THE DEVICE WRONG DURING ASSEMBLY CAN YOU. THIS DEVICE COULD KILL YOU OR MAIM YOU OR BREAK YOUR TAGE HAZARD. MAY CAUSE SEIZURES.

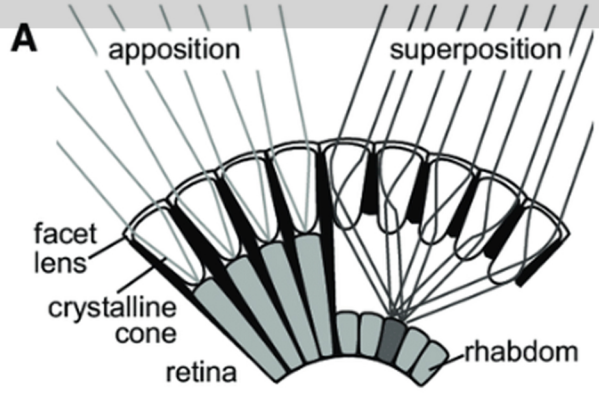
so REASONABLY, my proposal is this:

A bug helmet made of simple arduino-compatible codes that detects sounds and converts it to lights emitted from small LEDs. It works like phosphene lights. It's similar to being overstimulated with your surroundings. Your senses are heightened and more sensitive when you have to pay attention to each flickering sound and light in this claustrophobic space between you and your irises.

Q: how would you deal with intrusive and invasive thoughts, and how can it become a tangible and shared experience used to connect with people dealing w. depression?

Wearing the helmet puts the participant in a situation where senses are heightened and it feels as though sound and light are invading your thoughts. Like experiencing sensory overload, where environmental elements and noise crowding can cause one to feel anxious and tense. It's taking aspects of anxiety and depression and turning it into a tangible experience through the eyes of a bug.

HOW DO BUGS SEE?

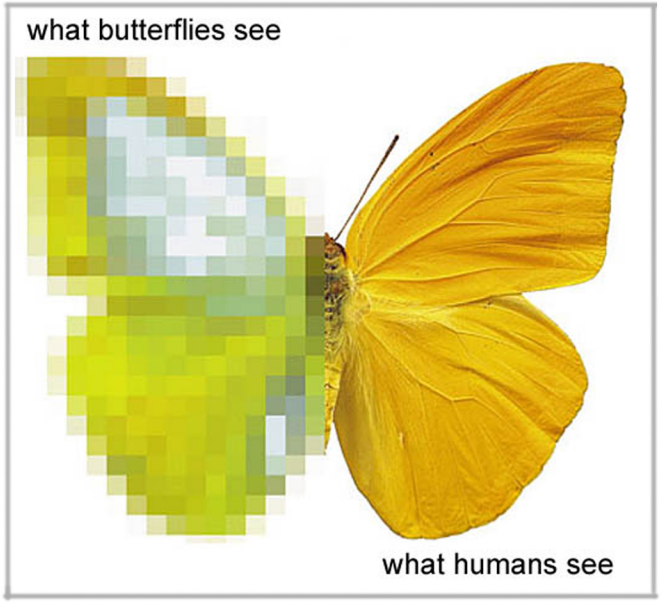


Assembled through individual optical units [ommatidia]. Light is focused through photoreceptors where photosensitive tissues combine into a single light absorbing structure [rhabdom]. Each facet lens collects light that contributes to one [1] pixel of the image.

source: resolving the trade-off between visual sensitivity and spatial acuity-lessons from hawkmoths [researchgate]

Rhabdoms do the 'seeing' in an insect's eye. It create mosaic-like textures.

Many insects are blind to red and orange light, but can see UV and polarized lights, which they use for navigating and mating signals.

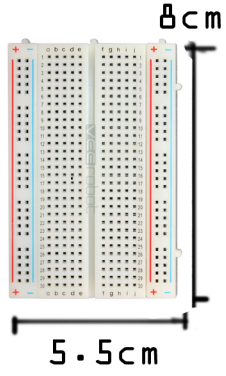


askentomologists.com/2015/02/25/through-the-compound-eye/

The LEDs being used in this project are blue light, green light, and pink light

2. the helmet

inside view



7 leds per breadboard
each breadboard has its own sound sensor, so the helmet can receive sound from two locations

exoskeleton goggles that opens/closes like a hockey mask

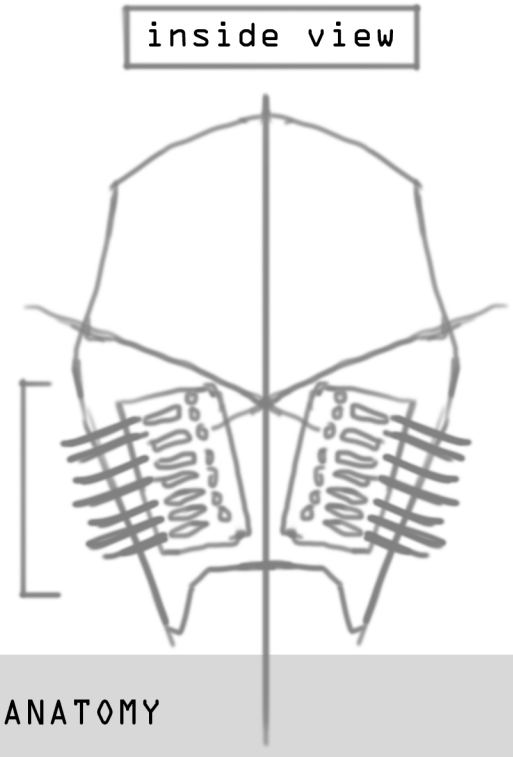
divided into three sections lower two contain two rows of LED lights

The cranial plate [section 1] covers the forehead and eyes. It's held on a headband-strap that keeps it in place.

Section 2, which i've named left and right mandibles, unhook from the helmet to open The sides of the mandibles open to help with breathing, along with the hole in the center of the helmet.

arduino boards are placed on the outside surface of the exoskeleton and are connected via wires to the breadboard housing the LEDs on the inside surface

7 wire cables connected to LEDs

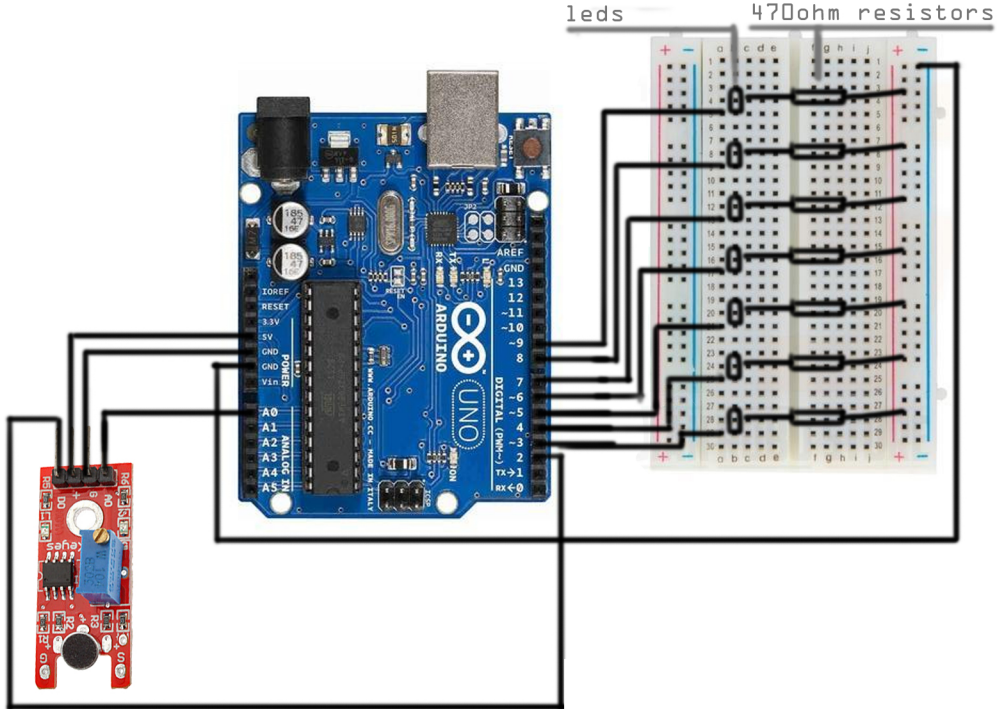


general supply grocery list
[provided by prncetronics.com]

- arduino [uno]
- breadboard
- wire cables
- sound sensor
- led [7 per board]
- resistors [one per led]

and it's all powered by a 9V battery

BASIC ANATOMY



connections between arduino and sound sensor:

arduino pin	sound sensor pin
A0	A0
GND	GND
5V	VCC
digital pin 2	D0

*calibrate the sensor by playing music and turning the flathead screw to adjust sensitivity and analog output. LED on the module should blink to the rhythm.

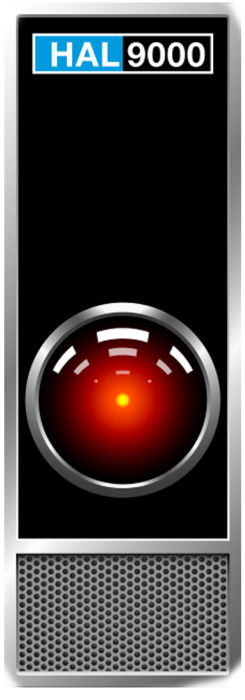
CONNECTING THE LEDS

For each LED, connect a resistor from ground to the shorter [negative] side of LED. Connect the longer [positive] side to digital pin 3 on the arduino board.

Do the same for each LED, but connect consecutively to the next digital pin. [digital pin 4 ... digital pin 5 ... etc]

Code generously provided by PRINCELECTRONIC supports up to 7 leds on a single board.

arduino digital pin [3-9] -> positive side of led -> negative side -> resistor -> arduino ground pin [GND]



connect ground on breadboard to ground on the arduino board to complete the circuit.

PROGRAMMING THE ARDUINO

```
int D0 = 2; //Pin for Digital Output - D0
int DA = A0; // Pin for Analog Output - A0
int threshold = 532; //Set minimum threshold for LED lit
int sensorvalue = 0;

void setup() {
  //Serial.begin(9600);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
  pinMode(7, OUTPUT);
  pinMode(8, OUTPUT);
  pinMode(9, OUTPUT);
}

void loop() {
  sensorvalue = analogRead(DA);  //Read the analog value
  //Serial.print("Analog: ");
  //Serial.print(sensorvalue);  //Print the analog value
  //Serial.print("  ");
  //Serial.print("Digital: ");
  //Serial.println(digitalRead(D0));  //Print the digital value

  if (sensorvalue >= threshold) {
    digitalWrite(3, HIGH);
    digitalWrite(4, HIGH);
    digitalWrite(5, HIGH);
    digitalWrite(6, HIGH);
    digitalWrite(7, HIGH);
    digitalWrite(8, HIGH);
    digitalWrite(9, HIGH);

  }
  else {
    digitalWrite(3, LOW);
    digitalWrite(4, LOW);
    digitalWrite(5, LOW);
    digitalWrite(6, LOW);
    digitalWrite(7, LOW);
    digitalWrite(8, LOW);
    digitalWrite(9, LOW);
  }
}
```