HEXAGONAL CUBE

A PLAY ON ASSUMPTIONS AND PERCEPTIONS

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Abstract

This project was an exploration of how perspective can change everything in perception. Guided by forces of innate curiosity, the box leads viewers on suggested path that follows along the same phases of good storytelling: exposition, rising action, climax, falling action, denouement. By extracting the human psyche, all of the functions of the box is automatically triggered by the human. When seen from the outside, a cube of hexagons seems to contradict the desire to pair like with like. However, when looking through the right perspective, everything begins to make sense. In another attempt to further stress the importance of perspective, even when the box is in action, the visual presentation would only make sense when viewed from a certain position.

Scenario

When you switch on any news channel on TV, the first thing you are most likely to see are two people arguing different sides of a topic. Person A sits on one end of the table and screams their view at the top of their lungs. Person B sit on the other end of the table, rolling their eyes and hurling out inappropriate gestures in the opposite direction. Why is it so difficult to come to peace with the topic? They don't necessarily have to agree with the other person, but why can't they even understand where the opposing argument may be coming from? This box is a perfect metaphor for the step that we are often missing in our day to day life. As is best with capturing the attention and emotions of an opposing figure, perspectives are best expressed in the narrative of a story. By guiding someone through a story, they can best place themselves in a different perspective, and finally see the picture of enlightenment.

Operation

The operation of this box is guided by self intuition. There are no buttons, only triggered by the person and their presence at the suggested location. Furthermore, the box provides visual feedback to the viewer, letting them know that it is being triggered. Following the dramatic structure of storytelling, the box would tell the viewer a beautiful story.

1. Exposition: The background information is provided to the audience by the shape of the box and the exterior markings of the box. One can visually see the hexagonal pattern covering the cube, and the idea of contradiction is already interpreted. The viewer would also see a stagnant version of the animation, beginning to put together the connection that is being made between the two.

2. Rising action: The viewer is drawn closer and closer to the eye hole. Since the box can only be triggered when the face is immediately in front of the hole, the approach towards the viewing builds tension and excitement.

3. Climax: The box is triggered when the light sensor passes a certain threshold. The zoetrope begins spinning, and the image of understanding finally clicks everything in place.

4. Falling Action: The animation gradually fades in interest; while the viewer takes in the rest of the animation.

5. Denouement: When the viewer steps back away from the box, everything returns to a standstill. They are now in a cathartic understanding of all perspectives and the connections between them.

Construction

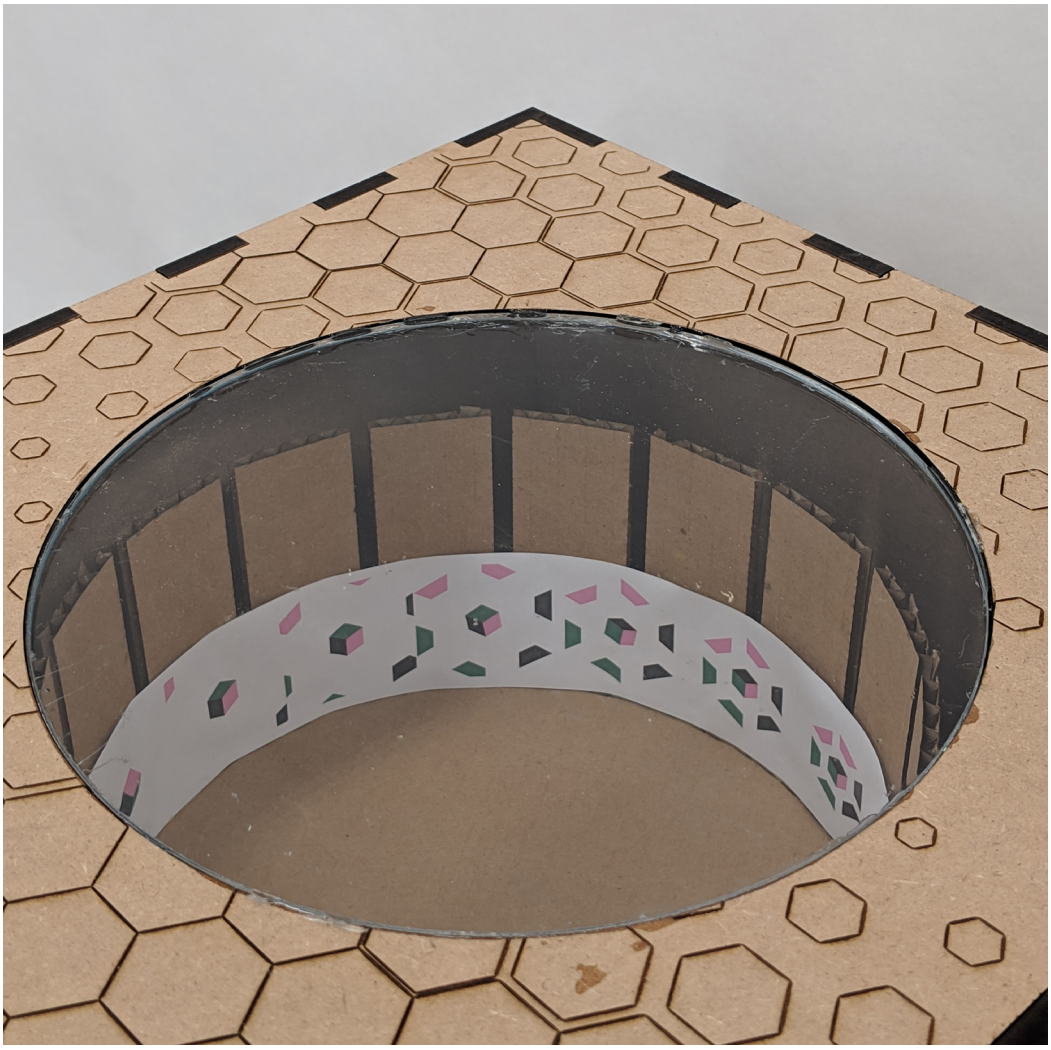
The construction of the outer box was done by gluing together 6 wooden panels of a cube. These panels were laser etched with a design built with rhino + grasshopper, in which the sizes of the hexagons were based on how close they were to a free flowing 3D curve. Holes were cut out in the panels to: allow light into the zoetrope and give a different perspective, let the viewer look at the zoetrope from the right perspective allow light to be read from the photoresistor, and lastly to plug the DC isolator into the wall.

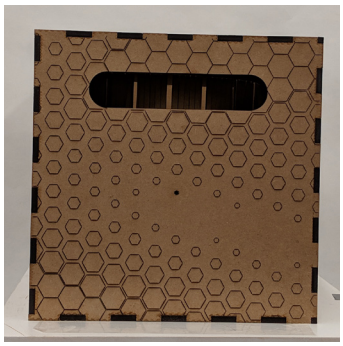
The inside of the box is composed of 3 sections: a cardboard rack that holds the motor/zoetrope up, a cardboard frame to organize electronics, and a wooden half box to hide the messiness of the electronics.

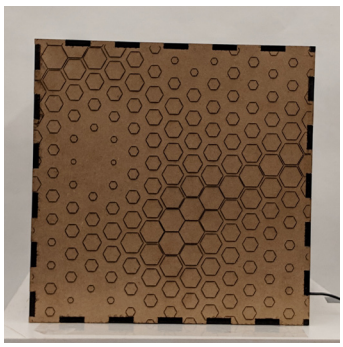
The cardboard rack puts the motor and the zoetrope at the right vertical height that it just barely sits above the inside wooden box. It is easily moved to better access the cardboard frame of electronics below.

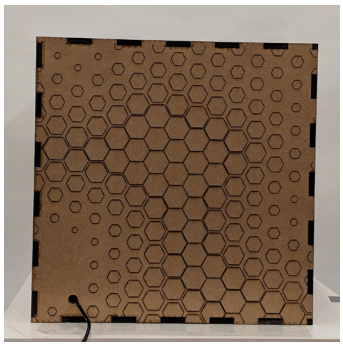
The cardboard frame of electronics holds pieces together so they do not rattle in the box or potentially disconnect from their wirings. This is an important part as there are many connections where the inputs of wires had to be precisely located.

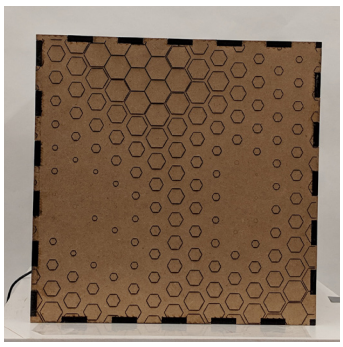
The wooden half box is made of the same material as the outer box. It gives the box a raised floor feeling that hides the ugly wiring and innards of the electronic connections.











List of Electonics

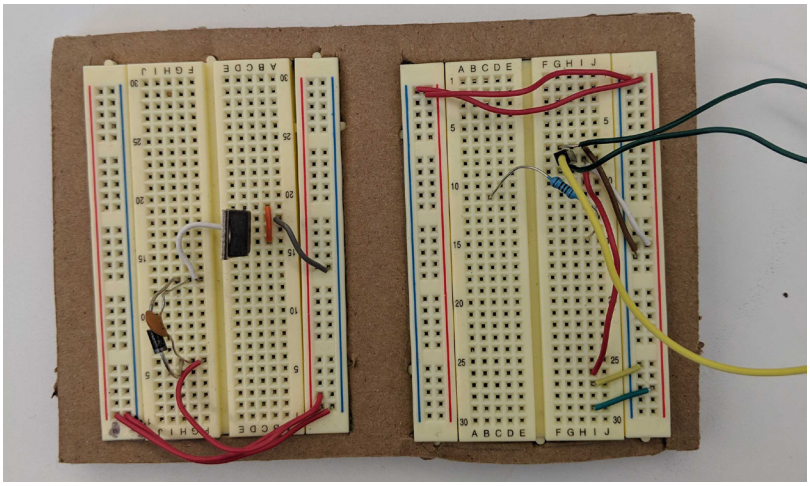
Microcontroller: AdaFruit ESP32 Feather board x 1
Breadboard x 2
Connecting Wires
DC Motor x 1
Photo Resistor x 1
9V Isolator x 1
TIP120 transistor x 1
Diode x 1
Filtering Capictor x 1
1k ohm resistor

List of Electonics

Cardboard panels
Wooden box panels
Plexiglass panel
Paper with animation printed on

Electrical Connections

The electronics were connected to a breadboard housed inside the box. The photoresistor is connected to pin A0, and the motor is connected to pin 21. In order to ensure the wires attaching the photoresistor to the breadboard were distinguished and not crossing, wires were taped to the photoresistor and then to the inside of the box.



Future Work

In the future, this box could utilize an IR sensor instead of a photoresistor. This is because different lighting situations and reflective surfaces greatly varied the results that were being gathered from the sensor, and thus triggering the box at unwanted distances. Another improvement that could be made is the connection between the zoetrope and the motor. The zoetrope is currently sitting on the motor at a slant, whereas if I had laser cut a fitting part the two could sit parallel to each other.

Results

The box works as intended and responds the changing light received of the photoresistor. In optimal lighting conditions, the box would be triggered when the face is 10cm away. Some parts of spinning the zoetrope went through iterations of gear matching, but it was realized that the speed of the motor was fast enough to produce the effect.

Video can be seen here:
https://youtu.be/seH1_g_Sh_c

Code

```
#include <analogWrite.h>

const int lightMeasuringPin = A0;
const int motorPin = 21;

void setup() {
  // put your setup code here, to run once:
  pinMode(lightMeasuringPin, INPUT);
  pinMode(motorPin, OUTPUT);
  Serial.begin(9600);
}

void loop() {

  //1. use the photoresistor module to measure the light intensity
  int measuredIntensity = analogRead(lightMeasuringPin);
  Serial.print("Intensity = ");
  Serial.println(measuredIntensity);

  //2. if below a threshold, turn motor to high
  if (measuredIntensity >= 3750) {
    analogWrite(motorPin, 255*1);
    Serial.println("Motor is Running");
  }

  else {
    analogWrite(motorPin, 255*0);
  }

  delay(20);
}
```