ECE 1895 Junior Design
Spring 2022

TEAM CHI
Members:
David Cramer, Christopher Guiher, Alexander Shuster, Morgan Visnesky

TEAM ROLES:
David Cramer: Integration Lead / scrum co-lead
Christopher Guiher: Hardware Lead
Alexander Shuster: Fabrication Lead
Morgan Visnesky: Software Lead / scrum co-lead

<div align="center">

Team CHI Project Proposal: Originally Conceptualized by Christopher Guiher
PITT TRADITIONS

</div>

For the Team-Chi BOP-IT proposal, we have decided to elaborate on the initial proposal made by Christopher who centered their user inputs around some of their favorite Pitt traditions.

The design will be encased in a model Cathedral of Learning and Panther Statue. A power switch and a 'Start Game' button will be connected to the base of the model. The power supply for the toy will come from a 9V battery. Once the game is started, a speaker will be used to prompt the user via pre-recorded audio messages to carry out one of 3 actions: Light the Victory Lights, Rub Panther's Nose, or shout Let's Go Pitt.

Light the Victory Lights: This action will be accomplished by positioning a blue and yellow LED as 'spotlights' directed towards a photoresistor positioned atop the Cathedral of Learning model. The user will be able to press a push-button that will trigger the spotlight to shine towards the photoresistor. Alternately, the user will be provided with a small, blue, keychain flashlight that will be used to trigger the photoresistor. This will provide a digital input into the microcontroller that verifies if the user chose the correct action.

Rub the Panther's Nose: This action will be accomplished by moving a joystick positioned on the panther's nose. The joystick will only consist of a single axis. Inputs will be considered valid if the joystick makes multiple oscillations from left to right or right to left.

Let's Go Pitt: A microphone will be positioned on the base of the model. To accomplish this action, the user should cheer into the microphone. The microcontroller will compare the ambient noise with the noise immediately after the prompt to detect if the correct input was provided.

Option #1:
The 'Pitt Traditions' Bop-It toy will give the user a set time interval to complete each task that will decrease linearly as an inverse function of the number of points the user has scored. Tasks will be chosen randomly, by using a disconnected analog pin as a seed reference and using the Arduino's random function. If a task is completed successfully, an LED on the model's base will light up. If an incorrect

action is chosen, or the allotted time has run out, a different LED will notify the user that the game is over. Two 7-Segment displays will be used to provide the user their score. If the user produces 99 successful actions, a special audio will be played notifying the user that they have won the game.

Option #2:

The 'Pitt Traditions' Bop-It toy will give the user a set time interval to complete each task that will decrease linearly as an inverse function of the number of rounds the user has completed. A. round will be a grouping of 5 random tasks with an equal interval of time between each task. Tasks will be chosen randomly, by using a disconnected analog pin as a seed reference and using the Arduino's random function. If a task is completed successfully, an LED on the model's base will light up. If an incorrect action is chosen, or the allotted time has run out, a different LED will notify the user that the game is over. After 20 rounds (or 99/100 completed tasks) the game will conclude, and the user will have won. Two 7-Segment displays will be used to provide the user their score. If the user produces 99 successful actions, the "Hail to Pitt" jingle will play to let the user know they have beaten the game.

Block Diagram:
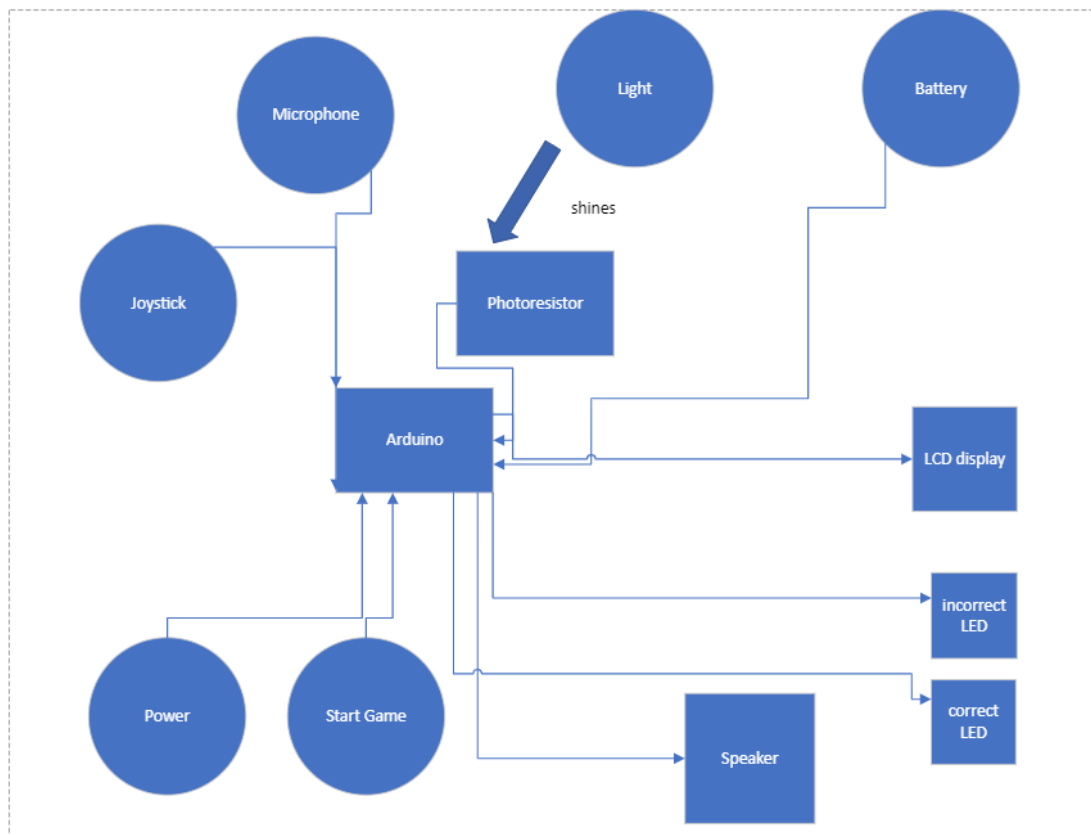
PSEUDO CODE:

```
// INPUTS
Const int micPin           = 13;
Const int joyStickPin      = 12;
Const int photoResistorPin = 2;
Const int startButton      = 8;

// OUTPUTS
Const int speakerPin    = 4;
Const int hexDisplayPin = 7;

// VARIABLES
Int curr_time = 0;
Int command_count = 0;

Void setup()
{
   // INPUTS
   pinMode(micPin, INPUT);
   pinMode(joyStickPin, INPUT);
   pinMode(lightDependentResistorPin, INPUT);
   pinMode(startButton, INPUT);

   // OUTPUTS
   pinMode(speakerPin, OUTPUT);
   pinMode(hexDisplayPin, OUTPUT);

   Time = getCurrTime();
}

panthers_nose()
{
   Time = currTime;
   Command = rubNose;
   Speak-command();
   If (nose_joy_stick == moved and getTime() - Time < currTimeInterval)
   {
      Score += 1;
   }
   Else
   {
      displayFinalScore();
      game_started = false;
   }
}

victory_lights()
{
   Time = currTime;
   Command = victoryLights;
   Speak-command();
   If (lightSensorPin == HIGH and getTime() - Time< currTimeInterval)
   {
      Score += 1;
   }
```

```
    Else
    {
        displayFinalScore();
        game_started = false;
    }
}

hail_to_pitt()
{
    Time = currTime;
    Command = hailToPitt;
    Speak-command();
    If (microphonePin == HIGH and getTime() - Time < currTimeInterval)
    {
        Score += 1;
    }
    Else
    {
        displayFinalScore();
        game_started = false;
    }
}

pickRamdomCommand()
{
    Random_command = random(
                        hail_to_pitt(),
                        victory_lights(),
                        panthers_nose());
    Command_count += 1;
    Return random_command;
}

Void loop()
{
    while(game_started == true)
    {
        If (command_count <= 99)
        {
            playWinningJingle();
            Game_started = false;
        }
        Command = pickRandomCommand();
    }
}
```

Sketch of 3D Model / Project Enclosure: