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ECE 411 Group 6 Product Design Specification (PDS)

Executive Summary/Concept of Operations

Brief project description: A light display tower that utilized audio input to create a unique and exciting light show. The tower will change light color and intensity according to the music in order to always create the perfect vibe. This is the perfect product for all ages, specifically anyone who enjoys music and excellent vibes. This is a practical and fun product that we could all see having in our homes. There is potential for a multitude of different shapes and concepts so this project is full of possibilities.

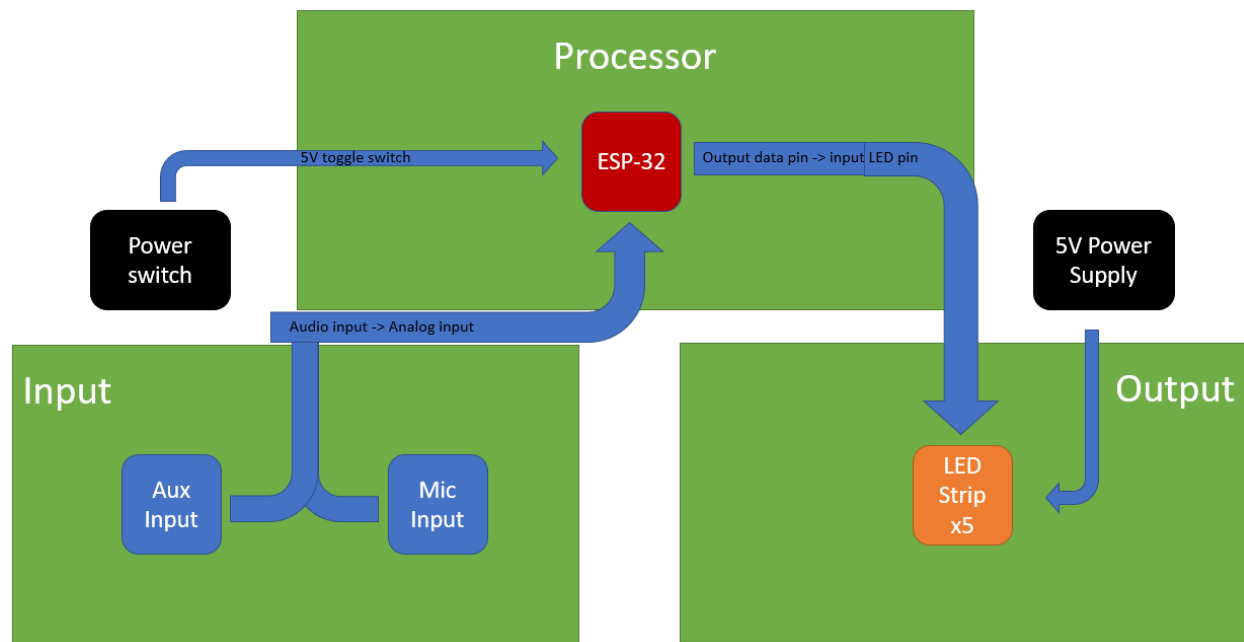Photo of Potential appearance:

Brief Market Analysis

The LED light tower is intended to be enjoyed by customers of all ages! Although there are light towers of various shapes and sizes, our product will be slightly different from the competition. Our product will utilize an audio input in order to create a unique and exciting light show. The tower will change both the light color and intensity according to the music. This will always create the perfect vibe regardless of the occasion! We believe our LED light tower will sell for $30, which is slightly higher than the price range compared to the other LED light towers. Our price is slightly higher due

to having the feature of the light color and intensity changing based on the pitch of the music.

Requirements

- ☐ Must change LED color according to surrounding sound and/or music
- ☐ Must be aesthetically pleasing
- ☐ Must be safe
- ☐ Must be user friendly (single power button)
- ☐ Must be portable
- ☐ Should change LED intensity / frequency according to surrounding sound and/or music
- ☐ Should be less than 30lbs
- ☐ Should be 2 feet tall
- ☐ Should have a metal base
- ☐ Should have a disco ball and RGB spotlight
- ☐ Should have soft bottom to prevent scratching floor
- ☐ May input music internally through microcontroller and use FFT to filter frequency
- ☐ May be battery powered
- ☐ May have light intensity settings
- ☐ May have amplifying speakers

System Architecture

Processor

ESP-32

5V toggle switch →

Power switch

Output data pin -> input LED pin

5V Power Supply

Input

Audio input -> Analog input →

Aux Input

Mic Input

Output

LED Strip x5

Design Specification

- Sensor: Microphone, auxiliary input
- Processor: LED controller
- Actuator: LEDs
- Power: 5V power source
- Mechanical design: Helix metal tower with solid base
- Firmware: ESP-32 AT firmware
- Arduino type: ESP-32
- Development environment: Arduino IDE