3x3x3 RGB LED Cube Requirements Document

Team # 2

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Overview

Although RGB led cubes can be found for sale on the internet, it is difficult to find a smaller size RGB led cubes which is pre assembled and offers audio responsive behavior. Our goal is to fill this need with a fun and tasteful product using engineering techniques and methodology. The 3x3x3 RGB cube will display audio input signals through a dazzling matrix of RGB leds, which are capable of creating millions of hues of color. The compact size of a 3x3x3 RGB LED cube allows it to be placed unobtrusively on a computer desk or bedside table.

Product Requirements

- Functionality
  - Must work as a music visualizer by animating a 3x3x3 array of RGB LEDs. This is the product's primary purpose.
  - Must have a standard size audio input port to be compatible with many audio devices.
  - Should have a power input port, so the owner doesn't have to use batteries.
  - May have an input for reprogramming, for computer savvy owners who want to make their own LED animations.
- Performance
  - Should have a microcontroller processor with a max clock speed of 20 MHz, which is the benchmark for similar products.
  - Should have a microcontroller with 32 kB of flash memory, to provide enough memory to code intricate animations.
- Economic
  - The product must not cost more than $100, so that it can compete with similar products sold online.
  - The product should cost less than $75, to make it available to a wider consumer base.
- Energy
  - The product may be powered with a battery, for users who don't like using a wall power supply.
  - Each LED should be delivered 20mA maximum to avoid excessive power consumption and inhibited lifespan.
  - The product must not consume more than 10W.

- Environmental
  - The protective case may be created from recycled material to lessen the cubes environmental impact.
- Maintainability
  - The protective case should be removable for repairs.
  - The protective case may have air circulation design.
- Manufacturability
  - The PCB must be at least 2 layers to conserve space.
  - The PCB may have through holes to secure with base.
- Operational
  - The product must be operational between -20° F to 120° F to ensure it works in all environments.
  - The product should be drop resistant, to ensure it doesn't break if it falls off a table or desk.
- Usability
  - The product must be plug and play to make it a more enjoyable experience for the owner.
- Documentation
  - Device documentation may be a single sheet provided with the product to explain the device's features to new owners