

LED Interactive Matrix Cube:

Project Proposal

Feb 12 2018

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Introduction

The LED Matrix Cube is a take on a hackathon idea and a reddit thread on an interactive cube. Originally, the cube with use of its accelerometer and gyroscope to detect its orientation in the real world and utilizing that information as parameters for the fluid dynamic function in the software portion of the project. The output from the software is displayed within 3D space on the LED cube.

Novel Contribution

While the original project was built with almost everything included for an interactive system, so that aspect will be replicated and reproduced. The additional component will be adding more interactive components like a microphone and have a set of complementary software such as creating an Alexa LED cube, and visual feedback via LEDs from sounds or music.

Motivation

The idea was originally from a project that was from a hackathon, and the reddit user /u/zzzaurak provided with the materials required to build it. Providing a perfect time to build something of this caliber.

Materials Required

* While the features of this project will be fully flushed, the LED component will have to be downscaled as the cost of 64x64 p2.5 LED Matrix plus shipping is extremely expensive so will be replaced with 16x16 LED Matrix either bought or (8x8) hand made LED matrix, both material requirements will be presented.

Bought LED Matrix

- 6x 16x16 p2.5 LED Matrix

Handmade LED Matrix

* ? = unknown quantity

- 384x = (6x(8x8)) RGB Cathode LED
- 2x-3x (4mm x ?m x ?m) Plywood
- 1x 2.5mm opal acrylic glass

Common Materials

- 1x ADXL330 (Accelerometer)
- 1x Raspberry Pi 3
- 1x Arduino Microcontroller
- 1x Mini USB Microphone
- 1x speaker

Milestones

Milestone 1	Feb 20	Have all or most parts gathered
Milestone 2	Feb 28	Finish 2D prototype -Able to gather information from accelerometer -Able to take information from accelerometer and output to led matrix that corresponds to orientation and velocity -LED is individually addressable and accessible for any
Milestone 3	Mar 15	Finish 3D prototype -Same testing as 2D prototype but being able to represent orientation in 3D space (z-axis)
Milestone 4	Mar 17	Get microphone and speakers working Build small library to easily interact with the components (LED, Accelerometer) in python or C++
Milestone 5	Mar 20	Integrate Alexa -Able to utilize microphone and speakers -Able to get information to interact with the LED component - Capability Agents provided by AVS API make it limitless of the things that can be done
Milestone 6	Mar 25	Fluid Dynamic Portion -Either refactor previous pseudo fluid dynamic source code to work or find another fluid dynamic source code or build one from the ground up Music Feedback -Use microphone to get enough information to provide a frequency spectrum and push a LED animation
Milestone 7	Project Presentation Day	Finish any outstanding goals Update GitHub (if not being done already) Finish final documentation -Project Design -Prototype Design

		-Prototype testing/changes -Including source code -Diagrams -Circuit -Logical Flow Chart -Testing Flow Chart -Testing -Mostly black box testing -Limitation -Future Consideration
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Team Roles

Dionne Pasion - Everything

Summary

The LED cube is limited to the creativity of the person, and it can be expanded to hit many applications. So, while the initial iteration provided is a glorified Amazon Echo, the purpose of the cube is to understand and work with sensors and being able to process them into purposeful output.

Sources

[1] /u/zzzaurak – LED Cube (https://www.reddit.com/r/gifs/comments/7oqs3a/led_cube/dsbv5s/)

[2] Alexa SDK (<https://github.com/alexa/avs-device-sdk>)

[3] Make your own 10x10 LED Matrix – GreatScott! (https://www.youtube.com/watch?v=D_QBIFIQk-o)