

Project Proposal

ECE 411

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Project Ideas

LED Cube

An input signal from an audio source goes into a frequency spectrum analyzer. The frequency analyzed audio signal goes into a microprocessor. The microprocessor outputs the processed signal to the RGB LED cube, creating animations based on the amplitude of each audio frequency band.

Scoreboard

The Scoreboard project keeps track of the scores received from user input or online with a time stamp. The recorded scores are displayed on a LCD panel.

Mini Synthesizer

Various buttons, switches, rotary potentiometers, and/or slide potentiometers input signals to a microprocessor. The microprocessor processes the inputs, and outputs sounds to an audio jack.

Digital Clock

The Digital Clock project should display current time and date on a 7 segment-display. The clock should have an alarm that can be modified with user input. The clock should have a setting for different time zones and also daylight savings time.

Decision Matrix

For our decision matrix, we specified six parameters which answered the questions we had when selecting from our project ideas. As a team, we also discussed how important each feature was to us, and we assigned weights to each parameter. A table that describes the parameters, and specifies their weights is shown below.

| Average Scores | Cube | Clock | Synth | Scoreboard |
|-------------------------|--------------|--|-------------|---------------|
| Feasability | 8.5 | 7.25 | 5.25 | 5.5 |
| Cost | 6.75 | 7 | 4.75 | 5.5 |
| Technical Complexity | 8.75 | 5 | 6.25 | 4.25 |
| Usefulness | 8.25 | 6 | 7.75 | 5.75 |
| Viability as a Product | 8.75 | 6.5 | 7.25 | 6.25 |
| Educational Application | 7.5 | 6.75 | 6 | 5.5 |
| Parameter Weight | | | | |
| Feasability | 0.2 | Can we get it done on time? | | |
| Cost | 0.15 | Is it expensive to produce? | | |
| Technical Complexity | 0.2 | Is it too easy or too hard? | | |
| Usefulness | 0.23 | Will our project team use our prototypes after we are finished? | | |
| Viability as a Product | 0.1 | Can we sell this if we were an actual MVP? | | |
| Educational Application | 0.12 | Will we apply the ECE skills that we have gained in 411 and other courses? | | |
| Total (should be 1): | 1 | | | |
| Adjusted Values | Cube | Clock | Synth | Scoreboard |
| Feasability | 1.7 | 1.45 | 1.05 | 1.1 |
| Cost | 1.0125 | 1.05 | 0.7125 | 0.825 |
| Technical Complexity | 1.75 | 1 | 1.25 | 0.85 |
| Usefulness | 1.8975 | 1.38 | 1.7825 | 1.3225 |
| Viability as a Product | 0.875 | 0.65 | 0.725 | 0.625 |
| Educational Application | 0.9 | 0.81 | 0.72 | 0.66 |
| Final Totals | 8.135 | 6.34 | 6.24 | 5.3825 |

After some discussion, a spreadsheet was set up where each team member filled out their own evaluations of each project idea. The values were then combined, weighted, and totaled up. The project that had the best overall score was the LED cube, so we decided to move forward with that project idea. To validate our final decision, we had a round of discussion to justify each other's evaluations and assess the best path forward for our group.

LED Music Cube Project Proposal

Our project is to design an LED "light show" based on audio input. The audio signal will come in from a 3.5mm jack, and be processed by the MSGEQ7 audio graphic analyzer. The processed signal will be fed to our Atmega328 microcontroller, which will take the input and produce outputs that are fed into our TLC5940 LED driver. The LED driver will help control every single RGB LED by changing colors and brightness based on the inputs it is given. Our initial prototype will have the RGB LEDs arranged in a 3x3x3 cube shape. The circuit will use an Atmega328 microcontroller, and will probably use the Arduino toolkit. At this point in the process we are considering the following expansions: one or more additional display shapes (besides a cube); multiple patterns based on button input; additional EEPROM memory to hold animations; and using a microphone input in addition to the line in.