

Final Project Proposal

Year: 2014 Semester: Spring
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Project Name: BeatSquare
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Team Members (#1 is Team Leader):

Member 1: Kevin Meyer

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Member 2: Ben Pluckebaum

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Member 3: Brennan Tran

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Member 4: Jonah Ea

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1.0 Project Description:

The BeatSquare is a project that will output musical sound based on the configuration of an 8x8 pushbutton grid. The columns in the grid will represent eight beats across two measures in 4/4 time. The rows will represent notes and will be ranked in order by pitch. As the device runs, it will loop through each beat in the configuration and output up to eight tones per beat, as determined by the configuration. Pressing a button in the grid will turn a note on or off at that beat in the configuration. LEDs contained within the buttons will indicate which notes are turned on. This functionality is similar to several applications which have been developed with software on the web, but contain little or no hardware. [1] Users will be able to manipulate musical configurations by way of an LCD and pushbutton interface, as well as via a web application hosted on a Raspberry Pi.

2.0 Roles and Responsibilities:

Kevin Meyer was selected to be the Team Leader due to his prior leadership experience in his ECE 362 project's team, as well as in other courses and extracurricular activities. He also has experience in packaging from ECE 362, and his background in software will enable him to assist in the software-oriented portions of the project. He will be in charge of organizing and documenting the team's activities.

Ben Pluckebaum was chosen to fill the role of Systems Engineer due to his mixed background in software and hardware, and his ability to work with a diverse number of systems and cooperate with others in integrating them. He is also skilled in seeing the project from a high-level point of view. He will be in charge of selecting parts and will assist in formulating the theory on how the device will function.

Brennan Tran will be the hardware engineer because of his extensive experience with electrical components, background in electrical engineering, and experience with wiring components together in ECE 362. He will be in charge of the bulk of the PCB design as well as hardware design.

Jonah Ea was selected as the software engineer due to his extensive background in software development, testing, and implementation. He will be assisted as needed by other teammates who also have experience in software development.

2.1 Homework Assignment Responsibilities

<i>Design Component Homework</i>	<i>Professional Component Homework</i>		
4-Packaging Design and Specs	KM	3-Design Constraint Analysis/Parts List	BP
5-Hardware Narrative and Prelim Schematic	BP	10-Patent Liability Analysis	KM
6-PCB Narrative and Prelim Layout	BT	11-Reliability and Safety Analysis	BT
9-Software Design Narrative	JE	12-Social/Political/Environmental Analysis	JE

Figure 1. Assignment Responsibilities

3.0 Estimated Budget

Item	Estimated Cost
<i>Packaging</i>	
Housing	\$30
8x8 Cube Button Pad	\$30
<i>Electrical</i>	
RGB Omni Board (x4)	\$20 x4 = \$80
PCB	\$30
Raspberry Pi	\$30
Microcontroller	\$30
LCD	\$20
Speakers	\$15
IC Parts	\$10
Electrical Components	\$20
<i>Miscellaneous</i>	
Shipping	\$40
Total	\$335

Figure 2. Estimated Budget

Of the total amount in the above estimate, Purdue is expected to cover \$300 plus the cost of the PCB. The remaining amount will be equally covered among team members.

The above estimate outlines several categories:

Packaging – materials used to house the project.

Electrical – electrical components used to provide functionality.

Miscellaneous – additional costs (e.g. shipping).

4.0 Project Specific Success Criteria

The project's specific success criteria are listed below:

- 1.** The ability to poll an array of pushbuttons to manipulate the musical configuration and display a visual pattern using LEDs
- 2.** The ability to adjust the beats per minute.
- 3.** The ability to output multi-tone audio.
- 4.** The ability to save audio output as a MIDI file through USB.
- 5.** The ability to manipulate the configuration with a web application hosted on a Raspberry Pi.

5.0 Sources Cited:

[1] Andre Michelle (2011). *Tone Matrix* [Online]. Available: <http://tonematrix.audiotool.com/>