Project Proposal

The AutoSpiel

CSCE 462 Fall 2018

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**Background**   
This project is being undertaken for CSCE 462. We will learn about low-level microcontroller programming, project management and general electronics and circuitry. The idea for the AutoSpiel was thought up because none of our team members know how to play a glockenspiel but would like to listen to one. To that end, we would like to design a player for a glockenspiel so that we would be able to load a USB thumb drive full of MIDI files and play the music automatically on the Glockenspiel.  
  
**Objectives**

* Take MIDI files from a USB, make sure they are valid, and convert them to a more useable format
* Create a way to transfer the converted MIDI files to the microcontroller
* Have microcontroller receive converted data and use it to activate the solenoids that will play the notes
* Have a bracket holding the solenoids that can be placed onto most (hopefully any) glockenspiel
* Have a working circuit board that has a place for the Raspberry Pi and UBW32 Microcontroller as well as holding all of the transistors that simplifies and cleans up wiring
* Give the AutoSpiel functionality to pause/play and skip/replay songs

**Scope**   
The end goal is to have a working prototype that will take files from a USB thumb drive, convert the files to a meaningful format (JSON) and have the microcontroller take this data to play notes on the glockenspiel. The end product being a prototype that will play music moments after the USB drive is inserted and can be paused/played/skipped/replayed.

**Timeframe**

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| --- | --- | --- |
|  | Description of Work | Start and End Dates |
| Phase One | Research and Purchasing | 10/16 – 10/30 |
| Phase Two | Building and Programming (Implementation) | 10/31 – 11/29 |
| Phase Three | Fine Tuning/Presentation planning | 11/30 – 12/5 |

**Parts Sourcing**

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| Part | Source |
| Solenoids | Ebay.com |
| BJT Transistors | Ebay.com |
| UBW32 Microcontroller | Sparkfun.com |
| MDF | Co-worker |
| Aluminum Braces | Home Depot |
| Solder Wire | Amazon.com |
| 18 Gauge Wire | Amazon.com |
| PCB From FEDC | Fischer Engineering Design Center |
| Header Pins | Sparkfun.com |
| 300 Watt Power Supply | Old computer |
| Alps Keyboard Switches | Already own |

**Project Budget**

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| --- | --- | --- | --- |
| Part | Quantities | Part Unit Cost | Part Total Cost |
| Solenoids | 32 | $2.60 | $83.20 |
| BJT Transistors | 32 | $3.79 (x10) | ~$16.00 |
| UBW32 Microcontroller | 1 | $40 | $40 |
| MDF | 1 2x8ft board | FREE | $0 |
| Aluminum Braces | 1 1/2x36in bar | $3.44 | $4.00 |
| Solder Wire | 2 rolls | $7.29 | $14.58 |
| 18 Gauge Wire | 100 ft | $18.99 | $19.00 |
| PCB From FEDC | 1 PCB | $50 | $50 |
| Header Pins | 2x40 pins | $1.50 | $3.00 |
| 300 Watt Power Supply | 1 | FREE | $0 |
| Alps Keyboard Switches | 3 | FREE | $0 |

**Total Cost: $229.78**

**Key Stakeholders**

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| Client | Jyh Liu |
| Sponsor | Jyh Liu |
| Project manager | Jonathan Westerfield |

**Monitoring and Evaluation**   
[Describe how progress will be evaluated throughout and at the end of the project. Formulate clear indicators for objectives and result.] The team will hold meetings during class times and labs as well as meetings on the weekends (as necessary). This allows us to meet at least 2 times a week. We will discuss project progress both individually and teamwise. We will do weekly updates that will detail what was done during the week (most likely during Wednesday lab times).

**Communication**

* Will mainly communicate through a group text since we all have iPhones
* All code, documentation and other project related files will be stored on a GitHub repo under the URL: https://github.com/JonathanGWesterfield/CSCE462

**Responsibility Delegation**

Alejandra Sandoval

* MIDI file handler from the USB stick and making sure the MIDI files are valid (Python)
* MIDI converter. Will convert the MIDI file to a more meaningful format (Javascript)
* Serial communications between the RPi and UBW32 (Python or C/C++)
  + Will also implement interrupt system to handle skip and replay functionality (from the RPi side)

Kenneth Obkirchner

* Microcontroller (C/C++)
* Will be using the input data stream from the RPi in order to activate the solenoids at the correct time
* Will handle interrupts if pause/play button and skip/replay is hit

Jonathan Westerfield

* Printed Circuit Board Designer. Will design the PCB design in order to simplify the system wiring
* Builder. Will build the physical unit
* Project Manager

**Approval Signatures**

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| Jyh Liu  Professor |
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| Jonathan Westerfield  Team Member/Project Manager |
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| Alejandra Sandoval  Team Member |
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| Kenneth Obkirchner  Team Member |