**Iteration Plan Document**

TeensyAudio Wavetable Synthesis

Iteration #4

**Abstract**

The purpose of this project is to provide a C++ library and accompanying Python utility scripts allowing realistic instrumentation audio to be synthesized on the Teensy 3.2 Arduino Digital Analog Converter (DAC). This library will be exposed to developers, and will allow pitch shifting, looping, tremolo, and vibrato effects to be imposed on a raw byte buffer of recorded samples.

**Document History**

|  |  |  |  |
| --- | --- | --- | --- |
| Version | Description | Date | Modifier |
| 100 | Initial Version | 11/18/2016 | Ryan Mellmer |

**Project Team**

Ryan Mellmer - Team Lead

Connor Delaplane - Infrastructure Manager

Aida Keifer - Scheduling Manager

Nicholas Craig - Requirements Manager

Josh Bucklin - Design/Architecture Lead (Teensy Library)

Jonathan Jensen - Developer

Xuan Tang - Developer

Note: All members also acting as developers.

**1.0 Introduction**

The purpose of this document is to describe the schedule and iteration artifacts for Iteration 4 of this project.

**1.1 Purpose**

The completion of this iteration completes the following milestones for the project:

* Teensy code optimization
  + Clean and optimize Teensy code. Examine assembly
* On demand loading of soundfont from SD card
  + Allow for on the fly loading of soundfont files from the Teensy’s SD card
* MIDI input on Teensy
  + Extend the Wavetable class to easily allow for handling Midi input

**1.2 Context**

This iteration is focused on optimizing the Teensy code developed in the previous iterations to maximize execution speed and minimize memory usage. The use cases should remain essentially unchanged, other than potential increases in efficiency/capability.

**2.0 Plan**

**2.1 Schedule of Iteration Workflows**

|  |  |  |  |
| --- | --- | --- | --- |
| **Workflow** | **Start Date** | **End Date** | **Duration (days)** |
| Requirements | 02/16/17 | 02/21/17 | 5 |
| Analysis and Design | 02/16/17 | 02/21/17 | 5 |
| Implementation | 02/21/17 | 3/13/17 | 21 |
| Testing | 02/21/17 | 3/13/17 | 21 |

**Table 1 :** Iteration Workflow Schedule

**2.2 Iteration Schedule Breakdown**

|  |  |  |  |
| --- | --- | --- | --- |
| **Task Name** | **Start** | **Finish** | **Assigned To** |
| **Requirements** |  |  |  |
| Update any new requirements | 02/16/17 | 02/21/17 | Requirements Team |
|  |  |  |  |
| **Analysis and Design** |  |  |  |
| Update Design plan | 02/16/17 | 02/21/17 | Everyone |
|  |  |  |  |
| **Implementation** |  |  |  |
| Teensy Code Optimization | 02/21/17 | 3/13/17 | Opt team (of 3?) |
| On-demand loading wavetables from SD card | 02/21/17 | 3/13/17 | SD team (of 2?) |
| MIDI input on Teensy | 02/21/17 | 3/13/17 | MIDI team (of 2?) |
|  |  |  |  |
| **Testing** |  |  |  |
| Teensy Code Optimization | 02/21/17 | 3/13/17 | Opt team |
| On-demand loading wavetables from SD card | 02/21/17 | 3/13/17 | SD team |
| MIDI input on Teensy | 02/21/17 | 3/13/17 | MIDI team |
| Final complete integration testing with latency validation | 02/21/17 | 3/13/17 |  |
|  |  |  |  |
| **Developer Documentation** |  |  |  |
| Produce/refine final developer documentation for all functionality | 02/10/17 | 3/17/17 | All devs |
|  |  |  |  |

**Table 2:** Iteration Plan Task Breakdown by Workflow

**2.3 Iteration Artifacts**

|  |  |  |
| --- | --- | --- |
| **Task Name** | **Deliverable** | **Responsible** |
| **Requirements** |  |  |
| Update any new requirements | Potentially updated requirements document | Requirements Team |
|  |  |  |
| **Analysis and Design** |  |  |
| Update Design plan | Potentially updated design document | Everyone |
|  |  |  |
| **Implementation** |  |  |
| Teensy Code Optimization | Optimized Teensy code (Assessing assembly level code) | Opt team (of 3?) |
| On-demand loading wavetables from SD card | C++ code to load a SF2 from SD and produce C++ object of resulting data | SD team (of 2?) |
| MIDI input on Teensy | Appropriate function hooks for handling MIDI input | MIDI team (of 2?) |
|  |  |  |
| **Testing** |  |  |
| Teensy Code Optimization |  |  |
| On-demand loading wavetables from SD card |  |  |
| MIDI input on Teensy |  |  |
| Final complete integration testing with latency validation |  |  |
|  |  |  |
| **Documentation** |  |  |
| Produce/refine final developer documentation for all functionality |  |  |
|  |  |  |

**Table 3:** Artifacts to be Delivered in this Iteration