MAPPING THE VESTAX VCI 100 USING JAVASCIPT & XML IN THE MIXXX SOFTWARE

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Date: May 2019

Final Dissertation Document submitted to Swansea University in Partial Fulfilment for the Degree of Bachelor of Science.

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This work has not previously been accepted in substance for any degree and is not being concurrently submitted for any degree.

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ACKNOWLEDGEMENTS

ABSTRACT

Mapping's for the Vestax VCI 100 DJ Controller are limited. Research has shown that there have been other mappings created for the hardware, but these all have different features implemented. However, there has yet to be a complete mapping which incorporates all the basic and advanced features that would be beneficial for today's DJ.

The project aim is to implement a solution which is a full complete mapping for the Vestax VCI-100. This document will contain everything needed to come up with a complete mapping and the process is documented at every chapter.

Various methodologies were adopted during the dissertation such as surveys and analysis of participants responses. Research indicates that further development is needed to create a full mapping for the Vestax VCI-100.

CHAPTER

1. INTRODUCTION

Being a DJ myself I have always had a deep interest in various methods of mixing. From using various types of DJ software to the use of analogues equipment.

Being a collector of iconic DJ hardware, I realized that I could not find a full mapping which incorporated all the features I needed for a seamless mix on the Vestax VCI 100 DJ Controller.

Over the years there has been many people who have created partial mapping for the hardware which will be mentioned in related work section. However, I was unable to find a mapping for this controller which incorporated all the features.

This led to me to this project in which I will attempt to create a mapping for the controller which maps all basic features and advanced features.

This project will also help me gain a further understanding in the field and this dissertation will document the steps and stages I went through.

1.1. What is a DJ controller?

DJ controllers are devices used to help DJs mix music with DJ software using knobs, encoders, jog wheels, faders, backlit buttons, touch strips, and other components.

Fig 1.1 The Vestax VCI 100 Hardware

In 2006, Vestax moved into the burgeoning digital DJ market and released the VCI 100, an all-in-one DJ controller used to control digital DJ software. Its design of jog wheels and a mixer in a single compact frame sparked a revolution in digital DJ hardware.

1.2. Software
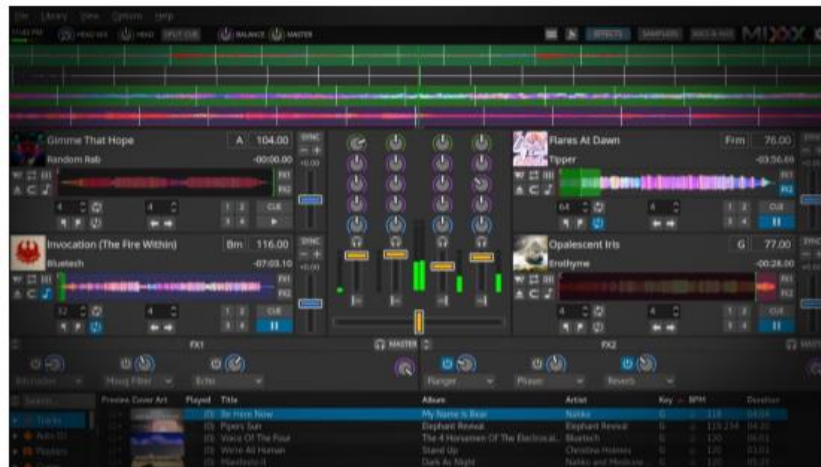
Fig 1.2. The Mixxx software

Mixxx is free and open-source software for DJing. It is cross-platform and supports most common music file formats. Mixxx can be controlled with MIDI and HID controllers and timecode vinyl records in addition to computer keyboards and mice.

Fig 1.3 Diagram of internal mixing mode.

Using Mixxx together with a DJ controller for internal mixing. The DJ controller has an integrated audio interface that provides two separate stereo outputs.

1.3. Other Types of software

There are various other pieces of software which are compatible with the Vestax VCI 100 however after a lot of research, "Mixxx" software is one of the only open source mixing software available on the market now.

An example of another piece of software

Fig 1.4. The Traktor pro software

Traktor is DJ software developed by Native Instruments. It is also used as a sub-brand for Native Instruments' associated DJ hardware products.

Traktor pro 3 (Most recent version) was released on October 18, for $99.

This software is good software however Traktor is not open source, so It is not suitable for the intended project.

1.4. Why choose the Mixxx software

[Taken from Mixxx's website]

BPM, Key Detection & Sync – BPM and musical key detection help you find the perfect next track from your library. Use master sync to match the temp and beats of four songs for seamless mixing.

DJ Controller Support – Built-in mapping for DJ controller hardware gives you hands-on control of Mixxx's features. Use the programmable mapping system to customize your workflow and add support for any MIDI or HID device.

Effects – Add your unique spin to tracks with sound effects. Get creative by chaining multiple effects together and twisting all their knobs.

Friendly Community – Mixxx is developed by an international community of DJs, programmers, and artists. Because Mixxx is free (as in freedom and price), open source software, anyone can contribute to make Mixxx even better – including you!

You can get involved with Mixxx today by reporting bugs and suggesting features, making a controller mapping, adding features and fixing bugs, helping with translations, or working on one of our other starter tasks.

2. PROJECT MOTIVATION

I have always had an interest in hardware that is iconic. The Vestax VCI 100 was an iconic controller and the first of its kind when it was released in 2006.

The overall aim of the project was to develop a full mapping for the controller that can be used by anyone.

The project I think will be challenging but I am really looking forward to doing this because I think it would not only be beneficial to me but also could benefit many other DJ's and be useful across various other DJ software

I have researched many theoretical aspects of the project including research into XML Editors and various JavaScript IDEs before I started this project.

2.1. Project Aims

The overall aim of the project was to create a mapping for the Vestax VCI 100 in the Mixxx Software. The software must be error free and easy to use.

2.2. Minimum Requirements
The minimum required aims/objectives that are essential for the project include:

- Map all switches on the Vestax to appropriate function.

- Create an appropriate mapping for the rotary knobs.

- Map all toggle buttons to the appropriate functions.

- Create an appropriate mapping of the volume faders.

- Make sure both equalizers are mapped to correct knobs.

- Create a mapping for the crossfaders.

- Ensure that the filters are mapped to the correct knobs.

- Ensure that the pitch faders work and are mapped to the correct faders.

- Ensure the effects section is simplistic and easy to understand.

- Ensure that toggles for browsing/loading songs are appropriately mapped.

- The overall mapping/layout should be easy to understand and simple to use but contain all necessary requirements.

These minimum aims are a requirement but if completed within the time limit then the requirements can be extended to include the advanced aims/objectives which are listed on the next page.

2.3. Advanced Requirements

The Advanced Aims/Objective are:
(Only to be completed if time is available).

- Mapping of Jog wheels so to allow for stopping and starting.

- Create a Graphical user interface which is easy to use and appropriate for the controller.

- Allow for buttons to scroll forward and backward through waveforms.

2.4. Software Development (SDLC – Software development life cycles).

Agile software development methodology will be adopted during this project; this is an approach to software development under which requirements and solutions evolve through the collaborative effort of self-organizing and cross-functional teams and their customer(s)/end user(s).

It advocates adaptive planning, evolutionary development, early delivery, and continual improvement, and it encourages rapid and flexible response to change.

This approach is well designed to respond to various changes throughout the development stage and is crucial in this type of project and hence is the most appropriate methodology to use.

3. BACKGROUND AND RELATED WORK

There is a lot of background information which needs to be analyzed and understood before conducting such a project. After conducting research, I have found a few other people who have done work in this area which I have included below.

3.1. RELATED WORK - Anders Gunnarsson's mapping

Anders Gunnarsson – Anders helped work to develop Mixxx 2.0.0 and was part of the development team.

After research, it shows that Anders has written many different .XML and .JS mapping files for various controllers/hardware such as the Vestax VCI 100.

A Mapping file for the Vestax VCI 100 is available at Mixxx's website however when loaded via the Mixxx software, many important features of the controller was not functioning properly and a lot of buttons were not mapped to any function and only the basic features were working (Crossfader, Volume fader, Play/Cue/Pause).

After analysis of the files by opening them in Notepad++ showed that there were a lot of comments in the .JS file which suggests that the script is incomplete.

There is no updated version of the script available and the last commit that Anders made to GitHub was over three years ago, so it could be that the script was abandoned.

Below is a file on the GitHub used by anders which shows his mapping. However, there is a To Do list which lists the features that Anders has not completed.

Knobs

VR 5 -> Quick Effect Super Knob 1
VR 13 -> Quick Effect Super Knob 2
VR 17 -> Effect Rack 1, Unit 1 Balance
VR 18 -> Effect Rack 1, Unit 2 Balance
VR 19 -> Effect Rack 1, Unit 3 Balance
VR 20 -> Effect Rack 1, Unit 4 Balance

Switches

SW 12 -> Deck 1, Hotcue 1
SW 13 -> Deck 1, Hotcue 2
SW 14 -> Deck 2, Hotcue 1
SW 15 -> Deck 2, Hotcue 2
SW 33 -> Effect Rack 1, Unit 1 Toggle
SW 34 -> Effect Rack 1, Unit 2 Toggle
SW 35 -> Effect Rack 1, Unit 3 Toggle
SW 36 -> Effect Rack 1, Unit 4 Toggle

TODO

- Add *Effect Select* for LRU effect
- Abuse *Effect Parameter* to toggle effect against Deck 1, 2 & Master
- Enable *Preview*
- Do something with *Effect* buttons for Deck 1, 2 & Master
- Do something with *Vinyl Mode* buttons for Deck 1, 2

Fig 1.5, Anders Gunnarsson's mapping for the Vestax VCI 100.

Mixxx mappings for the Vestax VCI-100. Based on Anders Gunnarsson's mapping that ships with Mixxx. These mappings work best with 2 virtual decks.

Findings/Conclusions Draw

The mapping has most features but as you can see there are some things that were still on the list to do, I wish to map the Vestax in a different way and include all the minimum required features I have stated previously and maybe the advanced features if time allows.

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3.2. RELATED WORK – Stock Mapping

Below is a screenshot of the devices which are supported by "Mixxx's Certified mapping"

The table clearly shows that there is not a mapping for the Vestax VCI-100 and all Vestax controller are no longer available (Discontinued).

Device	Price (USD) [8]	Description	Integrated audio interface	Balanced outputs	Signal protocol	Supported since Mixxx version	Released
Reloop Beatmix 4	discontinued	4 deck all-in-one	yes	no	MI		
Reloop Beatpad	discontinued	2 deck all-in-one	yes	yes	MI		
Reloop Digital Jockey 2 Controller Edition	discontinued	2 deck all-in-one	no	-	MIDI	1.8	2009
Reloop Digital Jockey 2 Master Edition	discontinued	2 deck all-in-one	yes	yes	MIDI [22]	1.8	2009
Reloop Jockey 3 ME	discontinued	2 deck[23] all-in-one	yes	yes	MIDI [24]	2.1	2011
Reloop Terminal Mix 2	discontinued	2 deck[25] all-in-one	yes	yes	MIDI	1.11	2012
Reloop Terminal Mix 4	discontinued	4 deck all-in-one	yes	yes	MIDI	1.11	2012
Tascam US-428	discontinued	mixing console	yes	no	MIDI	1.6.2	2001
Vestax VCI-100MKI	discontinued	2 deck all-in-one	no	-	MIDI	1.6	2007
Vestax VCI-100MKII	discontinued	2 deck[26] all-in-one	yes	no	MIDI	2.0	2011
Vestax VCI-300	discontinued	2 deck all-in-one	yes	yes	MIDI	1.11	2008
Vestax Typhoon	discontinued	2 deck all-in-one	yes	no	MIDI	1.9	2010
Vestax Spin	discontinued	2 deck all-in-one	yes	no	MIDI	1.9	2009

Fig 1.6 Image of Hardware Compatibility from Mixxx's website.

As shown in the picture, the mappings that are available on Mixxx's GitHub are very outdated and the last commit on GitHub was over five years ago.
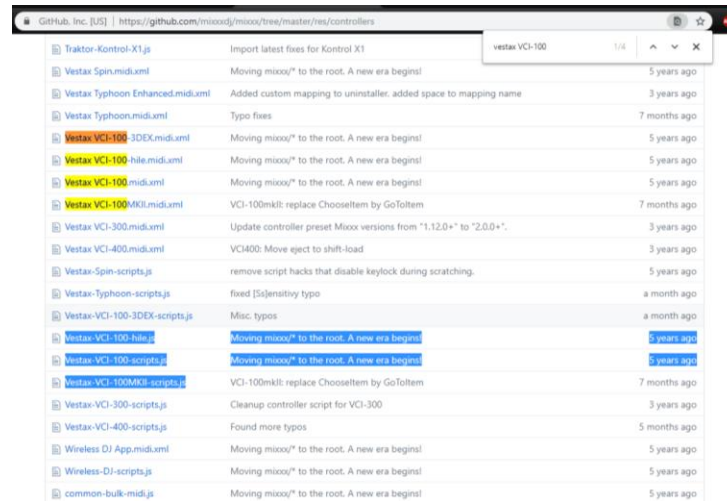
Fig 1.7 Image of the current mapping files for the Vestax VCI 100 that come preloaded in the Mixxx software.

- The "Vestax-VCI-100-scripts.js" and "Vestax VCI-100.midi.xml" has already been mentioned and is the Anders Gunnarsson mapping. It has already been said that some features are not implemented, and this script works for a few basic features on the controller however there are errors and features which are not implemented correctly.

- The Vestax-VCI-100-hile.js and Vestax-VCI-100-hile.midi.xml is a modified mapping for the controller, however testing showed that this script does not work with the Vestax VCI 100. This may be due to error in the mapping file or a firmware issue with the controller.

- "Vestax-VCI-100-3DEX-scripts.js" and "Vestax-VCI-100-3DEX.midi.xml" is another modified mapping file for the controller which says that it supports three deck functionalities. Results showed that the script did not work with the "Vestax VCI 100".

4. RISK ASSESSMENT AND ANALYSIS

Risk assessment is crucial in identifying hazards and risks that have the potential to have a negative effect on the project. Once risks are identified they can be evaluated and their impact on the project determined.

4.1 Risk Assessment Table

5. What is the risk?	Who will be affected and how?	Likelihood (X)	Impact (Y)	Risk factor (X * Y)
Code could have bugs which stops equipment working as required.	The users who will be testing my project may not be able to use/test it fully.	5	5	25
Project does not get completed on time.	I will lose marks on my project and testing may not be able to be done because the project is unfinished.	1	5	5
JavaScript and XML files could be accidently deleted.	I may not be able to recover the files and must start again from scratch.	3	5	15
Illness.	This could stop me attending important events or completing import tasks.	4	4	16
Water leak could damage equipment.	Equipment could be damaged and may stop me completing my project.	1	5	5
Natural disaster e.g. (Tsunami).	Could destroy all equipment.	1	5	5
Electrical malfunction which could lead to injury.	Could injure myself or damage the hardware.	1	5	5

Scale: 1 – 5 (1 = Low risk, 5 = high risk).

Most likely risks – Highlighted in green (Risk factor > 15).

The table below highlights the most likely risks which were identified in the Risk Assessment Table. The table will contain all risks which have a risk factor which is greater than fifteen. A new column is added to the table stating how to deal with the risk if the risk was to occur.

4.2 Highlighted Risks Table

What is the risk?	Who will be affected and how?	Risk factor (X * Y)	How to deal with the risk.
Code could have bugs which stops equipment working as required.	The users who will be testing my project may not be able to use/test it fully.	25	I could use GitHub and commit changes to the code as I go along, if an error occurs and the code does not work as intended, I can revert to the previous commit.
JavaScript and XML file could be accidently deleted.	I may not be able to recover the files and must start again from scratch.	15	Again, GitHub would be useful for me to use as I could commit new versions of the JavaScript and XML to the repo and if I accidently delete the files locally, they can be recovered easily.
Illness.	This could stop me attending important events or completing import tasks.	16	Time management would be useful to avoid the impact of illness. It would be impossible to predict when illness would occur, and it could have a high impact on the project but if I have kept up to date with the project aims, this shouldn't be too much of a risk.

6. PROJECT SPECIFICATION

This section will analyze both the minimum and advanced requirements for the project. What controls need to be declared to meet the requirements of the minimal/advanced project aims. This section will also discuss the programming languages used to develop the functions and what programs/software have been used in the creation and testing of the code.

6.1. Specification of Features

The main goal is to fully map the Vestax VCI 100, this includes mapping all faders, toggle buttons, jog wheels, rotary knobs and switches. To achieve this, a complete mapping .XML file and a .JS script file needs to be created and must incorporate all the controls mentioned in the project aims.

A detailed specification of the aims of the project needs to be addressed before creating these two files. The specification was generated from looking at the controller and considering the best function for each type of button, rotary, fader on the device.

6.2. Mapping plan (1st Draft)

Intended map of the features on the controller however, this design may change during the development process because an agile development life cycle was used.
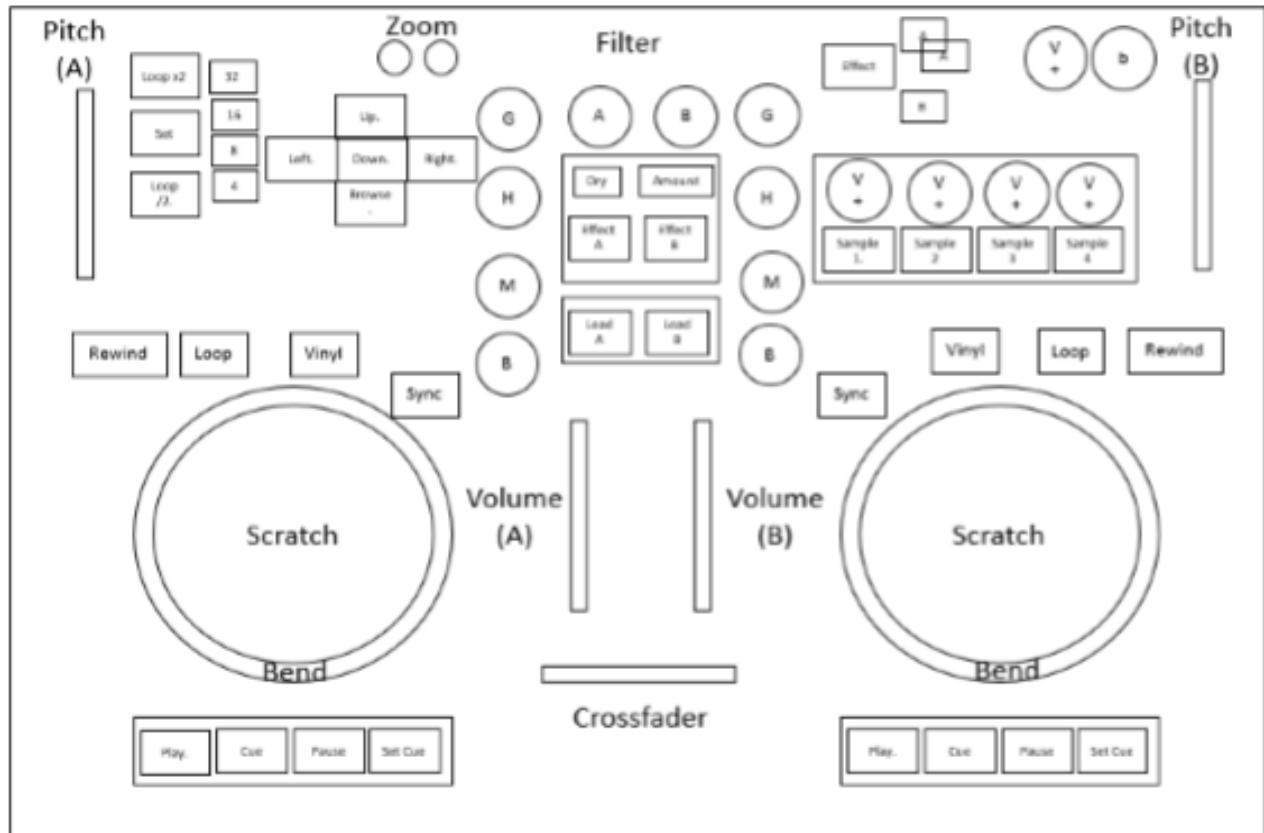
Fig. 1.8. Plan of controls for the Vestax VCI 100.

Explanation of controls

V + = Volume increase.

B = Bass.

M = Middle.

H = High.

G = Gain.

6.2. Table of Features

The table highlights all the features needed for a complete mapping to be generated. These features are derived from the minimum and advanced requirements from the project aims section and the plan of the controls from fig1.6

Channel	Action	Comment
MASTER	Master volume	Controls the master volume of audio.
1	Balance	Controls whether the signal is sent to the left or right.
1	Crossfader	Controls/splits the signal between channel 1 and 2.
1	Headphone cue	Listen to channel X on headphones.
1	Headphone Volume	Controls the volume of audio coming through headphones.
1	Play/Stop	Toggle button to either play or stop the audio.
1	Play/Cue	Toggle button to either play or cue the audio.
1	Cue/Pause	Toggle button to pause as a cue point in the audio.
1	Set Cue	Toggle button which sets a cue in the audio track.
MASTER	Headphone Mix	Rotary knob which controls the balance between master and current channel.
1	Low EQ	Rotary knob which isolates low bass frequencies.
1	Mid EQ	Rotary knob which isolates middle frequencies.

1	High EQ	Rotary knob which isolates high frequencies.
1	Gain	Rotary knob which increases gain level in audio track.
1	Filter	Rotary knob which controls filter, left = LPF (Low pass filter) and right = HPF (High pass filter) Middle = filter off.
1	Sync	Toggle button to sync the BPM/TEMPO of two audio files.
1	Fast Forward	Toggle button which skips forward through the audio track.
1	Rewind	Toggle button which skips backwards through the audio track.
1	Vinyl Mode	Toggle button which allows the jog wheel to be active or inactive when touched.
1	Jog Touch	Action of touching the jog wheel platter.
1	Jog Move	Action of moving the jog wheel forward or backwards.
1	Pitch	Controls the Pitch/BPM of the audio being played.
2	Headphone cue	Listen to channel X on headphones.
1	Balance	Controls whether the signal is sent to the left or right.
2	Headphone Volume	Controls the volume of audio coming through headphones.
2	Play/Stop	Toggle button to either play or stop the audio.

2	Play/Cue	Toggle button to either play or cue the audio.
2	Cue/Pause	Toggle button to pause as a cue point in the audio.
2	Set Cue	Toggle button which sets a cue in the audio track.
2	Low EQ	Rotary knob which isolates low bass frequencies.
2	Mid EQ	Rotary knob which isolates middle frequencies.
2	High EQ	Rotary knob which isolates high frequencies.
2	Gain	Rotary knob which increases gain level in audio track.
2	Filter	Rotary knob which controls filter, left = LPF (Low pass filter) and right = HPF (High pass filter) Middle = filter off.
2	Sync	Toggle button to sync the BPM/TEMPO of two audio files.
2	Fast Forward	Toggle button which skips forward through the audio track.
2	Rewind	Toggle button which skips backwards through the audio track.
2	Vinyl Mode	Toggle button which allows the jog wheel to be active or inactive when touched.
2	Jog Touch	Action of touching the jog wheel platter.
2	Jog Move	Action of moving the jog wheel forward or backwards.

2	Pitch	Controls the Pitch/BPM of the audio being played.
MASTER	Effect slot 1	Toggle button which activates the effect in slot 1 on/off.
MASTER	Effect slot 2	Toggle button which activates the effect in slot 2 on/off.
MASTER	Effect slot 3	Toggle button which activates the effect in slot 3 on/off.
MASTER	Effect slot 4	Toggle button which activates the effect in slot 4 on/off.
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effect slot 1.
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effect slot 2.
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effects slot 3.
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effects slot 4.

Channel – Refers to which channel 1 or 2, the Vestax VCI 100 is a two channel DJ Controller.

Action – Refers to what action will occur when the button is pressed.

Comment – A description of the action performed.

6.3. Programming Languages

This section will introduce the programming languages which are used to create all the different functions needed to map the Vestax Controller.

6.4. XML (Extensible Markup Language)

XML (Extensible Markup Language) - Mixxx uses a well-defined XML format to store its MIDI mappings. XML is a language for describing data. It does not do anything itself and has no predefined use.

Many programmers have their own ways of using XML that convey different information for example, Traktor TSI Controller mapping files (Traktor mentioned previously fig 1.4) Traktor's mapping system is completely different to Mixxx's mapping system so TSI files make no sense to Mixxx

```xml
<?xml version="1.0" encoding="utf-8"?>

    <MixxxMIDIPreset schemaVersion="1" mixxxVersion="1.11.0+"> <!-- Schema
version number to help compatibility, should the MIDI format change -->

        <info>

                <name>Example MIDI Preset for Mixxx</name>

                <author>Tom Care</author>

                <description>This is an example XML MIDI preset for Mixxx. The
scope of the preset could be from a small functionality addition, to a complete
mapping for a controller, to a complex personal setup with multiple controllers.
This description is intended for distribution and could include comments about
the extent of the functionality.</description>

                <wiki>Encoded URL to Mixxx wiki page documenting this controller
mapping</wiki>

                <forums>Encoded URL to Mixxx discussion forums page for this
controller mapping</forums>

        </info>

        <controller id="controller name"> <!-- Many controllers in one file
supported. A controller should only appear once -->
```

Fig 1.9. Example of XML Mapping file header with metadata taken from Mixxx's website

6.5. Controller Scripting – JavaScript

In order to support the features of many different MIDI controllers. Mixxx uses MIDI Scripting. It enabled MIDI controls to be mapped to various (JavaScript, QtScript, EMCAScript) Functions to allow/manage complex behaviors.

These functions can do anything desired with the MIDI event info for example adjust incoming control values to work better with Mixxx.

This project makes use of **JavaScript** to create functions.

JavaScript – Mostly used for programing complex functionality in web pages.

All JavaScript files in Mixxx need an accompanying XML mapping file. To specify script files to load, they need to be added to the XML file inside the controller tag

```xml
<controller id="controller">

        <scriptfiles>

            <file filename="Manufacturer-model-scripts.js"
functionprefix="MyController"/>

        </scriptfiles>
```

Fig 2.0. Specifying a JS file in XML Mapping file taken from Mixxx's Website.

7. PROJECT DESIGN

This section goes into detail about the design of the mapping. A variety of methods such as surveys have been adopted to help understand what the users of the system want. A variety of sources have been engaged during this process.

7.1 User Study (Survey)

A survey design was created after the initial idea was confirmed.

The survey was released via google forms and sent out to users of the system.

Vestax VCI-100 User Study

Please submit answers to all the questions shown on the form to the best of your abilities.

* Required

Name: *

Your answer

Current Mapping Design for Vestax VCI-100
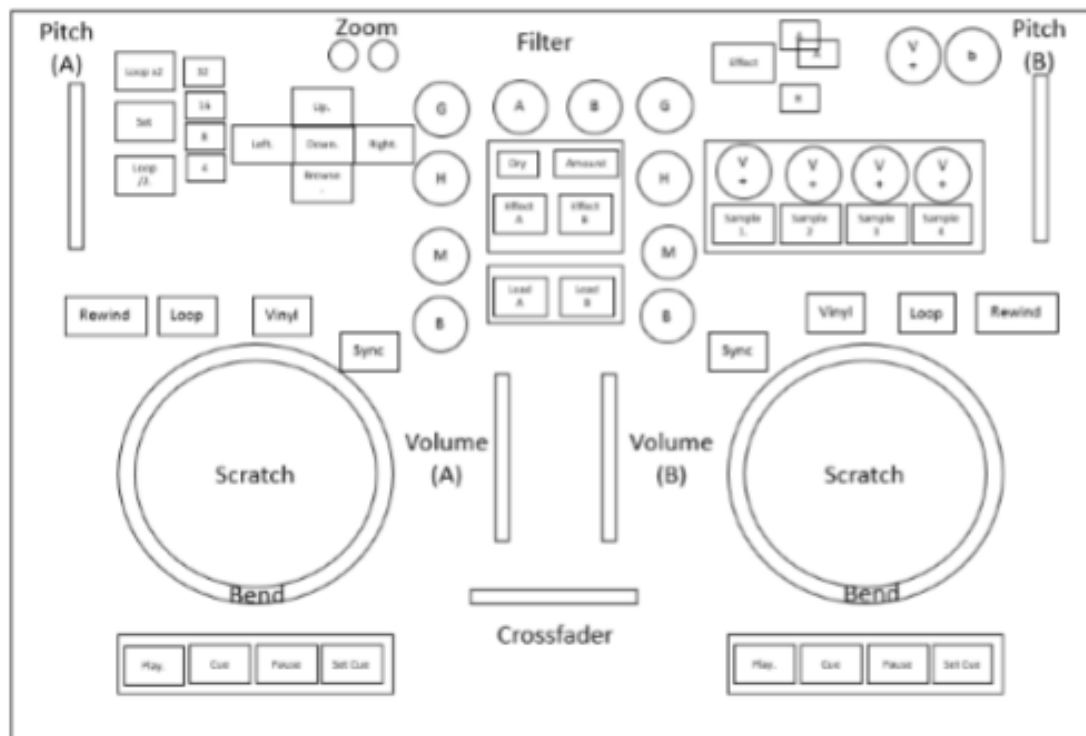
What do you think of the mapping of EQ? *

Your answer

Do you think the design for the Play/cue section is a good one?

	Poor	Fair	Satisfactory	Very good	Excellent
Rating	O	O	O	O	O

Do you think the design for the Volume faders and pitch fader is good?

	Poor	Fair	Satisfactory	Very good	Excellent
Rating	O	O	O	O	O

Whats your opinions on the loop section/loading tracks section?

Your answer

Whats your opinions on the Design of the effects and sampler section?

Your answer

Whats your opinions on the Design of the effects and sampler section?

Your answer

Overal How would you rate this Design?

○ Not very good.

○ Okay.

○ Very good.

How would you improve this mapping?

Your answer

SUBMIT

Never submit passwords through Google Forms.

Fig 2.1. Design Survey created using Google Forms.

7.2. Recruitment of Participants

Fig 2.2. The Techno Collective's Logo.

The Techno Collective - a collective of DJ's from South wales.
Bringing you the best unique music in the underground music scene

The organization above was contacted and asked if members of the organization were willing to answer questions on the design of the mapping for the Vestax Controller.

The form shown in section 7.1. was sent to the thetechnocollective@gmail.com for the users to complete.

7.3. Individual Responses

All participants agreed that this data could be used in the project.

Response 1

Name: Thomas O'Leary

What do you think of the mapping of EQ? *

Ye the EQ looks pretty good. All features (bass, mid, high, gain) included. good positioning.

Do you think the design for the Play/cue section is a good one?

Poor
Fair
Satisfactory
Very good
Excellent

Do you think the design for the Volume faders and pitch fader is good?
Poor
Fair
Satisfactory
Very good
Excellent

What's your opinions on the loop section/loading tracks section?

The three loop buttons on the left are good, the four smaller buttons need a rethink maybe, you could maybe use the smaller buttons for channel 2 loop and the three buttons to the left for channel 1? (Remove loop button above jog wheels on both channels and replace with fast forward maybe?) Loading tracks section seems good I like the design.

What's your opinions on the Design of the effects and sampler section?

To be honest, I like the sampler, but I don't think it's necessary in such a small DJ controller. Maybe remove the sampler section and replace with four different effects? with the amount rotary knob above each effect button? The two FX buttons in between the EQ I like.

Overall How would you rate this Design?

Not very good.
<mark>Okay.</mark>
Very good.

How would you improve this mapping?

I like the mapping and think it's a good idea your bringing such an iconic piece of hardware back to the modern day! I mentioned the improvements on the sections above. Another improvement - You have fast rewind etc... do you really need the jog wheels to scratch? maybe just use to stop/start nudge the beat.

Response 2

Name: Sam Andrews

What do you think of the mapping of EQ? *
Good.

Do you think the design for the Play/cue section is a good one?
<div align="center">

Poor
Fair
Satisfactory
Very good
<mark>Excellent</mark>
</div>

Do you think the design for the Volume faders and pitch fader is good?
<div align="center">

Poor
Fair
Satisfactory
Very good
<mark>Excellent</mark>
</div>

What's your opinions on the loop section/loading tracks section?

loop section looks ok. I like the /2 x2 option but do you need to have the smaller 4 buttons next to it? the /2 and x2 loop does the exact same thing. loading tracks section is good.

What's your opinions on the Design of the effects and sampler section?

yea all looks good. good idea with 4 separate sampler slots and volume.

Overall How would you rate this Design?

Not very good.
Okay.
<mark>Very good.</mark>

How would you improve this mapping?

Sort that loop section out like I mentioned above.

Response 3

Name: Sam Williams

What do you think of the mapping of EQ? *
Standard layout looks good.

Do you think the design for the Play/cue section is a good one?

Poor
Fair
Satisfactory
Very good
<mark>Excellent</mark>

Do you think the design for the Volume faders and pitch fader is good?
Poor
Fair
Satisfactory
Very good
<mark>Excellent</mark>

What's your opinions on the loop section/loading tracks section?
The loading tracks looks efficient and easy to use. Loop section needs a rethink don't think you need the 4 smaller buttons next to the 3 toggle buttons.

What's your opinions on the Design of the effects and sampler section?
Looks cool effects placed nicely above each channel, nice design on sampler with volume knobs.

Overall How would you rate this Design?

Not very good.
Okay.
<mark>Very good.</mark>

How would you improve this mapping?
I would look at the loop section and design it differently.

Response 4

Name: Darren Edwards

What do you think of the mapping of EQ? *

Nice easy to use.

Do you think the design for the Play/cue section is a good one?

Poor
Fair
Satisfactory
Very good
Excellent

Do you think the design for the Volume faders and pitch fader is good?

Poor
Fair
Satisfactory
Very good
Excellent

What's your opinions on the loop section/loading tracks section?

Loading tracks seems easy and I like it. Loop section looks a bit complicated don't know if I would use it.

What's your opinions on the Design of the effects and sampler section?

ye I use a lot of samples, so I think this is a good idea and the effects section seems good.

Overall How would you rate this Design?

Not very good.
Okay.
Very good.

How would you improve this mapping?

Make the looping section easier to understand.

7.4. Results and Analysis

The survey generated 4 responses:

Results

Participant Number	Participant Name
1	Thomas O'Leary
2	Sam Andrews
3	Sam Williams
4	Darren Edwards

Question: What do you think of the mapping of EQ?

Results

Participant Number	Participant Response
1	Ye the EQ looks pretty good. All Features (bass, mid, high, gain) included. Good positioning.
2	Good.
3	Standard Layout Looks good.
4	Nice Easy to use.

Question: Do you think the design for the Play/cue section is a good one?

Do you think the design for the Play/cue section is a good one?
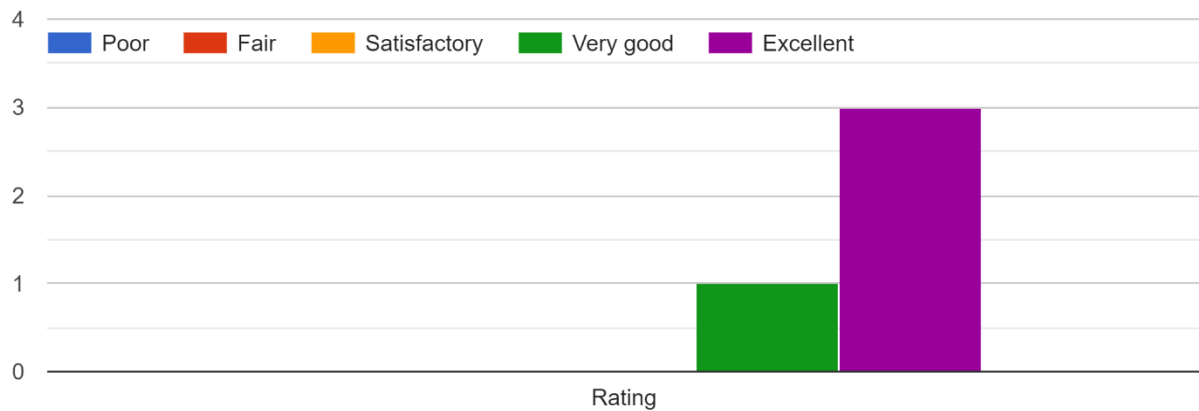
Fig 2.3. Graph created highlighting survey responses.

Question: Do you think the design for the Volume faders and pitch fader is good?

Results

Fig 2.4. Graph created highlighting survey responses.

Question: What's your opinions on the loop section/loading tracks section?

Participant Number	Participant Response
1	The three loop buttons on the left are good, the four smaller buttons need a rethink maybe, you could maybe use the smaller buttons for channel 2 loop and the three buttons to the left for channel 1? (Remove loop button above jog wheels on both channels and replace with fast forward maybe?) Loading tracks section seems good I like the design.
2	loop section looks ok. I like the /2 x2 option but do you need to have the smaller 4 buttons next to it? the /2 and x2 loop does the exact same thing. loading tracks section is good.
3	The loading tracks looks efficient and easy to use. Loop section needs a rethink don't think you need the 4 smaller buttons next to the 3 toggle buttons. .
4	Loading tracks seems easy and I like it. Loop section looks a bit complicated don't know if I would use it.

Question: What's your opinions on the Design of the effects and sampler section?

Participant Number	Participant Response
1	To be honest, I like the sampler, but I don't think it's necessary in such a small DJ controller. Maybe remove the sampler section and replace with four different effects? with the amount rotary knob above each effect button? The two FX buttons in between the EQ I like.
2	yea all looks good. good idea with 4 separate sampler slots and volume.
3	Looks cool effects placed nicely above each channel, nice design on sampler with volume knobs. .
4	ye I use a lot of samples, so I think this is a good idea and the effects section seems good.

Question: Overall How would you rate this Design? 4 responses

Overal How would you rate this Design?
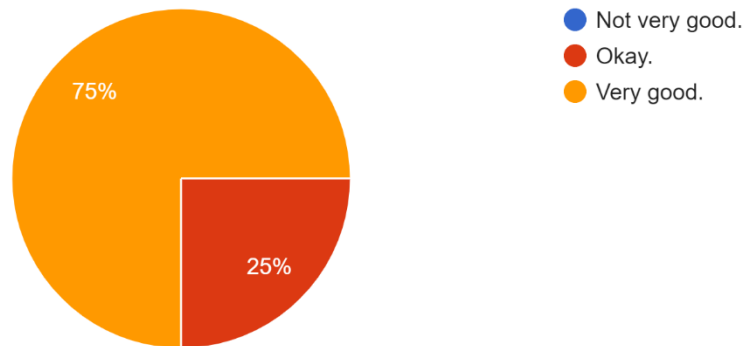
4 responses

Fig 2.5. Pie chart showing rating of design.

Question: How would you improve this mapping?

Participant Number	Participant Response
1	I like the mapping and think it's a good idea your bringing such an iconic piece of hardware back to the modern day! I mentioned the improvements on the sections above. Another improvement - You have fast rewind etc... do you really need the jog wheels to scratch? maybe just use to stop/start nudge the beat.
2	Sort that loop section out like I mentioned above.
3	I would look at the loop section and design it differently. .
4	Make the looping section easier to understand.

7.5. Input for Design

From the Results & findings [7.4] many considerations need to be made before implementation. The responses to the survey created generated a lot of qualitative data and suggestions on improvements to the Mapping design.

The main suggestions which need to be considered include:

Question	Feedback	Input For design
Question: What's your opinions on the loop section/loading tracks section?	The three loop buttons on the left are good, the four smaller buttons need a rethink maybe, you could maybe use the smaller buttons for channel 2 loop and the three buttons to the left for channel 1? (Remove loop button above jog wheels on both channels and replace with fast forward maybe?) Loading tracks section seems good I like the design.	From the comment it is easy to see that the loop section needs to be looked at.
	loop section looks ok. I like the /2 x2 option but do you need to have the smaller 4 buttons next to it? the /2 and x2 loop does the exact same thing. loading tracks section is good.	• The 3 toggle buttons need to be used for setting loop, /2 loop and x2 loop. • The 4 smaller buttons next to the toggle button need to be used as a loop section for channel 2. • Button 1: loop /2. • Button 2: set loop. • Button 3: x2. • Button 4: loop exit for channel 1 & 2.
	The loading tracks looks efficient and easy to use. Loop section needs a rethink don't think you need the 4 smaller buttons next to the 3 toggle buttons. .	
	Loading tracks seems easy and I like it. Loop section looks a bit complicated don't know if I would use it.	

Question	Feedback	Input For design
Question: What's your opinions on the Design of the effects and sampler section?	To be honest, I like the sampler, but I don't think it's necessary in such a small DJ controller. Maybe remove the sampler section and replace with four different effects? with the amount rotary knob above each effect button? The two FX buttons in between the EQ I like.	This comment highlighted a problem with the mapping which was not originally considered (Size of controller). I believe this response is making a valid point and needs to be consider. INPUT • Change the current sampler plan with effect 1-4 instead of sampler 1-4 for the 4 toggle buttons. • Change the sampler volume rotary knob the effect amount.

8. PROJECT PLAN

This section revisits the Mapping Plan previously shown in [Fig 1.2] and considers the feedback which was given to the surveys in the previous section.

The section will contain the Updated Mapping Plan [8.1] along with Coding Conventions [8.2] to be considered in the implementation along with Commenting Code [8.3]. Finally, a timetable for the implementation of features will be included [8.4].

8.1. Updated Mapping Plan

The updated mapping incorporates the input for design generated previously [7.5].
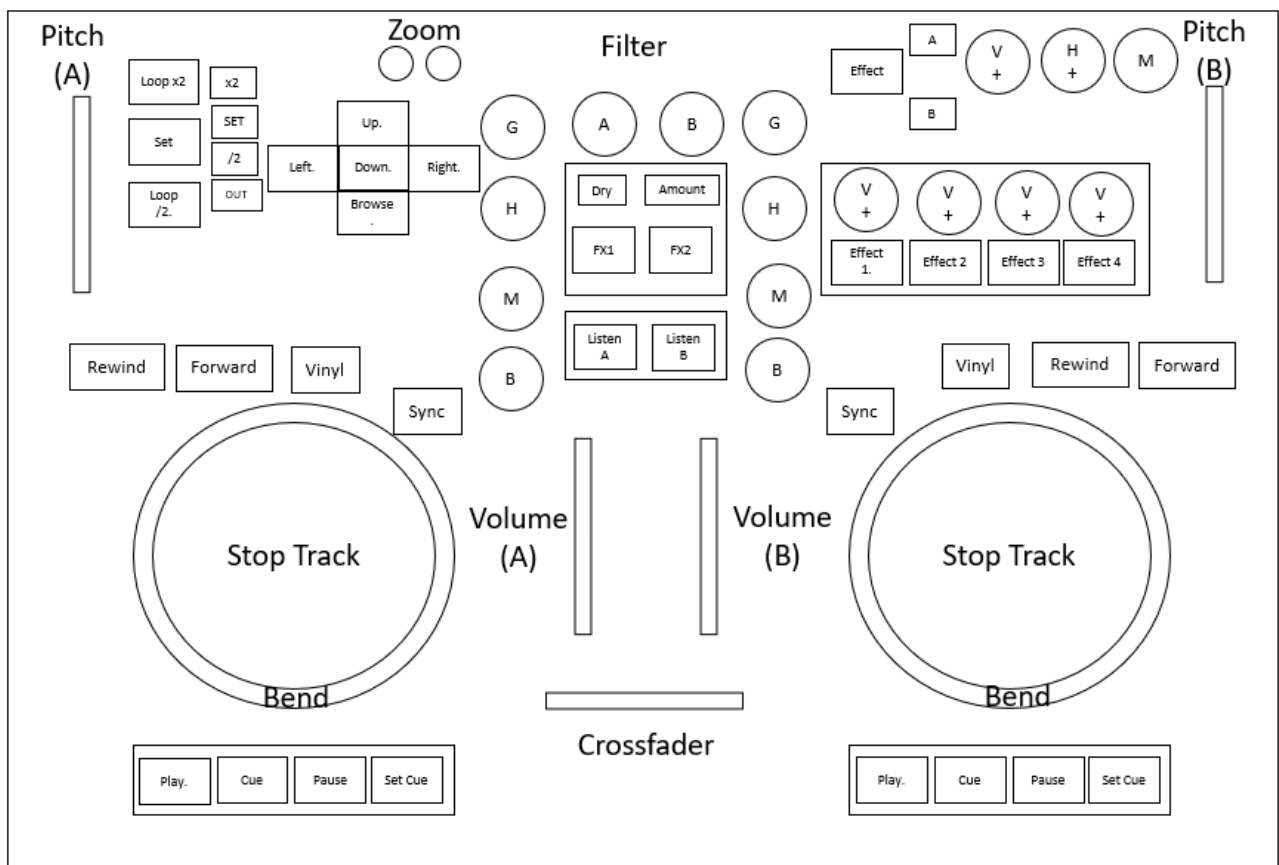
Fig 2.6. Updated Mapping Plan for the Vestax VCI-100.

8.2. Coding Conventions

Coding conventions need to be followed to come up with a good mapping file. Analysis of Mixxx's website has shown that the following things need to be considered when writing code for open source project.

Below is the most important convention that need to be taken into consideration during the implementation stage taken from Mixxx's coding guidelines for developers.

The most important rule to follow is this: **Try to make your code blend in with the existing code.**

Tabs vs. Spaces - The convention is that indents are 4 spaces.

Line Widths - Configure your editor to have a max column-width of 80-columns (provides significant efficiency gains to developers).

Variables - Give variables and classes a descriptive but succinct name.

Classes

Class names must be in CamelCase (e.g. "MyName"), with each word capitalized.

Member functions of classes must be camelBack cased (e.g. "thisFunction")

Member variables **must** be prefixed with "m_". It is essential to know the scope of a variable is at the class-member level with a simple glance for easy readability of source files.

Class variables (static class members) **must** be prefixed with "s_".

Braces - Should not be given their own newline. They should always be separated from surrounding code by a single space.

Namespaces - In new code, please wrap the code in the "mixxx" namespace (avoid making a hierarchy of namespaces). Put module-local helper functions in an anonymous namespace.

If Statements - One-line statements following an if clause are acceptable, but it is preferable to wrap them in braces since someone may add a line at the same indentation level, not realizing that there are no braces.

For Loops - Similarly to if-statements, there should be a single-space of padding after the for keyword and after the closing conditional parenthesis. Additionally, a single-space padding should come after the semicolon separators between the initializer, conditional, and increment statements.

TODO's - If you'd like to leave a TODO for yourself, format them like this:

```
// TODO(rryan) Make sure to double-check this.
```

8.3. Commenting Code

Comments - Use C++-style comments only. Do not use C-style comments or Java-style comments. Comments should be complete, descriptive sentences in the present tense. If a comment is a warning or something that might need to be re-evaluated in the future, date the comment with the current month and year, along with your username.

Previous experience with Mixxx's XML files I noticed that all comments that are placed in the .XML files are removed during loading of the script via the software.

To describe what the .XML functions are doing I plan to use a description tag to describe what is happening.

The segment of code below is a control for the crossfader. The description mentioned above is highlighted.

```xml
<control>
    <group>[Master]</group>
    <key>crossfader</key>
    <description>Controls for the crossfader.</description>
    <status>0xB0</status>
    <midino>0x08</midino>
    <options>
        <normal/>
    </options>
</control>
```

8.4. Timetable

This notion of the project began in late 2018 where the problem of an incomplete mapping was discovered. It took a few months of planning to work out the best mapping for the controller and if it was a feasible idea.

The Timetable below show how the project will be set out. All the different stages of the project will be listed with their Expected Completion Date and Actual Completion Date.

It is important to consider that an agile software development methodology has been adopted and hence subject to change through the duration.

Many extra things needed to be completed during the project, for example during the project equipment was damaged and needed to be repaired which greatly impacted the project however the risk was identified during risk management.

Description	Expected Completion Date	Actual Completed Date
Initial project document deadline	24th October 2018	1 Nov 2018 11:00 AM
Create slides for Initial project presentation at Gregynog Hall.	1st December 2018.	5th December 2018.
Come up with project demonstration for Initial project presentation at Gregynog Hall.	25th December 2018.	23rd December 2018.
Initial Project presentation (Gregynog Hall)	25th January 2018	January 30th – February 3rd 2019
Come up with Initial mapping for the Vestax Controller.	February 15th 2019	February 15th 2019

Conduct Surveys for Mapping created and analyze feedback.	March 1st 2019	March 3rd 2019
Update the mapping plan if needed from feedback.	March 7th 2019	March 7th 2019
Implementation of .XML files and .JS files incorporating the feedback from surveys.	April 10th 2019	April 15th 2019
Testing and evaluation of final product	April 18th 2019	April 18th 2019
Dissertation final document write up.	5th May 2018	9th May
Dissertation Deadline	9th May 2018	10th May 2018
Project Fair	15th May 2019 11:00 AM	15th May 2019 11:00 AM

9. IMPLEMENTATION

Notepad ++ text editor and source code editor was the chosen during implementation for the creation of .XML files and JavaScript files.

Below is the final actual implementation of the XML file which is used to store the MIDI mappings for the Vestax VCI-100 DJ Controller.

Mixxx's Coding conventions were followed throughout.

Some functions initially developed by Anders Gunnarsson and files included in the Stock Mapping [3.1] have been used/adapted in some way during implementation: this further backs up Mixxx's convention of trying to make development code fit in with existing code.

Screenshots of the code in Notepad++ editor will be shown below however, due to the large amount of code, pages will contain two screenshot per page.

9.1. Overview of implemented Features

This section will discuss the features which have been implemented and maybe some features which were not implemented

Channel	Action	Comment	Completed
MASTER	Master volume	Controls the master volume of audio.	✓
1	Balance	Controls whether the signal is sent to the left or right.	✓
1	Crossfader	Controls/splits the signal between channel 1 and 2.	✓
1	Headphone cue	Listen to channel X on headphones.	✓
1	Headphone Volume	Controls the volume of audio coming through headphones.	✓
1	Play/Stop	Toggle button to either play or stop the audio.	✓
1	Play/Cue	Toggle button to either play or cue the audio.	✓
1	Cue/Pause	Toggle button to pause as a cue point in the audio.	✓
1	Set Cue	Toggle button which sets a cue in the audio track.	✓
MASTER	Headphone Mix	Rotary knob which controls the balance between master	✓

		and current channel.	
1	Low EQ	Rotary knob which isolates low bass frequencies.	✓
1	Mid EQ	Rotary knob which isolates middle frequencies.	✓
1	High EQ	Rotary knob which isolates high frequencies.	✓
1	Gain	Rotary knob which increases gain level in audio track.	✓
1	Filter	Rotary knob which controls filter, left = LPF (Low pass filter) and right = HPF (High pass filter) Middle = filter off.	✓
1	Sync	Toggle button to sync the BPM/TEMPO of two audio files.	✓
1	Fast Forward	Toggle button which skips forward through the audio track.	✓
1	Rewind	Toggle button which skips backwards through the audio track.	✓
1	Vinyl Mode	Toggle button which allows the jog wheel to be active or inactive when touched.	✓

1	Jog Touch	Action of touching the jog wheel platter.	✓
1	Jog Move	Action of moving the jog wheel forward or backwards.	✓
1	Pitch	Controls the Pitch/BPM of the audio being played.	✓
2	Headphone cue	Listen to channel X on headphones.	✓
1	Balance	Controls whether the signal is sent to the left or right.	✓
2	Headphone Volume	Controls the volume of audio coming through headphones.	✓
2	Play/Stop	Toggle button to either play or stop the audio.	✓
2	Play/Cue	Toggle button to either play or cue the audio.	✓
2	Cue/Pause	Toggle button to pause as a cue point in the audio.	✓
2	Set Cue	Toggle button which sets a cue in the audio track.	✓
2	Low EQ	Rotary knob which isolates low bass frequencies.	✓
2	Mid EQ	Rotary knob which isolates middle frequencies.	✓

2	High EQ	Rotary knob which isolates high frequencies.	✓
2	Gain	Rotary knob which increases gain level in audio track.	✓
2	Filter	Rotary knob which controls filter, left = LPF (Low pass filter) and right = HPF (High pass filter) Middle = filter off.	✓
2	Sync	Toggle button to sync the BPM/TEMPO of two audio files.	✓
2	Fast Forward	Toggle button which skips forward through the audio track.	✓
2	Rewind	Toggle button which skips backwards through the audio track.	✓
2	Vinyl Mode	Toggle button which allows the jog wheel to be active or inactive when touched.	✓
2	Jog Touch	Action of touching the jog wheel platter.	✓
2	Jog Move	Action of moving the jog wheel forward or backwards.	✓
2	Pitch	Controls the Pitch/BPM of the audio being played.	✓

MASTER	Effect slot 1	Toggle button which activates the effect in slot 1 on/off.	✓
MASTER	Effect slot 2	Toggle button which activates the effect in slot 2 on/off.	✓
MASTER	Effect slot 3	Toggle button which activates the effect in slot 3 on/off.	✓
MASTER	Effect slot 4	Toggle button which activates the effect in slot 4 on/off.	✓
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effect slot 1.	✓
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effect slot 2.	✓
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effects slot 3.	✓
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effects slot 4.	✓

9.1. Overview of Project Aims

The minimum required aims/objectives that are essential for the project include:

- Map all switches on the Vestax to appropriate function. ✅

- Create an appropriate mapping for the rotary knobs. ✅

- Map all toggle buttons to the appropriate functions. ✅

- Create an appropriate mapping of the volume faders. ✅

- Make sure both equalizers are mapped to correct knobs. ✅

- Create a mapping for the crossfaders. ✅

- Ensure that the filters are mapped to the correct knobs. ✅

- Ensure that the pitch faders work and are mapped to the correct faders. ✅

- Ensure the effects section is simplistic and easy to understand. ✅

- Ensure that toggles for browsing/loading songs are appropriately mapped. ✅

- The overall mapping/layout should be easy to understand and simple to use but contain all necessary requirements. ✅

The Advanced Aims/Objective are:

- Mapping of Jog wheels so to allow for stopping and starting. ☑

- Create a Graphical user interface which is easy to use and appropriate for the controller. ✗

  Reason for non-completion: After researching, there is not a need to develop a full GUI, this would increase the project time greatly and there is already Skins available which can be customized.

  This project adopts an agile methodology so is subject to change through the duration of the project.

- Allow for buttons to scroll forward and backward through waveforms. ☑

Section [9.2] Will contain the actual source code that was written during the implementation stage.

9.2. XML Code - Vestax_PC-CONTROLLER.midi

Fig 2.7. Screenshots of .XML file implemented (Pages 78 - 80)

```xml
 75        <description>Controls Deck2 Pitch Slider.</description>
 76        <status>0xE2</status>
 77        <options>
 78            <normal/>
 79        </options>
 80      </control>
 81      <control>
 82        <group>[EffectRack1_EffectUnit2_Effect2]</group>
 83        <key>meta</key>
 84        <description>Control effect in slot 3.</description>
 85        <status>0xB0</status>
 86        <midino>0x48</midino>
 87        <options>
 88            <fourteen-bit-msb/>
 89        </options>
 90      </control>
 91      <control>
 92        <group>[QuickEffectRack1_[Channel1]]</group>
 93        <key>super1</key>
 94        <description>Controls the filter.</description>
 95        <status>0xB0</status>
 96        <midino>0x1C</midino>
 97        <options>
 98            <normal/>
 99        </options>
100      </control>
101      <control>
102        <group>[EffectRack1_EffectUnit1_Effect2]</group>
103        <key>enabled</key>
104        <description>Toggle effect in slot 2.</description>
105        <status>0x90</status>
106        <midino>0x58</midino>
107        <options>
108            <normal/>
109        </options>
110      </control>
111      <control>
112        <group>[Channel1]</group>
```

eXtensible Markup Language file | length : 40,767 lines : 1,145 | Ln : 1 Col : 39 Sel : 0 | 0

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```xml
112        <group>[Channel1]</group>
113        <key>back</key>
114        <description>Fast rewind for Deck1.</description>
115        <status>0x90</status>
116        <midino>0x42</midino>
117        <options>
118            <normal/>
119        </options>
120      </control>
121      <control>
122        <group>[EffectRack1_EffectUnit2_Effect3]</group>
123        <key>enabled</key>
124        <description>Toggle effect in slot 4.</description>
125        <status>0x90</status>
126        <midino>0x2C</midino>
127        <options>
128            <normal/>
129        </options>
130      </control>
131      <control>
132        <group>[Master]</group>
133        <key>balance_set_default</key>
134        <description>Master balance 1.</description>
135        <status>0x90</status>
136        <midino>0x16</midino>
137        <options>
138            <normal/>
139        </options>
140      </control>
141      <control>
142        <group>[EffectRack1_EffectUnit1_Effect2]</group>
143        <key>meta</key>
144        <description>Control effect in slot 2.</description>
145        <status>0xB0</status>
146        <midino>0x47</midino>
147        <options>
148            <normal/>
149        </options>
```

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```
149                    </options>
150                </control>
151            <control>
152                <group>[Channel2]</group>
153                <key>filterLow</key>
154                <description>Channel 2 bass EQ.</description>
155                <status>0xB0</status>
156                <midino>0x1B</midino>
157                <options>
158                    <normal/>
159                </options>
160            </control>
161            <control>
162                <group>[EffectRack1_EffectUnit1_Effect1]</group>
163                <key>meta</key>
164                <description>Control effect in slot 1.</description>
165                <status>0xB0</status>
166                <midino>0x46</midino>
167                <options>
168                    <fourteen-bit-msb/>
169                </options>
170            </control>
171            <control>
172                <group>[Channel2]</group>
173                <key>sync_enabled</key>
174                <description>Sync Button.</description>
175                <status>0x90</status>
176                <midino>0x6C</midino>
177                <options>
178                    <normal/>
179                </options>
180            </control>
181            <control>
182                <group>[Channel2]</group>
183                <key>filterMid</key>
184                <description>Channel 2 mid EQ.</description>
185                <status>0xB0</status>
186                <midino>0x1A</midino>
```

```
186                <midino>0x1A</midino>
187                <options>
188                    <normal/>
189                </options>
190            </control>
191            <control>
192                <group>[Channel2]</group>
193                <key>rate_temp_down</key>
194                <description>Deck2 decrease speed.</description>
195                <status>0x80</status>
196                <midino>0x3D</midino>
197                <options>
198                    <normal/>
199                </options>
200            </control>
201            <control>
202                <group>[Channel2]</group>
203                <key>filterHigh</key>
204                <description>Channel 2 high EQ</description>
205                <status>0xB0</status>
206                <midino>0x19</midino>
207                <options>
208                    <normal/>
209                </options>
210            </control>
211            <control>
212                <group>[Channel1]</group>
213                <key>sync_enabled</key>
214                <description>Sync Button.</description>
215                <status>0x90</status>
216                <midino>0x6B</midino>
217                <options>
218                    <normal/>
219                </options>
220            </control>
221            <control>
222                <group>[EffectRack1_EffectUnit1_Effect1]</group>
223                <key>enabled</key>
```

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Vestax_PC-CONTROLLER.midi.xml   Vestax-VCI-100-scripts.js

```xml
223        <key>enabled</key>
224        <description>Toggle effect in slot 1.</description>
225        <status>0x90</status>
226        <midino>0x55</midino>
227        <options>
228            <normal/>
229        </options>
230    </control>
231    <control>
232        <group>[Channel2]</group>
233        <key>VestaxVCI100.hotcueMode</key>
234        <description>Refers to script for touching jog wheel for chan2.</descripti
235        <status>0x80</status>
236        <midino>0x68</midino>
237        <options>
238            <script-binding/>
239        </options>
240    </control>
241    <control>
242        <group>[Channel2]</group>
243        <key>rate_temp_up</key>
244        <description>Deck2 increase speed.</description>
245        <status>0x80</status>
246        <midino>0x3C</midino>
247        <options>
248            <normal/>
249        </options>
250    </control>
251    <control>
252        <group>[Channel2]</group>
253        <key>pregain</key>
254        <description>Deck2 gain.</description>
255        <status>0xB0</status>
256        <midino>0x18</midino>
257        <options>
258            <normal/>
259        </options>
260    </control>
```

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```xml
260    </control>
261    <control>
262        <group>[Master]</group>
263        <key>headMix</key>
264        <description>Controls headphone mix.</description>
265        <status>0xB0</status>
266        <midino>0x59</midino>
267        <options>
268            <normal/>
269        </options>
270    </control>
271    <control>
272        <group>[Channel1]</group>
273        <key>rate_temp_down</key>
274        <description>Deck1 Decrease speed.</description>
275        <status>0x80</status>
276        <midino>0x3B</midino>
277        <options>
278            <normal/>
279        </options>
280    </control>
281    <control>
282        <group>[Channel1]</group>
283        <key>filterLow</key>
284        <description>Channel 1 bass EQ.</description>
285        <status>0xB0</status>
286        <midino>0x17</midino>
287        <options>
288            <normal/>
289        </options>
290    </control>
291    <control>
292        <group>[Channel2]</group>
293        <key>VestaxVCI100.hotcueMode</key>
294        <description>Refers to script for touching jog wheel for chan2.</description>
295        <status>0x80</status>
296        <midino>0x66</midino>
297        <options>
```

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Page 28 of 41   2348 words   English (United States)

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Tab: Vestax_PC-CONTROLLER.midi.xml | Vestax-VCI-100-scripts.js

```xml
297              <options>
298                  <script-binding/>
299              </options>
300          </control>
301          <control>
302              <group>[Master]</group>
303              <key>headGain</key>
304              <description>Headphone gain.</description>
305              <status>0xB0</status>
306              <midino>0x58</midino>
307              <options>
308                  <normal/>
309              </options>
310          </control>
311          <control>
312              <group>[Channel1]</group>
313              <key>rate_temp_up</key>
314              <description>Deck1 Decrease speed.</description>
315              <status>0x80</status>
316              <midino>0x3A</midino>
317              <options>
318                  <normal/>
319              </options>
320          </control>
321          <control>
322              <group>[Channel1]</group>
323              <key>reloop_toggle</key>
324              <description>Toggle loop Deck 1.</description>
325              <status>0x90</status>
326              <midino>0x68</midino>
327              <options>
328                  <normal/>
329              </options>
330          </control>
331          <control>
332              <group>[Channel1]</group>
333              <key>filterMid</key>
334              <description>Channel 1 mid EQ.</description>
```

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Page 28 of 40   2348 words   English (United States)

Right window — C:\Users\S101\Desktop\Project Dissertation\COMPLETE Script\Vestax_PC-CONTROLLER.midi.xml -

File Edit Search View Encoding Language Settings Tools Macro Run Plugins Win

Tab: Vestax_PC-CONTROLLER.midi.xml | Vestax-VCI-100-scripts.js

```xml
334              <description>Channel 1 mid EQ.</description>
335              <status>0xB0</status>
336              <midino>0x16</midino>
337              <options>
338                  <normal/>
339              </options>
340          </control>
341          <control>
342              <group>[Channel2]</group>
343              <key>rate_temp_down</key>
344              <description>Deck2 decrease speed.</description>
345              <status>0x90</status>
346              <midino>0x52</midino>
347              <options>
348                  <normal/>
349              </options>
350          </control>
351          <control>
352              <group>[Channel2]</group>
353              <key>rate_temp_up</key>
354              <description>Deck2 increase speed.</description>
355              <status>0x90</status>
356              <midino>0x3C</midino>
357              <options>
358                  <normal/>
359              </options>
360          </control>
361          <control>
362              <group>[EffectRack1_EffectUnit2_Effect3]</group>
363              <key>meta</key>
364              <description>Control effect in slot 4.</description>
365              <status>0xB0</status>
366              <midino>0x57</midino>
367              <options>
368                  <fourteen-bit-msb/>
369              </options>
370          </control>
371          <control>
```

eXtensible Markup Language file   length : 40,767   lines : 1,145   Ln : 1   Col : 39   Sel

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```

Vestax_PC-CONTROLLER.midi.xml   Vestax-VCI-100-scripts.js

```xml
371            <control>
372                <group>[Channel2]</group>
373                <key>cue_set</key>
374                <description>Deck 2 set cue.</description>
375                <status>0x80</status>
376                <midino>0x39</midino>
377                <options>
378                    <normal/>
379                </options>
380            </control>
381            <control>
382                <group>[Channel1]</group>
383                <key>loop_double</key>
384                <description>Double loop length Deck1.</description>
385                <status>0x90</status>
386                <midino>0x67</midino>
387                <options>
388                    <normal/>
389                </options>
390            </control>
391            <control>
392                <group>[Channel1]</group>
393                <key>filterHigh</key>
394                <description>Channel 1 high EQ.</description>
395                <status>0xB0</status>
396                <midino>0x15</midino>
397                <options>
398                    <normal/>
399                </options>
400            </control>
401            <control>
402                <group>[Master]</group>
403                <key>VestaxVCI100.key3</key>
404                <description>Refers to the .js file.</description>
405                <status>0x80</status>
406                <midino>0x64</midino>
407                <options>
408                    <script-binding/>
```

eXtensible Markup Language file   length : 40,767   lines : 1,145   Ln : 1   Col : 39   Sel : (

```xml
408                    <script-binding/>
409                </options>
410            </control>
411            <control>
412                <group>[Channel1]</group>
413                <key>rate_temp_down</key>
414                <description>Deck1 Decrease speed.</description>
415                <status>0x90</status>
416                <midino>0x3B</midino>
417                <options>
418                    <normal/>
419                </options>
420            </control>
421            <control>
422                <group>[EffectRack1_EffectUnit2_Effect2]</group>
423                <key>meta</key>
424                <description>Control effect in slot 3.</description>
425                <status>0xB0</status>
426                <midino>0x56</midino>
427                <options>
428                    <fourteen-bit-msb/>
429                </options>
430            </control>
431            <control>
432                <group>[Channel2]</group>
433                <key>cue_preview</key>
434                <description>Deck 2 preview cue.</description>
435                <status>0x80</status>
436                <midino>0x38</midino>
437                <options>
438                    <normal/>
439                </options>
440            </control>
441            <control>
442                <group>[Channel1]</group>
443                <key>pregain</key>
444                <description>Deck1 Gain</description>
445                <status>0xB0</status>
```

eXtensible Markup Language file   length : 40,767   lines : 1,145   Ln : 1   Col : 39   Sel : (

```
                <status>0xB0</status>
                <midino>0x14</midino>
                <options>
                    <normal/>
                </options>
            </control>
            <control>
                <group>[Channel1]</group>
                <key>beatloop_activate</key>
                <description>Start Loop deck 1.</description>
                <status>0x90</status>
                <midino>0x66</midino>
                <options>
                    <normal/>
                </options>
            </control>
            <control>
                <group>[Master]</group>
                <key>VestaxVCI100.key2</key>
                <description>Refers to the .js file.</description>
                <status>0x80</status>
                <midino>0x63</midino>
                <options>
                    <script-binding/>
                </options>
            </control>
            <control>
                <group>[Channel1]</group>
                <key>rate_temp_up</key>
                <description>Deck1 Decrease speed.</description>
                <status>0x90</status>
                <midino>0x3A</midino>
                <options>
                    <normal/>
                </options>
            </control>
            <control>
                <group>[EffectRack1_EffectUnit1_Effect2]</group>
```

```
                <group>[EffectRack1_EffectUnit1_Effect2]</group>
                <key>meta</key>
                <description>Control effect in slot 2.</description>
                <status>0xB0</status>
                <midino>0x55</midino>
                <options>
                    <fourteen-bit-msb/>
                </options>
            </control>
            <control>
                <group>[Channel2]</group>
                <key>cue_goto</key>
                <description>Deck 2 cue.</description>
                <status>0x80</status>
                <midino>0x37</midino>
                <options>
                    <normal/>
                </options>
            </control>
            <control>
                <group>[Channel1]</group>
                <key>loop_halve</key>
                <description>Double loop length Deck1</description>
                <status>0x90</status>
                <midino>0x65</midino>
                <options>
                    <normal/>
                </options>
            </control>
            <control>
                <group>[Channel2]</group>
                <key>VestaxVCI100.jog_wheel</key>
                <description>Refers to script for touching jog wheel for chan2.</description>
                <status>0xB0</status>
                <midino>0x13</midino>
                <options>
                    <script-binding/>
                </options>
```

```xml
519          </options>
520        </control>
521        <control>
522          <group>[Channel2]</group>
523          <key>rate_temp_up</key>
524          <description>Deck2 increase speed.</description>
525          <status>0x90</status>
526          <midino>0x4F</midino>
527          <options>
528            <normal/>
529          </options>
530        </control>
531        <control>
532          <group>[Master]</group>
533          <key>VestaxVCI100.key1</key>
534          <description>Refers to the .js file.</description>
535          <status>0x80</status>
536          <midino>0x62</midino>
537          <options>
538            <script-binding/>
539          </options>
540        </control>
541        <control>
542          <group>[Channel2]</group>
543          <key>cue_set</key>
544          <description>Deck 1 set cue.</description>
545          <status>0x90</status>
546          <midino>0x39</midino>
547          <options>
548            <normal/>
549          </options>
550        </control>
551        <control>
552          <group>[EffectRack1_EffectUnit1_Effect1]</group>
553          <key>meta</key>
554          <description>Control effect in slot 1.</description>
555          <status>0xB0</status>
556          <midino>0x54</midino>
```

```xml
556          <midino>0x54</midino>
557          <options>
558            <fourteen-bit-msb/>
559          </options>
560        </control>
561        <control>
562          <group>[Channel2]</group>
563          <key>play</key>
564          <description>Deck 2 Play.</description>
565          <status>0x80</status>
566          <midino>0x36</midino>
567          <options>
568            <normal/>
569          </options>
570        </control>
571        <control>
572          <group>[Channel2]</group>
573          <key>loop_double</key>
574          <description>Deck2 double length of loop.</description>
575          <status>0x90</status>
576          <midino>0x64</midino>
577          <options>
578            <normal/>
579          </options>
580        </control>
581        <control>
582          <group>[Channel1]</group>
583          <key>VestaxVCI100.jog_wheel</key>
584          <description>Refers to script for touching jog wheel for chan1.</description>
585          <status>0xB0</status>
586          <midino>0x12</midino>
587          <options>
588            <script-binding/>
589          </options>
590        </control>
591        <control>
592          <group>[Channel2]</group>
593          <key>cue preview</key>
```

```
593                    <key>cue_preview</key>
594                    <description>Deck 2 preview cue.</description>
595                    <status>0x90</status>
596                    <midino>0x38</midino>
597                    <options>
598                        <normal/>
599                    </options>
600                </control>
601                <control>
602                    <group>[Channel2]</group>
603                    <key>LoadSelectedTrack</key>
604                    <description>Load the track to deck 2.</description>
605                    <status>0x80</status>
606                    <midino>0x61</midino>
607                    <options>
608                        <normal/>
609                    </options>
610                </control>
611                <control>
612                    <group>[EffectRack1_EffectUnit2_Effect3]</group>
613                    <key>meta</key>
614                    <description>Control effect in slot 4.</description>
615                    <status>0xB0</status>
616                    <midino>0x69</midino>
617                    <options>
618                        <fourteen-bit-lsb/>
619                    </options>
620                </control>
621                <control>
622                    <group>[Channel1]</group>
623                    <key>cue_set</key>
624                    <description>Deck 1 set cue.</description>
625                    <status>0x80</status>
626                    <midino>0x35</midino>
627                    <options>
628                        <normal/>
629                    </options>
630                </control>
```

```
630                </control>
631                <control>
632                    <group>[EffectRack1_EffectUnit2_Effect2]</group>
633                    <key>meta</key>
634                    <description>Control effect in slot 3.</description>
635                    <status>0xB0</status>
636                    <midino>0x3D</midino>
637                    <options>
638                        <fourteen-bit-lsb/>
639                    </options>
640                </control>
641                <control>
642                    <group>[Channel2]</group>
643                    <key>beatloop_activate</key>
644                    <description>Start Loop deck 2.</description>
645                    <status>0x90</status>
646                    <midino>0x63</midino>
647                    <options>
648                        <normal/>
649                    </options>
650                </control>
651                <control>
652                    <group>[Channel2]</group>
653                    <key>VestaxVCI100.jog_wheel_scratch</key>
654                    <description>Refers to script for touching jog wheel for chan2.</description>
655                    <status>0xB0</status>
656                    <midino>0x11</midino>
657                    <options>
658                        <script-binding/>
659                    </options>
660                </control>
661                <control>
662                    <group>[EffectRack1_EffectUnit2_Effect2]</group>
663                    <key>meta</key>
664                    <description>Control effect in slot 3.</description>
665                    <status>0xB0</status>
666                    <midino>0x68</midino>
667                    <options>
```

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```xml
667              <options>
668                  <fourteen-bit-lsb/>
669              </options>
670          </control>
671          <control>
672              <group>[Channel2]</group>
673              <key>cue_goto</key>
674              <description>Deck 2 cue.</description>
675              <status>0x90</status>
676              <midino>0x37</midino>
677              <options>
678                  <normal/>
679              </options>
680          </control>
681          <control>
682              <group>[Channel1]</group>
683              <key>LoadSelectedTrack</key>
684              <description>Load the track to deck 1.</description>
685              <status>0x80</status>
686              <midino>0x60</midino>
687              <options>
688                  <normal/>
689              </options>
690          </control>
691          <control>
692              <group>[Channel1]</group>
693              <key>cue_preview</key>
694              <description>Deck 1 preview cue.</description>
695              <status>0x80</status>
696              <midino>0x34</midino>
697              <options>
698                  <normal/>
699              </options>
700          </control>
701          <control>
702              <group>[EffectRack1_EffectUnit1_Effect1]</group>
703              <key>meta</key>
704              <description>Control effect in slot 1.</description>
```

Right window — `Vestax_PC-CONTROLLER.midi.xml - Notepad++`

```xml
704              <description>Control effect in slot 1.</description>
705              <status>0xB0</status>
706              <midino>0x3C</midino>
707              <options>
708                  <fourteen-bit-lsb/>
709              </options>
710          </control>
711          <control>
712              <group>[Channel2]</group>
713              <key>loop_halve</key>
714              <description>Deck2 halve length of loop.</description>
715              <status>0x90</status>
716              <midino>0x62</midino>
717              <options>
718                  <normal/>
719              </options>
720          </control>
721          <control>
722              <group>[Channel1]</group>
723              <key>VestaxVCI100.jog_wheel_scratch</key>
724              <description>Refers to script for touching jog wheel for chan1.</description>
725              <status>0xB0</status>
726              <midino>0x10</midino>
727              <options>
728                  <script-binding/>
729              </options>
730          </control>
731          <control>
732              <group>[Master]</group>
733              <key>headSplit</key>
734              <description>Toggle headphone cue.</description>
735              <status>0x90</status>
736              <midino>0x4C</midino>
737              <options>
738                  <normal/>
739              </options>
740          </control>
741          <control>
```
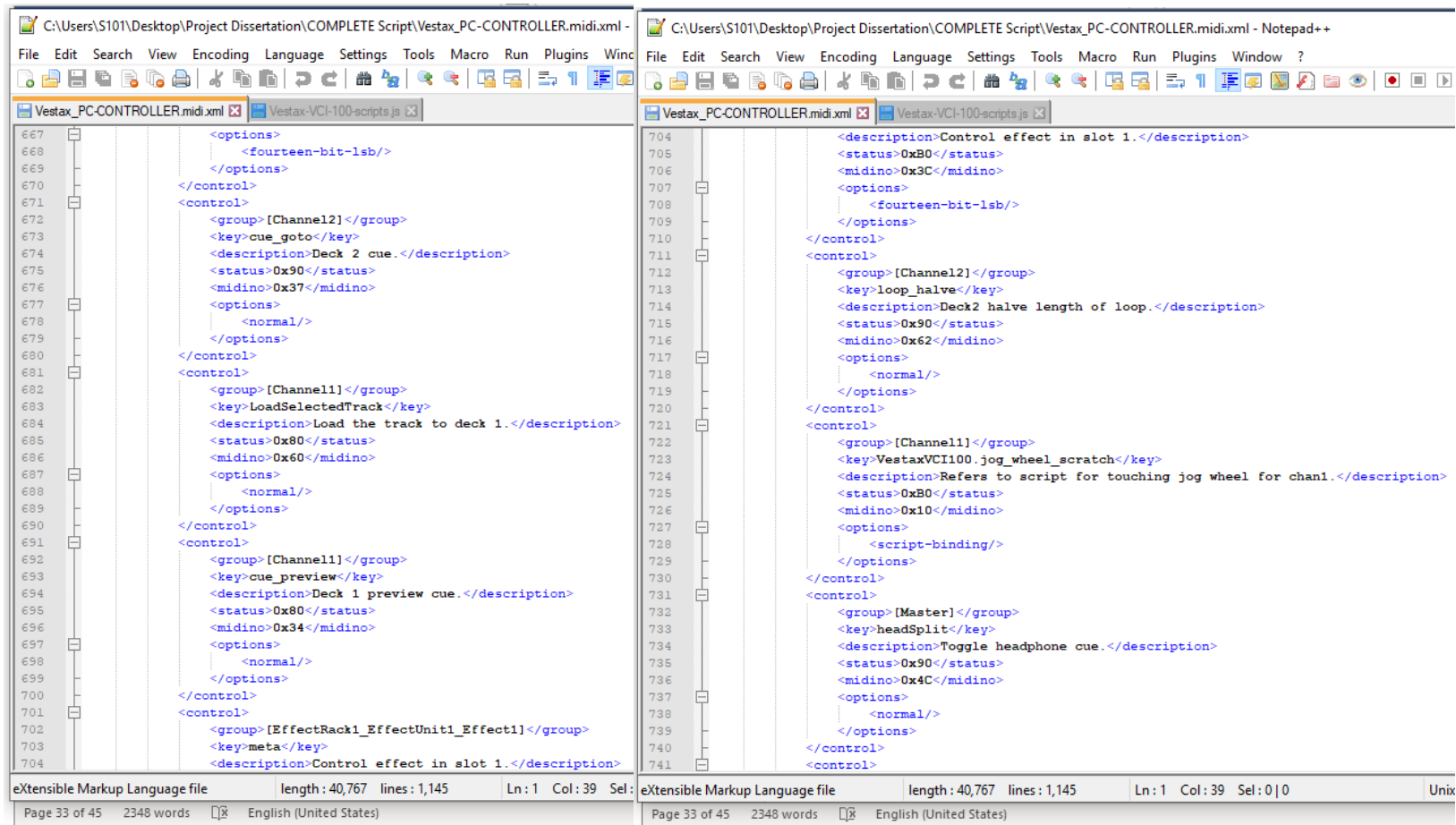
C:\Users\S101\Desktop\Project Dissertation\COMPLETE Script\Vestax_PC-CONTROLLER.midi.xml - Notepad+
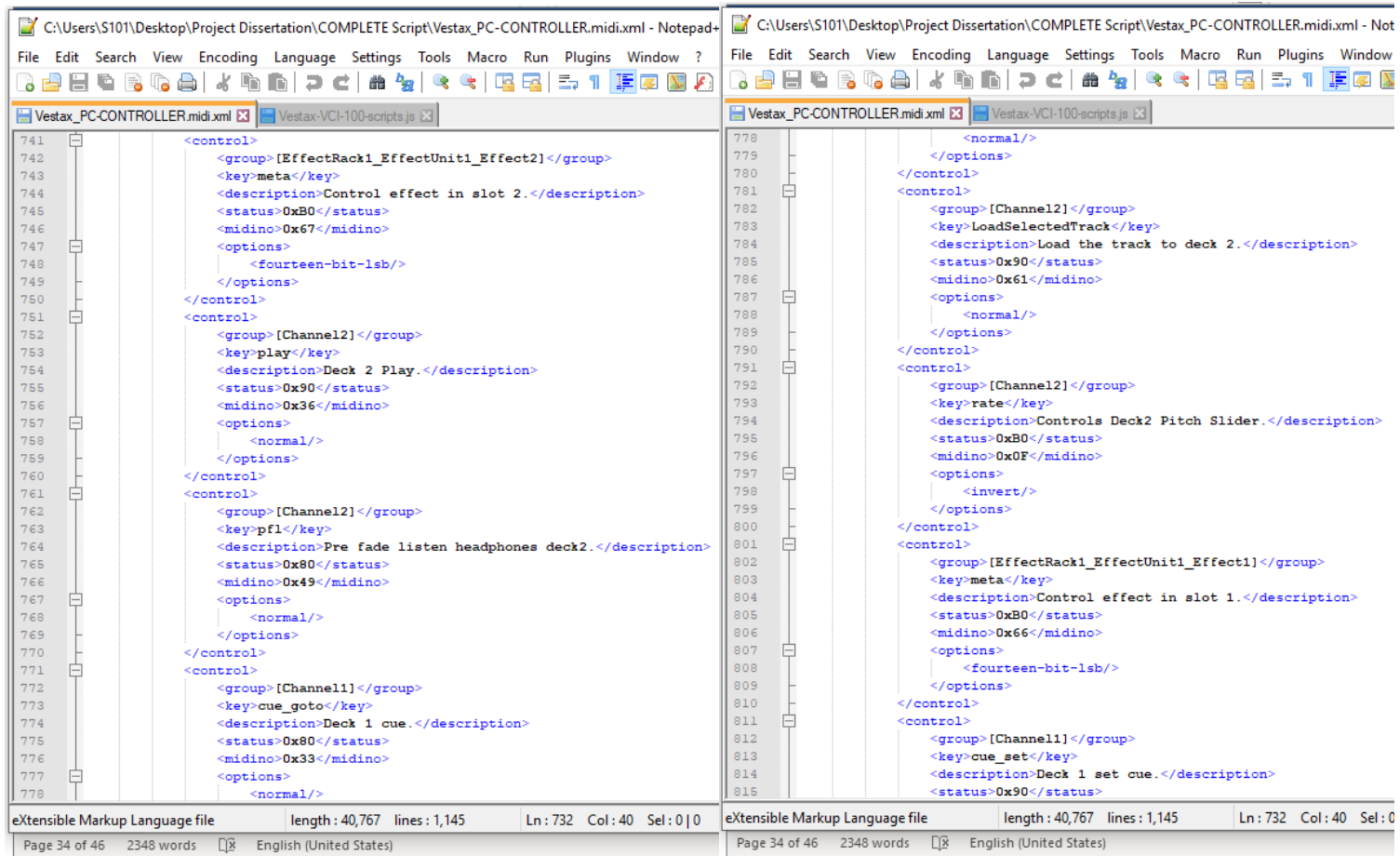
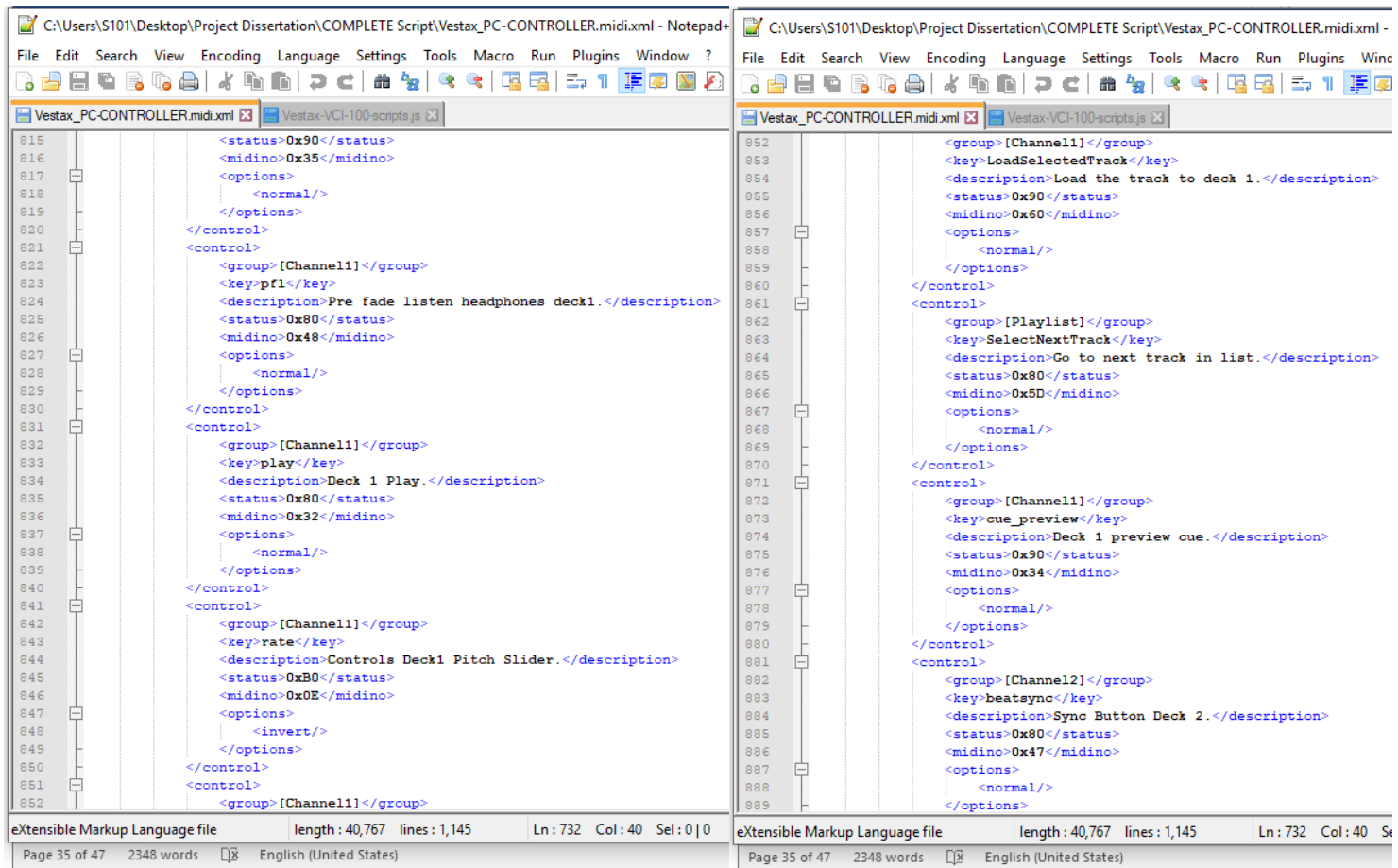File   Edit   Search   View   Encoding   Language   Settings   Tools   Macro   Run   Plugins   Window   ?

Vestax_PC-CONTROLLER.midi.xml   Vestax-VCI-100-scripts.js

```xml
741        <control>
742            <group>[EffectRack1_EffectUnit1_Effect2]</group>
743            <key>meta</key>
744            <description>Control effect in slot 2.</description>
745            <status>0xB0</status>
746            <midino>0x67</midino>
747            <options>
748                <fourteen-bit-lsb/>
749            </options>
750        </control>
751        <control>
752            <group>[Channel2]</group>
753            <key>play</key>
754            <description>Deck 2 Play.</description>
755            <status>0x90</status>
756            <midino>0x36</midino>
757            <options>
758                <normal/>
759            </options>
760        </control>
761        <control>
762            <group>[Channel2]</group>
763            <key>pfl</key>
764            <description>Pre fade listen headphones deck2.</description>
765            <status>0x80</status>
766            <midino>0x49</midino>
767            <options>
768                <normal/>
769            </options>
770        </control>
771        <control>
772            <group>[Channel1]</group>
773            <key>cue_goto</key>
774            <description>Deck 1 cue.</description>
775            <status>0x80</status>
776            <midino>0x33</midino>
777            <options>
778                <normal/>
```

```xml
778                <normal/>
779            </options>
780        </control>
781        <control>
782            <group>[Channel2]</group>
783            <key>LoadSelectedTrack</key>
784            <description>Load the track to deck 2.</description>
785            <status>0x90</status>
786            <midino>0x61</midino>
787            <options>
788                <normal/>
789            </options>
790        </control>
791        <control>
792            <group>[Channel2]</group>
793            <key>rate</key>
794            <description>Controls Deck2 Pitch Slider.</description>
795            <status>0xB0</status>
796            <midino>0x0F</midino>
797            <options>
798                <invert/>
799            </options>
800        </control>
801        <control>
802            <group>[EffectRack1_EffectUnit1_Effect1]</group>
803            <key>meta</key>
804            <description>Control effect in slot 1.</description>
805            <status>0xB0</status>
806            <midino>0x66</midino>
807            <options>
808                <fourteen-bit-lsb/>
809            </options>
810        </control>
811        <control>
812            <group>[Channel1]</group>
813            <key>cue_set</key>
814            <description>Deck 1 set cue.</description>
815            <status>0x90</status>
```

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```
815            <status>0x90</status>
816            <midino>0x35</midino>
817            <options>
818                <normal/>
819            </options>
820        </control>
821        <control>
822            <group>[Channel1]</group>
823            <key>pfl</key>
824            <description>Pre fade listen headphones deck1.</description>
825            <status>0x80</status>
826            <midino>0x48</midino>
827            <options>
828                <normal/>
829            </options>
830        </control>
831        <control>
832            <group>[Channel1]</group>
833            <key>play</key>
834            <description>Deck 1 Play.</description>
835            <status>0x80</status>
836            <midino>0x32</midino>
837            <options>
838                <normal/>
839            </options>
840        </control>
841        <control>
842            <group>[Channel1]</group>
843            <key>rate</key>
844            <description>Controls Deck1 Pitch Slider.</description>
845            <status>0xB0</status>
846            <midino>0x0E</midino>
847            <options>
848                <invert/>
849            </options>
850        </control>
851        <control>
852            <group>[Channel1]</group>
```

Right window: C:\Users\S101\Desktop\Project Dissertation\COMPLETE Script\Vestax_PC-CONTROLLER.midi.xml

```
852            <group>[Channel1]</group>
853            <key>LoadSelectedTrack</key>
854            <description>Load the track to deck 1.</description>
855            <status>0x90</status>
856            <midino>0x60</midino>
857            <options>
858                <normal/>
859            </options>
860        </control>
861        <control>
862            <group>[Playlist]</group>
863            <key>SelectNextTrack</key>
864            <description>Go to next track in list.</description>
865            <status>0x80</status>
866            <midino>0x5D</midino>
867            <options>
868                <normal/>
869            </options>
870        </control>
871        <control>
872            <group>[Channel1]</group>
873            <key>cue_preview</key>
874            <description>Deck 1 preview cue.</description>
875            <status>0x90</status>
876            <midino>0x34</midino>
877            <options>
878                <normal/>
879            </options>
880        </control>
881        <control>
882            <group>[Channel2]</group>
883            <key>beatsync</key>
884            <description>Sync Button Deck 2.</description>
885            <status>0x80</status>
886            <midino>0x47</midino>
887            <options>
888                <normal/>
889            </options>
```

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```xml
889            </options>
890          </control>
891          <control>
892            <group>[Channel2]</group>
893            <key>volume</key>
894            <description>Deck2 volume fader.</description>
895            <status>0xB0</status>
896            <midino>0x0D</midino>
897            <options>
898              <normal/>
899            </options>
900          </control>
901          <control>
902            <group>[Channel2]</group>
903            <key>pfl</key>
904            <description>Pre fade listen headphones deck2.</description>
905            <status>0x90</status>
906            <midino>0x49</midino>
907            <options>
908              <normal/>
909            </options>
910          </control>
911          <control>
912            <group>[Channel1]</group>
913            <key>cue_goto</key>
914            <description>Deck 1 cue.</description>
915            <status>0x90</status>
916            <midino>0x33</midino>
917            <options>
918              <normal/>
919            </options>
920          </control>
921          <control>
922            <group>[Playlist]</group>
923            <key>SelectPrevTrack</key>
924            <description>Go to previous track in list.</description>
925            <status>0x80</status>
926            <midino>0x5C</midino>
```

```xml
926            <midino>0x5C</midino>
927            <options>
928              <normal/>
929            </options>
930          </control>
931          <control>
932            <group>[Channel1]</group>
933            <key>beatsync</key>
934            <description>Sync Button Deck 1.</description>
935            <status>0x80</status>
936            <midino>0x46</midino>
937            <options>
938              <normal/>
939            </options>
940          </control>
941          <control>
942            <group>[Channel1]</group>
943            <key>volume</key>
944            <description>Deck 1 volume fader.</description>
945            <status>0xB0</status>
946            <midino>0x0C</midino>
947            <options>
948              <normal/>
949            </options>
950          </control>
951          <control>
952            <group>[Channel1]</group>
953            <key>pfl</key>
954            <description>Pre fade listen headphones.</description>
955            <status>0x90</status>
956            <midino>0x48</midino>
957            <options>
958              <normal/>
959            </options>
960          </control>
961          <control>
962            <group>[Channel1]</group>
963            <key>play</key>
```

```
963                    <key>play</key>
964                    <description>Deck 1 Play.</description>
965                    <status>0x90</status>
966                    <midino>0x32</midino>
967                    <options>
968                        <normal/>
969                    </options>
970                </control>
971                <control>
972                    <group>[Channel2]</group>
973                    <key>back</key>
974                    <description>Fast rewind for Deck2.</description>
975                    <status>0x80</status>
976                    <midino>0x45</midino>
977                    <options>
978                        <normal/>
979                    </options>
980                </control>
981                <control>
982                    <group>[Playlist]</group>
983                    <key>SelectNextTrack</key>
984                    <description>Go to next track in list.</description>
985                    <status>0x90</status>
986                    <midino>0x5D</midino>
987                    <options>
988                        <normal/>
989                    </options>
990                </control>
991                <control>
992                    <group>[Channel2]</group>
993                    <key>beatsync</key>
994                    <description>Sync Button Deck 2.</description>
995                    <status>0x90</status>
996                    <midino>0x47</midino>
997                    <options>
998                        <normal/>
999                    </options>
1000               </control>
```

C:\Users\S101\Desktop\Project Dissertation\COMPLETE Script\Vestax_PC-CONTROLLER.midi.xml - Notepad++

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Vestax_PC-CONTROLLER.midi.xml   ×   Vestax-VCI-100-scripts.js   ×

```
1000               </control>
1001               <control>
1002                   <group>[Channel2]</group>
1003                   <key>VestaxVCI100.jog_touch</key>
1004                   <description>Refers to script for touching jog wheel for chan2.</description>
1005                   <status>0x90</status>
1006                   <midino>0x31</midino>
1007                   <options>
1008                       <script-binding/>
1009                   </options>
1010               </control>
1011               <control>
1012                   <group>[Channel1]</group>
1013                   <key>fwd</key>
1014                   <description>Fast forward for Deck1.</description>
1015                   <status>0x80</status>
1016                   <midino>0x44</midino>
1017                   <options>
1018                       <normal/>
1019                   </options>
1020               </control>
1021               <control>
1022                   <group>[Playlist]</group>
1023                   <key>SelectPrevTrack</key>
1024                   <description>Go to previous track in list.</description>
1025                   <status>0x90</status>
1026                   <midino>0x5C</midino>
1027                   <options>
1028                       <normal/>
1029                   </options>
1030               </control>
1031               <control>
1032                   <group>[Channel1]</group>
1033                   <key>beatsync</key>
1034                   <description>Sync Button Deck 1.</description>
1035                   <status>0x90</status>
1036                   <midino>0x46</midino>
1037                   <options>
```

```xml
1037                <options>
1038                    <normal/>
1039                </options>
1040            </control>
1041        <control>
1042            <group>[Channel1]</group>
1043            <key>VestaxVCI100.jog_touch</key>
1044            <description>Refers to script for touching jog wheel for chan1.</description>
1045            <status>0x90</status>
1046            <midino>0x30</midino>
1047            <options>
1048                <script-binding/>
1049            </options>
1050        </control>
1051        <control>
1052            <group>[Channel2]</group>
1053            <key>fwd</key>
1054            <description>Fast forward for Deck2.</description>
1055            <status>0x80</status>
1056            <midino>0x43</midino>
1057            <options>
1058                <normal/>
1059            </options>
1060        </control>
1061        <control>
1062            <group>[Master]</group>
1063            <key>headMix_set_default</key>
1064            <description>Reset headphone mix.</description>
1065            <status>0x90</status>
1066            <midino>0x1A</midino>
1067            <options>
1068                <normal/>
1069            </options>
1070        </control>
1071        <control>
1072            <group>[Master]</group>
1073            <key>balance</key>
1074            <description>Master balance 2.</description>
```

eXtensible Markup Language file | length : 40,767 lines : 1,145 | Ln : 732 Col : 40 Sel : 0 | 0 | Unix (

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```xml
1074            <description>Master balance 2.</description>
1075            <status>0xB0</status>
1076            <midino>0x1F</midino>
1077            <options>
1078                <normal/>
1079            </options>
1080        </control>
1081        <control>
1082            <group>[EffectRack1_EffectUnit2_Effect2]</group>
1083            <key>enabled</key>
1084            <description>Toggle effect in slot 3.</description>
1085            <status>0x90</status>
1086            <midino>0x5B</midino>
1087            <options>
1088                <normal/>
1089            </options>
1090        </control>
1091        <control>
1092            <group>[Channel2]</group>
1093            <key>back</key>
1094            <description>Fast rewind for Deck2.</description>
1095            <status>0x90</status>
1096            <midino>0x45</midino>
1097            <options>
1098                <normal/>
1099            </options>
1100        </control>
1101        <control>
1102            <group>[Channel1]</group>
1103            <key>back</key>
1104            <description>Fast rewind for Deck1.</description>
1105            <status>0x80</status>
1106            <midino>0x42</midino>
1107            <options>
1108                <normal/>
1109            </options>
1110        </control>
1111        <control>
```

eXtensible Markup Language file | length : 40,767 lines : 1,145 | Ln : 732 Col : 40 S

Page 38 of 50   2348 words   English (United States)

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Vestax_PC-CONTROLLER.midi.xml ☒   Vestax-VCI-100-scripts.js ☒

```
1109                            </options>
1110                        </control>
1111                        <control>
1112                            <group>[Master]</group>
1113                            <key>balance</key>
1114                            <description>Master balance 1.</description>
1115                            <status>0xB0</status>
1116                            <midino>0x1E</midino>
1117                            <options>
1118                                <normal/>
1119                            </options>
1120                        </control>
1121                        <control>
1122                            <group>[Master]</group>
1123                            <key>crossfader</key>
1124                            <description>Controls for the crossfader.</description>
1125                            <status>0xB0</status>
1126                            <midino>0x08</midino>
1127                            <options>
1128                                <normal/>
1129                            </options>
1130                        </control>
1131                        <control>
1132                            <group>[Channel1]</group>
1133                            <key>fwd</key>
1134                            <description>Fast forward for Deck1.</description>
1135                            <status>0x90</status>
1136                            <midino>0x44</midino>
1137                            <options>
1138                                <normal/>
1139                            </options>
1140                        </control>
1141                    </controls>
1142                    <outputs/>
1143                </controller>
1144            </MixxxControllerPreset>
1145
```

eXtensible Markup Language file   length : 40,767   lines : 1,145   Ln : 732   Col : 40   Sel : 0 | 0   Unix (LF)   UTF-8   INS
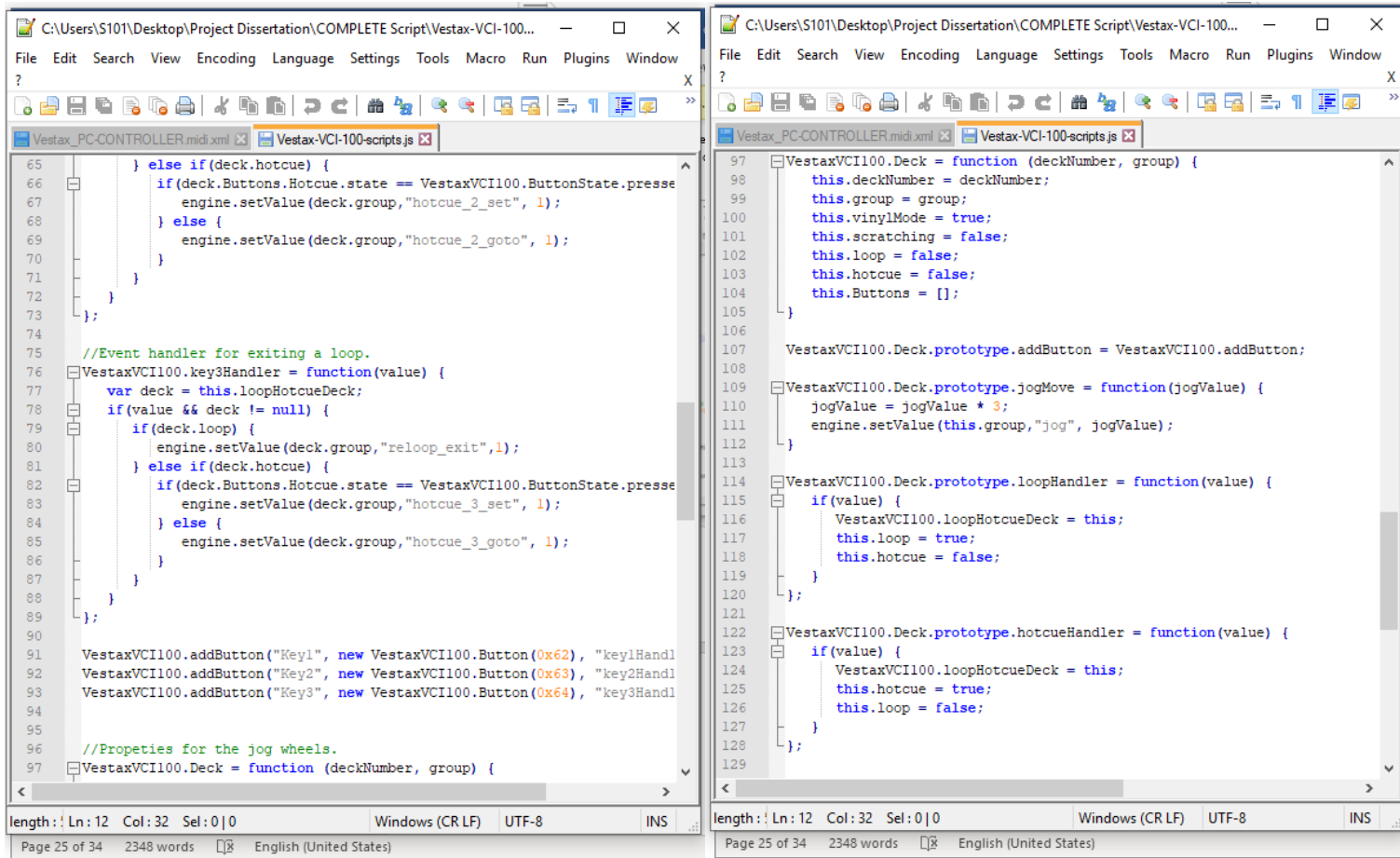
Page 39 of 51   2348 words   English (United States)

9.3. JavaScript Code - Vestax-VCI-100-scripts
Below is the JavaScript files that were created for the Vestax.

Fig 2.8. Screenshots of .JS file implemented (Pages 78 - 80)

Left window:

```
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File   Edit   Search   View   Encoding   Language   Settings   Tools   Macro   Run   Plugins   Window
?

Vestax_PC-CONTROLLER.midi.xml        Vestax-VCI-100-scripts.js

65          } else if(deck.hotcue) {
66              if(deck.Buttons.Hotcue.state == VestaxVCI100.ButtonState.presse
67                  engine.setValue(deck.group,"hotcue_2_set", 1);
68              } else {
69                  engine.setValue(deck.group,"hotcue_2_goto", 1);
70              }
71          }
72      }
73  };
74
75      //Event handler for exiting a loop.
76  VestaxVCI100.key3Handler = function(value) {
77      var deck = this.loopHotcueDeck;
78      if(value && deck != null) {
79          if(deck.loop) {
80              engine.setValue(deck.group,"reloop_exit",1);
81          } else if(deck.hotcue) {
82              if(deck.Buttons.Hotcue.state == VestaxVCI100.ButtonState.presse
83                  engine.setValue(deck.group,"hotcue_3_set", 1);
84              } else {
85                  engine.setValue(deck.group,"hotcue_3_goto", 1);
86              }
87          }
88      }
89  };
90
91  VestaxVCI100.addButton("Key1", new VestaxVCI100.Button(0x62), "key1Handl
92  VestaxVCI100.addButton("Key2", new VestaxVCI100.Button(0x63), "key2Handl
93  VestaxVCI100.addButton("Key3", new VestaxVCI100.Button(0x64), "key3Handl
94
95
96      //Propeties for the jog wheels.
97  VestaxVCI100.Deck = function (deckNumber, group) {

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Page 25 of 34     2348 words         English (United States)
```

Right window:

```
C:\Users\S101\Desktop\Project Dissertation\COMPLETE Script\Vestax-VCI-100...
File   Edit   Search   View   Encoding   Language   Settings   Tools   Macro   Run   Plugins   Window
?

Vestax_PC-CONTROLLER.midi.xml        Vestax-VCI-100-scripts.js

97  VestaxVCI100.Deck = function (deckNumber, group) {
98      this.deckNumber = deckNumber;
99      this.group = group;
100     this.vinylMode = true;
101     this.scratching = false;
102     this.loop = false;
103     this.hotcue = false;
104     this.Buttons = [];
105 }
106
107     VestaxVCI100.Deck.prototype.addButton = VestaxVCI100.addButton;
108
109 VestaxVCI100.Deck.prototype.jogMove = function(jogValue) {
110     jogValue = jogValue * 3;
111     engine.setValue(this.group,"jog", jogValue);
112 }
113
114 VestaxVCI100.Deck.prototype.loopHandler = function(value) {
115     if(value) {
116         VestaxVCI100.loopHotcueDeck = this;
117         this.loop = true;
118         this.hotcue = false;
119     }
120 };
121
122 VestaxVCI100.Deck.prototype.hotcueHandler = function(value) {
123     if(value) {
124         VestaxVCI100.loopHotcueDeck = this;
125         this.hotcue = true;
126         this.loop = false;
127     }
128 };
129

length :   Ln : 12   Col : 32   Sel : 0 | 0          Windows (CR LF)      UTF-8            INS
Page 25 of 34     2348 words         English (United States)
```

File   Edit   Search   View   Encoding   Language   Settings   Tools   Macro   Run   Plugins   Window   ?

Vestax_PC-CONTROLLER.midi.xml   Vestax-VCI-100-scripts.js

```javascript
130    VestaxVCI100.Decks = {"Left":new VestaxVCI100.Deck(1,"[Channel1]"), "Right":new VestaxVCI100.Deck(2,"[Channel2]")};
131    VestaxVCI100.GroupToDeck = {"[Channel1]":"Left", "[Channel2]":"Right"};
132
133    VestaxVCI100.GetDeck = function(group) {
134        try {
135            return VestaxVCI100.Decks[VestaxVCI100.GroupToDeck[group]];
136        } catch(ex) {
137            return null;
138        }
139    }
140    //Controls what happens when jog wheel is touched.
141    VestaxVCI100.jog_touch = function (channel, control, value, status, group) {
142        var deck = VestaxVCI100.GetDeck(group);
143        if(value) {
144            engine.scratchEnable(deck.deckNumber, 128*3, 45, 1.0/8, (1.0/8)/32);
145        } else {
146            engine.scratchDisable(deck.deckNumber);
147        }
148    }
149
150    VestaxVCI100.hotcueMode = function (channel, control, value, status, group) {
151        var deck = VestaxVCI100.GetDeck(group);
152        deck.Buttons.Hotcue.handleEvent(value);
153    }
154
155    //adds a new key.
156    VestaxVCI100.key1 = function (channel, control, value, status, group) {
157        VestaxVCI100.Buttons.Key1.handleEvent(value);
158    }
159    VestaxVCI100.key2 = function (channel, control, value, status, group) {
160        VestaxVCI100.Buttons.Key2.handleEvent(value);
161    }
162    VestaxVCI100.key3 = function (channel, control, value, status, group) {
163        VestaxVCI100.Buttons.Key3.handleEvent(value);
164    }
```

JavaScript file   length : 5,141   lines : 165   Ln : 12   Col : 32   Sel : 0 | 0   Windows (CR LF)   UTF-8   INS

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9.4. GUI (Graphical User Interface)

This section discusses the Interface design. Initially a new interface was to be designed but further research suggested that there was no need to develop a new GUI because it would be like the plan anyway and would be a waste of time.
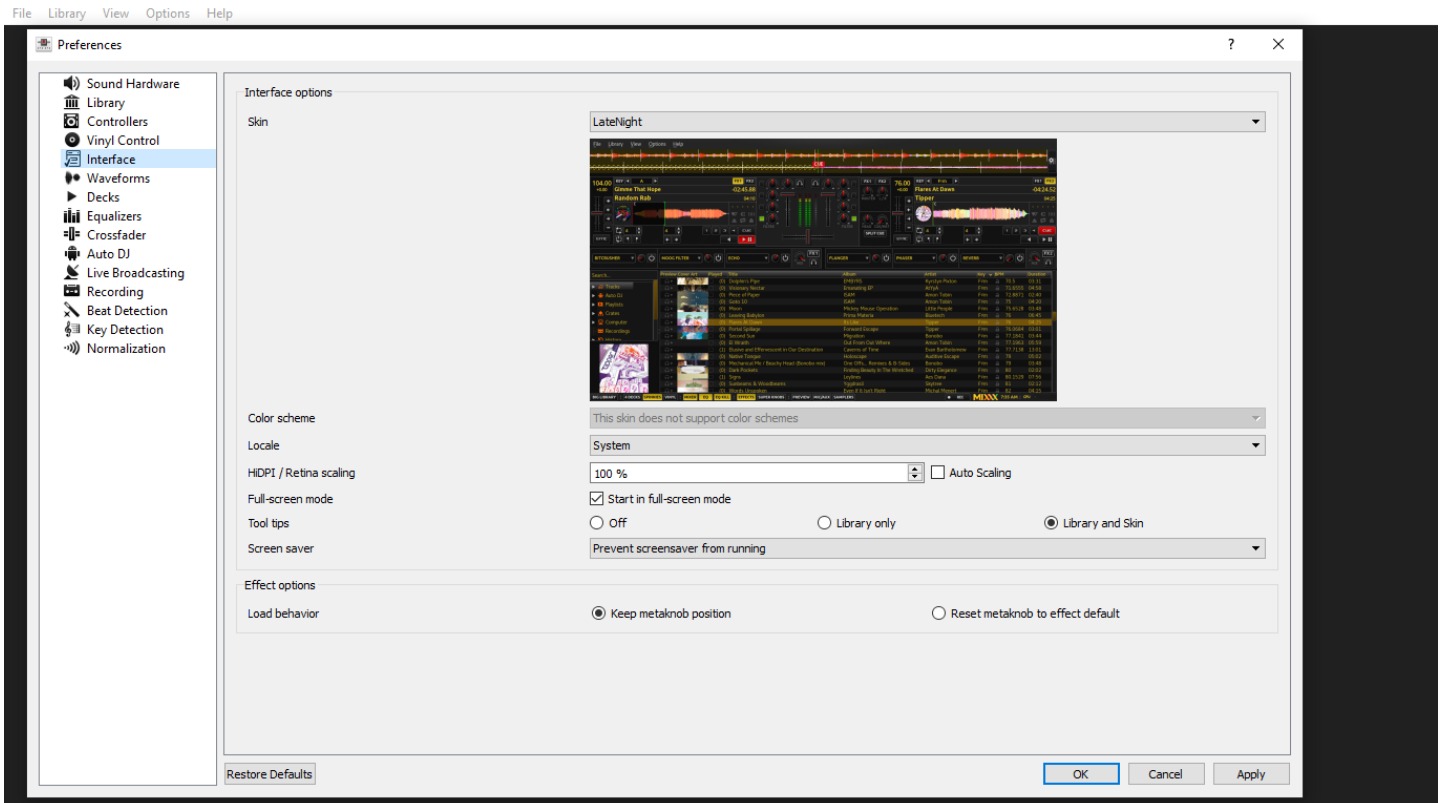

Fig 2.9. Image of the interface chosen on the Mixxx Software.

The above interface was chosen from the option within the Mixxx Software. The design is called: and was customised to match the controller layout.

The Advanced Aims of the project stated that a new GUI was to be coded. However, an agile software development methodology was adopted during the project, so this aim is no longer necessary.

The interface chosen was then customized (Fig below) to display all the necessary features in an easy to use non-cluttered way.

Customized Interface
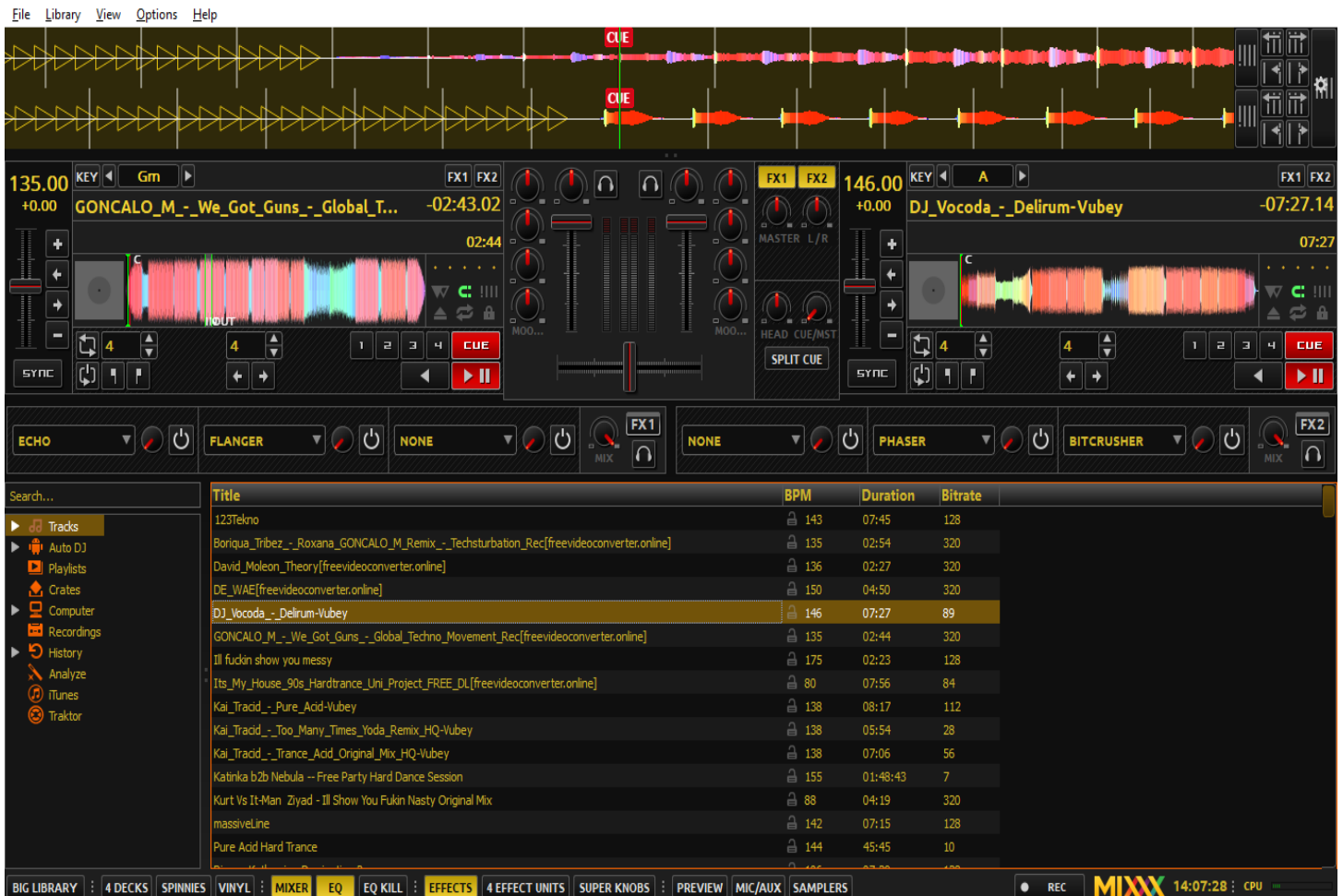
Fig 3.0. Screenshots of the Interface with the customizations.

10. TESTING & EVALLUATION

This section details with the testing of the code which has been written during implementation. The section will contain a test plan with actual results of what happened during testing.

10.1 Loading the scripts via the Mixxx Software
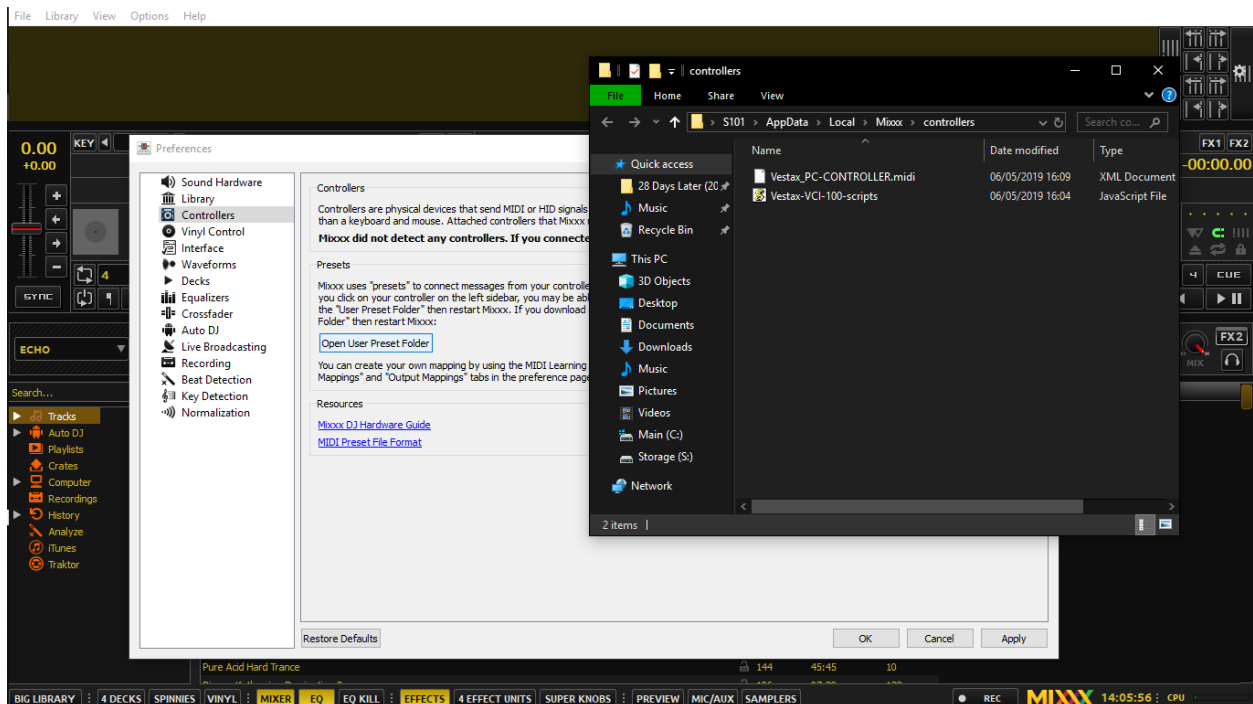
Fig 3.1. Loading the scripts via the Mixxx Software.

Result: The scripts loaded successfully. However, comments were removed from the .XML file every time they are loaded to Mixxx. This may be done to improve efficiency (Reduce code size for easier/faster processing).

The Image shows that the Scripts were loaded correctly into the Mixxx software and the controller is enabled

Fig 3.2. Screenshots of Controller setup.

10.2 Checking the input Mappings

All the controls which were created in the source code seem to be present in the input mappings.
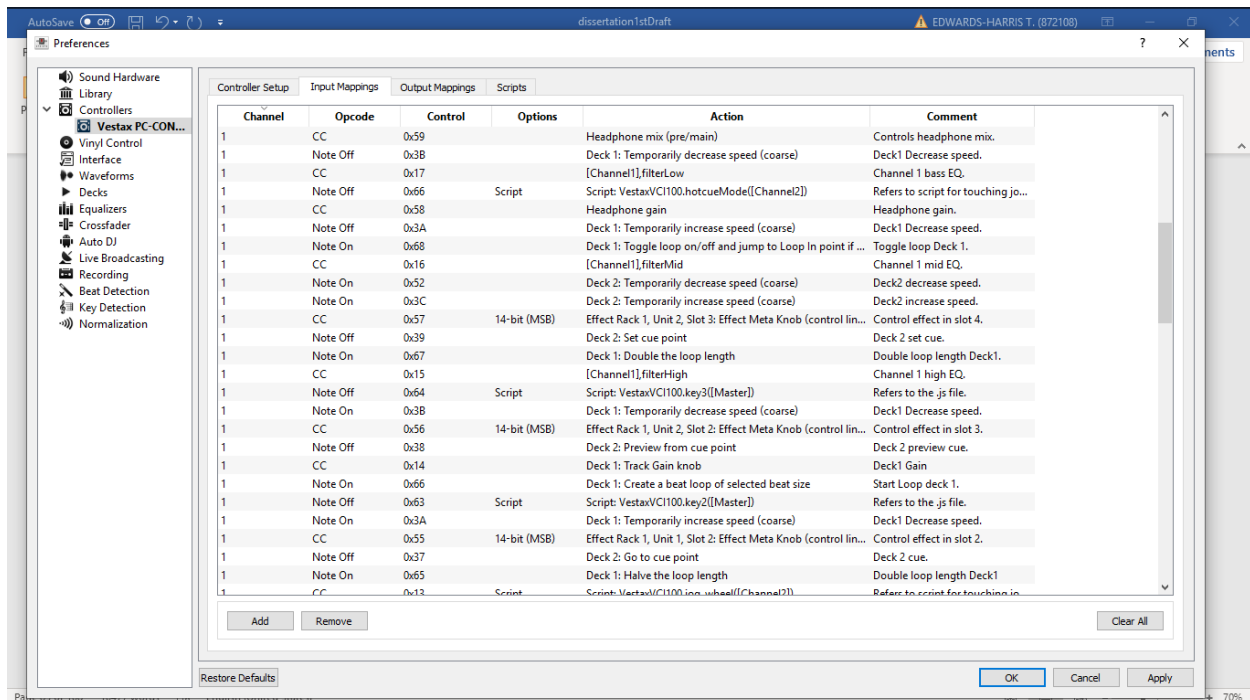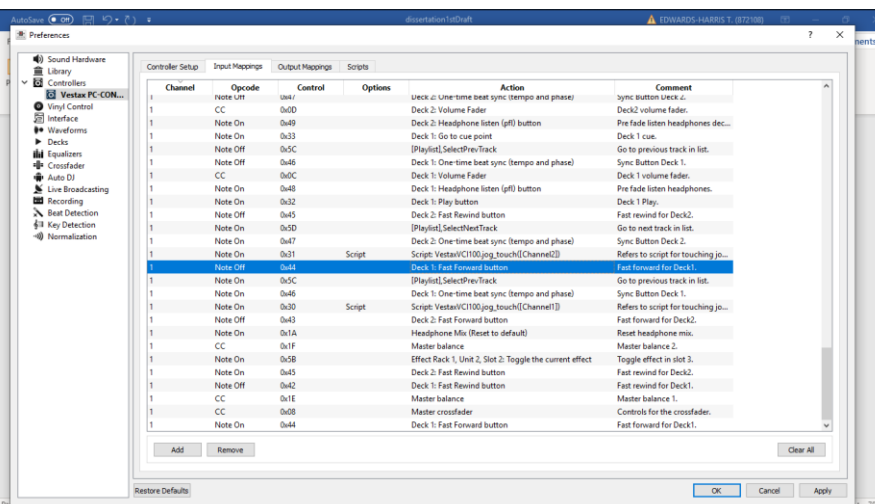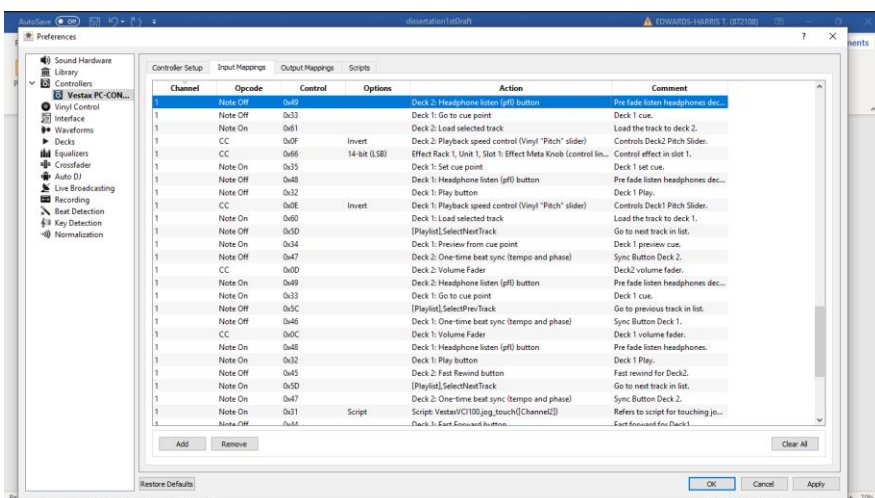
Channel	Opcode	Control	Options	Action	Comment
1	CC	0x49		Effect Rack 1, Unit 2, Slot 3: Effect Meta Knob (control lin...	Control effect in slot 4.
1	CC	0x1D		Quick Effect: Quick Effect Super Knob (control linked eff...	Controls the filter.
1	CC	0x07		[Master].volume	Controls the Master Volume.
1	Note On	0x43		Deck 2: Fast Forward button	Fast forward for Deck2.
2	Pitch Bend	0xFF		Deck 1: Playback speed control (Vinyl "Pitch" slider)	Controls Deck1 Pitch Slider.
1	Note On	0x17		Master Balance (Reset to default)	Master balance 2.
3	Pitch Bend	0xFF		Deck 2: Playback speed control (Vinyl "Pitch" slider)	Controls Deck2 Pitch Slider.
1	CC	0x48	14-bit (MSB)	Effect Rack 1, Unit 2, Slot 2: Effect Meta Knob (control lin...	Control effect in slot 3.
1	CC	0x1C		Quick Effect: Quick Effect Super Knob (control linked eff...	Controls the filter.
1	Note On	0x58		Effect Rack 1, Unit 1, Slot 2: Toggle the current effect	Toggle effect in slot 2.
1	Note On	0x42		Deck 1: Fast Rewind button	Fast rewind for Deck1.
1	Note On	0x2C		Effect Rack 1, Unit 2, Slot 3: Toggle the current effect	Toggle effect in slot 4.
1	Note On	0x16		Master Balance (Reset to default)	Master balance 1.
1	CC	0x47		Effect Rack 1, Unit 2, Slot 2: Effect Meta Knob (control lin...	Control effect in slot 2.
1	CC	0x1B		[Channel2].filterLow	Channel 2 bass EQ.
1	CC	0x46	14-bit (MSB)	Effect Rack 1, Unit 1, Slot 1: Effect Meta Knob (control lin...	Control effect in slot 1.
1	Note On	0x6C		Deck 2: Tap to sync, hold to enable sync mode	Sync Button.
1	CC	0x1A		[Channel2].filterMid	Channel 2 mid EQ.
1	Note Off	0x3D		Deck 2: Temporarily decrease speed (coarse)	Deck2 decrease speed.
1	CC	0x19		[Channel2].filterHigh	Channel 2 high EQ
1	Note On	0x6B		Deck 1: Tap to sync, hold to enable sync mode	Sync Button.
1	Note On	0x55		Effect Rack 1, Unit 1, Slot 1: Toggle the current effect	Toggle effect in slot 1.
1	Note Off	0x68	Script	Script: VestaxVCI100.hotcueMode([Channel2])	Refers to script for touching jo...
1	Note Off	0x3C		Deck 2: Temporarily increase speed (coarse)	Deck2 increase speed.
1	CC	0x18		Deck 2: Track Gain knob	Deck2 gain.
1	CC	0x59		Headphone mix (pre/main)	Controls headphone mix.

Fig 3.3. Implemented Mappings (Pages 85 – 87).

Channel	Opcode	Control	Options	Action	Comment
1	CC	0x59		Headphone mix (pre/main)	Controls headphone mix.
1	Note Off	0x3B		Deck 1: Temporarily decrease speed (coarse)	Deck1 Decrease speed.
1	CC	0x17		[Channel1].filterLow	Channel 1 bass EQ.
1	Note Off	0x66	Script	Script: VestaxVCI100.hotcueMode([Channel2])	Refers to script for touching jo...
1	CC	0x58		Headphone gain	Headphone gain.
1	Note Off	0x3A		Deck 1: Temporarily increase speed (coarse)	Deck1 Decrease speed.
1	Note On	0x68		Deck 1: Toggle loop on/off and jump to Loop In point if ...	Toggle loop Deck 1.
1	CC	0x16		[Channel1].filterMid	Channel 1 mid EQ.
1	Note On	0x52		Deck 2: Temporarily decrease speed (coarse)	Deck2 decrease speed.
1	Note On	0x3C		Deck 2: Temporarily increase speed (coarse)	Deck2 increase speed.
1	CC	0x57	14-bit (MSB)	Effect Rack 1, Unit 2, Slot 3: Effect Meta Knob (control lin...	Control effect in slot 4.
1	Note Off	0x39		Deck 2: Set cue point	Deck 2 set cue.
1	Note On	0x67		Deck 1: Double the loop length	Double loop length Deck1.
1	CC	0x15		[Channel1].filterHigh	Channel 1 high EQ.
1	Note Off	0x64	Script	Script: VestaxVCI100.key3([Master])	Refers to the .js file.
1	Note On	0x3B		Deck 1: Temporarily decrease speed (coarse)	Deck1 Decrease speed.
1	CC	0x56	14-bit (MSB)	Effect Rack 1, Unit 2, Slot 2: Effect Meta Knob (control lin...	Control effect in slot 3.
1	Note Off	0x38		Deck 2: Preview from cue point	Deck 2 preview cue.
1	CC	0x14		Deck 1: Track Gain knob	Deck1 Gain
1	Note On	0x66		Deck 1: Create a beat loop of selected beat size	Start Loop deck 1.
1	Note Off	0x63	Script	Script: VestaxVCI100.key2([Master])	Refers to the .js file.
1	Note On	0x3A		Deck 1: Temporarily increase speed (coarse)	Deck1 Decrease speed.
1	CC	0x55	14-bit (MSB)	Effect Rack 1, Unit 1, Slot 2: Effect Meta Knob (control lin...	Control effect in slot 2.
1	Note Off	0x37		Deck 2: Go to cue point	Deck 2 cue.
1	Note On	0x65		Deck 1: Halve the loop length	Double loop length Deck1
1	CC	0x13	Script	Script: VestaxVCI100.jog_wheel([Channel2])	Refers to script for touching jo...

10.3. Testing Features

This section describes the test activities that will be conducted to thoroughly decide whether the system is working correctly. The aim of the testing stage will allow for features to be tested and results of the testing process to be recorded.

Channel	Action	Expected Result	Actual Result
MASTER	Master volume	Controls the master volume of audio.	Master volume is increased when turning rotary right and decreased when turned left.
1	Balance	Controls whether the signal is sent to the left or right.	Turning the rotary knob left sends audio signal to left speakers. Turning to the right sends audio signal to right speakers.
1	Crossfader	Controls/splits the signal between channel 1 and 2.	Moving to the left play's audio from channel 1. Moving to the right play's audio from channel 1.
1	Headphone cue	Listen to channel X on headphones.	Pressing button above channel 1 enabled audio to be listened to via headphones. Pressing button above channel 2 enabled audio to be listened to via headphones.

1	Headphone Volume	Controls the volume of audio coming through headphones.	Turning the rotary CW increases volume and turning it CCW decreases the volume.
1	Play/Stop	Toggle button to either play or stop the audio.	Pressing once plays the audio for channel one. Pressing again stops the audio for channel 1.
1	Play/Cue	Toggle button to either play or cue the audio.	Pressing once plays from the cue point for audio loaded onto channel 1.
1	Cue/Pause	Toggle button to pause as a cue point in the audio.	Pressing once pauses at the stored cue point for the audio loaded onto channel 1.
1	Set Cue	Toggle button which sets a cue in the audio track.	Each time pressed the cue button sets a cue in the track loaded onto channel 1.
MASTER	Headphone Mix	Rotary knob which controls the balance between master and current channel.	Turning the rotary knob CW plays both master and cued track through headphones. Turning the rotary CCW plays just the cued track.
1	Low EQ	Rotary knob which isolates low bass frequencies.	Turning the rotary knob CW increases bass. Turning the

			rotary knob CCW removes the bass on channel 1.
1	Mid EQ	Rotary knob which isolates middle frequencies.	Turning the rotary knob CW increases mid. Turning the rotary knob CCW removes the mid on channel 1.
1	High EQ	Rotary knob which isolates high frequencies.	Turning the rotary knob CW increases high frequencies. Turning the rotary knob CCW removes the highs on channel 1.
1	Gain	Rotary knob which increases gain level in audio track.	Turning the rotary knob CW increases the gain level. Turning the rotary knob CCW decreases the gain level for channel 1.
1	Filter	Rotary knob which controls filter, left = LPF (Low pass filter) and right = HPF (High pass filter) Middle = filter off.	Turning the rotary knob CCW engages the LPF. Turning the rotary knob CW engages the HPF. Turning the rotary knob to the 12:00 point turns off the filter on channel 1.
1	Sync	Toggle button to sync the BPM/TEMPO of two audio files.	Pressing sync button on channel 1 matches the bpm of channel 1 to channel 2.

1	Fast Forward	Toggle button which skips forward through the audio track.	Holding in the button skips through the track, letting go stops fast forward for the audio loaded onto channel 1.
1	Rewind	Toggle button which skips backwards through the audio track.	Holding in the button skips backwards through the track. Releasing the button stops this happening for the audio on channel 1.
1	Vinyl Mode	Toggle button which allows the jog wheel to be active or inactive when touched.	Pressing the button once allows the jog wheel to cause the track to stop when touched. Pressing it again disabled this action for the audio on channel 1.
1	Jog Touch	Action of touching the jog wheel platter.	Touching the jog wheel on channel 1 stops the track. Releasing the touch causes the track to continue.
1	Jog Move	Action of moving the jog wheel forward or backwards.	Temporary increases the BPM when moved CW. Temporary decreases the BPM when moved CCW for audio loaded onto channel 1.
1	Pitch	Controls the Pitch/BPM of the	Moving the fader for channel 1 in the up direction

		audio being played.	increases the pitch. Moving the fader down decreases the pitch.
2	Headphone cue	Listen to channel X on headphones.	Pressing button above channel 1 enabled audio to be listened to via headphones. Pressing button above channel 2 enabled audio to be listened to via headphones.
1	Balance	Controls whether the signal is sent to the left or right.	Turning the rotary knob left sends audio signal to left speakers. Turning to the right sends audio signal to right speakers.
2	Play/Stop	Toggle button to either play or stop the audio.	Pressing once plays the audio for channel 2. Pressing again stops the audio for channel 2.
2	Play/Cue	Toggle button to either play or cue the audio.	Pressing once plays from the cue point for audio loaded onto channel 2.
2	Cue/Pause	Toggle button to pause as a cue point in the audio.	Pressing once pauses at the stored cue point for the audio loaded onto channel 2.

2	Set Cue	Toggle button which sets a cue in the audio track.	Each time the toggle button is pressed the cue button sets a cue in the track loaded onto channel 2.
2	Low EQ	Rotary knob which isolates low bass frequencies.	Turning the rotary knob CW increases bass. Turning the rotary knob CCW removes the bass on channel 2.
2	Mid EQ	Rotary knob which isolates middle frequencies.	Turning the rotary knob CW increases mid. Turning the rotary knob CCW removes the mid on channel 2.
2	High EQ	Rotary knob which isolates high frequencies.	Turning the rotary knob CW increases high frequencies. Turning the rotary knob CCW removes the highs on channel 2.
2	Gain	Rotary knob which increases gain level in audio track.	Turning the rotary knob CW increases the gain level. Turning the rotary knob CCW decreases the gain level for channel 2.
2	Filter	Rotary knob which controls filter, left = LPF (Low pass filter) and right = HPF	Turning the rotary knob CCW engages the LPF. Turning the rotary knob CW engages the HPF.

		(High pass filter) Middle = filter off.	Turning the rotary knob to the 12:00 point turns off the filter on channel 2.
2	Sync	Toggle button to sync the BPM/TEMPO of two audio files.	Pressing sync button on channel 2 matches the bpm of channel 2 to channel 1.
2	Fast Forward	Toggle button which skips forward through the audio track.	Holding in the button skips through the track, letting go stops fast forward for the audio loaded onto channel 2.
2	Rewind	Toggle button which skips backwards through the audio track.	Holding in the button skips backwards through the track. Releasing the button stops this happening for the audio on channel 1.
2	Vinyl Mode	Toggle button which allows the jog wheel to be active or inactive when touched.	Pressing the button once allows the jog wheel to cause the track to stop when touched. Pressing it again disabled this action for the audio on channel 2.
2	Jog Touch	Action of touching the jog wheel platter.	Touching the jog wheel on channel 2 stops the track. Releasing the

			touch causes the track to continue.
2	Jog Move	Action of moving the jog wheel forward or backwards.	Temporary increases the BPM when moved CW. Temporary decreases the BPM when moved CCW for audio loaded onto channel 2.
2	Pitch	Controls the Pitch/BPM of the audio being played.	Moving the fader for channel 2 in the up direction increases the pitch. Moving the fader down decreases the pitch.
MASTER	Effect slot 1	Toggle button which activates the effect in slot 1 on/off.	Issue with the four toggle button (E1, E2, E3, E4). They all seem to be sending the same signal. When trying to program buttons they all seem to be giving off the same MIDI signal.
MASTER	Effect slot 2	Toggle button which activates the effect in slot 2 on/off.	Issue with the four toggle button (E1, E2, E3, E4). They all seem to be sending the same signal. When trying to program buttons they all seem to be giving off the same MIDI signal.

MASTER	Effect slot 3	Toggle button which activates the effect in slot 3 on/off.	Issue with the four toggle button (E1, E2, E3, E4). They all seem to be sending the same signal. When trying to program buttons they all seem to be giving off the same MIDI signal.
MASTER	Effect slot 4	Toggle button which activates the effect in slot 4 on/off.	Issue with the four toggle button (E1, E2, E3, E4). They all seem to be sending the same signal. When trying to program buttons they all seem to be giving off the same MIDI signal.
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effect slot 1.	Turning the rotary knob CW increases the amount of the effect being applied to the music over the master output. Turning the rotary CCW decreases the amount of the effect for effect in slot 1.
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effect slot 2.	Turning the rotary knob CW increases the amount of the effect being applied to the music over the master output. Turning the

			rotary CCW decreases the amount of the effect for effect in slot 2.
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effects slot 3.	Turning the rotary knob CW increases the amount of the effect being applied to the music over the master output. Turning the rotary CCW decreases the amount of the effect for effect in slot 3.
MASTER	Effect Amount	Rotary knob which controls the amount of effect (intensity) in effects slot 4.	Turning the rotary knob CW increases the amount of the effect being applied to the music over the master output. Turning the rotary CCW decreases the amount of the effect for effect in slot 4.

10.4 Results of testing

Testing of features was thoroughly conducted and most of the tests had the expected results. Below are the highlighted errors/bugs that were identified during the testing process.

MASTER	Effect slot 1	Toggle button which activates the effect in slot 1 on/off.	Issue with the four toggle button (E1, E2, E3, E4). They all seem to be sending the same signal. When trying to program buttons they all seem to be giving off the same MIDI signal.
MASTER	Effect slot 2	Toggle button which activates the effect in slot 2 on/off.	Issue with the four toggle button (E1, E2, E3, E4). They all seem to be sending the same signal. When trying to program buttons they all seem to be giving off the same MIDI signal.
MASTER	Effect slot 3	Toggle button which activates the effect in slot 3 on/off.	Issue with the four toggle button (E1, E2, E3, E4). They all seem to be sending the same signal. When trying to

			program buttons they all seem to be giving off the same MIDI signal.
MASTER	Effect slot 4	Toggle button which activates the effect in slot 4 on/off.	Issue with the four toggle button (E1, E2, E3, E4). They all seem to be sending the same signal. When trying to program buttons they all seem to be giving off the same MIDI signal.

There is clearly an issue which was identified with the effects toggle section during the testing process.

Issue: Each of the four buttons seem to be sending the same MIDI signal, hence trying to program any of the buttons different will only revert to the programming on effect slot 1. This may be due to an error with the software or a hardware issue.

Solution: Effects are automatically toggled on startup but the amount of the effect (Rotary knobs above toggles) will be set far left. Now for the user to use the effect, they simple turn the rotary knob CW to activate the effects chosen above each toggle button. This hence proves that there is no need to toggle the effects On/Off.

Update: After analysis of the code, a fix for the original plan of the effects toggle buttons was found hence the solution above does not need to be used.

Post Fader Effects

It is important to note that the implementation of the effects section makes use of Post Fader effects.

Post-Fader Effects - allow the effect tail to be heard after the fader is closed, adding depth to the mix.

11. CONCLUSION

This section details what has been achieved during the duration of project. Many risks were encountered during the problem that were highlighted during risk analysis will be discussed. The technical and educational achievements will also thoroughly be talked about in this section and finally, what the future work/development for the project could entail.

11.1 Achievements

The overall outcome of the project has been a success. The aims and objectives of the project have changed dramatically over the course of the project however, all the aims discussed previously have been completed along with many more. The mapping for the Vestax VCI 100 is a complete mapping for the DJ Controller for use in the Mixxx software. The project has gone beyond what could be initially imagined.

The implementation stage generated over 1,100 lines of XML code and over 150 lines of JavaScript code which was a lot more than could of be imagined at the start of the project. Through the implementation stage many key controls/features have been created and implemented.

- All the Minimum Aims [2.1] such as the EQ controls have been created, implemented correctly and have been tested thoroughly.

- All the Advanced Aims [2.3] have been met and all features specified work as they are intended.

- The Initial Idea for a Non-Cluttered GUI [9.4] has been met however the approach has changed during development but works better than intended.

On top of these features a modern, responsive mapping with man, new features such as the re-designed effects section have been implemented and is completely unique when compared with other mappings.

The project has adopted all the latest, up to date coding conventions supplied by Mixxx's website and has been created with all the latest programing tools with a modern well designed user experience in mind.

Time management of the project went well. All the important deadlines were met. The correct software choices and software development model has aided the developer greatly. All issues/problems that occurred during the project have been identified and solved.

The undertaking of such a project has been a great experience for the developer and a lot has been learnt. The developer now has a greater understanding of the programming tools involved and would feel confident in creating other application/mappings in the programming languages/tools mentioned.

11.2 Risks and Mitigation

During the start of the project many risks to the project were identified and analyzed However, during the project there were various issues which occurred which were not identified during the Risk Assessment and Analysis (CH 4).

Problem 1: Developers Laptop screen was damaged in transit on April 25th.

Solution: A replacement screen needed to be purchased by the developer with the option for Next day delivery (this was needed with the project deadline being so close). This problem was a large cost to the developer and was not identified during Risk Assessment & Analysis.

Problem 2: Developer Hardware **[Vestax VCI 100]** also became damaged in transit on the 25th of April. The jog wheel for channel 2 had been severely damaged and the whole assembly had dropped to the bottom of the metal casing making the jog wheel completely useless.

Solution: Developer frantically searched various online auction sites to find a replacement for the hardware but was unable to find any because the DJ Controller is quite a rare piece of hardware and the Vestax company are discontinued and no longer in business.

With the Dissertation deadline and Project fair approaching quickly, the developer took it upon themselves to dismantle the controller and repair the issue.

After trawling through many online manuals and videos, the developer managed to identify the issue as being four screws. The thread had been damaged during the incident which caused the jog wheel assembly to fall due to the thread being damaged on the four screws holding it in place.

The developer then replaced these screws, cleaned the inside of the Hardware thoroughly and re-assembled it. Luckily, the Vestax powered on first time and worked better than it did previously. This issue caused a lot of stress for the developer and could have had the possibility to completely ruin the project. This variation of this risk (Water damage) was identified during Risk Assessment and Analysis.

11.3 Future Development

Future development is hoped to continue. There are various other ways that the Vestax VCI-100 could have been mapped however, further testing would be needed to re-design the Mapping Plan.

The developer plans to send the dissertation to the Mixxx development team and submit the Mapping to the contributing mapping on Mixxx's website. This will not only benefit other users of the hardware but hopefully generate some more opportunities for the developer.

If the development of this project was to be handed over to another individual, it would be easy to understand and hand control over due to the techniques and management tools used throughout the course of the project.

REPRODUCED MATERIAL

This section will describe the material that has been reproduced with slight variations and features in order to make the dissertation possible.

- Scripts created by Anders Gunnarsson were adapted and used in this project.
- Scripts included in Mixxx's stock mapping has been adapted or used in some way.

All other work completed in this project has been edited/adapted or is the developers original work.

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GLOSSARY

A glossary of the technical terms used for the controller have been included throughout and may not be known by most readers. The glossary has been written and contains all the uncommon technical terms mentioned throughout the project.

Midi Controller - A MIDI controller is any hardware or software that generates and transmits Musical Instrument Digital Interface (MIDI) data to electronic or digital MIDI-enabled devices, typically to trigger sounds and control parameters of an electronic music performance.

HID Device - A human interface device or HID is a type of computer device usually used by humans that takes input from humans and gives output to humans. The term "HID" most commonly refers to the USB-HID specification.

Midi Mapping - Midi mapping allows DJs to create custom controller mappings that are unique to their workflow or performance

Vestax - The Vestax Corporation was a Japanese musical instrument, turntable and audio equipment firm founded by Hidesato Shiino in 1977.[1] The company started by designing and manufacturing electronic guitars. In the 1980s, Vestax produced multitrack recorders and later move to making DJ mixers, professional turntables, compact disc players and signal processors. Debt troubles lead to the company's bankruptcy at the end of 2014.

XML - the language used for Mixxx's MIDI controller mapping file format.

JavaScript API – Used as an input handler for the MIDI XML file.

Notepad++ - a text editor and source code editor for use with Microsoft Windows. It supports tabbed editing, which allows working with multiple open files in a single window. The project's name comes from the C increment operator. Notepad++ is distributed as free software.

DJ controller - DJ controllers are devices used to help DJs mix music with DJ software using knobs, encoders, jog wheels, faders, backlit buttons, touch strips, and other components.

MIDI signal - MIDI is the abbreviation of "Musical Instrument Digital Interface". This is a unified standard used when recording the sounds of instruments (digital data). On the CDJ-350, MIDI signals are used to control DJ software.