MIDI Command Controller Interface

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Contents

1 update 3/3/2015, meeting canceled for today

- The meeting was cancelled for today, will update some other day when this week's schedule get fixed.

2 update 2/24/2015, updates include

2.1 updates

- idol(3); moved to the correct position to paint GUI button responsively;
- modified "Play" key to be "Stop" playing a music key, set upper row last key as "STOP" key;
- made playing a song and stop the song become responsive (two operations in total) by implementing play the song through a thread; This way the "STOP" key could work;
- Issue is that only 2 operations responsive, but need to be always responsive. The reason for this failed could be playing thread didn't reinitialize as expected, or need another thread to always check midi user input, and I suspect the reason is more likely the latter; So moved to remove main GUI clicks step and use midi as the main input;
- I mean to use while loop, but even after the advisor approved the method, afterwards I realized that multi-threading is the more intuitive and correct way to do it, so skipped while loops;
- I packed my data array buffer into an object and include setter/getter; I should have read thread always checking midi input periodically; I should have write thread to write back to midi to light LED on; I was blocked slightly when finished reading but not implementing writing, I failed to read the data needed to play the song; will try this appoarch later;
- After get blocked using reading thread, I changed back to the advisor suggested using while loop way. As predicted, the main UI got blocked by the while loop, which still point/approve to the multi-threading appoarch;
- This is the first time that I realize such blocking problems, though I made quite some progress, and last week's meet suggestions/updates is NOT for one week to finish, rather eventual goals, so I am confident that eventually I would get all these problems solved;
- The write back to midi to light LED on for the key pressed, and methods are ready there already, I just need to make my threads work first, then use a thread to write back to midi when necessary,

2.2 other

- As listed above, review the play/stop details and issues, reading thread issues, and while loop issues sequencially and logically with advisor by demo all these different version, and show necessary codes parts;
- The project goal keeps the same, and the advisor actually maybe interested in ”PAUSE” button and seekslider bar, and later if I have time, would work on that;
- For the followed several weeks, try to get a responsive softwares in fairly reasonable period.

3 Update 2/19/2014, updates include

3.1 updates

- These are two sets in the MIDI keyboard, the 25 key main board, and the adjustment 8 keys;
- Corresponded the main keyboard keys with the same ”surfinUSA.wav” song, and it works;
- Tested that all the 25 keys (I tested 4-5 keys by random sample) bonds to one song as a comand controller should work;
- Applied the same method on the left side 8 keys, but they are completely different set, so need further look into the sets (”Bend” could show key values, but the value could be changed to, and the other seven could NOT print Note ON/OFF values cause they are functionally different);
- GUI Interface keeps the same unchanged, so refer to last update for interface snapshot;
- I have spent tons of hours on Emacs ever since Fall 2012 triggered by Emacs Lisp program hightlights, and I still got blocked by unexpected bugs from time to time, but still, have been blocked by thousands of times, I still like Emacs the most. Fully functional Emacs without bugs significantly improves efficiency for me. Now brought readme.tex and readme.pdf back, I like to have them before git update to avoid multiple unnecessary updates···

3.2 todo

- So far linked to only one song, I have about 4-5, and need to link all of them to the keys (instead of link all the keys to the same song);
- Add two buttons for ”Pause” and ”Stop” in GUI to pause/stop playing a song;
- To light the midi controller LED on while the specific key pressed and light it on during the song time;
- Two set of input, midi controller and GUI buttons, prefer midi controller for input during tower show; The advisor said use an infinte loop for Checking midi input is ok, but I (me~) would expect to explore qt threads when loop is functional; The advisor expect that the midi controller should be responsive, so I should program to update midi-readin frequently (maybe even less than 500 ms interval according to the advisor);
- Though ”the more information the better”, the sliderbar is not necessary, I will list it as low priority.
- These are the suggestions that the advisor offered during morning meeting, and before the followed week meeting, I will try to finish as much as I can.

3.3 other issues

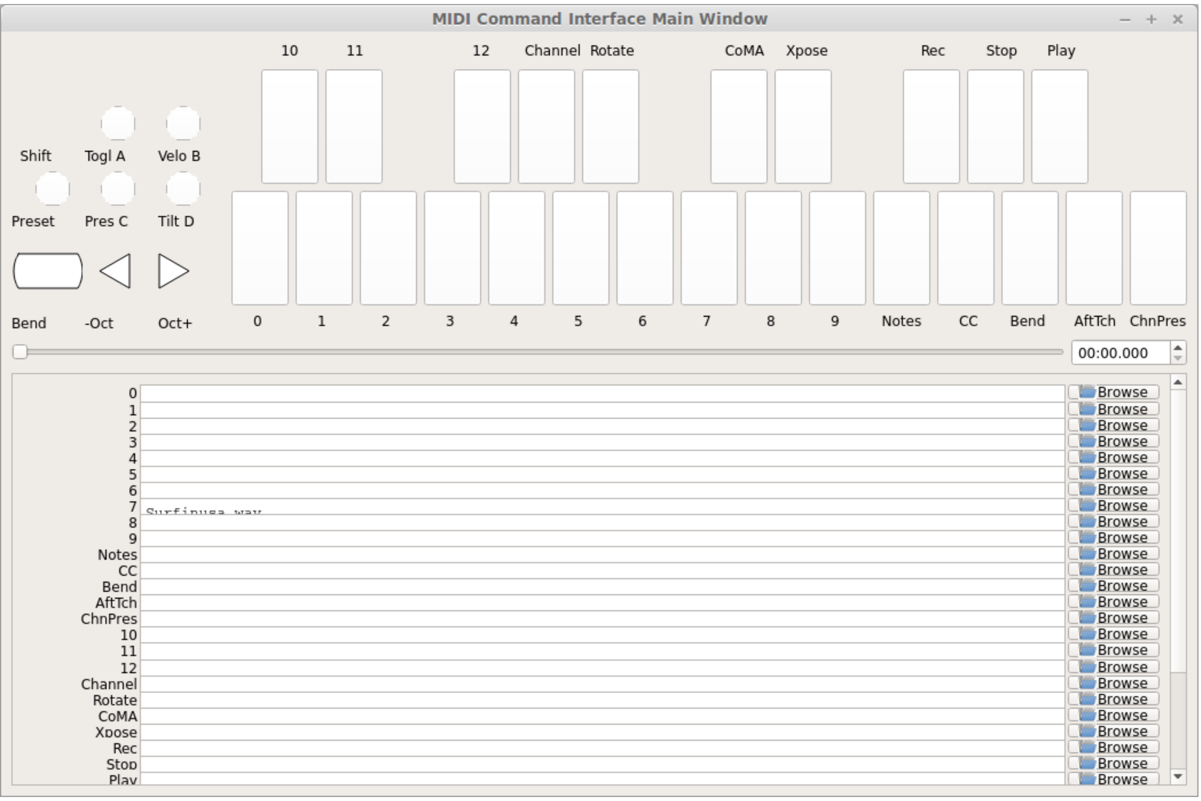
- The advisor and I rescheduled our meeting time to be 2:30pm on Wednesday afternoon because actually he has bi-weekly meeting at the original meeting time;
- Then I realize that I failed to state it clear that I need to work at 3pm means I needs to be well uniformly-dressed and be able to clock in and start work immediately, so we will have only about 15 minutes, and even advisor says I may start early, but I don’t want to run to work late at times.
- I wrote to the advisor and during yesterday’s short meet we rescheduled the meeting time to be ”**10:00am - 11:00am on Tuesday**” and for this week’s meeting rescheduled to be this morning at 8:30am - 9:30am (the advisor showed up at 9:05, so we did have about half an hour meeting this morning. He had visitor at 9:30am).

- Later on will update this repository weekly **around 11:00am within +/- 30 minutes** time period to help and enforce myself to make some progress weekly.

4 Update 2/12/2014, updates include

4.1 updates

- Didn't start until this week was mainly before the foot court work had waited more than one week to get docs processed, and waiting for work Schedule before Scheduling with advisor, and advisor approved it.
- Scheduled Wednesday 12:30-1:30pm to meet advisor weekly, and will update at least once a week to record progress.
- For coming week's meeting, advisor suggested to get more keys combines with songs in the normal 25 key set besides the finished one.
- Today got the Rectangle/Triangle shapes work and ready.

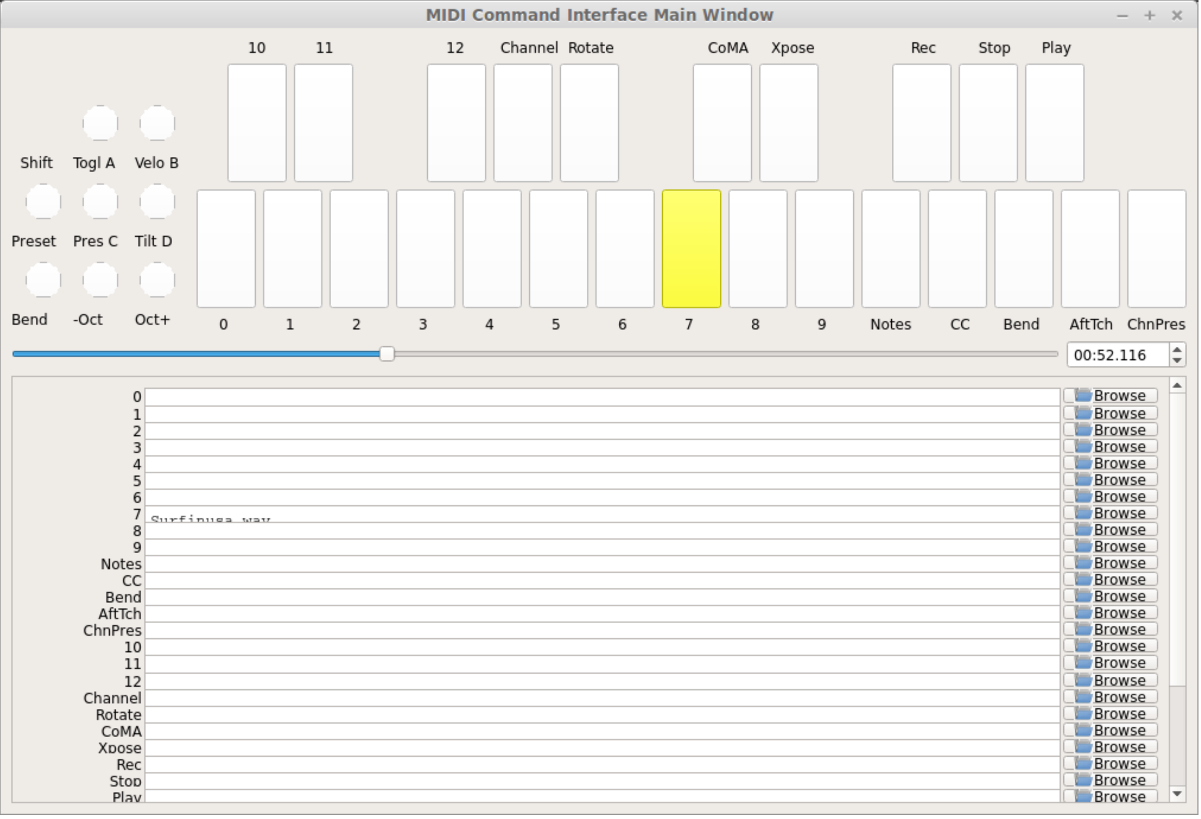


0		Browse
1		Browse
2		Browse
3		Browse
4		Browse
5		Browse
6		Browse
7	Surfinusa.wav	Browse
8		Browse
9		Browse
Notes		Browse
CC		Browse
Bend		Browse
AftTch		Browse
ChnPres		Browse
10		Browse
11		Browse
12		Browse
Channel		Browse
Rotate		Browse
CoMA		Browse
Xpose		Browse
Rec		Browse
Stop		Browse
Play		Browse

5 Update 12/11/2014, updates include

5.1 updates

- Temporatorily mimic phonon seekslider, but have not connected the signals and slots fully functioning yet;
- This seekslider may still eventually came back to use Phonon library using Qt4.8 version;
- So far consider this as a bonus feature;



00:52.116

0		Browse
1		Browse
2		Browse
3		Browse
4		Browse
5		Browse
6		Browse
7	Surfinusa.wav	Browse
8		Browse
9		Browse
Notes		Browse
CC		Browse
Bend		Browse
AftTch		Browse
ChnPres		Browse
10		Browse
11		Browse
12		Browse
Channel		Browse
Rotate		Browse
CoMA		Browse
Xpose		Browse
Rec		Browse
Stop		Browse
Play		Browse

5.2 review

- Because of lack Xbee modules (needs devices from intstructor), so far playing only .wav file is ok;
- It is basic, setting one buttone to work only, without any threads yet, but will expend it to be better during spring semester.
- Spring semester (1 credit) will pack all my instructor's Tower Play modules into a well-designed fully-functional softwares for user's convenience.

6 Update 12/09/2014, updates include

- worked in it a little bit to set the connections between Midi controller and Qt Creator;
- tried to implement pthead for reading user input, but got slightly frustrated today, and applied easier methods instead;
- the project basically satisfied the instructor's requirements for connecting one key to work for playing his sequence, for example, Surfinusa.wav file;
- Will demo to his to see if he has better suggestions.

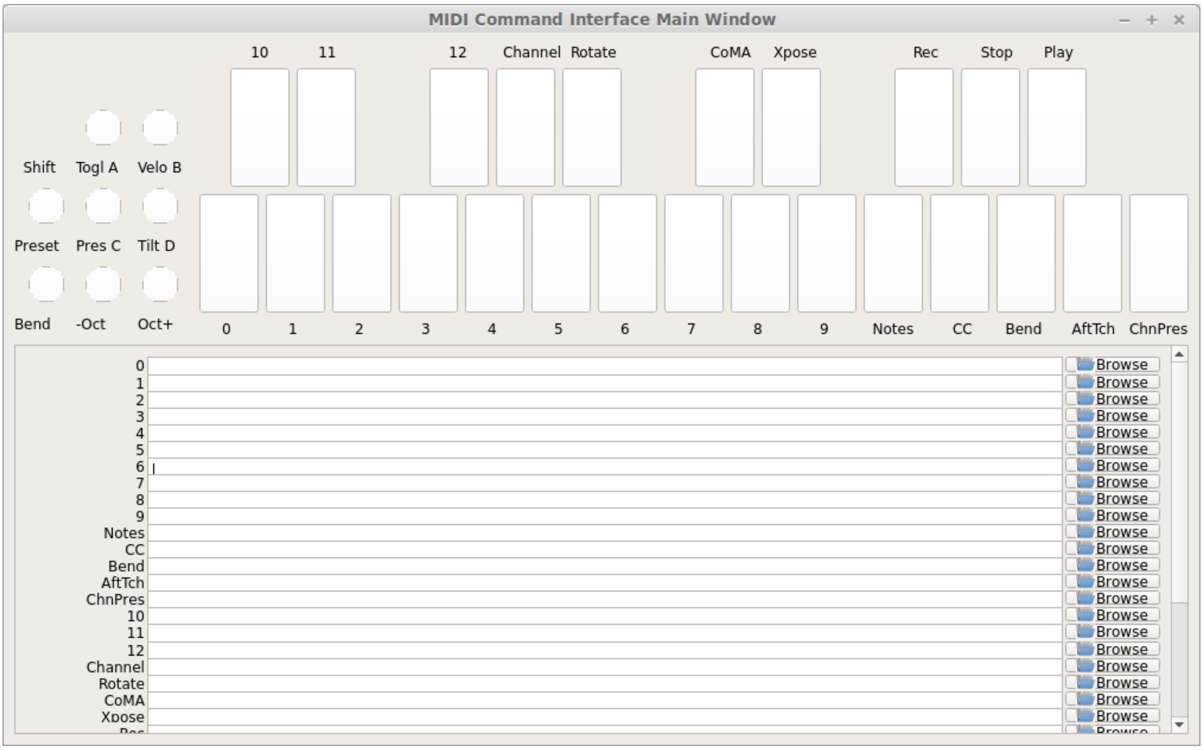
7 Update 11/23/2014, updates include

- Cleaned repository so that it looks clean and nice;
- Remove menubar as suggested by advisor;
- Removed topright four line texts cause it's not necessary;
- Shifted top line keys so that they look like original midi controller layout;
- Changed PlainTextEdit so that they satifies the requirements;

- Added left side 8 keys, just that three keys **Bend**, **-Oct**, **Oct+** are **NOT** like the original shapes yet, need work on them later on;

- Will link possible functionalities to make it a functional softwares first, and then updates minus issues.

- Current layout looks as below snapshotted:

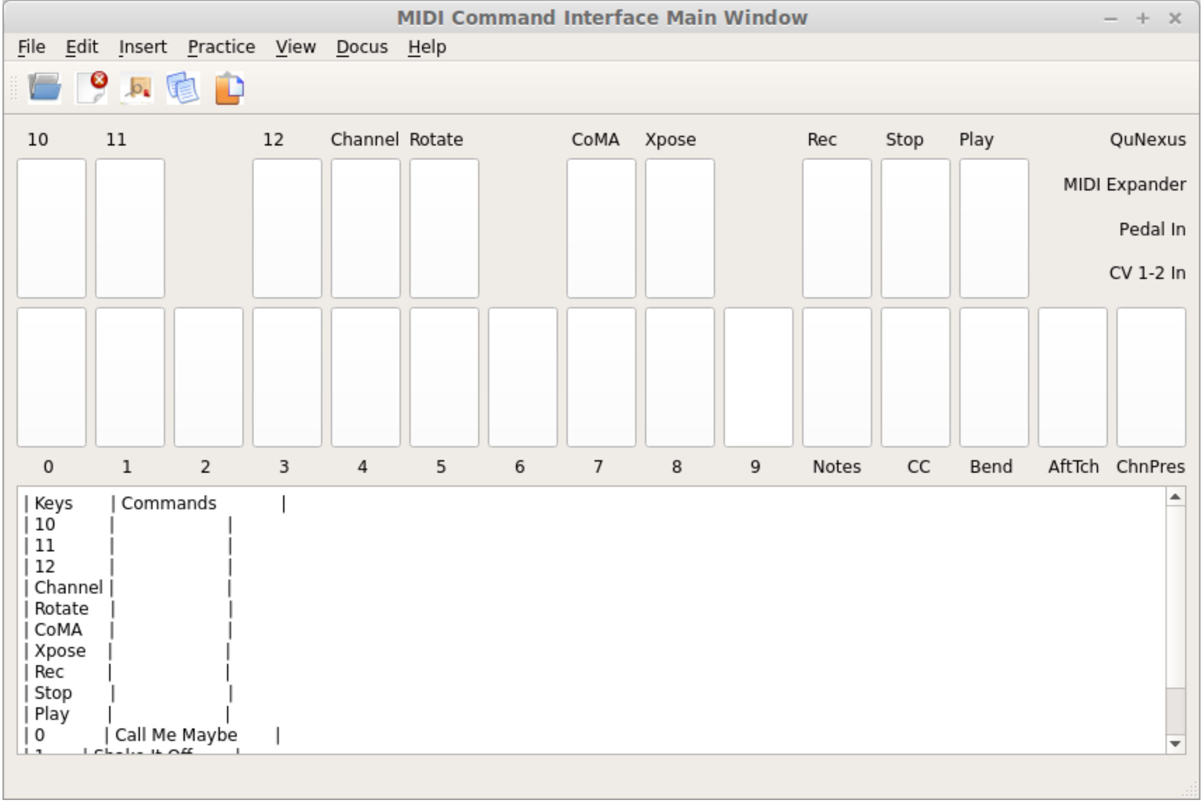


8 Review 11/21/2014, updates include

8.1 Review Contents

- Created most basic interface for the client, and reviewed with course instructor.

- Demo the most basic interface to him, and get corresponding specific requirements as listed followed.



```
| Keys     | Commands       |
| 10       |                |
| 11       |                |
| 12       |                |
| Channel  |                |
| Rotate   |                |
| CoMA     |                |
| Xpose    |                |
| Rec      |                |
| Stop     |                |
| Play     |                |
| 0        | Call Me Maybe    |
| 1      | Shake It Off     |
```

8.2 Detailed Requirements

- menubar is NOT necessary, and could be removed away;
- Interface topright four line texts are not necessary, could be removed away;
- Interface top line keys should shift to the right by half key width so that the interface looks similar to the original midi controller keyboard;
- PlainTextEdit should be changed to be array of 25/33 lines of (text label, file name editor, browse QPushButton keys) layout;
- Left handside 8 keys should be included in the midi interface even functionalities are not required at this moment;
- When finished the above basic ones, if I have extra time, could explore the left side 8 keys to test if it is possible to use them to set a bunch of sequence so that save time when needed compared with set sequence one by one from the basic 25 keys.

9 Project Requirements

- Use QuNexus Midi controller as a command controller to manipulate play sequence for tower lights show;
- Besides the main functionalities, create a Qt Creator Interface to help facilate the tower light playing process for clients convenience.

10 main functionality

10.1 Read data from MIDI

- Use the MIDI Controller as a speical Controller that can be operated to play specific songs sequence, or do some specific work.
- play specific sequence may be the work for keys 0-9, and 10-12, how about other 20 keys? Do they require specific work to be done?

10.2 Write data back to MIDI

- When a key was pushed, the specific Controller key's LED is supposed to be on to indicate the operation.
- Trick about the LED to be continuously on is that when a key is pressed, that is 1 byte that indicates the ”Duration” of the key press, I may need to
  - try to set this byte to be a large value, (1 byte, $2^8 = 256$, it has limits!)
  - or continuously reset is to be that large value;
  - or continuously write this key to be pressed data back to MIDI with time intervals

11 Programming Language

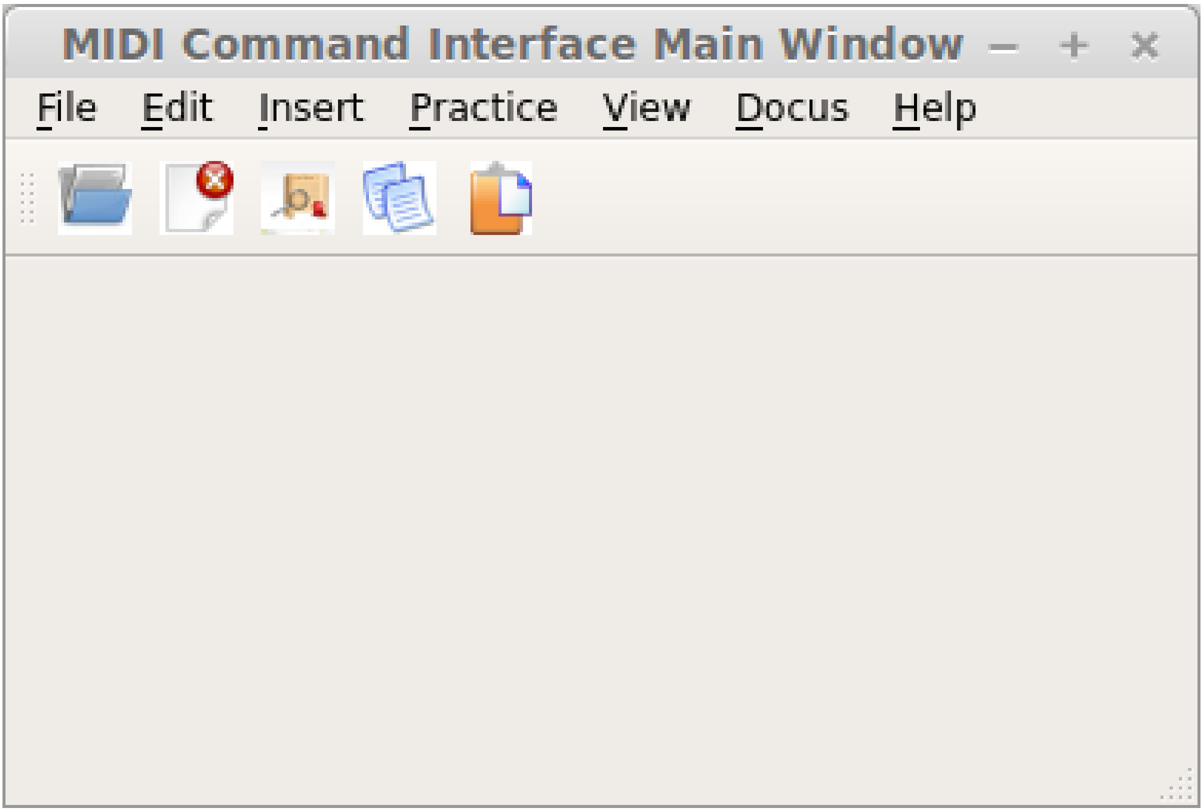
11.1 Qt

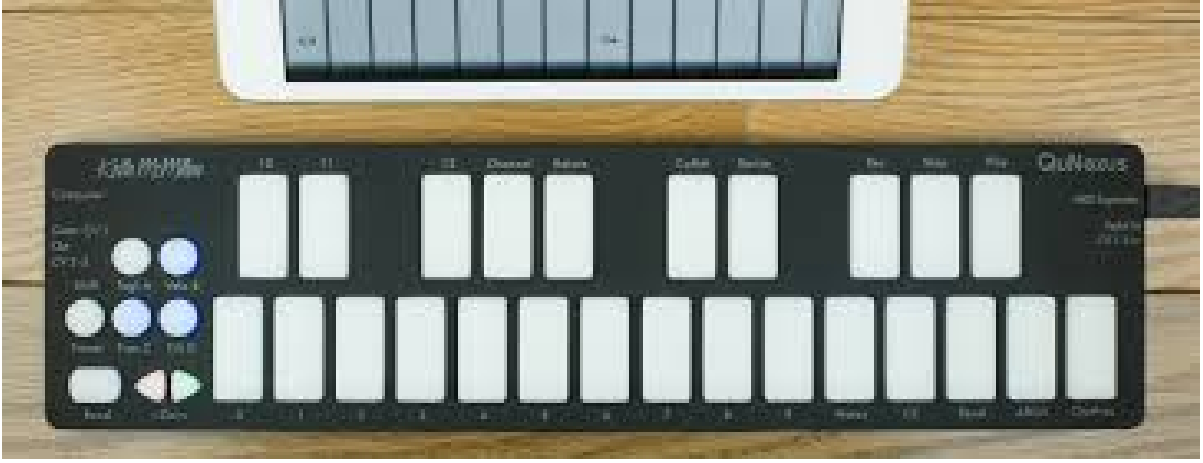
- the worries that I have by using Qt is that if Qt has the capability to handle the MIDI-Linux connection problems.
- And also Qt-to-Audio (linux) connection things as well. Should it be Qt, or as far as I can set it to work in Linux, just let it be that way then?

11.2 c++

- I believe C++ is the most widely used Language used by those midi sequencer softwares, so I have no better choice than c++ right now.

12 Interface Design





13 Midi keys and corresponded operations

Table 1: midi keys and corresponded operations

Keys	Commands
10	
11	
12	
channel	
Rotate	
CoMA	
Xpose	
Rec	
Stop	
Play	
0	Call Me Maybe
1	Shake It Off
2	All About That Bass
3	...
4	
5	
6	
7	
8	
9	
Notes:	
CC	
Bend	
AftTch	
ChnPres	
Togl A	
Velo B	
Preset	
Pres C	
Tilt D	
Bend	
Oct-	
Oct+	

14 Interface Guide

- Give text instructions on how to use the Interface, and what are the corresponded operations by press specific keys.
- Like list the above table in the Interface Guide text area.

15 References

15.1 For circle QPushButton

- http://stackoverflow.com/questions/12734319/change-rectangular-qt-button-to-round

15.2 Draw circle separate

- https://coderalbert.wordpress.com/2014/03/16/creating-circle-in-linux-using-qt-creator/

15.3 For Rectangle Arc

- http://stackoverflow.com/questions/20416789/how-to-add-a-small-triangle-at-one-of-the-corn

15.4 PaintEvent Triangle

- http://stackoverflow.com/questions/20416789/how-to-add-a-small-triangle-at-one-of-the-corn
- http://stackoverflow.com/questions/3894737/qt4-how-to-draw-inside-a-widget
- http://qt-project.org/forums/viewthread/1623
- http://stackoverflow.com/questions/7968269/basic-qt-gui-qpushbutton-for-drawing-a-line

15.5 QPushButton::drawButton(QPainter *painter);

- https://www.tbi.univie.ac.at/~pmg/tutorials/QT/html/qpushbutton.html

15.6 QGraphicsSene QGraphicsProxy···

- http://qt-project.org/forums/viewthread/4020

15.7 QPushButton raised enabled

- http://www.qtcentre.org/threads/42852-QStyledItemDelegate-paint-QPushButton-with-styleshee

15.8 QPushButton two icons

- http://www.qtcentre.org/threads/39445-How-to-add-two-icons-images-to-the-same-QPushButton

15.9 QPainter

- http://qt-project.org/forums/viewthread/23628

15.10 QGridLayout ScrollArea

- http://qt-project.org/forums/viewthread/20843
- http://qt-project.org/forums/viewthread/20924/

15.11 Linux Midi

- https://ccrma.stanford.edu/~craig/articles/linuxmidi/input/section1.html
- https://ccrma.stanford.edu/~craig/articles/linuxmidi/

15.12 Open device

- http://pubs.opengroup.org/onlinepubs/009695399/functions/open.html

15.13 Qt QIODevice

- http://doc.qt.digia.com/qq/qq12-iodevice.html
- http://stackoverflow.com/questions/14821792/what-does-file-openqiodevicereadonly-mean

15.14 Qt Debugging

- https://bbs.archlinux.org/viewtopic.php?id=174523
- http://www.qtcentre.org/threads/53549-connect()-terminates-the-program

15.15 pulseaudio linux mint

- http://community.linuxmint.com/software/view/pulseaudio

```
towerplayer  ./towerplayer Surfinusa.wav surfinUSA.tan
Loading Surfinusa.wav
File Size=26368316
Header Size=16
Data Size=26368272 (0x1925910)
Done reading tan file!
Checking for fast nodes
unable to open ftdi (xbee) device: -3 (device not found)
```

15.16 QSound example

- http://doc.qt.digia.com/3.3/sound-example.html

15.17 QSound QSoundEffect(pulseaudio): Error Decoding course

- https://together.jolla.com/question/53394/qsoundeffectpulseaudio-error-decoding-sourc/

15.18 QTimer

- http://qt-project.org/forums/viewthread/27190

15.19 Triangle

- http://en.wikibooks.org/wiki/Qt/Qt_Quick_Overview
- http://qt-project.org/forums/viewthread/25624
- http://stackoverflow.com/questions/24672146/qpainter-draw-lien
- http://doc.qt.digia.com/4.6/widgets-styles.html
- http://qt-project.org/doc/qt-4.8/painting-painterpaths-window-cpp.htm

15.20 play loops

- http://stackoverflow.com/questions/16751778/qt-qsound-looping
- http://forum.codecall.net/topic/71902-qt-c-play-sound-on-key-press-stops-working-after-a-f

15.21 Phonon

- http://bbs.qter.org/forum.php?mod=viewthread&tid=784
- seek slider: http://pencil-animation.org/forum/viewtopic.php?id=672
- http://qt-project.org/doc/qt-4.8/phonon-qmusicplayer.html

15.22 QThread

- http://www.360doc.com/content/12/0218/20/6828497_187676466.shtml
- http://www.360doc.com/content/12/1106/14/7899729_246182251.shtml
-

15.23 QMutex

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