

# CS480 Senior Design GUI Interface

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## Contents

### 1 Statement

It was a four day short project that I have just worked on during the passed weekend. This isn't any project to show off, but rather a review of a project and to review the process of practising myself into a professional software engineer. Besides the most fundamental knowledge that we need to learn on campus, student should also focus on the problem-solving skills so that eventually without any instructor or mentor, we could still learn new knowledges and succeed any project or requirements that we initially don't have at all.

### 2 Course Introduction

#### 2.1 Reason for choosing this Course

This fall semester I didn't have many course to choose at all. I targeted for the <Android App Programming> course, and I introduce my self to the instructor and says that I need some envoironmental force, like by taking a couse even I only register for one credit to help me stay on schedule and learn some new knowledge. I mean to register one credit, but the instructor asked me to register 3.

I felt clear that this fall semester don't have many choice for courses, like usual engineer outreach courses are not opening at all. After a week they confirmed that we are ok to choose parallel Programming, I registered a 500 level. Both 500 level and 400 level requires a project, just the difficulty will be slightly different. I registered 500 level, but as the registration deadline went closer and closer, I realized more and more that with all the difficulties that I have, together with the instructor in another campus, I can be dead easily without noticing anything. So the dealine day last night, I tried to chagne it back to 400 level, but I failed. So I will have to chose the followed <Software Design>.

My other choices includes computer forensics, I attended couple of class, but the so many term I can never guess the meaning without google translate. So it left only <Fault Tolerance> and this <Senior Design>. I took software engineer from a small class, and from my intern experience, I realize that as a software engineer, I should at least get some engineering idea common sense before I make any mistake. As I also lack design experience, that forms the reason I want to register this course for the fall semester when I have no any other better choices.

#### 2.2 Expectations

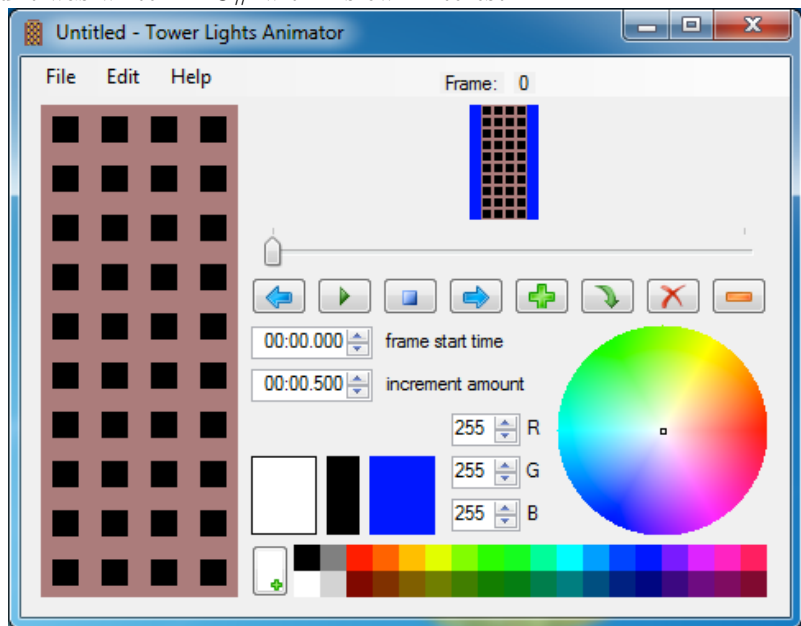
I don't have much team working experience except that I have worked in industry for quite some time. Just that I lack some computer science majored team working experience. And I thought maybe I can benefit a lot from working in a team envoironment together with some talented students.

### 3 Project Introduction

#### 3.1 Project Selection

It was not our choice who works on which project, but rather, assigned by the department course instructor, or by the department. Each of the student can list four choices, and will be assigned one. I have specific students that I want to work with the most, but I was not able to be assigned to his team. And I was left in this team's traditional old project "Tower Lights Animator".

It's a old project that repeats each year maybe just for us students to get practised. Our current version of project was pretty much a fully functioning one, and it was written by one ACM student who graduated already, and it was written in C# with his own interest.



### 3.2 Team Members and Contributions

We have five members, and one of them is going to graduate this semester. Except me, all other students are undergraduates. Since I am the only graduate student here, I know that I am supposed to handle all the difficulties if we could have any.

## 4 The Project Process

I felt I must be in a lazy team or something, our team's performance is always just-so-so. The team manager seems to be assigned randomly within team, and I thought a female manager may just make the other gender happier, and that's all. I understand that all four of them are currently in compiler class, but still it was slowly.

We meet almost twice a week, but doesn't seem to be as efficient as it seems to be. Most of the time, we split into couple of subgroups without even noticing it.

### 4.1 Initial Point

During one meeting, one of our team member has helped us with Qt Creator installation and setup. They all are using Windows right now for the project, but I like Linux too much and I just stuck to Linux and installed Qt Creator there, and with that team member's sample program, it seemed that my linux version of Qt Creator worked just fine.

In the team member's sample program, a button menu bar "File" button was created, but during that meeting, with Qt Creator installed already, I wasn't able to compile and execute the program without the team member's help. At that point, I began to think that I should keep up with the teammates. But still, with the other course's homeworks and exam, I didn't really start to do anything at all.

### 4.2 Snapshot Day

The coming tuesday will be this course's snapshot day, I felt like the whole team should meet together and we do well preparation for the snapshot day. So after Friday's TA meeting, I tried to get an old version of Animator software interface, so that I can spend some hours on the Qt to see how far I can reach from there.

#### 4.2.1 Qt call: "try me~!"

From: me Sent: Friday, October 10, 2014 4:52 PM To: E, B, P, R Subject: RE: Tower Animator \_GUI Interface

I want to get access to the interface the other day Dr. client has showed us when we have our client meeting. I know some of you have that interface, I tried in CSAC to load that .vcproj file, it built but failed to get the GUI interface.

Anybody can help give simple instruction how to access and get the interface, or at least help attach an interface snapshot?

Feels like we still get lots of things to do for the Snapshot day. Let me know if we need to gather together to prepare something materials.

thanks, me

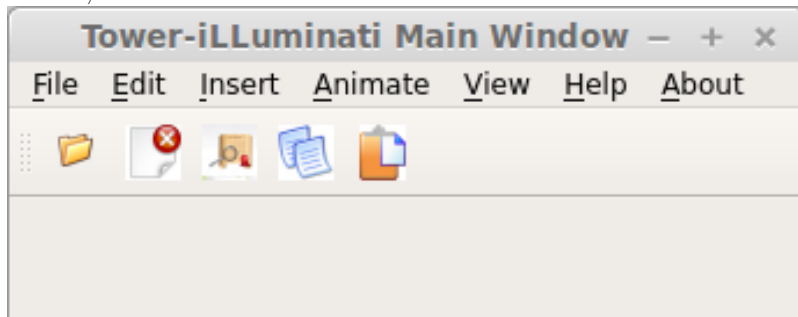
#### 4.2.2 Frustrating

RE: Tower Animator \_ Simple GUI Interface Sent: Friday, October 10, 2014 8:06 PM To: e, b, p, r Attachments: Screenshot from 2014-10-10~1.png (17 KB) hi guys,

now i believe b is correct, Qt thing is really not that hard. I have worked two hours on it today and got a simply menu bar interface. I attached it in case anybody else besides me think maybe we could go ahead and create a simply interface for our Snapshot day.

Let me know any ideas you have about interface, and according to your response, let's see if we need to target to make any progress this weekend.

thanks, me

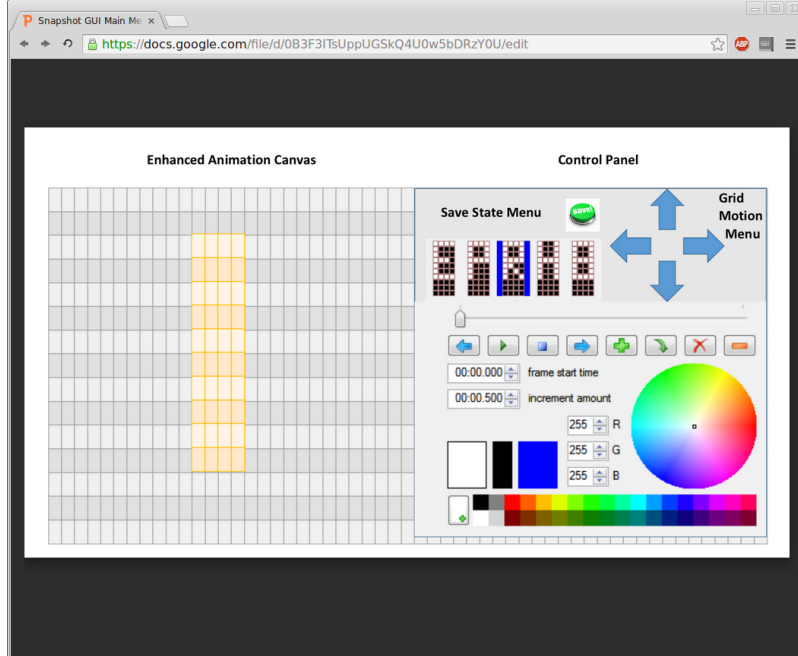


I states I worked two hours on the Qt, but actually I did work from 4:52pm ~ 8:06 pm three hours on the Qt, just that the first two hours are efficient, I used codes to implement the menubar. But the third hour was quite frustrating, because the wired Qt kept telling me layers on layers, blah...blah...blah...

I wrote to teammates call for trial on GUI interface, but actually I was frustrated that evening and gave it up when nobody responded to me at all, and I never touched the "Qt" thing ever since that evening.

#### 4.2.3 Snapshot Day performance

I thought we would meet and prepare for tuesday's meeting, but all other team member's doesn't have any reply to my email at all, and the team mamager was not saying anything. Then I just let it go. And tuesday they said it was p and e prepared several pages of print out, and p used his graphics and vedio skills prepared a graphics interface design.



There were barely any visitors in front of our booth, and really hoped if we had meet before, we should have performed better. But since they took the initiative to work on it, maybe I should just keep quiet.

## 5 New Assignments

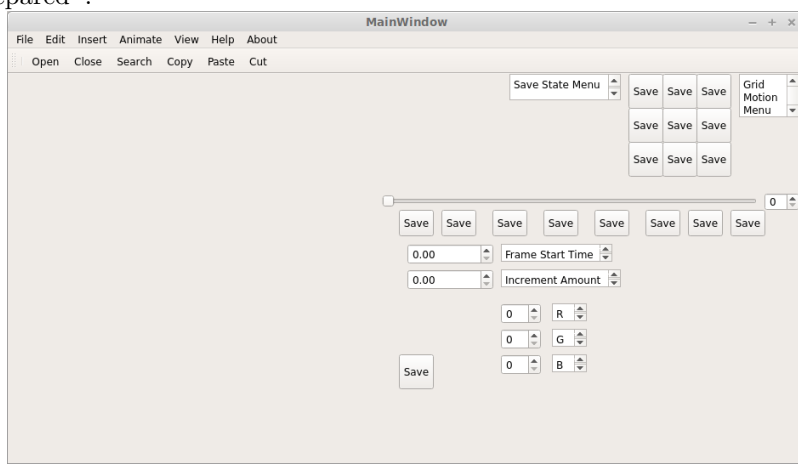
### 5.1 Team meeting

On 10/23/2014, we have a team meet. There are several things that we need to do, and these assignments are assigned to individual students as well. b was working on State diagram, e and r were going to work on class diagram, I chose to work on GUI, and paul chose to join me to work on GUI design and documentation. The reason why I chose gui? I don't really remember, maybe I considered that I am the graduate one, and I should work on the most difficult part, and Qt Creator at that time was a really bad experience for me.

### 5.2 Progress

b's state diagram was finished pretty fast. I felt we didn't really review his diagram, but I knew he finished it already. I must be horrible experience trying to use code to separate frames. I barely made any progress, and meanwhile, my subteammate p taught me how to use qt form to create interface, I tried to add couple of them, and it did work easily! And I have spent about 1-2 hours on 10/31 Friday at noon to have some fun creating the form interface. On that Friday, when it's 1pm, I went home to have rest and didn't continue.

11/11 today will be the design review day. As deadline came closer and closer, my teammates and I got to settle this GUI. On 11/7 afternoon, in the end of the team meeting, some teammate asked if our interface is ready, and I answered my form interface hurts people's eyes. **Warning:** The form interface does hurt people's eyes, so be prepared~!



After team meeting, my subteammate and I went to CSAC, and I asked him some questions about using form how to add imagebutton images, but both of us failed to search any obvious answer. As frustrated as I was, he decided to make a telephone call to our team manager, and team manager told him we could still simply use graphics tools and MS powerpoint to make some fake graphics, as far as it's slightly better than the last version from snapshot day. He used his laptop taught me how to make a upleft arrow, and we agreed that I would work on it, and we would meet on Monday 2:30 to review and clear what's left.

## 6 Software Engineer's Hurt

If you were not a software engineer, you won't be able to understand software engineer's pain when he has to use some graphics tools to get an interface image while he was supposed to use the correct software or codes to implement it, yet even when he was a computer science majored student, and supposed to be passionate on projects as well as supposed to learn any programming language without any difficulty (according to my small scale software engineer course instructor).

Last Thursday midnight 11/7, I was lying on the bed before sleep, but I felt shamed on myself if I were really going to use graphics tool to produce image interface. I have learned this major already, I have even implemented a simply python GUI interface one year ago, why change the library to be Qt, and suddenly, I still can not do it yet? When will be the right time for me to be able to do it?

Even after 10 hour's continuous hard work on Qt, if I still failed, I would still have enough time to finish an image, so I must give it another try, and yet how difficult could this Qt Creator possibly be?

Form will always make interface ugly, I want to code the interface. "Tomorrow morning, I am going to code this gui, junk by junk, piece by piece, I must be able to do it~!" That evening, lying on the bed, I made up my mind that I must do it ~ !!

## 7 I can do it ~ !

Next morning Friday morning at 8:00am, I started from the left hand side grid. It seems like projects hate people to make up their mind, cause once people has a mind, nothing can break it except human being themselves~!

I built left hand side grid in the morning, and I worked on searing directories images and adding buttons for "Grid Motion Menu" before, during and after Friday's TA meeting. I have worked about six hours (8~12~1-1, 1-3pm I went home have rest) on Qt and up to 8:00pm before I went home, I was pretty much sure that I can do it ~ !!

At this point, I was very comfortable with c++ programming with more than 2 years programming experience. Then recall the GUI I designed last summer during the internship, I had barely used Python before yet, it must be my mentor's great guide, team environment, together with my problem-solving skills, and passionate on projects that helped me to survive my very first GUI without understanding interface beforehand. How comfortable I was feeling righth now with c++/Qt Creator programming, to the same extent how uncomfortable I was with Andriod App Programming course ~ I am not able to understand Andriod, still have minor Java programming uncomfortable, which resulted that I always dependes on examples, and have barely any capability to develop my own code and project. How could I know what's the correct/good method to learn it?

I worked most of the time continuous on this project on Saturday, Sunday and Monday, and yet on each of these three days, I spent some time to work on my Andriod app Paint project for some hour so that I could finish my course priority on time. All the rest time, I was on this project. I felt drunk.

## 8 problem-solving skill practise

I have good problem-solving skills, yet on this project, I practised this capability even more.

I built all the easy ones first, and left only color-wheel and grid preview 5 frames undone.

5 frame preview was too many grids and I didn't know how to do it at beginning. The first intuition of getting around was to use separate grid program to generate five letters, took snapshots, and then loaded images as I did on buttons. But unfortunately, the images were just too small.

Then I searched and came QGraphicsScene QGraphicsView method, but still, just like I was not able to include a left hand side grid pointer in my button class, I could make QGraphicsScene QGraphicsView work in my main program, but I couldn't make it work for color-wheel, let alone the 5 grid frames.

Then I knew I could simple implement 5 grids just like left handside one, using same method to print letters. And left Color-wheel eventually came out to be a plugin class searched from online.

All the major modules were built properly, I began to link button functions. I started from "Browse". Once I figured out `QOBJECT` signal and slot, it worked soon; Then next step would be predefined 17 colors. I passed my

button array index to my predefined slot function, but it never worked; Then instead of work on the whole array, I worked on one button first, click it, and tried to pass its background color to color preview button (besides Color wheel, right above predefined color array); I tested it, made it work, realized I have to write 17 slot functions for each button, while 17's labor work was still ok for me for now; Then it came to be 72 grid buttons.

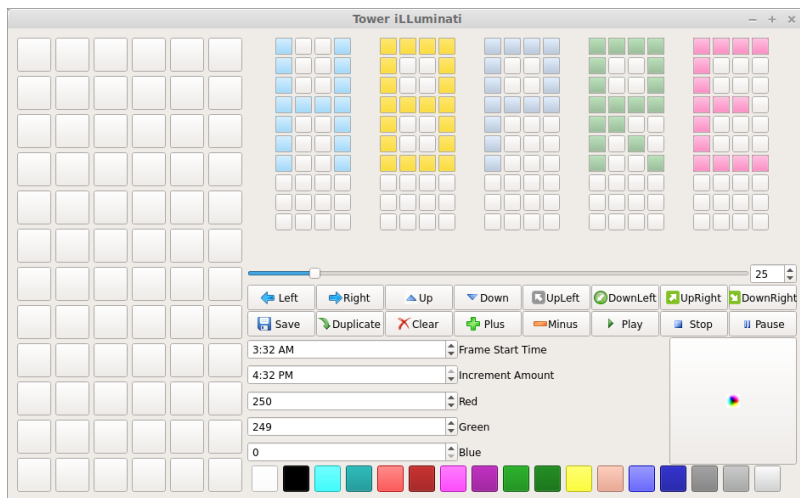
I redid the same thing as in array, I passed in grid pointer, and grid indicis to one slot function, of course still, it wouldn't work; I hard coded and tested on one button again, like want grid[ 0 ][ 0 ] to pick the color I clicked from color array, it just worked with the slot function without parameters.

It was Sunday evening, and I need get this done on time so that my subteammate could continue to label it and make documentations. I had to work like a slave to write 72 slot functions to make the grid be able to pick color. Even with emacs fast keys, it was still too painful. I must be missing some great friend and team who offered help when I did need help, and leave me alone and struggle my way out when he believed that I have the capability to do it. What a pity when I was in difficulties, yet I didn't even have a keyword in mind to search for the answers, yet nobody else could possibly help me in the environment~

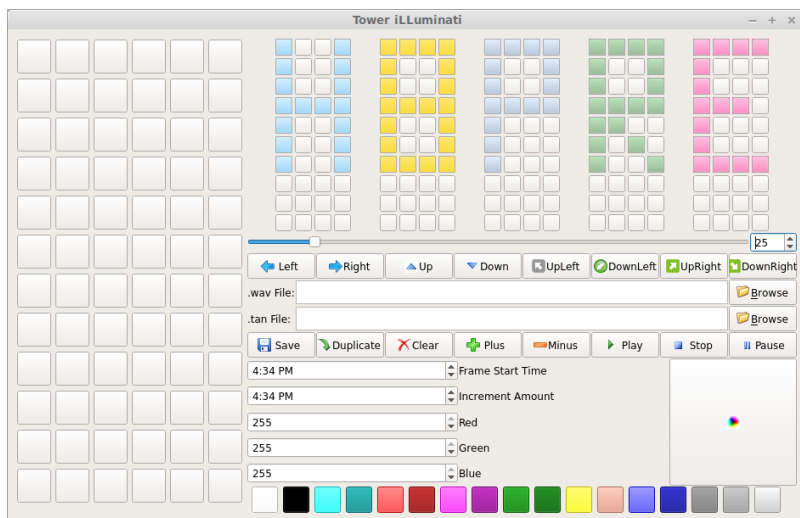
I labored and typed on Saturday until 1am; Sunday midnight, I didn't ride. I walked all the way home, on the way somewhere the old song came into my mind, "who you are, where are you from , what do you do? ~ "

## 9 Review Updates

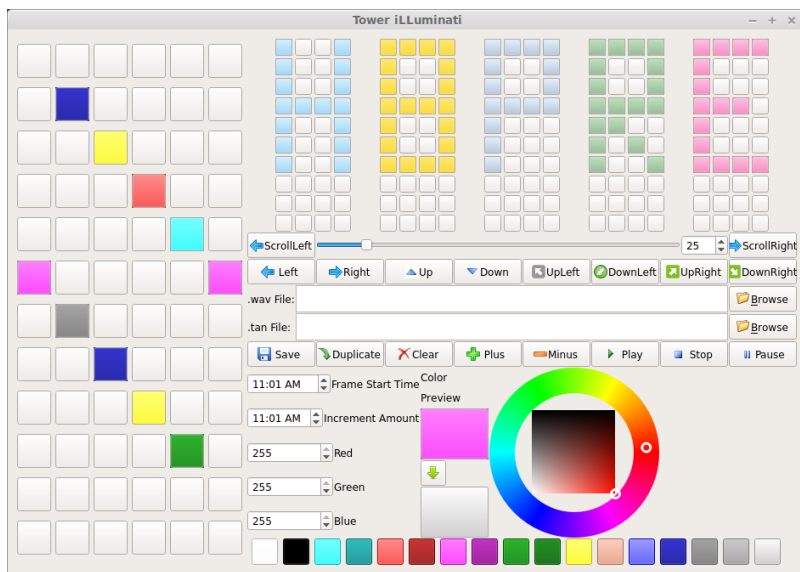
### 9.1 first version



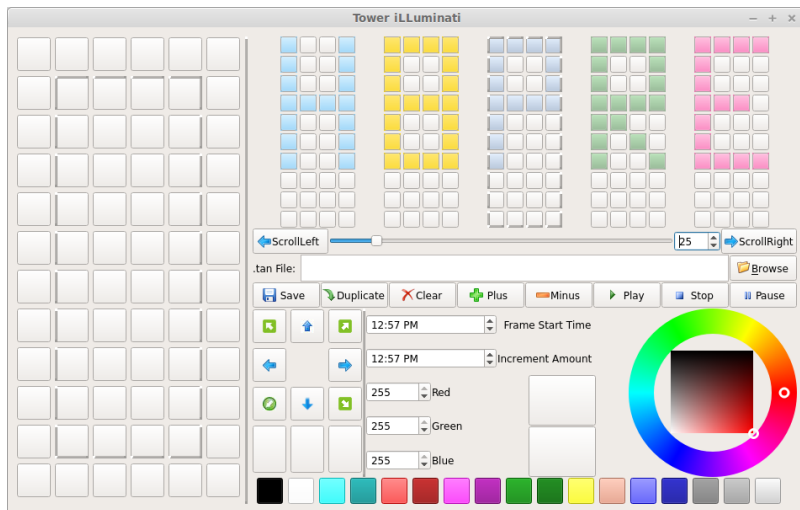
### 9.2 open file



### 9.3 colors



### 9.4 frame label version



### 9.5 Up to Monday evening



## 10 Benefits

### 10.1 Programming skills

a very good practis of new libraries and problem-solving skills

### 10.2 OOD

a good practis of OOD, still needs review with teammates in order to well design and implement review scrolling.

### 10.3 Functions

- Last color used could be preserved;
- New picked color can be previewed;
- Predefined 17 colors are clickable;
- Design grid 72 buttons are clickable to get background color set;

## 11 Easy Undone Parts for Fall semester

- Color Wheel was a plugin, and haven't link/activate color-picking yet;
- "Frame Start Time" & "Increment Amout" needs to be in format of "00:00.000";
- Latest color used is preserved, yet 2nd, 3rd, 4th Latest ones are not able to be remembered yet; Color queue 3 buttons behind direction square are not implemented (which is very easy).
- RGB values are supposed to get value set from predefined color, color wheel, or latest 2-4 color queue, undone yet.
- "Clear" & 8 directions are easy to implement and will be done by end of this semester;
- Yet I will take my time to finish all the color/time/direction related button slot functions by the end of this semester;

## 12 Reference

### 12.1 Basic layouts

- <http://qt-project.org/doc/qt-4.8/layouts-basiclayouts.html>

### 12.2 layout example

- <http://zetcode.com/gui/qt4/layoutmanagement/>

### 12.3 *my\_gridlayout*

- <http://stackoverflow.com/questions/9660080/how-does-one-fill-a-qgridlayout-from-top-left-to-bottom-right>
- <http://stackoverflow.com/questions/8685005/qt-making-a-splitter-horizontal-and-vertical-at-the-same-time>

### 12.4 Layout management: find file, directories and subdirectories

- <http://www.informit.com/articles/article.aspx?p=1405543>

### 12.5 subclass for buttons

- <http://qt-articles.blogspot.com/2010/06/how-to-customize-button-in-qt.html>
- <http://stackoverflow.com/questions/3137805/how-to-set-image-on-qpushbutton>



## 12.6 float spin box

- <http://www.qtforum.org/article/12505/qspinbox-with-float-values.html?s=b97a1086f89c740edca2>

## 12.7 QGraphicsView

- <http://stackoverflow.com/questions/1357960/qt-jpg-image-display>

## 12.8 RGB Color

- <http://help.dottoro.com/labpxqqe.php>