

# Team 2 Goofy Lights Editor

Csm383

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## 1 About this Project

What does this thingy do?

## 2 Design process

stuff

### 2.1 Problems encountered

stuff

### 3 Figures

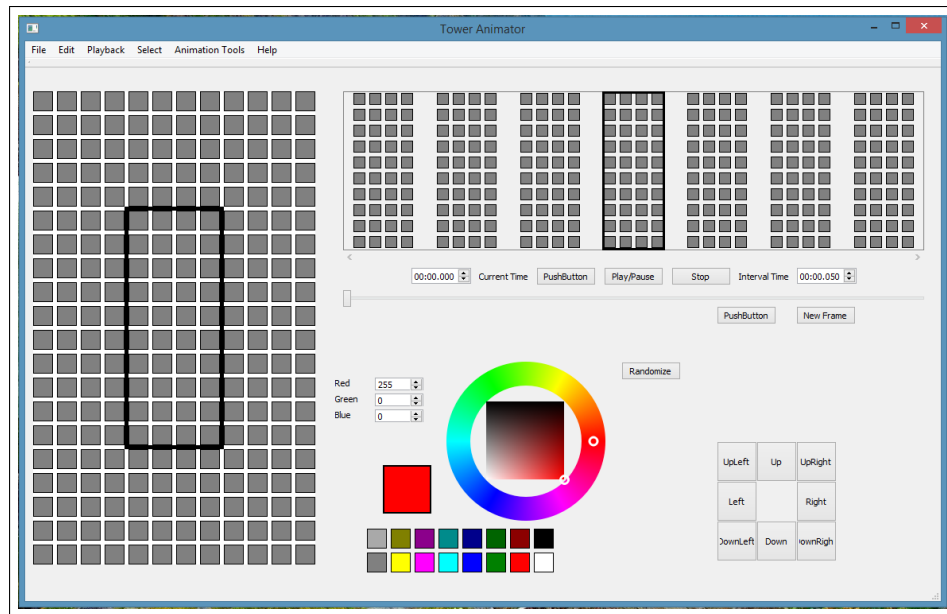


Figure 1: Original GUI design from previous tower lights project

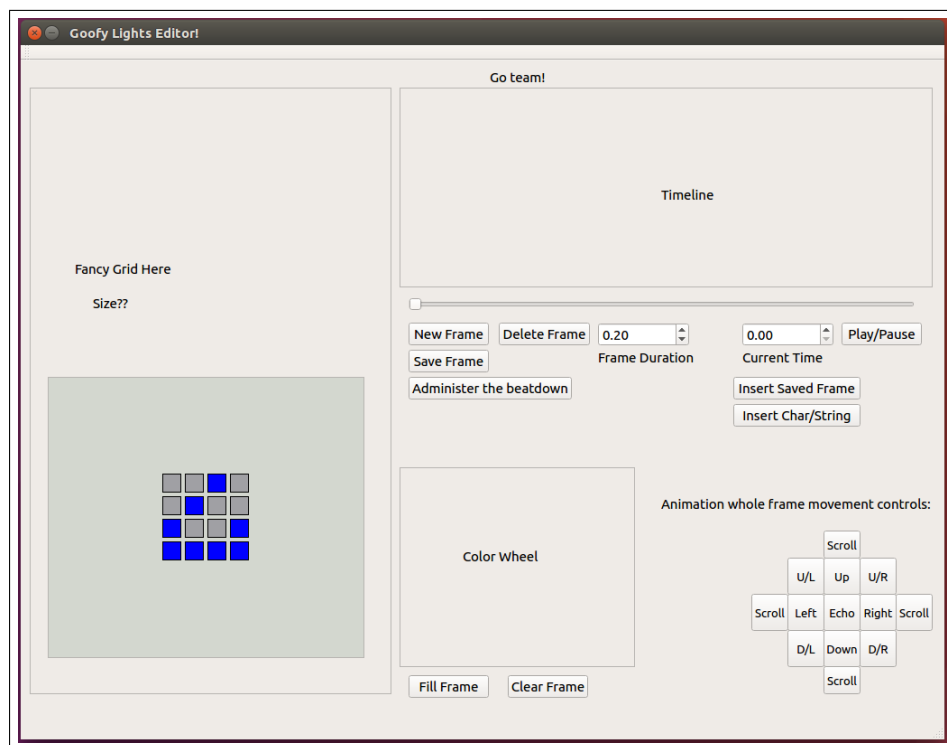


Figure 2: Our initial GUI after first sprint

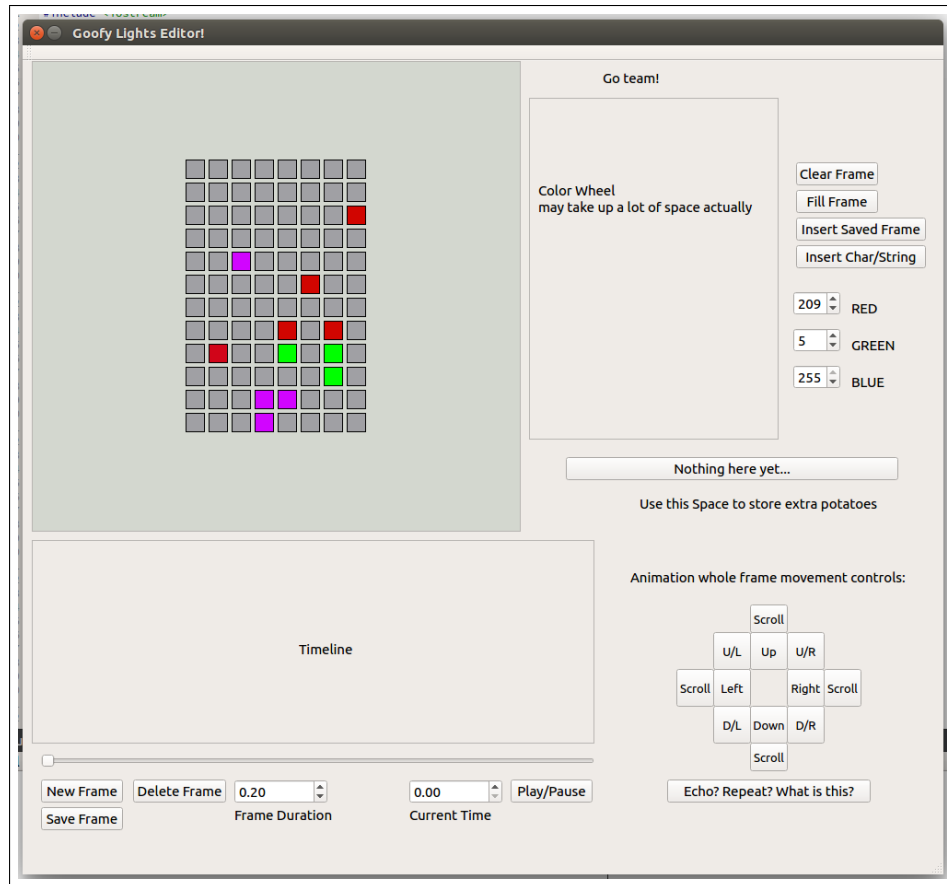


Figure 3: GUI after second sprint, RGB functionality added

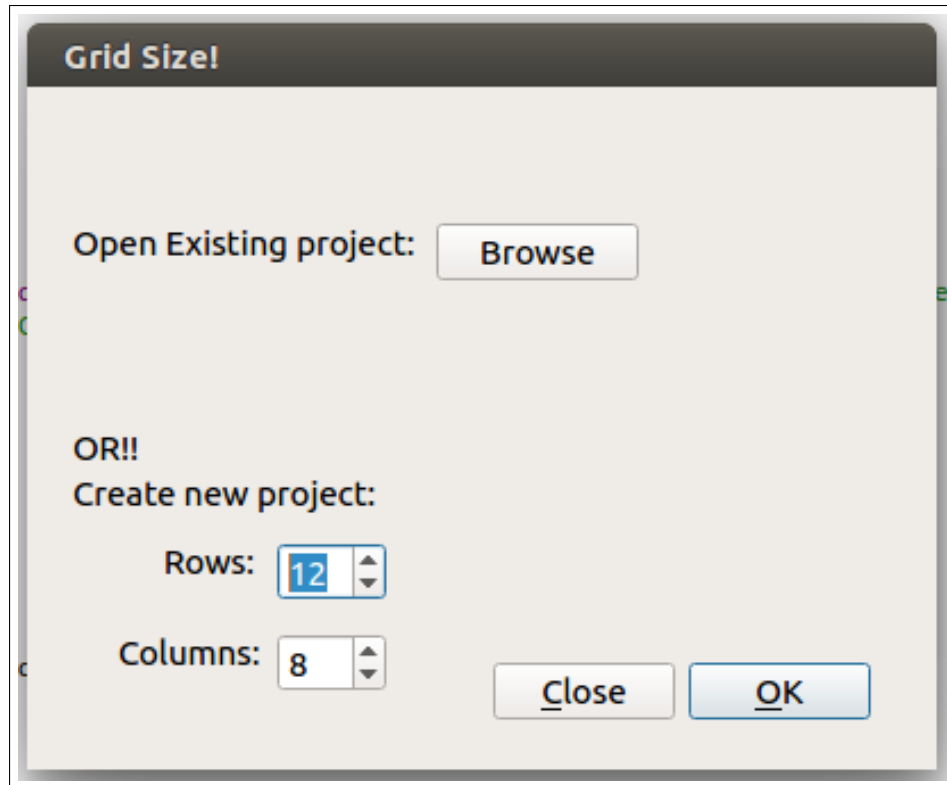


Figure 4: Grid size selection dialog added

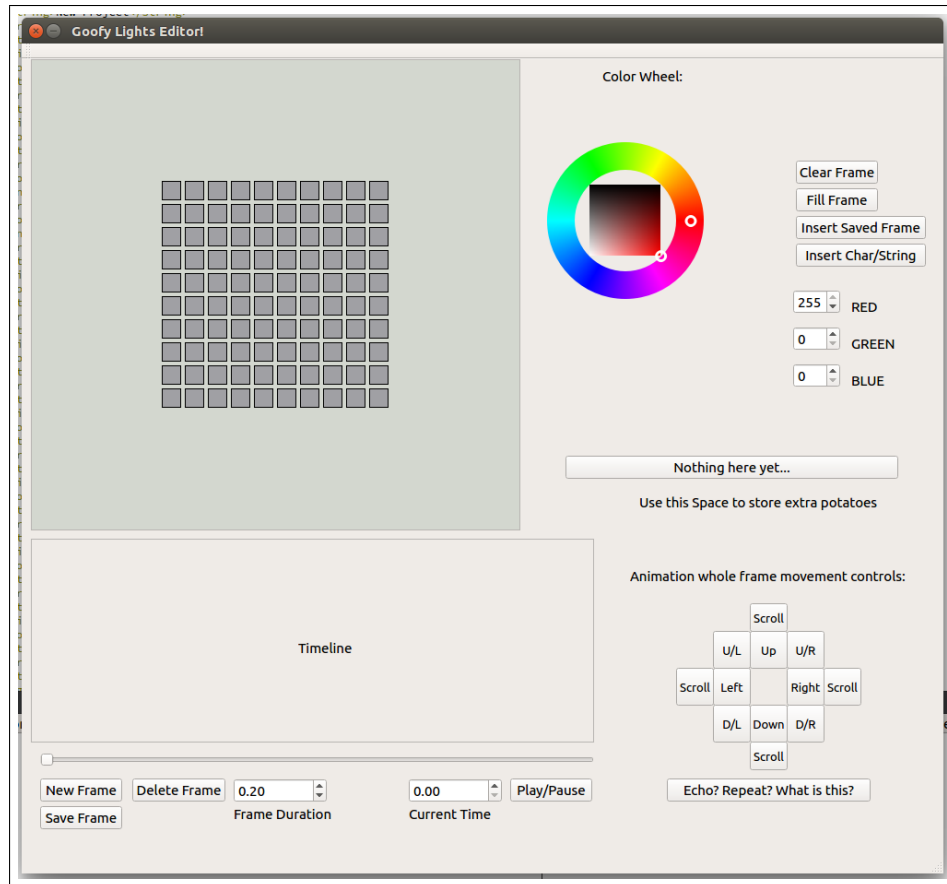


Figure 5: Color wheel added in sprint 3

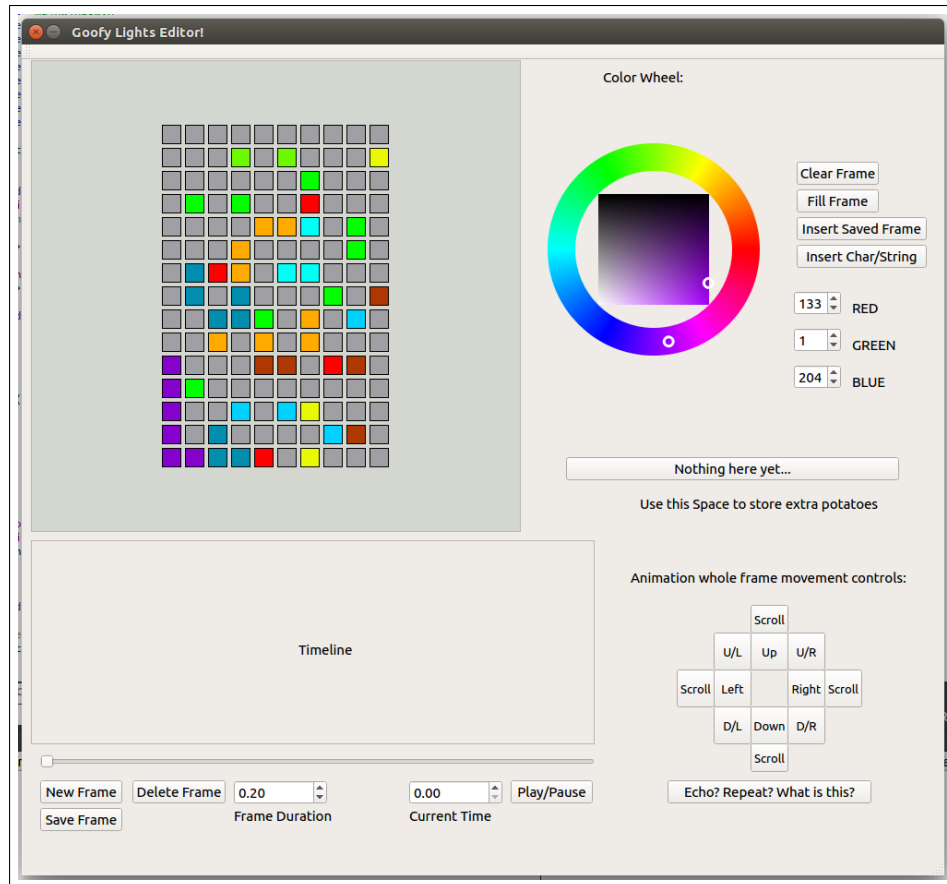


Figure 6: Color wheel demo

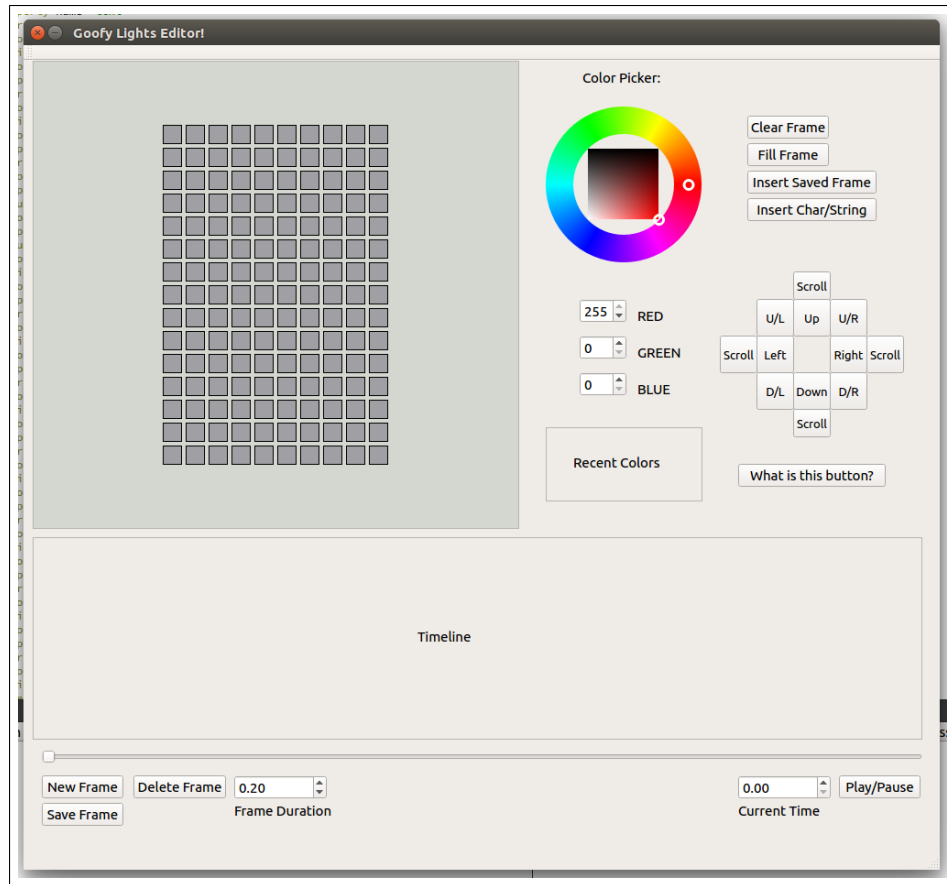


Figure 7: Control buttons moved in sprint 3



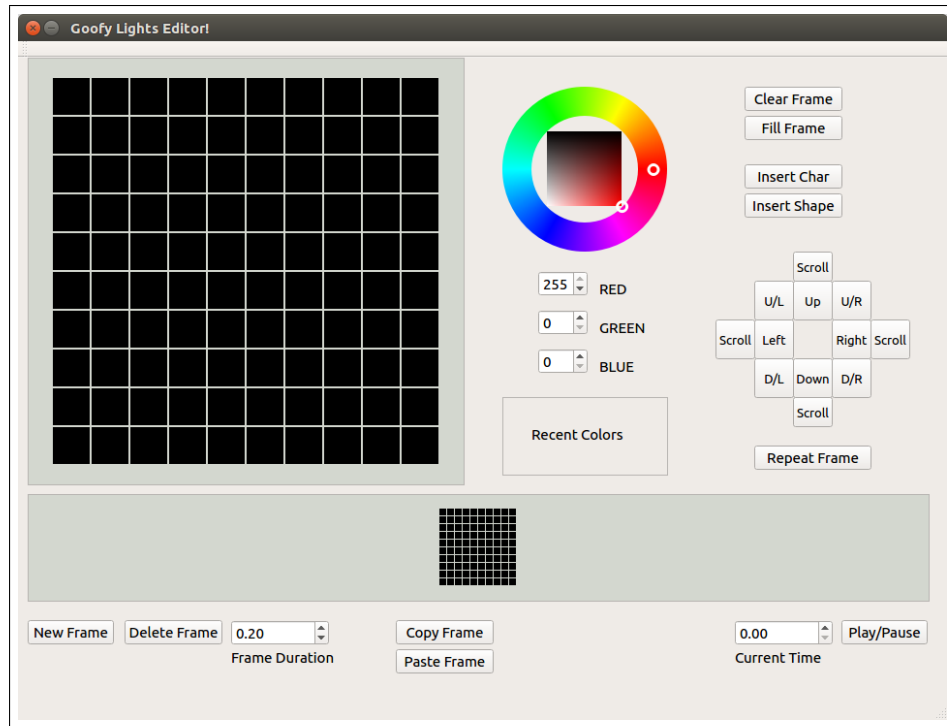


Figure 8: Timeline implemented. Default squares now black

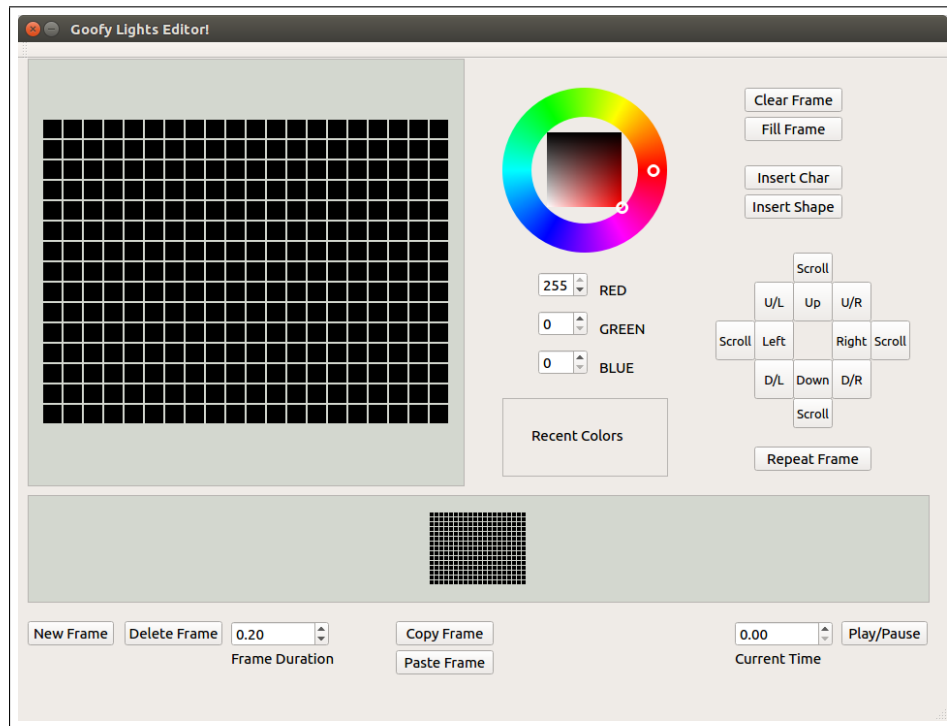


Figure 9: Grid size demo 15x20

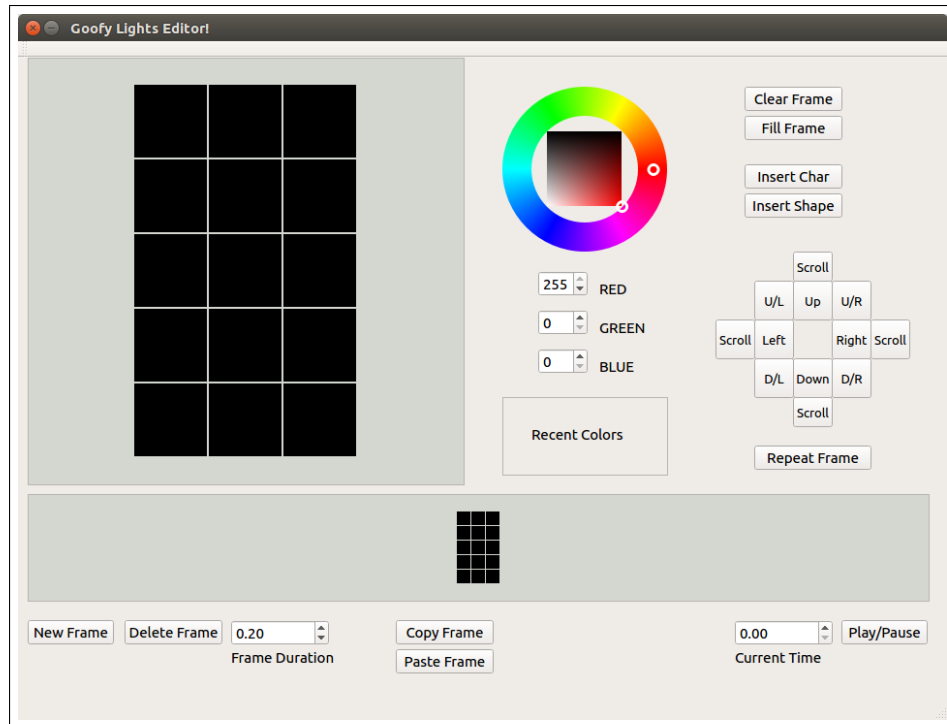


Figure 10: Grid size demo 5x3

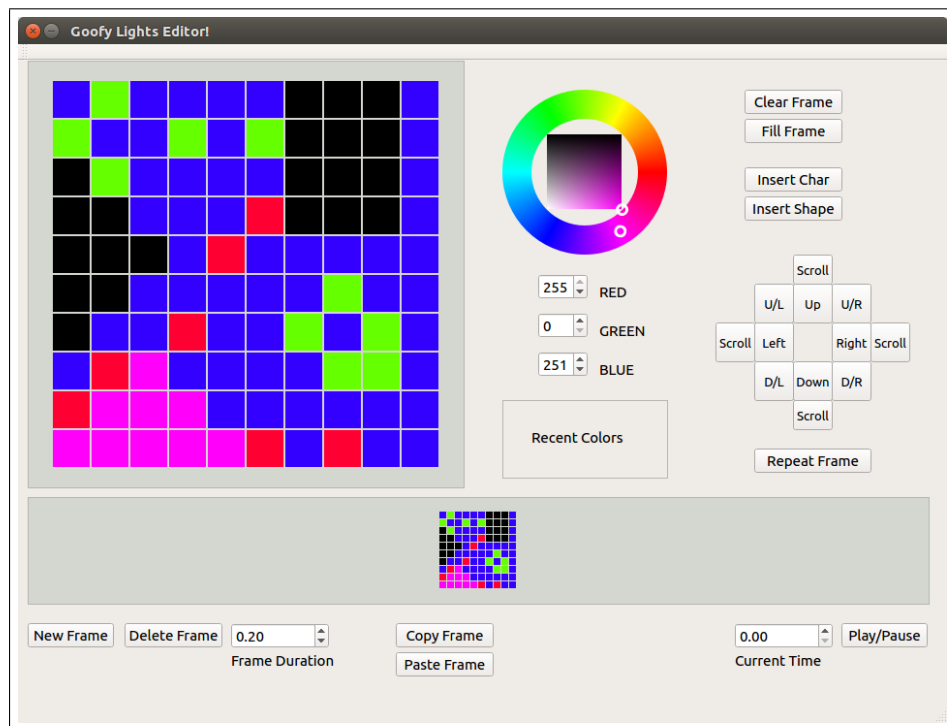


Figure 11: GUI usage demo at the end of sprint 3

### 3.1 Timeline

---

Rough timeline, revision #2  
Starting March 30th (Thursday)

Week 1: (completed)

- 1) Rough out GUI
- 2) Create data structure
- 3) Start file manipulation functions
- 4) Make something to look at (pretty colors)

Week 2:

Sprint 2:

- 1) Add Row/Column data to Framedata
  - 2) Delete attached RGB structures
  - 3) Copy Framedata
  - 4) Retrieve frame x
  - 5) Fix RGB bug
  - 6) Update frame x
- //finish by TUESDAY???

Week 3:

Sprint 3:

SOLIDIFY GUI LAYOUT (buttons, sliders, sizes)  
Start filling out the functionality of buttons

Week 4:

Sprint 4:

Finish all functionality  
Add extra features  
Start final documentation

Week 5:

Final sprint??

System testing, find bugs, hopefully something works mostly  
Update UML diagrams  
Polish final documentation

---

## 4 UML Diagrams

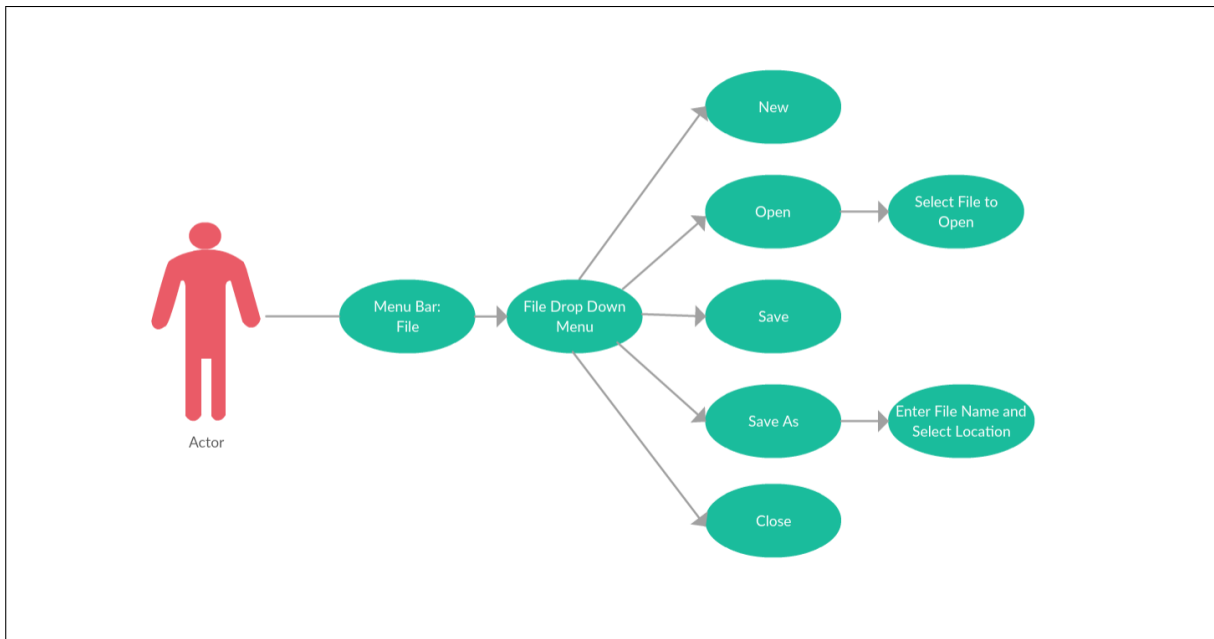


Figure 12: File manipulation

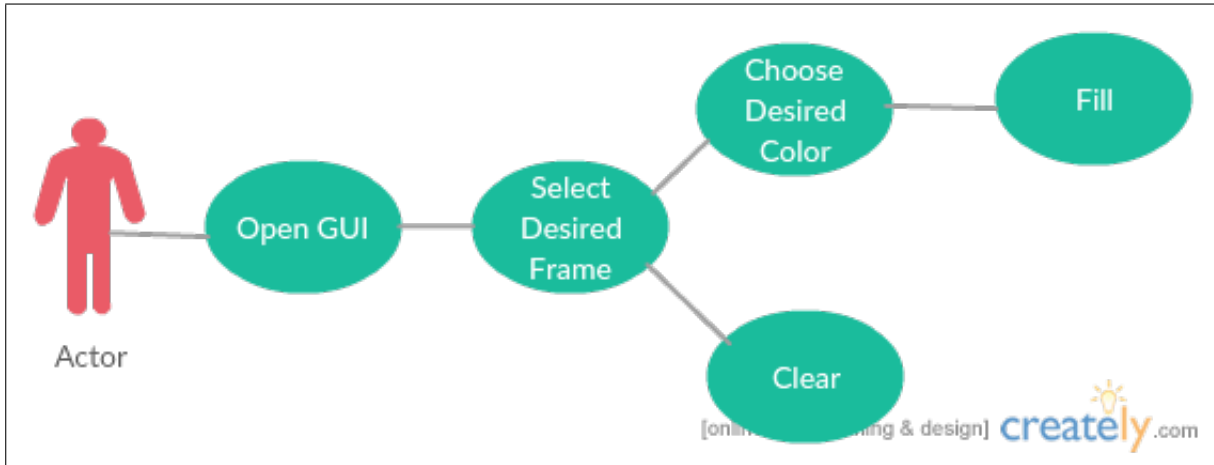


Figure 13: Fill or clear frame with current color

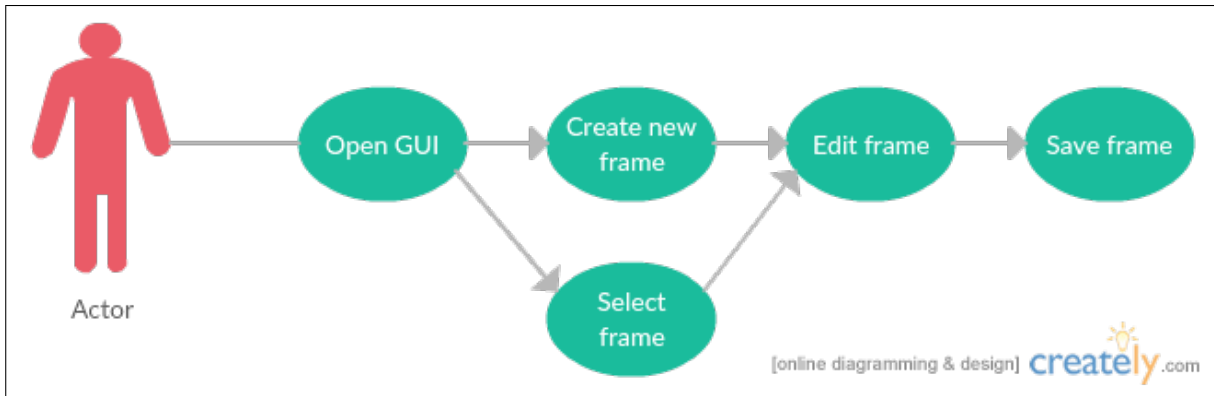


Figure 14: Save/copy current frame for re-use in animation

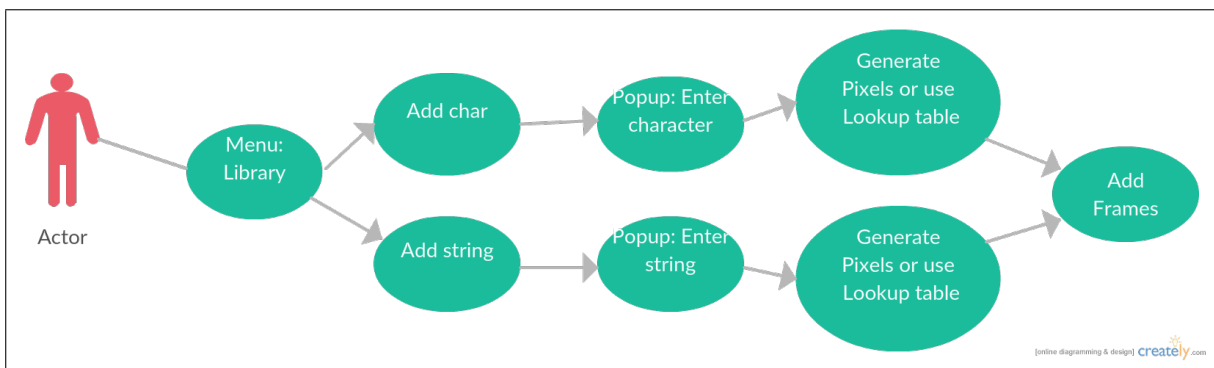


Figure 15: Add char/string from predefined set

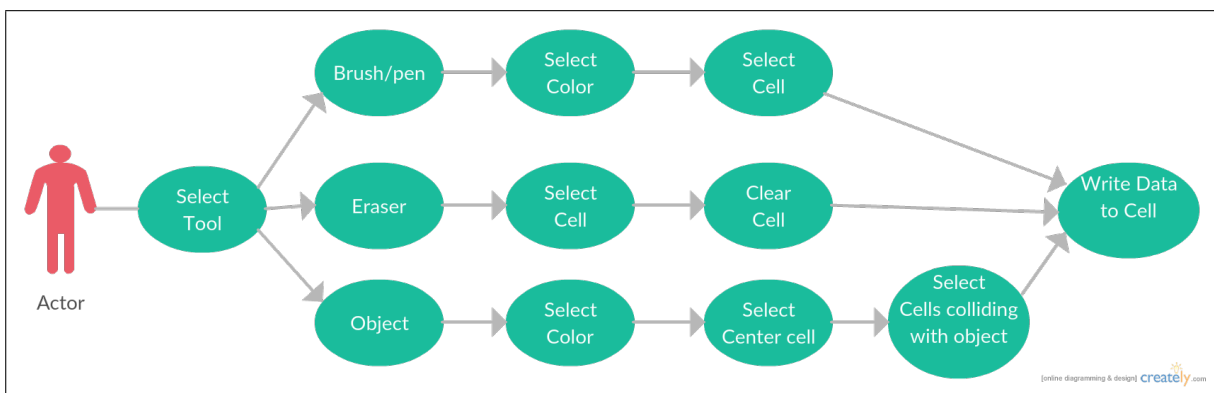


Figure 16: Add a pixel in any position in any color

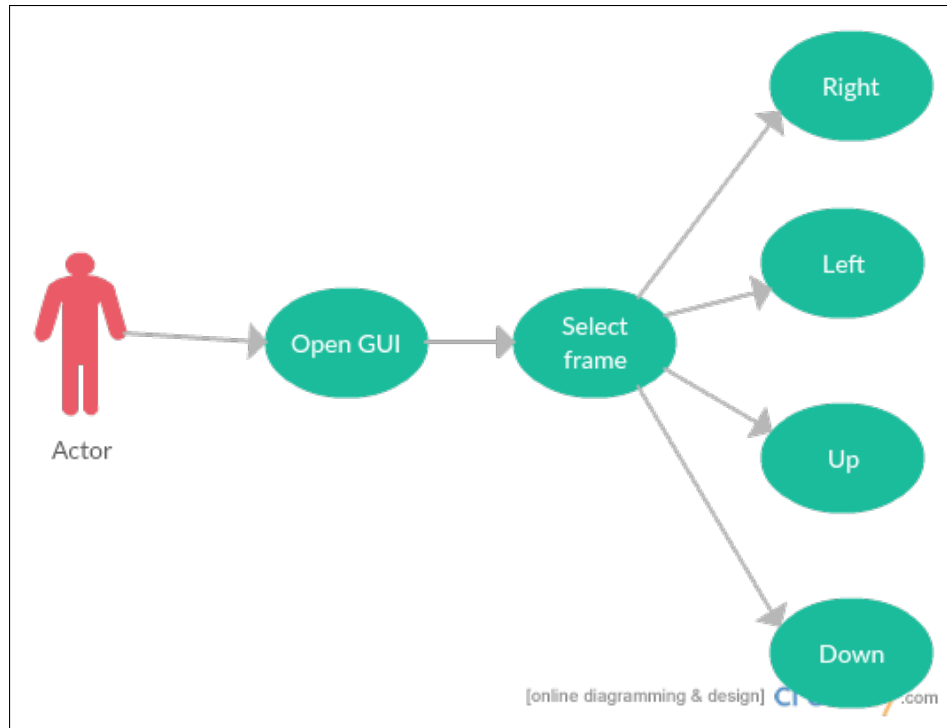


Figure 17: Move everything in frame 1 pixel in a direction

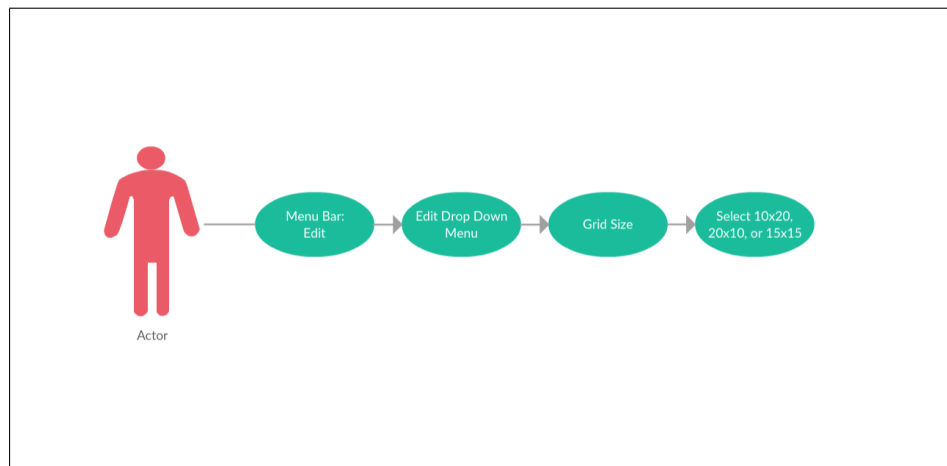


Figure 18: Choose grid size for the file

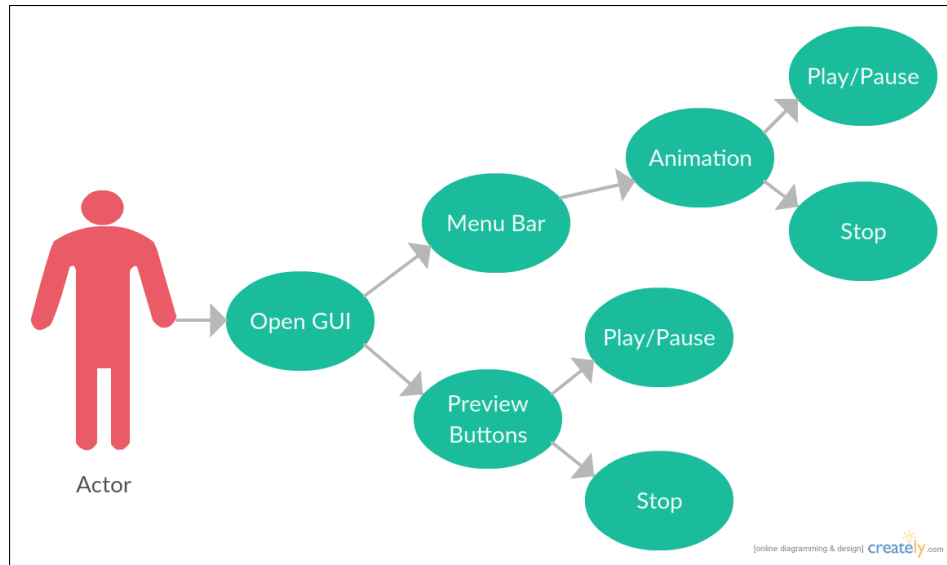


Figure 19: Preview play/pause/stop animation

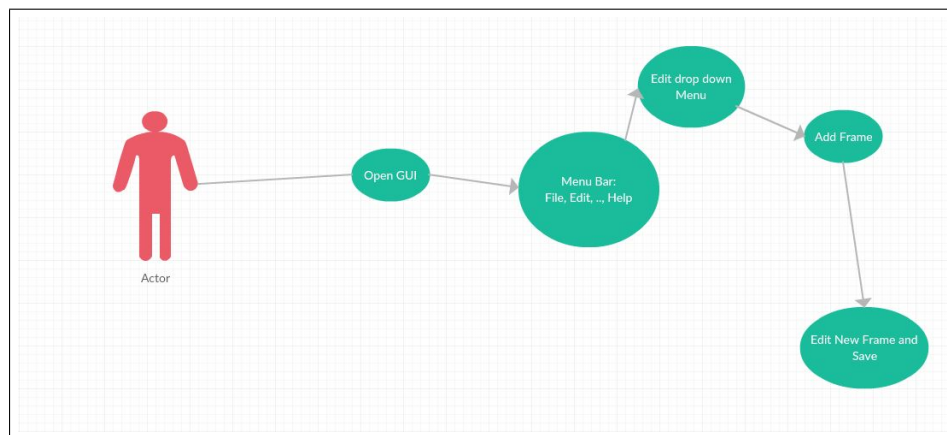


Figure 20: Create new frame

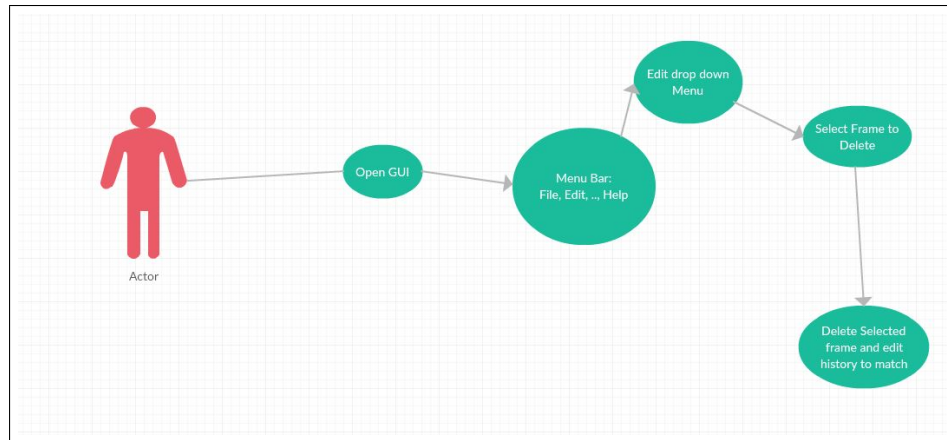


Figure 21: Delete a frame

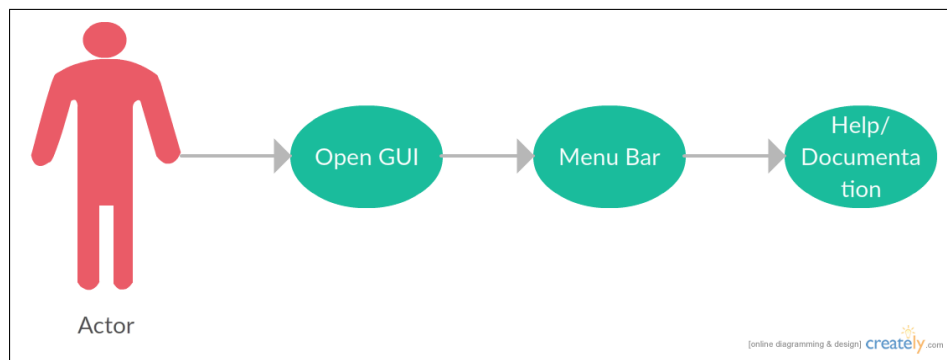


Figure 22: Open help/documentation text



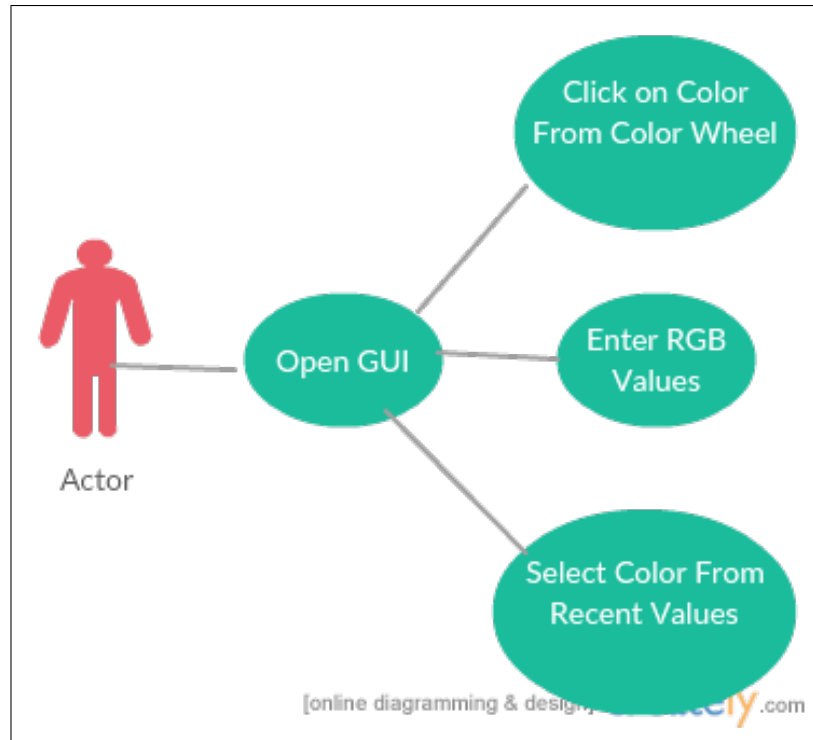


Figure 23: Chose a color on the colorwheel

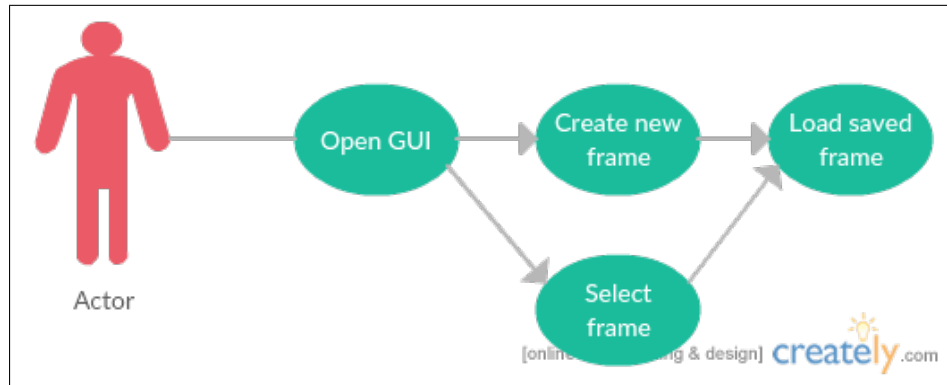


Figure 24: Insert a saved frame

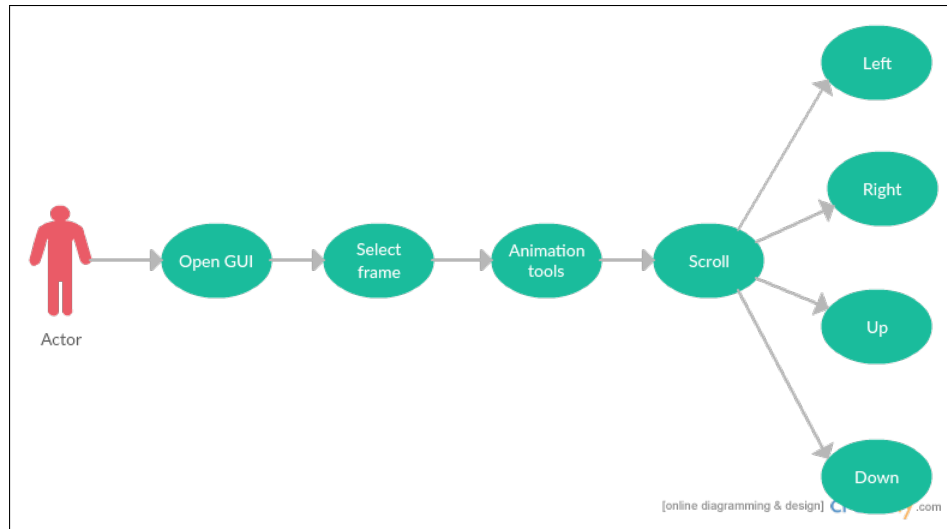


Figure 25: Scroll everything across entire frame

## 5 Files

### 5.1 main.cpp file

---

```
#include <iostream>
#include "mainwindow.h"
#include <QApplication>

#include "framestructure.h"
#include "FrameList.h"
#include "FrameManipulation.h"
#include "FileOperations.h"
#include <globals.h>
#include <sizedialog.h>

int G_COL = 0; //initialize globals -P
int G_ROW = 0;
double G_SCALE = 0;

int G_RED = 255;
int G_GREEN = 0; //fixed -P
int G_BLUE = 0;
int G_RED_RIGHT = 0;
int G_GREEN_RIGHT = 0;
int G_BLUE_RIGHT = 0;

int G_FRAMECOUNT = 0; //hah -P

long FrameIDCount = 0;

// creates the dynamic RGB array
t_RGB** create_RGB(int r, int c);

int main(int argc, char *argv[])
{
    QApplication a(argc, argv);
    //LET'S GET IT STARTED -P
    SizeDialog dialog1;
    dialog1.setWindowFlags(Qt::Window | Qt::WindowTitleHint | Qt::CustomizeWindowHint);
    //You will NOT exit this window your way -P
    dialog1.setModal(true); //YOU SHALL NOT CLICK OUTSIDE OF THIS WINDOW -P
    dialog1.exec(); //execute pls -P

    //read in a file here probably -P

    MainWindow w;
    w.show();

    // linked list test
    std::cout << "FrameList testing" << std::endl;
```

```

t_RGB ** rgb_data;

t_FrameData FrameData; // Local frame data
FrameList frames(G_ROW, G_COL); // linked list for frame data. r c for print function

//Frame 0
// Generate new rgb_data array
rgb_data = create_RGB(G_ROW, G_COL);

// fill rgb_data for Frame 0
unsigned short color = 0; // arbitrary data
for (int i = 0; i < G_ROW; i++){
    for (int j = 0; j < G_COL; j++){
        rgb_data[i][j].R = color++;
        rgb_data[i][j].G = color++;
        rgb_data[i][j].B = color++;
    }
}
FrameData.ID = FrameIDCount++;
FrameData.durruration = 123;
FrameData.data = rgb_data;
frames.AddTail(FrameData); // add this frameData to linked list
rgb_data = NULL; // disconnect this pointer from rgb_data

// next frame Frame 1
// Generate new rgb_data array
rgb_data = create_RGB(G_ROW, G_COL);

// fill rgb for Frame 1
color = 100; // arbitrary increment to make data different
for (int i = 0; i < G_ROW; i++){
    for (int j = 0; j < G_COL; j++){
        rgb_data[i][j].R = color++;
        rgb_data[i][j].G = color++;
        rgb_data[i][j].B = color++;
    }
}
FrameData.ID = FrameIDCount++;
FrameData.durruration = 212;
FrameData.data = rgb_data;
frames.AddTail(FrameData);
rgb_data = NULL; // disconnect this pointer from rgb_data

// next frame Frame 2
rgb_data = create_RGB(G_ROW, G_COL);
FrameData.ID = FrameIDCount++;
FrameData.durruration = 214;
FrameData.data = rgb_data;
fillFrame2(FrameData, 21, 32, 45);
frames.AddTail(FrameData);

// copyFrame Test

```

```

t_FrameData newFrame;
rgb_data = create_RGB(G_ROW, G_COL);
newFrame.ID = FrameIDCount++;
newFrame.durration = 217;
newFrame.data = rgb_data;
copyFrame(newFrame, FrameData);
frames.AddTail(newFrame);

frames.PrintNode();

// std::cout << "Now printing frames" << std::endl;
// note: frames are in reverse order when added to head
// print frames
// frames.PrintNode();
// FrameList frameList = FileOperations::LoadFromFile("autofill.proj");
// frameList.PrintNode();
FileOperations::SaveToFile(frames, "autofill.proj");

frames.DeleteList();
std::cout << "Program end" << std::endl;
return a.exec();
}

```

---

## 5.2 FrameList.h file

---

```
/* Tim Sonnen      Lab #5
 * 9/24/2015
 *
 * FrameList.h
 * Class that holds a linked list
 */

#ifndef LINK_H
#define LINK_H

#include <iostream>
#include "framestructure.h"
class FrameList{
private:
    struct Node{
        t_FrameData FrameData;
        struct Node *next;
        struct Node *prev;
    };
    typedef struct Node* NodePtr;

    NodePtr head;
    NodePtr tail;
    int row, col;
    int count;

public:
    // Constructor
    FrameList(int r, int c){
        head = NULL;
        row = r;
        col = c;
        count = 0;
    }

    // Constructor for empty FrameList
    FrameList(){
        head = NULL;
        row = 0;
        col = 0;
        count = 0;
    }

    // Destructor
    ~FrameList(){
        FrameList::DeleteList();
    }
    // Add a node onto the end of the linked list.
    void AddTail(t_FrameData x);

    // Function will call DeleteNode for every item in the Linked List, and delete
```

```

// the head node until all items in the linked list have been deleted.
void DeleteList();

// Delete the first node in the list.
void DeleteNode();

// Add node at position x
// 0 will be the first node. 1 would be the 2nd node in the list.
void AddNode_Middle(t_FrameData x, int pos);

// Delete node at position x in the list
// If pos == 0 this refers to the head node, and
// If pos == count - 1 this refers to the tail node.
void DeleteNode_Middle(int pos);

// retrieve node at given position x.
// If pos == 0 this refers to the head node and,
// If pos == count - 1 this refers to the tail node.
t_FrameData * RetrieveNode_Middle(int pos);

// Return the first node found in the list
t_FrameData FirstNode();

// Advance one node in the list
int AdvanceList();

// Get the row count
int GetRowCount();

// Get the column count
int GetColCount();

// Output the values in the nodes, one integer per line.
void PrintNode();

//Returns a value if the list is empty
int IsEmpty();

// Return a count of the number of nodes in the list.
int Size();

// Updates frame data
void UpdateNode(t_FrameData d, int position);
};
#endif

```

---

### 5.3 FrameList.cpp file

---

```
/* Tim Sonnen      Lab #4
 * 9/25/2015
 *
 * FrameList.cpp
 *
 */

#include <iostream>

#include "FrameList.h"
#include "framestructure.h"

using namespace std;

/* Add an item to the end of the list*/
void FrameList::AddTail( t_FrameData n ){
    NodePtr p;

    //Allocate the node
    p = new Node;
    p->FrameData = n;
    p->next = NULL;

    //Check if the list is empty
    if(head == NULL ){
        head = p;
        tail = p;
        p->prev = NULL;
    }
    else{
        // next/prev pointers
        tail -> next = p;
        p -> prev = tail;

        // update tail pointer
        tail = p;
    }
    this->count++;
}

/*Function to delete all the entries in the Linked List upon program termination */
void FrameList::DeleteList(){
    while (head != NULL)
    {
        DeleteNode();
    }
}

/*Deletes the first node in the list*/
void FrameList::DeleteNode(){
    NodePtr p = head;
```



```

    if( p == NULL){
        /*Nothing. Error case.*/
        return;
    }
    else{
        head = p->next;
        p->next = NULL;
        if (head != NULL)
            head->prev = NULL;
        // Delete Attached RGB structure here
        delete p;
    }
    this->count--;
}

void FrameList::AddNode_Middle(t_FrameData x, int pos){
    // indexing scheme to start at 0 to n where n == items in linked list
    // Node 0 is the head of the list while node (count - 1) is the tail
    int tempCount = 0;

    NodePtr current = head;
    NodePtr insert = new Node;
    insert -> FrameData = x;
    insert -> next = NULL;
    insert -> prev = NULL;

    if (head == NULL)
    {
        head = insert;
    }

    else if (pos == 0)
    {
        insert -> next = head;
        insert -> prev = NULL;
        head -> prev = insert;
        head = insert;
        this->count++;
        return;
    }
    else
    {
        while (tempCount != pos-1 && current != NULL)
        {
            current = current -> next;
            tempCount++;
        }
        insert -> next = current -> next;
        // Adjustment of previous pointer for addition of node x
        if (current -> next != NULL)
        {
            NodePtr p = current -> next;
            p -> prev = insert;
        }
    }
}

```

```

    }
    // else if current -> next == null then insert == null above

    // Adjustment of prev pointer for node added at position x
    current -> next = insert;
    insert -> prev = current;

    this->count++;
    return;
}
}

void FrameList::DeleteNode_Middle(int pos){

    if (head == NULL){
        // Error list is empty, do nothing and return.
        return;
    }

    NodePtr current = head;

    if (pos == 0){
        // Delete the head node.
        head = current -> next;
        head -> prev = NULL;
        // Delete Attached RGB structure here
        delete(current);
        this->count--;
        return;
    }

    for (int i = 0; current != NULL && i < pos - 1; i++){
        current = current -> next;
    }

    if (current == NULL || current -> next == NULL){
        // the position given is greater than total number of nodes in the list.
        return;
    }

    // if this point has been reached and the function has not returned, current -> next
    // holds
    // the node to be deleted from the list.
    NodePtr p = current -> next -> next;
    // Adjustment of previous pointers.
    p -> prev = current;
    // Delete Attached RGB Structure here
    delete (current -> next);
    current -> next = p;
    this->count--;
    return;
}

// Added function to search the lined list for node at position x

```

```

// same indexing scheme as before, passing 0 to this function refers to the head
// passing count - 1 to this function refers to the tail.
t_FrameData * FrameList::RetrieveNode_Middle(int pos){
    int tempCount = 0;
    t_FrameData *rtnVal = NULL;
    NodePtr temp = head;

    if (pos == 0)
    {
        // return pointer to the head node's FrameData.
        if (head == NULL)
        {
            // no pointer to return Error.
            return NULL;
        }
        else
        {
            *rtnVal = head -> FrameData;
            return rtnVal;
        }
    }
    else
    {
        while (tempCount != pos && temp != NULL)
        {
            tempCount++;
            temp = temp -> next;
        }

        if (temp != NULL)
        {
            // Just checking to make sure no bounds have been crossed.
            *rtnVal = temp -> FrameData;
            return rtnVal;
        }
        else
        {
            return NULL;
        }
    }
}

/*Returns the first node in the list */
t_FrameData FrameList::FirstNode(){
    return head->FrameData;
}

/* Advance one node through the list */
int FrameList::AdvanceList(){
    this->head = this->head->next;

    /* If we are out of the list return 0, else return 1 */
    if (this->head == NULL)
        return 0;
}

```

```

        else
            return 1;
    }

    /* Get the row count */
    int FrameList::GetRowCount(){
        return this->row;
    }

    /* Get the column count */
    int FrameList::GetColCount(){
        return this->col;
    }

    /*Returns if the list is empty or not*/
    int FrameList::IsEmpty(){
        if(head == NULL){
            return 1;
        }
        else{
            return 0;
        }
    }

    void FrameList::PrintNode(){
        NodePtr p = head;
        /* sample output
           ID: 0 Dur: 123
           0,1,2 : 3,4,5 : 6,7,8 :
           9,10,11 : 12,13,14 : 15,16,17 :
           18,19,20 : 21,22,23 : 24,25,26 :
           27,28,29 : 30,31,32 : 33,34,35 :
           36,37,38 : 39,40,41 : 42,43,44 :
        */

        while(p != NULL){
            cout << "ID: " << p->FrameData.ID << "\tDur: " << p->FrameData.duration << endl;
            for (int i = 0; i < row; i++) {
                for (int j = 0; j < col; j++) {
                    cout << p->FrameData.data[i][j].R << "," << p->FrameData.data[i][j].G
                        << "," << p->FrameData.data[i][j].B << " : ";
                }
                cout << endl;
            }
            cout << endl;
            p = p->next;
        }
    }

    int FrameList::Size(){
        return this->count;
    }

    void FrameList::UpdateNode(t_FrameData d, int position)

```

```

{
    int pcount = 0;
    NodePtr current = head;
    NodePtr temp = new Node;
    NodePtr old;
    temp -> FrameData = d;
    temp -> next = NULL;
    if (position == 0)
    {
        if (head == NULL)
            head = temp;
        else if (head -> next == NULL)
        {
            head = temp;
            delete current;
        }
        else
        {
            old = current;
            current = current -> next;
            temp -> next = current;
            delete old;
        }
    }
    else
    {
        current = current -> next;
        pcount++;
        while (pcount != position-1)
        {
            current = current -> next;
            pcount++;
        }
        temp -> next = current -> next -> next;
        old = current -> next;
        current -> next = temp;
        delete old;
    }
    return;
}

```

---

## 5.4 FrameManipulation.h file

---

```
#ifndef FRAMEMANIPULATION_H
#define FRAMEMANIPULATION_H

#include "framestructure.h"

// Directions
#define D_UP      1
#define D_DWN    2
#define D_LEFT   3
#define D_RIGHT  4
#define D_UP_L   5
#define D_UP_R   6
#define D_DWN_L  7
#define D_DWN_R  8

// Return codes
#define SUCCESSFUL 0
#define ERROR      1

// Prototypes

// creates a RGB Array and returns a pointer to it.
t_RGB** create_RGB(int r, int c);

// Takes original frame and returns a new copy of it
int copyFrame(t_FrameData &copyFrame, t_FrameData origFrame);

// translates from by a given direction
int translateFrame(t_FrameData d, int direction);

// Fills given frame with color
int fillFrame(t_FrameData &d, t_RGB rgb_fill);
int fillFrame2(t_FrameData &d, unsigned short r, unsigned short g, unsigned short b);

#endif // FRAMEMANIPULATION_H
```

---

## 5.5 FrameManipulation.cpp file

---

```
#include "FrameManipulation.h"
#include <iostream>
#include "globals.h"

// Function creates a 2d memory element of the RGB struct then passes back the pointer
// to it.
t_RGB** create_RGB(int r, int c)
{
    t_RGB** arr = new t_RGB*[r];
    for(int i = 0; i < r; ++i)
        arr[i] = new t_RGB[c];
    return arr;
}

// creates a RGB Array and returns a pointer to it.
t_RGB** create_RGB(int r, int c);

// Takes original frame and returns a new copy of it
// Frame must be declared and rgb_data array must already be allocated
int copyFrame(t_FrameData &copyFrame, t_FrameData origFrame)
{
    // Error checking
    if (origFrame.data == NULL)
        return ERROR;

    int i, j; // loop control

    //Fill rgb_data with data from FrameData
    for (i = 0; i < G_ROW; i++) {
        for (j = 0; j < G_COL; j++) {
            copyFrame.data[i][j] = origFrame.data[i][j];
        }
    }

    return SUCSESFUL;
}

// translates from by a given direction
int translateFrame(t_FrameData d, int direction)
{
    int i = 0; //counters
    int j = 0;
    t_RGB *temp; //Temp variable for row that is pushed out of the frame
    t_RGB emptyRGB;
    emptyRGB.B = 0;
    emptyRGB.G = 0;
    emptyRGB.R = 0;
```

```

//Condition for up, up left, and up right. Uses recursion for left and right
translation
if(direction == D_UP || direction == D_UP_L || direction == D_UP_R){
    temp = d.data[0];
    for(i = 0; i < G_ROW-1; i++){
        d.data[i] = d.data[i+1];
    }
    d.data[i] = temp;
    for(int j = 0; j < G_COL; j++){
        d.data[i][j] = emptyRGB;
    }
    if(direction == D_UP_L)
        translateFrame(d, D_LEFT);
    if(direction == D_UP_R)
        translateFrame(d, D_RIGHT);
}

//Condition for down, down left, and down right. Uses recursion for left and right
translation
if(direction == D_DWN || direction == D_DWN_L || direction == D_DWN_R){
    temp = d.data[G_ROW-1];
    for(i = G_ROW-1; i > 0; i--){
        d.data[i] = d.data[i-1];
    }
    d.data[i] = temp;
    for(j = 0; j < G_COL; j++){
        d.data[i][j] = emptyRGB;
    }
    if(direction == D_DWN_L)
        translateFrame(d, D_LEFT);
    if(direction == D_DWN_R)
        translateFrame(d, D_RIGHT);
}

//Condition for left transition
if(direction == D_LEFT){
    for(i = 0; i < G_ROW; i++){
        for (j = 0; j < G_COL-1; j++){
            d.data[i][j] = d.data[i][j+1];
        }
    }
    for(i = 0; i < G_ROW; i++){
        d.data[i][j] = emptyRGB;
    }
}

//Condition for right transition
if(direction == D_RIGHT){
    for(i = 0; i < G_ROW; i++){
        for (j = G_COL-1; j > 0; j--){
            d.data[i][j] = d.data[i][j-1];
        }
    }
    for(i = 0; i < G_ROW; i++){
        d.data[i][j] = emptyRGB;
    }
}

```



```

    }
}

return SUCSSESFUL;
}

// Fills given frame with color
int fillFrame(t_FrameData &d, t_RGB rgb_fill)
{
    int i, j; // loop control

    // Error checking
    if (d.data == NULL)
        return ERROR;

    //Fill data
    for (i = 0; i < G_ROW; i++) {
        for (j = 0; j < G_COL; j++) {
            d.data[i][j] = rgb_fill;
        }
    }

    return SUCSSESFUL;
}

int fillFrame2(t_FrameData &d, unsigned short r, unsigned short g, unsigned short b)
{
    t_RGB rgb;
    rgb.R = r;
    rgb.G = g;
    rgb.B = b;

    // error check if over bounds for type short
    if (r > 255 || g > 255 || b > 255)
        return ERROR;

    return fillFrame(d, rgb);
}

```

---

Other files here