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Modeling a Route Selection in the Virtual World

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Abstract
Navigation technologies are used in various areas in our life. Nowadays, using a car navigator, we can easily find the route to our destination. Moreover with Google Street View we can not only find the route to the destination but also see the full view of the destination. We can even find out that navigation technologies are used in some computer games to make players easily find their destinations in the virtual life. Navigation technology has infiltrated into our life, we cannot live without this technology.

There are different navigation technologies in our life such as American Global Position System, Chinese Beidou Navigation System, Google Maps and Google Street Views. Among them Google Street View provides a new concept of navigation technology. Instead of provide only vector map, this software can also providing the full-view of the route. With this function users can easily find the destination they want.

In this thesis I used Adobe Flash to create a navigation software for the M-Building of Mikkeli University of Applied Sciences. My software is similar to the Google Street views. It provided not only the vector map but also the full-view of the route.

Subject headings, (keywords)
Adobe Flash, Navigation technology, GPS, Google , Beidou

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1 INTRODUCTION

1.1 Understanding the main concept of the topic

Navigation technology has been used in various areas in our life, and it has made our life more convenient. Nowadays, using a car navigator, we can easily find the route to our destination. Meanwhile with Google Street View we can not only find the route to the destination but also see the full view of the destination. We can even find out that navigation technologies are used in some computer games to make players easily find their destinations in the virtual life. Navigation technology has infiltrated into our life, we can not live without this technology.

1.2 Main purpose of the study

The aim of the study is to use Adobe Flash to create a navigator which is slightly similar to Google Street View. The practical aim of the thesis is to create a navigator which can offer the best route between the starting point and destination, for the M-Building of Mikkeli University of Applied Science. Moreover the navigator will also provide the full view of the route, which is slightly similar to the Google Street View.

1.3 Realization methods and structure

In the second chapter, there will be a simple introduction of different navigation technologies and the prospect of these technologies. In Chapter 3, I will give simple introduction of the Adobe Flash technology which will be used in my study. In Chapter 4, I will simply introduce the function of my navigator. In Chapter 5, I will explain the method of owing the full view of the route for my navigator. In Chapter 6, I will explain the method to make the vector map flash for every route. In Chapter 7, I will explain the method to establish connections of different parts of flashes. In Chapter 8, there will be a final conclusion of my project and the prospect of the future research in this area.

2 DIFFERENT NAVIGATION TECHNOLOGY

There are two major kinds of navigation technologies: dynamic and static. American GPS, Russian Glonass and Chinese BeiDou are dynamic technologies in which the route navigators provide will change as the users' site change. Another technology such as Google Maps, Google Street view is static navigation technology which are finished programs or applications the route would not update as the location of the user changes. In this chapter I will introduce different types of navigation technologies.

2.1 Introduction of different dynamic navigation technology

2.1.1 Global Position System

GPS technology is the most popular navigation technology which is used in most areas around the world. GPS, short for the Global Position System, is a U.S space-based radionavigation system. This system can provide accurate position, navigation and timing (PNT) service in all weather for the people who carry a receiver.

According to the government website of the United States, GPS system is made up with three parts: satellites which are orbiting the Earth at any moment which called the space segment; control and monitoring stations located on the Earth which called the control segment; and the GPS receivers which are held by users on the Earth which called the user segment. The Space Segment is composed of 24 to 32 satellites, which orbits the earth twice a day, in Medium Earth Orbit and also includes the boosters required to launch them into orbit. [1]The orbiting satellite is shown in Figure 1.

Figure 1 The orbiting satellite of GPS system [2]

The control part is made up with control and monitor stations which are distributed throughout the world. These stations are used for keeping the orbiting satellites stay in their proper orbits when they are moving around the Earth, and adjust the clocks of those satellites. These stations are also responsible for tracking satellites, transmitting updated information and keeping the satellites working in the healthy station.[2]

The user segment is made up with GPS signal receivers that receive signals from orbiting satellites. Receivers use the signal it received to figure out the users' three-domain position and the time. The GPS receiver has been presented in Figure 2.

Figure 2 GPS Receiver [2]

The working principle of GPS is quite complicated. In this thesis I will simply introduce how the GPS technology locates the position of its user which is the core part of GPS technology. Getting the accurate position of a receiver is the main challenge for all navigation technologies. For the GPS technology, the receiver firstly sends requests to satellites to ask for GPS service. Moreover then the receiver will get feedback from satellites. After that the receiver begins to calculate the distance between satellites and itself. The receiver first calculates the time that the signal arrives by the calculation ($t_r - t_i$), t_r is the time that the signal is received by the receiver; t_i is the time that signal was transmitted from the satellites. Meanwhile the subscript *i* is the satellite number and has the value 1, 2, 3, 4 e.g. The GPS technology uses at least four satellites during this process. We assume the message travels at the speed of light c, so the distance between receiver and satellites then can be computed

as $c(t_r - t_i)$. Meanwhile we can imagine that the receiver is on the spherical surface of which the center is the satellite and the radius is equal to the distance between the receiver and the satellite. So four satellites create four spherical surfaces and the receivers can determine the accurate position by calculating the intersection of the surfaces of four spheres. In Figure 3 we can see the situation when two spheres intersect.

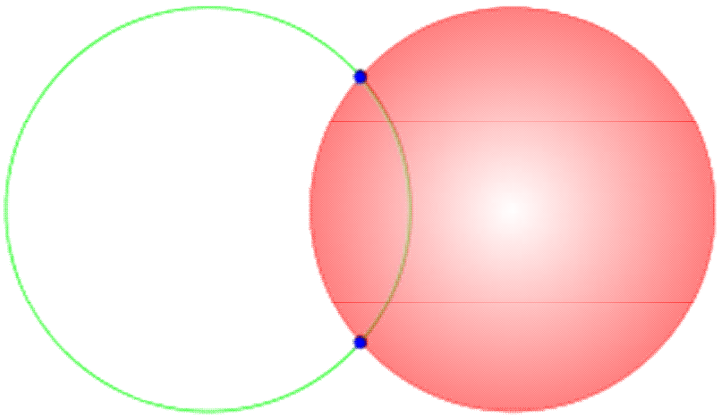

Figure 3 The intersection of two spherical surfaces [2]

The American government is trying to develop a more advanced program which can implement a second and a third signal on GPS satellites. The aim of the second civil signal is to improve the civilian service accurate. Moreover the third civil signal is used for improving the capability of the civilian. The improvement of service quality that the additional signals provide can be seen in Figure 4.

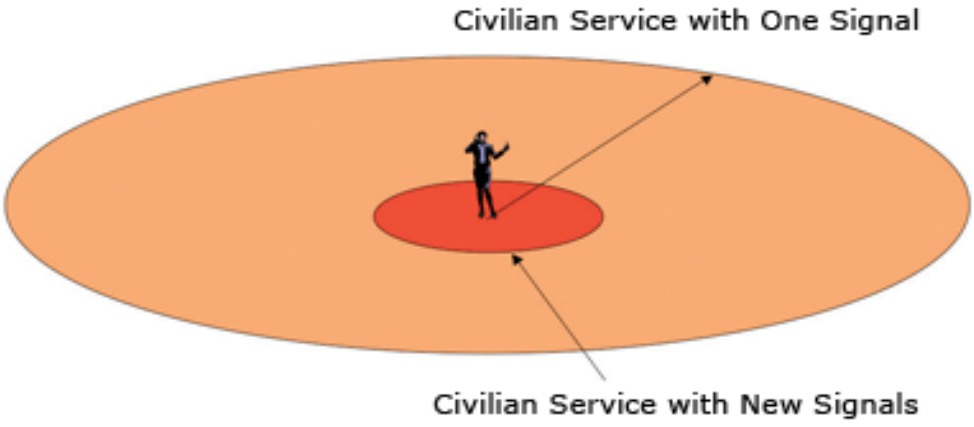

Figure 4 Changes taken by the additional signals [1]

2.1.2 Beidou Navigation System

Beidou Navigation System or Beidou Satellite Navigation and Positioning System, is a navigation system developed by China independently. Beidou navigation system consists of three parts: space segment, control segment and user segment. According to the introduction in the Chinese Government Website, in the current technology which called Beidou-1, the space segment consists of four satellites in a geostationary orbit. The number of the satellites limits the coverage of this system. Unlike GPS which covers the whole world, Beidou Navigation System just covers the area from 70°E to 140° E and from 5° N to 55°N [5]. The coverage of Beidou Navigation System has been shown in Figure 5(the blue square is the coverage extent of Beidou). The control segment of Beidou consists of some stations in China and the user segment consists of the receivers and terminal of Beidou.

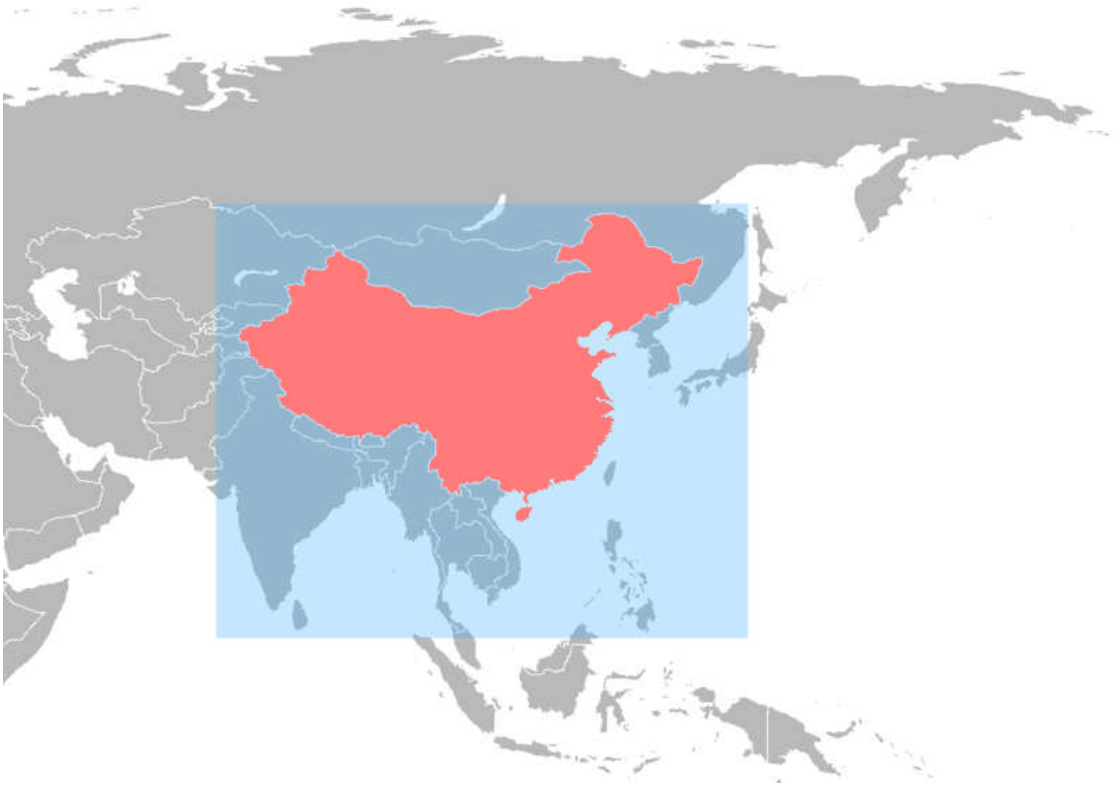

Figure 5 Coverage of Beidou [3]

The working principle of Beidou Navigation System is also quite different from that of the American GPS and Russian Glonass. When one needs position determining service, a user needs receiver to send a request to the control station first. Then the control station will calculate the distance between the satellites and user and the earth's core and user.[4] After that the control station will send the three-domain posi-

tion information back to the receiver. However in the GPS and Glonass systems the receiver can calculate the distances itself. Moreover because of the different working principle of Beidou Navigation System, the control station will know the position of the receiver, which provides some convenience in the rescue usage.

The Chinese government states that they are developing a new navigation system which is called Beidou-2 or Compass system. This system will contain 35 satellites including five geostationary orbit (GEO) satellites and 30 medium Earth orbit (MEO) satellites. Moreover this system will offer coverage of the whole world. Meanwhile Chinese authority states that this system will be published in 2020[4]

2.2 Statics Navigation Technologies

2.2.1 Google Maps

Google Maps is a web-based navigation application produced by Google. Users can get the route they want by entering the starting point and their destination. Google Map can provide different routes between starting point and destination. This application can also provide two types of a map: a normal vector map and a satellite view map which have been shown in Figure 6 and Figure 7 respectively.

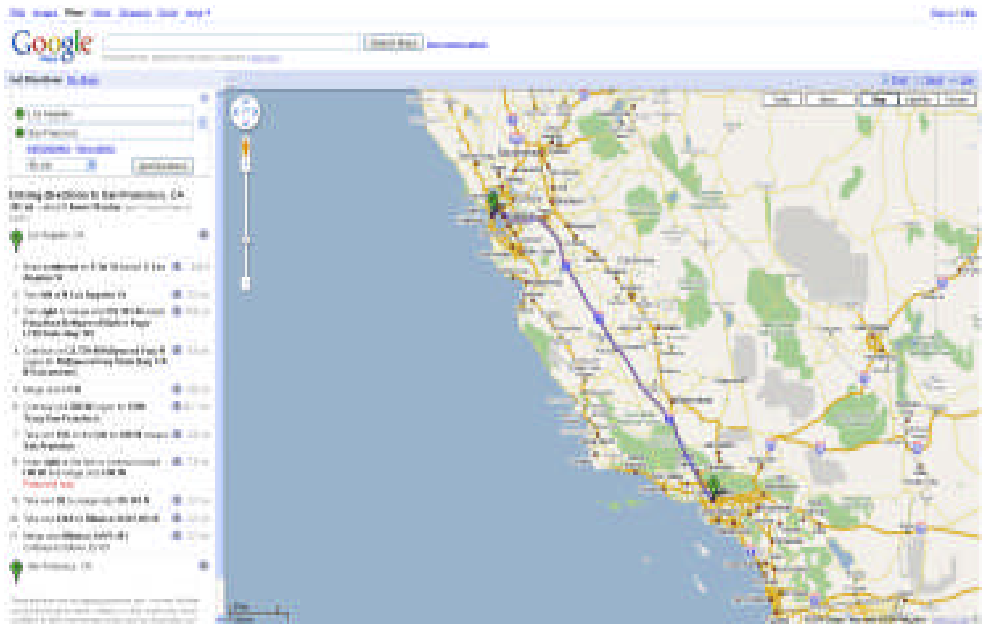

Figure 6 Vector map [5]

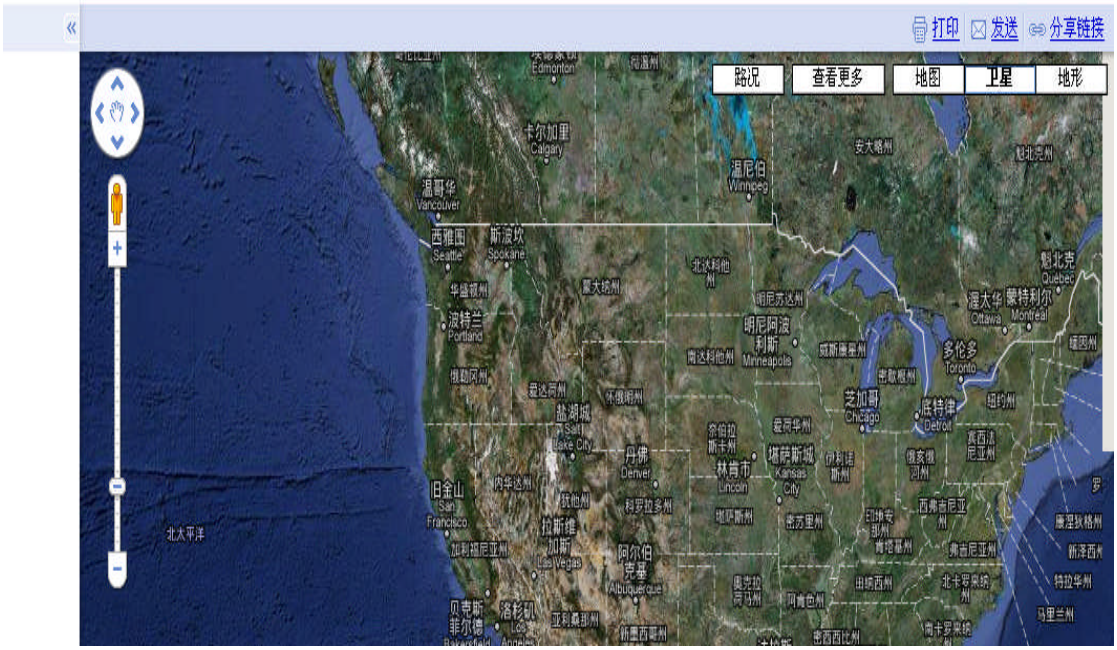

Figure 7 Satellite view map [6]

Google Map uses JavaScript extensively, and when users drag the map further maps will be downloaded from the server and inserted into the page. The vector map has covers most areas in the world. Meanwhile lots of areas has already been included in the satellite view map function such as the urban areas in the United States (including Hawaii, Alaska, Puerto Rico, and the U.S. Virgin Islands), Canada, and the United Kingdom, as well as parts of Australia and many other countries. The high-resolution imagery has been used by Google Maps to cover all of Egypt's Nile Valley, Sahara desert and Sinai. Google Maps also covers many cities in the English speaking areas. However, Google Maps is not solely an English maps service, since its servics are intended to cover the world. [5]

2.2.2 Google Street View

Google Street View is a very popular navigation software now. It is a feature of Google Maps and Google Earth. Unlike other normal navigators which can just show vector maps, Google Street Views can provide panoramic views from various positions along many streets in the world. It can provide 360 degree view of the route and 2.5 meters vertical view of the route. Google uses cars (and tricycles) with nine directions cameras to take pictures of the route. Users can use a mouse and keyboard

to select the horizontal and vertical view directions. Meanwhile the yellow line with arrows in the photos has been used to show the path and direction of the car which is used to take phones. Figure 8 represents the pictures taken by the Google cars and the yellow line with direction in the pictures.

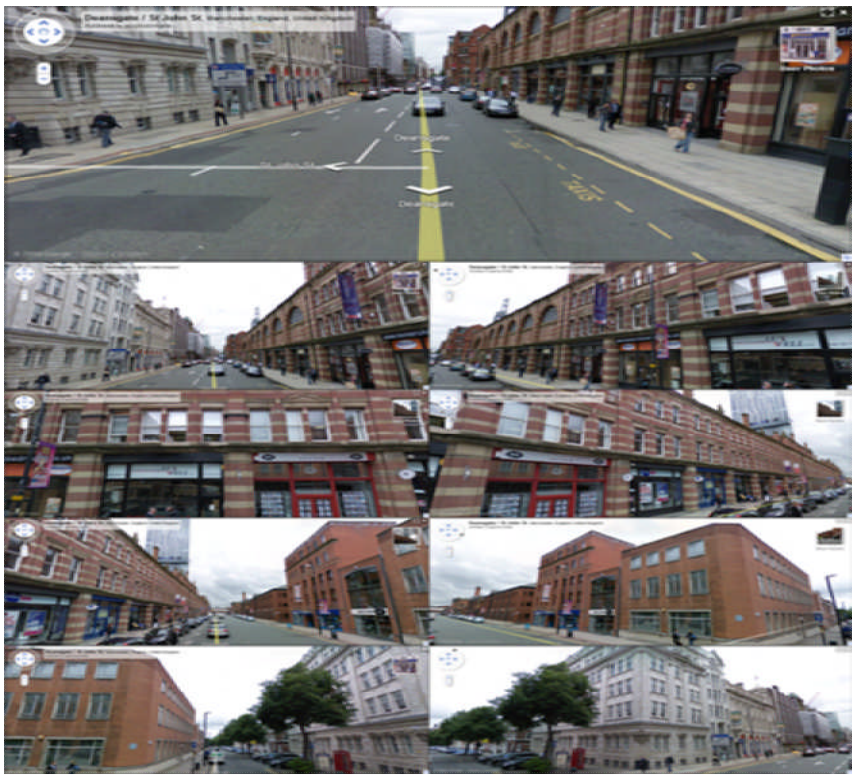

Figure 8 Pictures of Google Street View and the line with directions [7]

Google Street View has covered lots of areas in the world. We can find most cities in United States and Europe. Meanwhile in Asia, Japan, Singapore and some cities of China such as Hong Kong and Taiwan have also been added in Google Street View. Street View function has also been introduced into map applications of different versions of mobile phones such as the Apple iPhone, S60 3rd Edition [7].

3 ADOBE FLASH SOFTWARE

3.1 Simple introduction to Adobe Flash

Adobe Flash is the major tool in my project. Therefore knowing this software well is extremely important to develop my project. So in this chapter I will give some simple introduction to Adobe Flash.

Adobe Flash (earlier named as Macromedia Flash) was originally developed by an American company called Macromedia. Adobe Flash is a multimedia platform to add animations and interaction to websites. Flash can be used to create vivid vectors and raster graphics. Flash was firstly introduced in 1996 and since then Flash has become popular. Now Flash has already become a common tool to create animations, web page flash components and internet applications. Flash format has occupied a lot in the desktop market, and the latest study shows that in the US 95 % [8] of web users and 99.3 % [9] of all Internet desktop users have installed the Flash Player and 92%-95 % [10] of them have the latest version. Moreover Adobe Flash Player is also available for different versions of systems such as Windows, Linux, Palm OS, BeOS, HP-UX, QS/2, Solaris, Mac OS 9/X, QNX, Symbian. The working environment of Adobe Flash is shown in Figure 9.

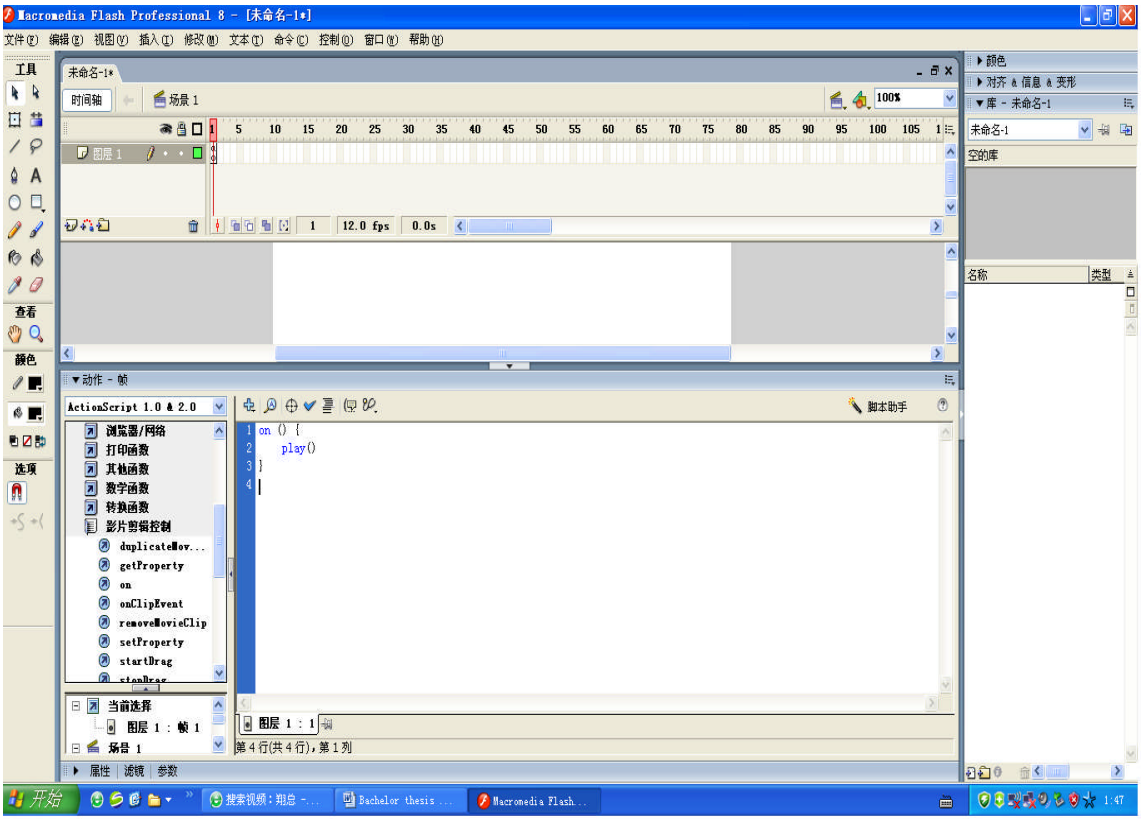

Figure 9 Working environment of Adobe Flash

Adobe Flash contains a programming language named ActionScript. ActionScript is a scripting language based on ECMAScript. ActionScript was firstly introduced by Adobe (acquired Adobe in 2005) to control simple 2D vector animations made in Adobe Flash. Meanwhile the new functions that make it possible to create website games were added in the later versions of ActionScript. ActionScript has three versions: ActionScript 1.0, ActionScript 2.0 and ActionScript 3.0.

3.2 Introduction to Adobe Flash Professional 8 and ActionScript 2.0

Now I will give some introduction about Adobe Flash Professional 8 and ActionScript 2.0 which are closely related to my project.

3.2.1 Adobe Flash Professional 8

Adobe Flash Professional 8 was firstly introduced in 2005. Compared to the old version of Adobe Flash, features related to video, quality, mobile authoring and expressiveness have been added. New features that were added in this version of Flash included: Filters (graphic effects), blend modes, advanced easing control for animation, ActionScript 2.0, Flash Type advanced Text Rendering Engine, PDF and EPS support, Templates, Data component, UI component, Publish to Flash Lite, Mobile Templates, External Players, MIDI Ring Tone support, Embedded Video, External Video, Advanced Video Import Workflow, Advanced Video Component, Advanced Encoding Option, Script Assistance, Project Panel, SWF metadata, Accessibly and so on. [11]

3.2.2 ActionScript 2.0

ActionScript 2.0 was published in September 2003. Its aim is to give the users a more comfortable language environment to edit larger complex applications, so ActionScript 2.0 added the features includes compile-time type checking and class-based syntax, such as the keywords class and extends. In the ActionScript 2.0 environment the developers could force variables to a specific type by adding a type annotation so that type mismatch errors could be found at compile-time. The class-based inheritance syntax has been introduced into the ActionScript 2.0 which means that the developers could create classes and interfaces, just like what they could do in

class-based languages such as Java and C++. This version conformed partially to the ECMAScript Fourth Edition draft specification. [12]

4 INTRODUCTION TO MY NAVIGATION SOFTWARE

In this chapter I will introduce my navigator. I will explain every function of my navigation software and explain how it works. At first, the main page of my navigation software is shown in the Figure 10

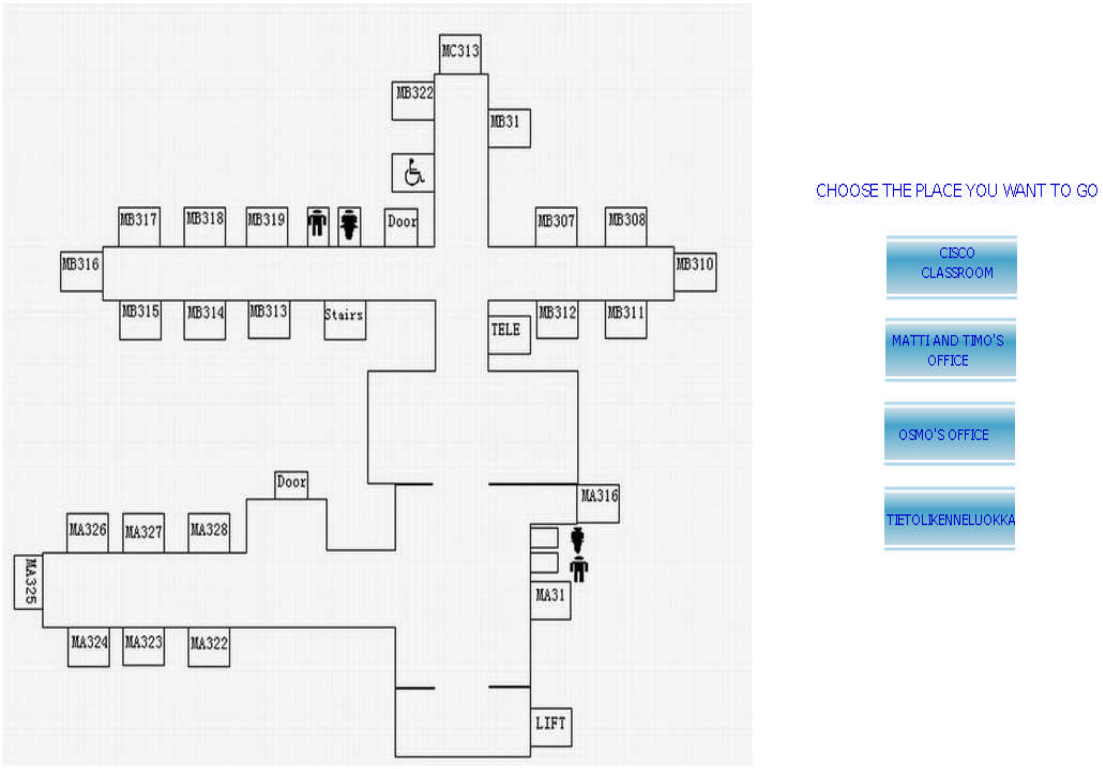

Figure 10 Main page of my navigation software

My navigation software can provide the route to four places: Cisco classroom, the office of teachers Matti and Timo's office, teacher Osmo's office and Tietolikenne-luokka classroom. We can see each of those places corresponding to one blue button below the sentence "CHOOSE THE PLACE YOU WANT TO GO". Here we take the CISCO CLASSROOM button as an example. When we press this button a new page will appear. Figure 11 represents this page.

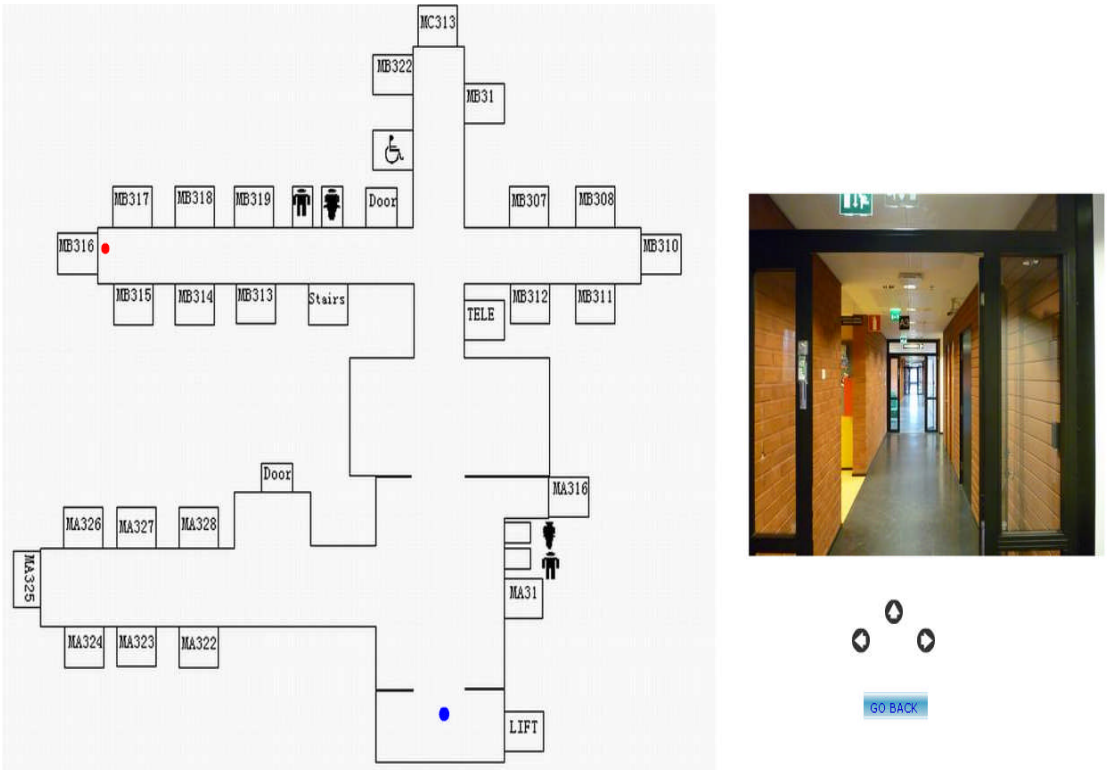

Figure 11 The view of the page showed after pressing “CISCO CLASSROOM” button

We can see that two points appear on the map a red point and a blue point. The blue point represents the starting point, in my navigation software the starting point is beside the lift. Moreover the red point represents the destination which the user has chosen from the main page. In this example, the destination is Cisco classroom so we can see the red point beside the MB316 classroom. On the right side of the page, a small screen appears and three arrows and one button below the screen come out. The small screen is used for showing full view of the route. The three arrows below the screen are used for controlling the direction that the screen moves to. Figure 12 shows the change of the page when the user presses the up arrow.

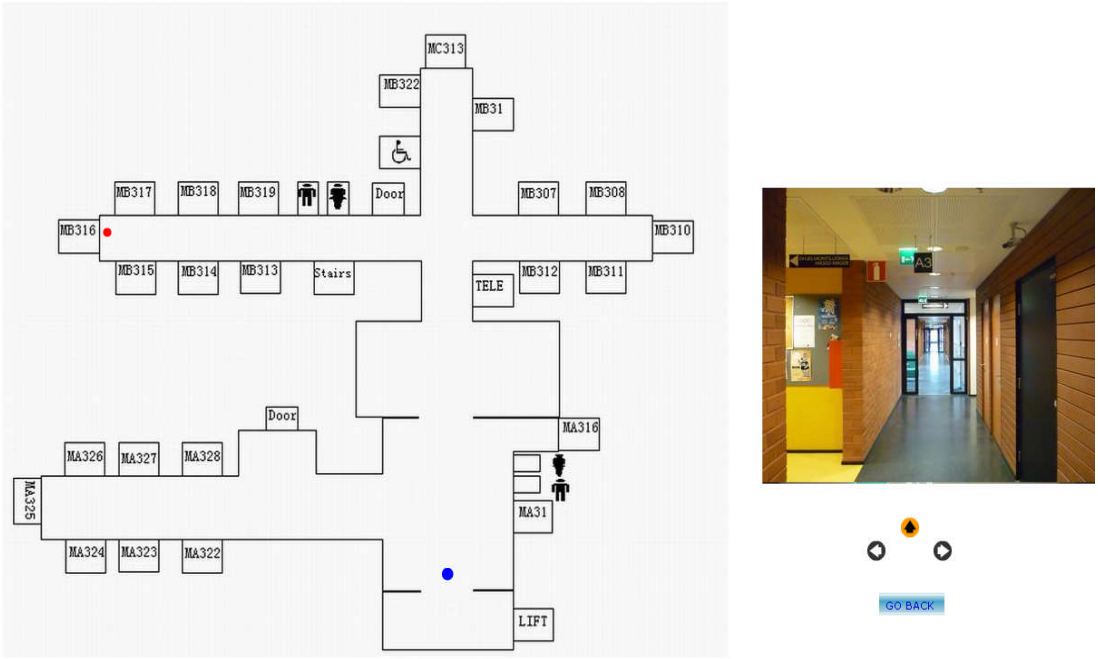

Figure 12 Situation when user presses the up arrow

We can see from the picture that the blue point in the map has moved upward and the view in the small screen has changed. These changes indicate that the user has moved forward. When the user presses the right arrow or the left arrow user can see the environment on the right side and left side. Figure 13 represents the situation when user presses the right arrow. Meanwhile just like in Google Street View, when the user hold the right direction and presses the up arrow, instead of showing the view in front of the user, the small screen will show the right side view of the next step. Meanwhile this situation is shown in Figure 14.

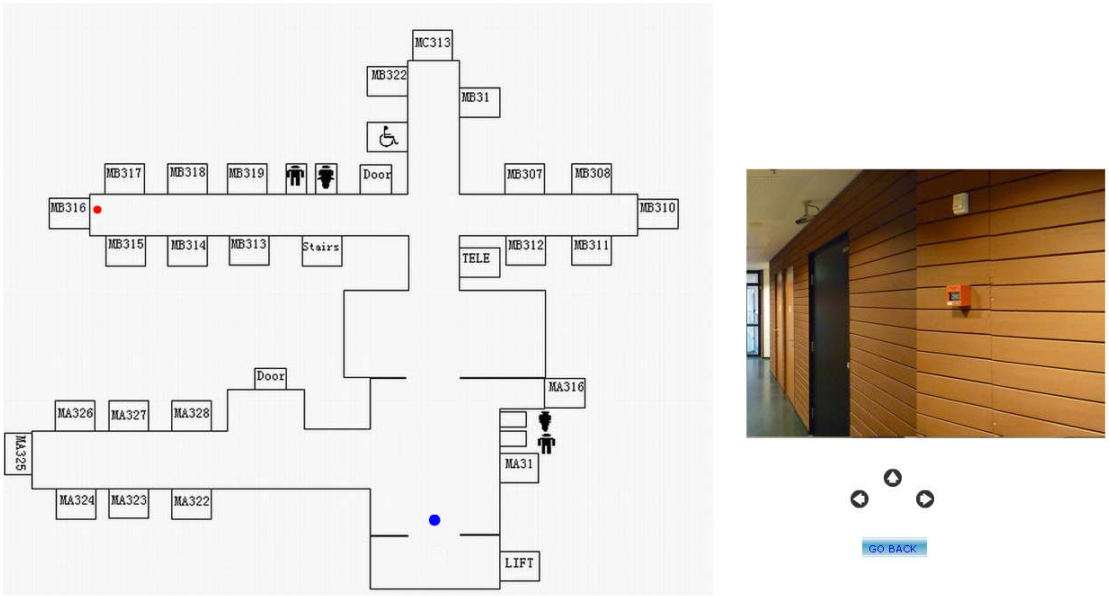

Figure 13 The situation when user presses right arrow

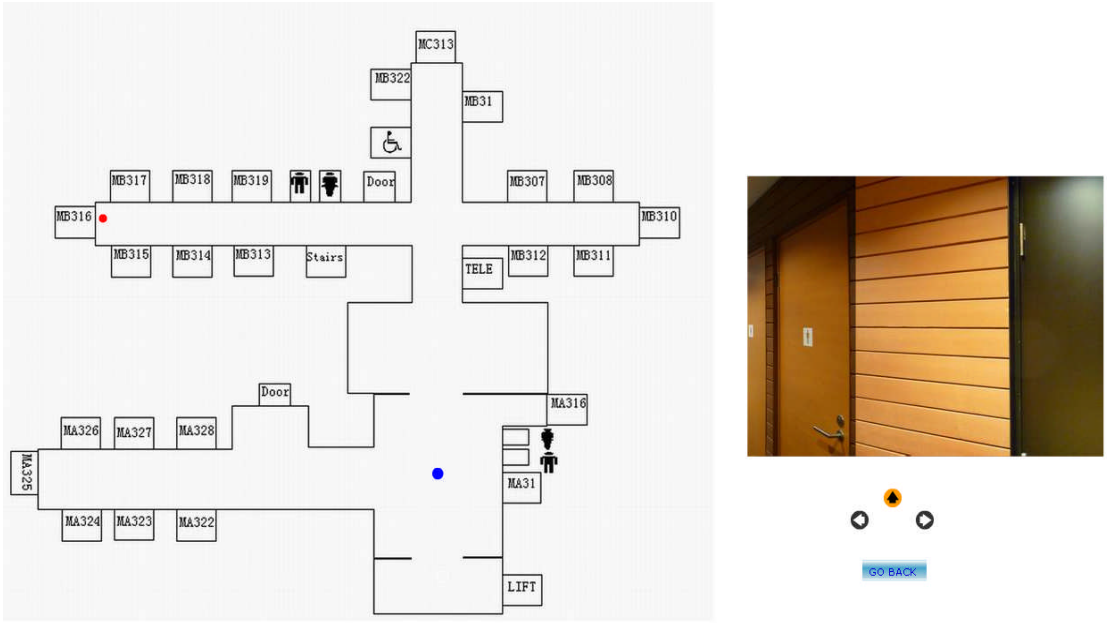

Figure 14 The right views forward the user

When user keeps moving forward and arrives at the destination a sentence with blue word said: “YOU HAVE ARRIVED AT CISCO CLASSROOM” in the map will inform the user that he or she has arrived. Figure 15 has represented this situation. And user can go back to the main page by pressing the “GO BACK” button below the arrow button.

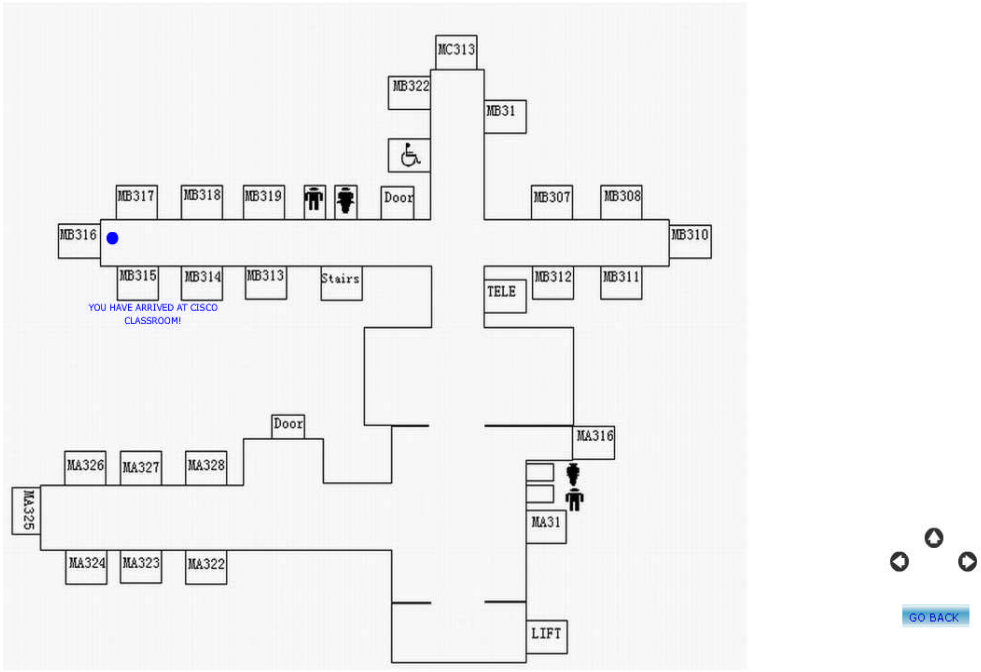

Figure 15 Situation that user arrive at destination

5 IMPLEMENTATION METHOD OF THE FULL -VIEW EFFECT OF ROUTES

As I introduced before, my navigation software can provide the full view of the route to users in the small screen. Fulfilling this function is the main challenge in my project, so I will use the whole chapter to explain the method I used to make this function come true.

In the beginning of this chapter, I will explain how to make the full view for one scene, after that I will explain the method to make scenes move one by one.

5.1 The full view for one scene

5.1.1 Two plans to make the full-view pictures.

The full-view pictures are basic elements to create the view of the route. Meanwhile I met lots of challenges in taking pictures because it is difficult to shoot in the same altitude. Meanwhile sometime the pictures I took could not show the full view because were those pictures overlapping. So at the beginning of my project I tried to make four directions' pictures for the full-view picture.

This method of getting a full-view picture is to make pictures for four directions (east, west, south and north). Meanwhile one of the full-view pictures of four directions I made is shown in the Figure 16.

Figure 16 Full-view picture formed by four pictures

We can easily see from Figure 16 that the seams of these four pictures and the whole view of this scan also can not be represented because of the limitation of the number of pictures. When the flash runs, the drawbacks of this method are seen obvious.

The other plan is using six pictures to form the full-view picture and the coverage of each picture is 60 degrees. Then six pictures can perfectly represent the 360 degree view. Figure 17 represents the full-view picture formed by six pictures.

Figure 17 Full-view picture formed by six pictures

We can see from Figure 17 that the seam of the pictures can hardly be detected. Meanwhile when flash plays, pictures transit one by one smoothly. In order to keep the same shooting altitude, I have used a tripod during the process of taking pictures. Meanwhile the angle division circle on the tripod helped me a lot in keeping the coverage of every picture I took in 60 degrees. The tripod and camera I used in my project are shown in Figure 18.

Obviously, the full-view picture formed by six pictures performing a much better way than the way formed by four pictures. So in my project, I chose the former one as my full-view picture.

Figure18 Taking picture process

5.1.2 Pictures processing

As I used a digital camera to take pictures, the size of the pictures I got is 4000*3000 which are 12,000,000 pixels. Meanwhile this size is too huge for making flash, so I should reduce the size of these pictures firstly. Through my experiments, to gain the best performance, the size of the picture should be limited to 400*300 which is just 120,000 pixels. The ACDSee 5.0 picture processing software was used in my picture processing work. It is very convenient to use ACDSee because this software provides the function that transits all pictures in the same time. After the picture processing step, all preparation work that should be done before making flash has been finished.

5.1.3 Creating the full-view flash for one scan

Now I will give a detailed introduction to the method of creating the full-view flash for one scan.

First of all I need to create a move clip which named “mc” then put the six pictures related to the scan before of the front of the lift of M-Building into the move clip I created, and arrange these pictures in a row. This step is shown in Figure 19. We can see from Figure 19 that “mc” movie clip is shown in the right list and the pictures we need has been added into the movie clip.

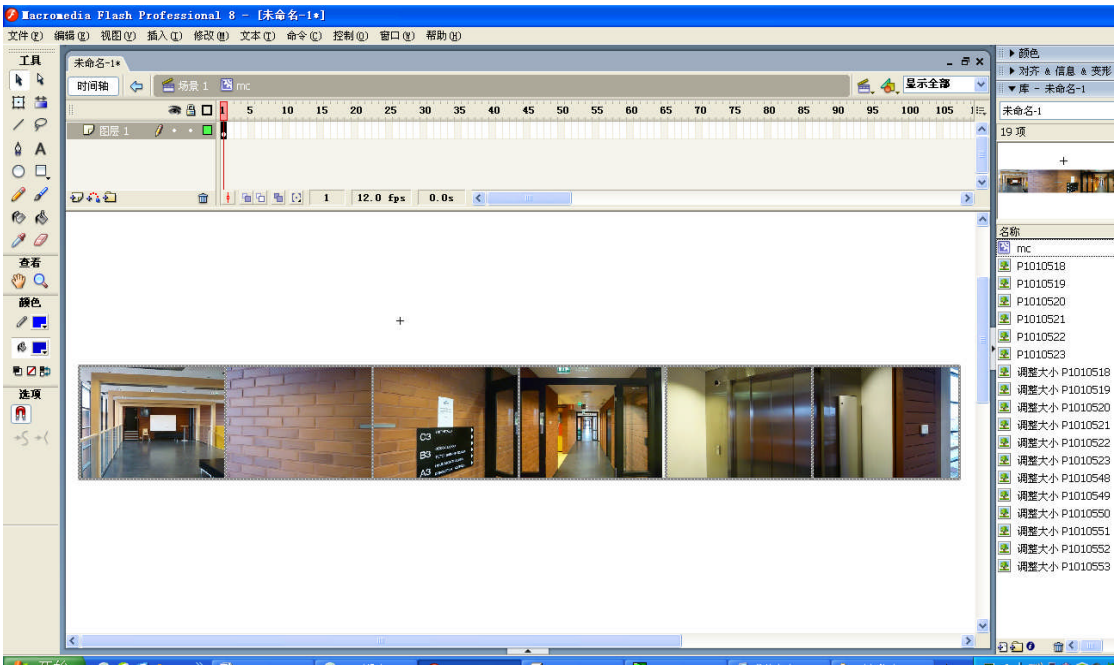

Figure 19 Creating the “mc” movie clip

After creating “mc” movie clip, we go back to the main timeframe and add three arrow buttons. Then we drag the movie clip we created into the main stage. Meanwhile we give an instance name “mc” to the movie clip. Figure 20 represents this step.

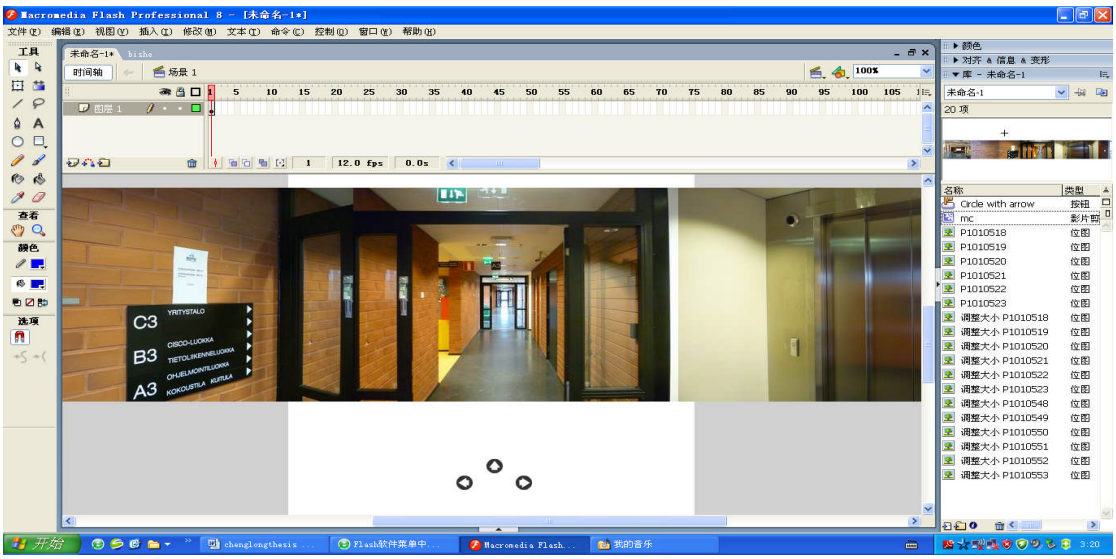

Figure 20 Add arrow buttons and movie clip

Now we will add actions to the arrow buttons. Because we do not go forward (go to the next scan) so we just add actions to the left arrow button and right arrow button here.

We add the action below to the right arrow button

```
on (press) {
mc._x=mc._x-30
if (_root.mc._x<40)
{
_root.mc._x=2078.8
}
}
```

The meaning of these sentences is when pressing the left button the x coordinate value of “mc” movie clip subtracts 30 and if the x coordinate value is less than 40 then set the x coordinate value of “mc” movie clip to 2078.4. The usage of the judgment is to link the left side of the first picture and the right side of the sixth picture together. 40 and 2078.8 is the x coordinate value of sixth picture and first picture respectively.

Then we add the left arrow button with the action below:

```
on (press)
{mc._x=mc._x+30
if (_root.mc._x>2078.8)
{
_root.mc._x=40
}
}
```

The meaning of these sentences is slightly similar to the meaning of the action added to the right arrow button. When pressing the left button the x coordinate value of “mc” movie clip adds 30, and if the x coordinate value is more than 2078.8, then set the x coordinate value of “mc” movie clip to 40. The usage of the judgment is to link the left side of the first picture and the right side of the sixth picture together. 40 and 2078.8 is the x coordinate value of the sixth picture and first picture respectively.

Now we add an action to the movie clip “mc”. Double-click “mc” and enter the edit mode. Then we put the action：

stop()

At the first frame of “mc” this sentence is used for making the movie clip stop at the beginning. This step is shown in Figure 21

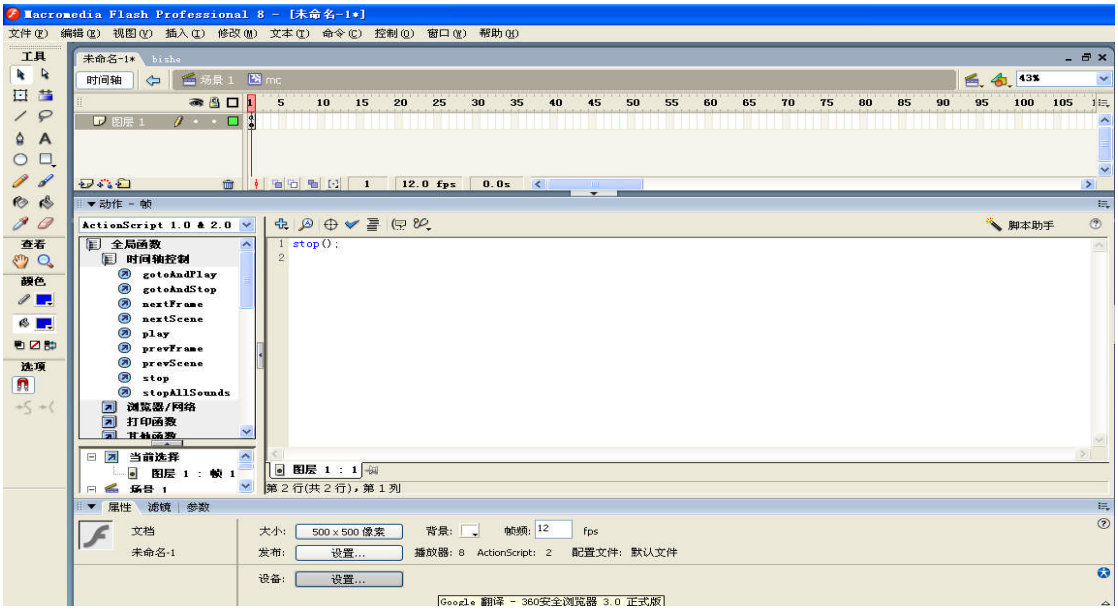

Figure 21 Add actions to movie clip

5.2 Create the full-view effects for the whole route

After finishing the full-view effects for one scan, I need to create the Flash to link each scan together which means creating the full-view Flash for the whole route. My navigation Flash can provide the routes to four destinations (Cisco classroom, teacher Matti and Timo’s office, teacher Osmo’s office and telecommunication class-room). As the way to creating full-view effects for these four destinations is same, so I chose one of them, the route to Cisco classroom, as an example to explain the method to create full-view effects for the whole route. At the beginning of that, I should also do some preparation work.

5.2.1 Processing pictures

Unlike the pictures processing work I did before, this time we do not need to change the size of the pictures. We just place the pictures of the whole route together. And in this step we should also arrange these pictures in good order which is the picture tak-

ing sequence. I also made six pictures which represent the view for one scan as a row. Figure 22 shows the pictures I arranged in this step.

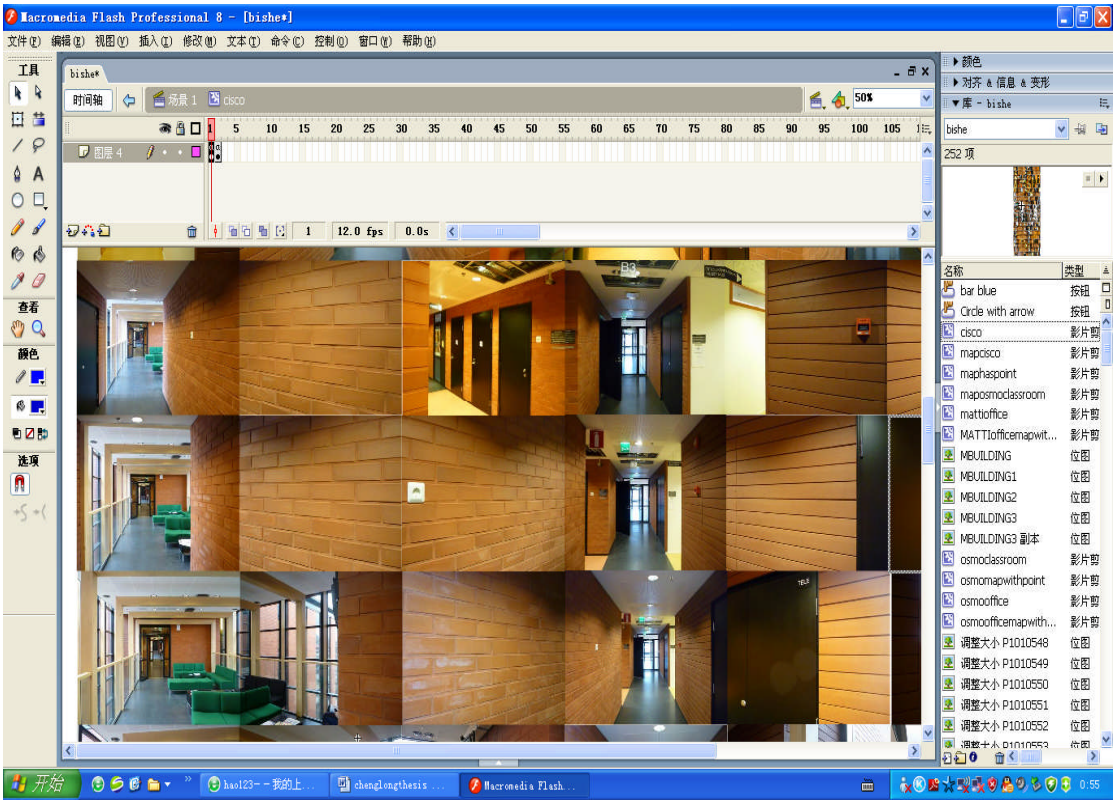

Figure 22 Place pictures

Then I create a movie clip named Cisco and put these pictures on the stage of this movie clip. Meanwhile add the action:

stop();

to the first frame of this movie clip.

5.2.2 Add actions to buttons

Then I go back to the main time frame page. Meanwhile insert a new layer and name it as picture. I drag the “Cisco” movie clip into the stage of the “picture” layer. Then give an instance name, “cisco_mc”, to this movie clip. After that I create a new layer named “buttons” and add three arrow buttons (up, left, right) on the stage of this layer. Then we add actions to these three arrow buttons. The action of the left arrow button and right arrow button is similar to the action that we added to one scan full-view effects. And the actions add to the up arrow button is shown below:

```
on (press)
{cisco_mc._y=cisco_mc._y+300
}
```

The meaning of these actions is that when user press the up arrow button, the y coordinates value of the movie clip that instance name is “cisco_mc” adds 300. Because the height of each picture is 300, so with these actions users can change the pictures in a vertical line one by one when pressing the up arrow button.

5.2.3 Create the mask layer

As size of the small screen is just 400*300 but the size of the “cisco_mc” movie clip is much huger than the size we want, so we need to create a mask layer to hide the contents that we do not want the user to see. Figure 23 shows the situation before the mask layer was created. Meanwhile we can see from Figure 23 that the size of “cisco_mc” movie clip is very huge and when we run the Flash, we can see the whole picture move, which is not the effect we want.

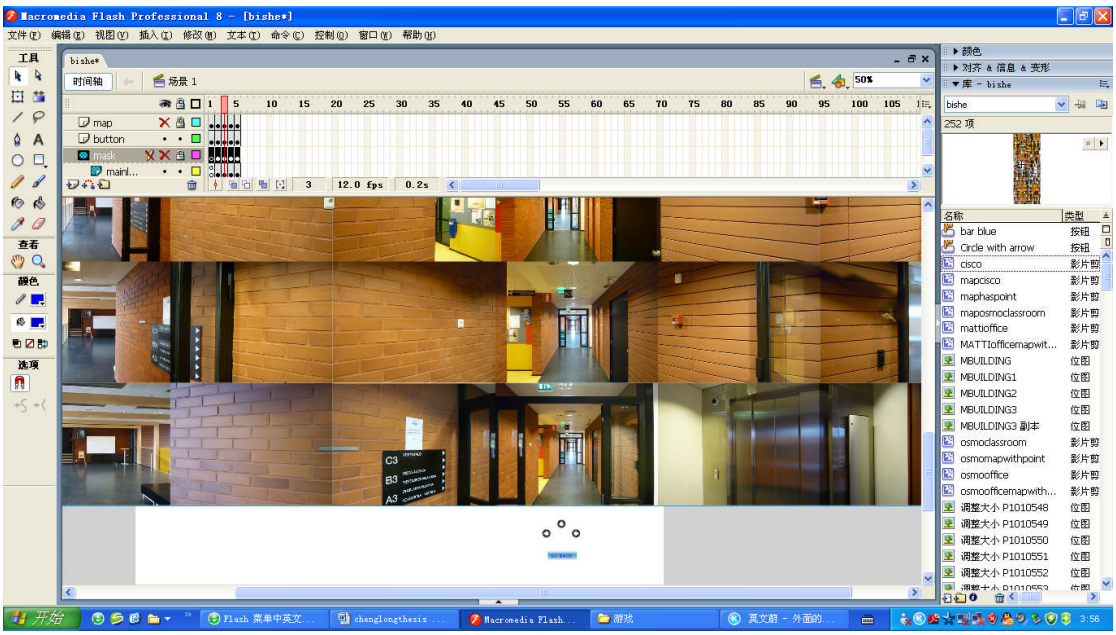

Figure 23 The Flash without a mask layer

Now insert a new layer named mask, and convert this layer to a mask layer, and put the mask layer on the picture layer and below other layers. Figure 24 represents this step.

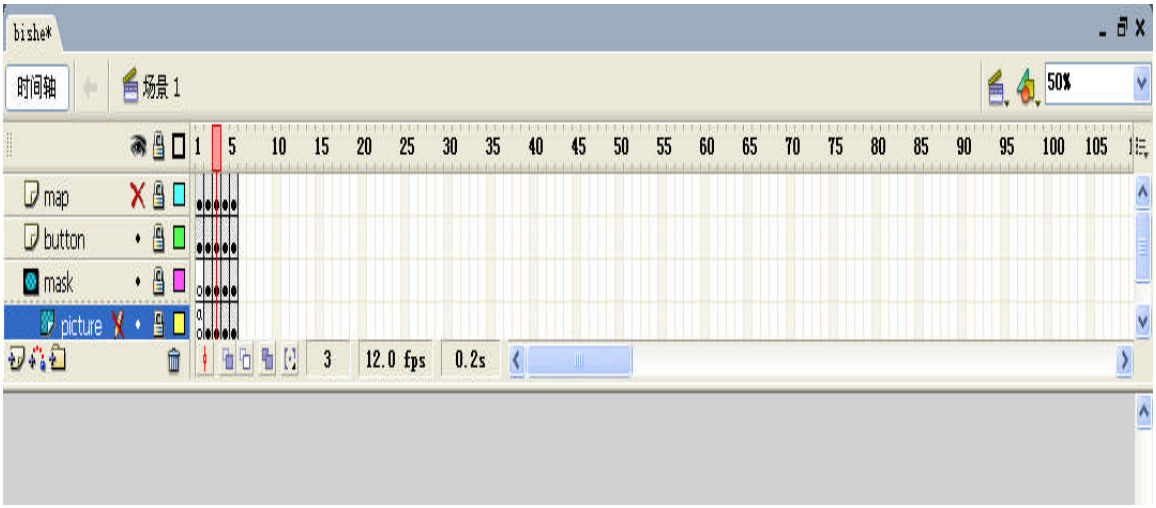

Figure 24 Insert the mask layer

After that I selected the mask layer and draw a red square on the stage, and the size of the square should be 400*300 to make the mask layer shows only the square-size contents of the picture layer. Then put the square on the site of fourth picture in the first row of all the pictures of the “cisco_mc” movie clip. This step is shown in Figure 25.

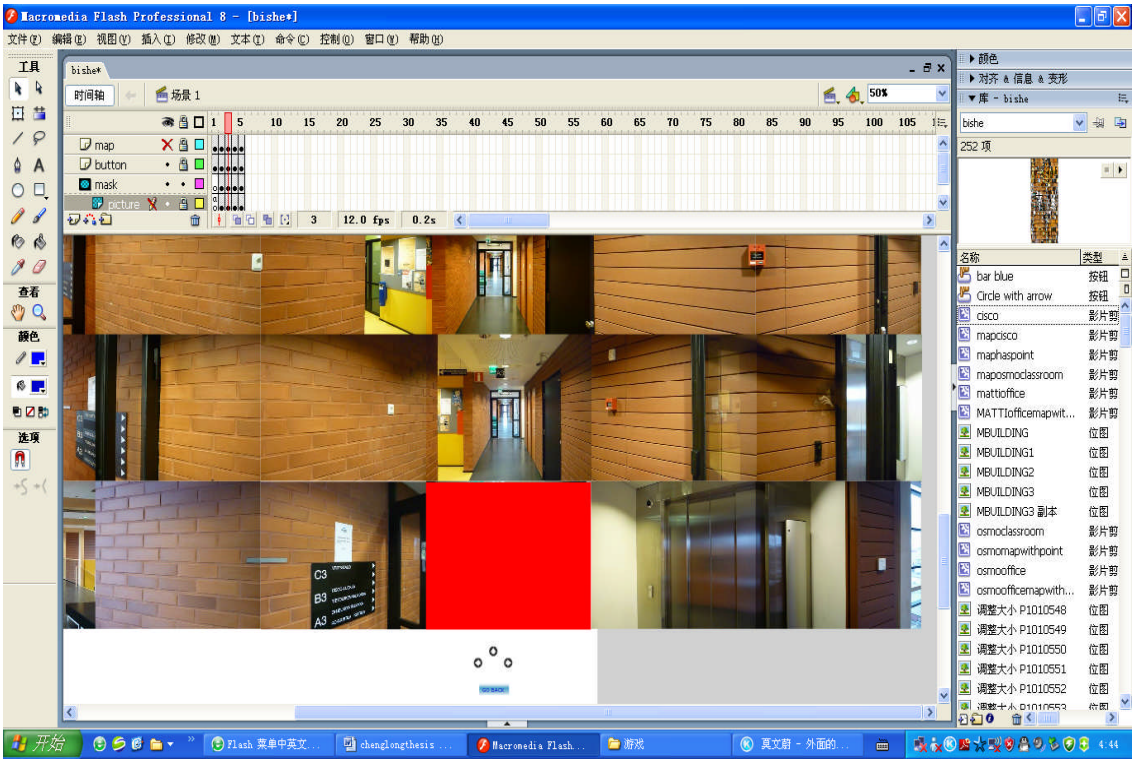

Figure 25 Mask layer with a red square

Now I have finished all the necessary steps to create the flash that provides the full-view effects for the route from the starting point to the Cisco classroom.

5.3 The process of creating full-view effects for other destinations

As I have mentioned before, the method of creating the full-view effects for other three routes is quite similar to the method used in creating full-view effects for the route to Cisco classroom. I will simply introduce the process of creating flash for other three routes one by one.

5.3.1 Create full-view effects for the route to the office of the teachers Matti and Timo

First place the pictures we need, because for different destination we should place different pictures. Moreover the method to arrange picture is same as the method I used in arranging pictures for the route to the Cisco classroom.

After that I create a movie clip named mattioffice and put the picture we just created in this movie clip. meanwhile add the action below to the first frame:

```
stop();
```

Then I inserted a keyframe behind the Cisco classroom frame and deleted the Cisco classroom movie clip on the stage. Then I dragged the “mattioffice” movie clip onto the stage of the main time frame page. After that I gave instance name mattioffice_mc to the movie clip. Then added actions to arrow buttons the actions to the up arrow button should be:

```
on (press)
{ mattioffice_mc._y= mattioffice _mc._y+300
}
```

Meanwhile actions added to the left arrow button should be:

```
on (press)
{mattioffice_mc._x= mattioffice_mc._x+30
if (_root. mattioffice_mc._x>2078.8)
{
```

```
_root. mattioffice_mc._x=40
}
}
```

the actions added to the right arrow button is：

```
on (press) {
mattioffice_mc._x= mattioffice_mc._x-30
if (_root. mattioffice_mc._x<40)
{
_root. mattioffice_mc._x=2078.8
}
}
```

5.3.2 Create full-view effects for the route to the office of teacher Osmo

As the steps before add actions to arrow buttons is very similar to the steps of creating full-view effects for the two routes I introduced before, I just explain the different part of creating full-view effects for this route. First the name of the movie clip we create is osmooffice and the instance name of this movie clip is osmooffice_mc, so the actions added to the arrow buttons is slightly different.

The actions added to the up arrow button:

```
on (press)
{ osmooffice_mc._y=osmooffice_mc._y+300
}
```

Then actions added to the left arrow button:

```
on (press)
{osmooffice_mc._x= osmooffice_mc._x+30
if (_root. osmooffice_mc._x>2078.8)
{
_root. osmooffice_mc._x=40
}
```

```
}
```

The actions added to the right arrow button is：

```
on (press) {
osmooffice_mc._x=osmooffice_mc._x-30
if (_root. osmooffice_mc._x<40)
{
_root. osmooffice_mc._x=2078.8
}
}
```

5.3.3 Create full-view effects for the route to the telecommunication classroom

The steps of creating this flash are quite similar to the other three routes. The different is that the movie clip's name is osmoclassroom and the instance name of this movie clip is osmoclassroom_mc. So the actions added to the arrow buttons are slightly different.

The actions added to the up arrow button:

```
on (press)
{ osmoclassroom _mc._y= osmoclassroom_mc._y+300
}
```

Meanwhile actions added to the left arrow button:

```
on (press)
{ osmoclassroom_mc._x= osmoclassroom _mc._x+30
if (_root. osmoclassroom _mc._x>2078.8)
{
_root. osmoclassroom _mc._x=40
}
}
```

The actions added to the right arrow button is：

```
on (press) {
osmoclassroom _mc._x= osmoclassroom _mc._x-30
```

```
if (_root. osmoclassroom _mc._x<40)
{
_root. osmoclassroom _mc._x=2078.8
}
}
```

Now all Flashes related to the full-view effects for four routes have been finished.

6 REALIZATION OF THE VECTOR MAP FUNCTION

As I have introduced before, there is a vector map in my navigator and two points on the map represents the location of the user and their destination. In this chapter I will explain the method using Adobe Flash to realize this function.

6.1 Creating the vector map

The vector map is drawn by me. Firstly I drew a map which shows the layout of the third floor of M-Building on paper and then used the drawing tool of Windows system to finish the digital picture of the map by my computer. After I finished drawing, the picture I have used the ACDsee picture modifying software to modify the size of the picture and finally got the layout map of the third floor of M-Building of Mikkeli University of Applied Sciences. The final map is shown in Figure 26 below.

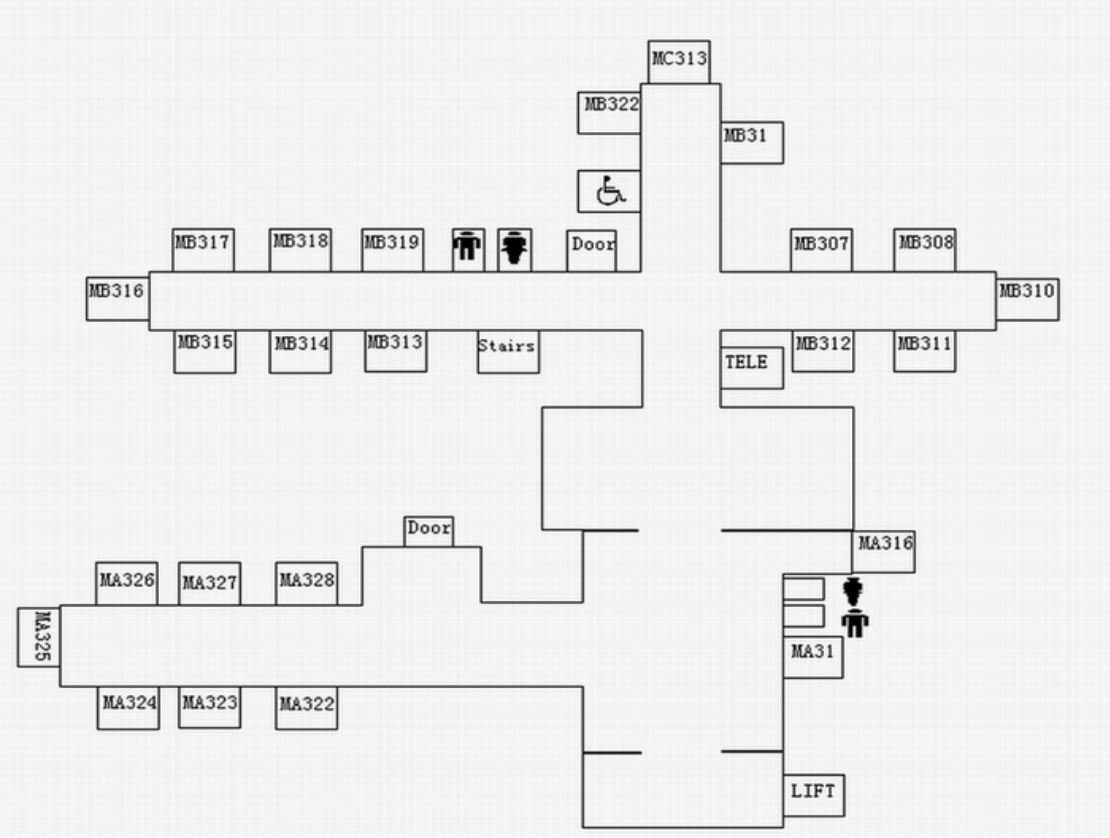

Figure 26 Layout of the third floor of M-Building of Mikkeli University of Applied Science

6.2 Create the Flash of the vector map

In this part I will explain the methods of creating the vector map flash by Adobe Flash for the four routes of my project.

At first I created a new movie clip named “maphaspoint” and imported the map I created. Then I named the layer which the picture placed as “picture” and insert a new layer named point. The steps above are represented in the Figure 27.

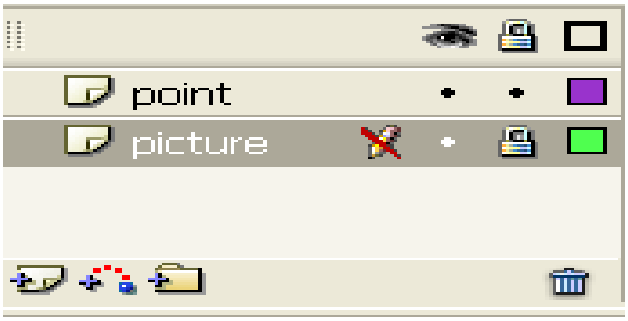

Figure 27 Creating the movie clip and inserting point layer

As the Cisco classroom is located at MB316 classroom adding a red point beside the MB316 classroom indicates the destination and a blue point besides the lift indicates the starting point on the “point” layer. This step is shown in Figure 28.

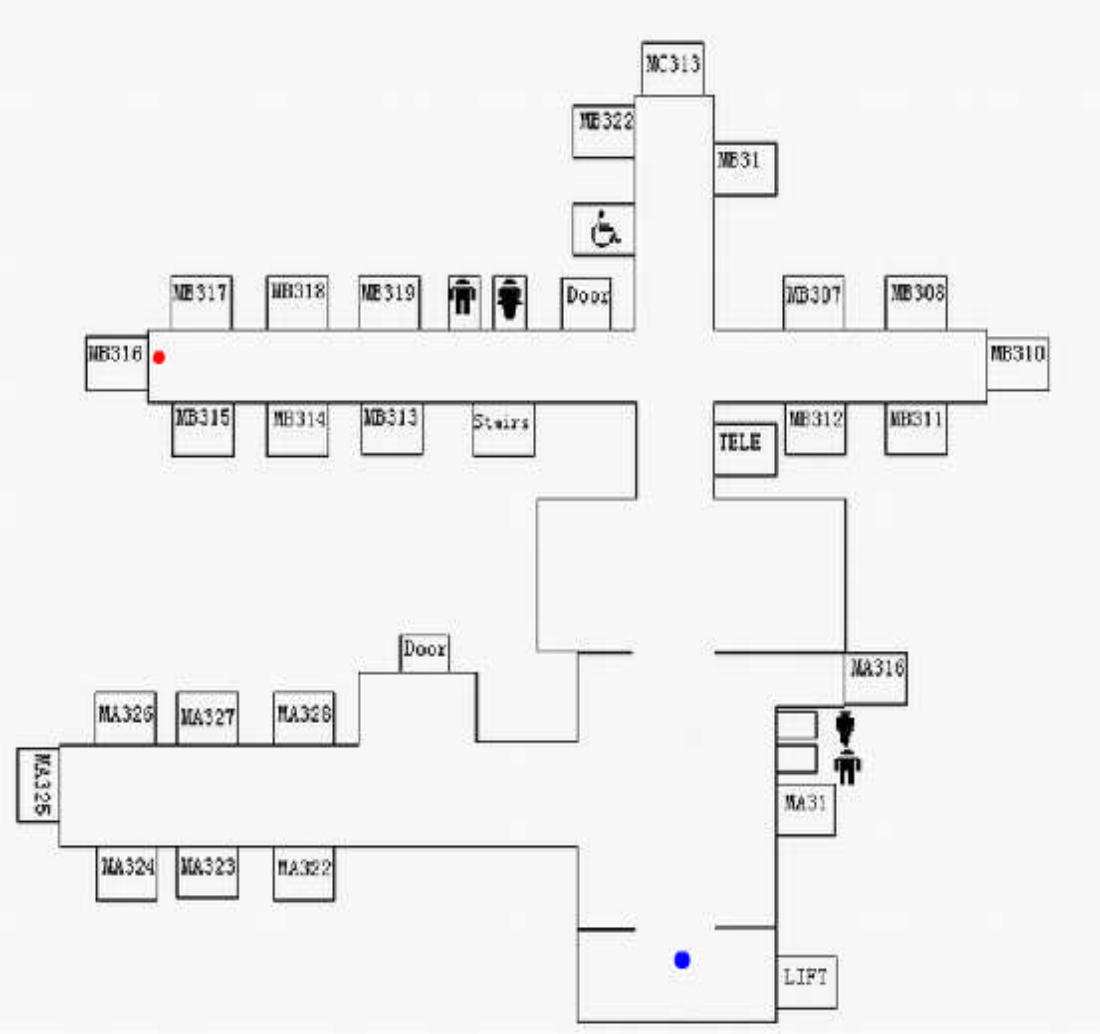

Figure 28 Add points on the point layer

Then we convert the first frame of point layer and picture layer to be a key frame and add the action:

stop()

to this frame so that the movie clip is stopped at the beginning. Then I converted the next frame of the picture layer and point layer to be a key frame, and changed the site of the blue point. Figure 29 represents the changing position of the blue point. When comparing Figures 28 and 29 we can easily notice the site change of the blue point. And the change indicates that the position of the user has changed.

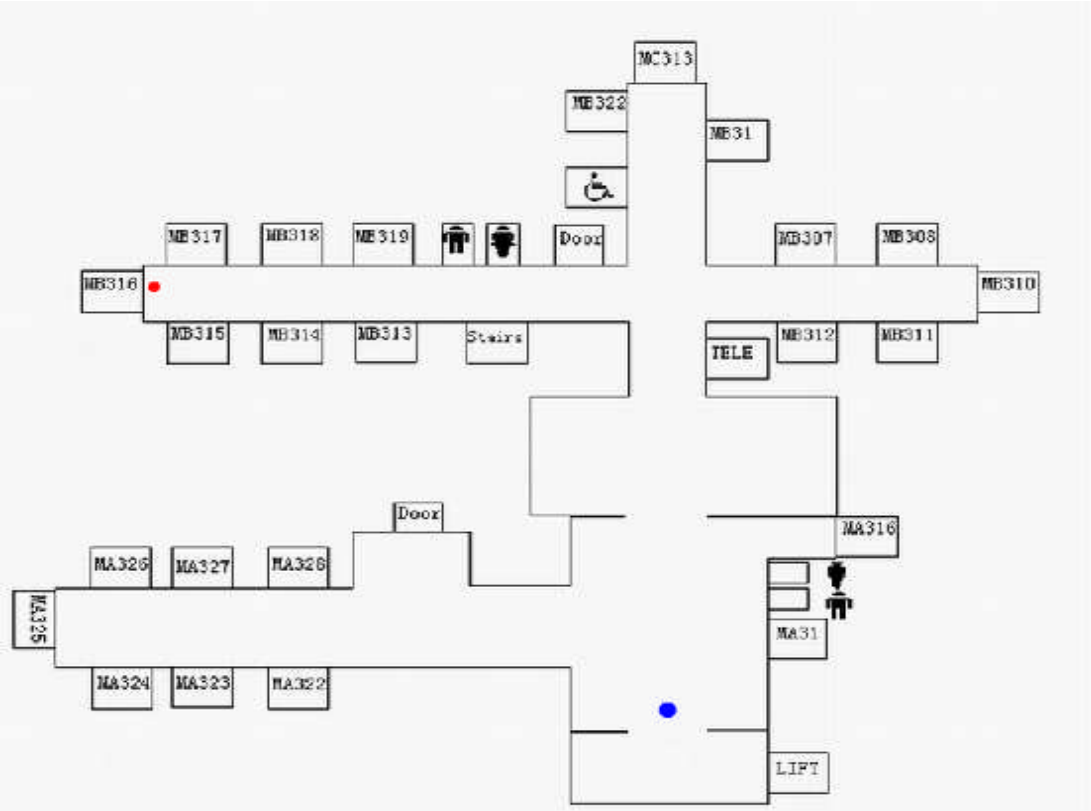

Figure 29 Site changing of the blue point

After that I need to change the location of the blue point again, and it should be in accordance with the small screen indicated. The accordance of the vector map and the small screen is shown in Figure 30

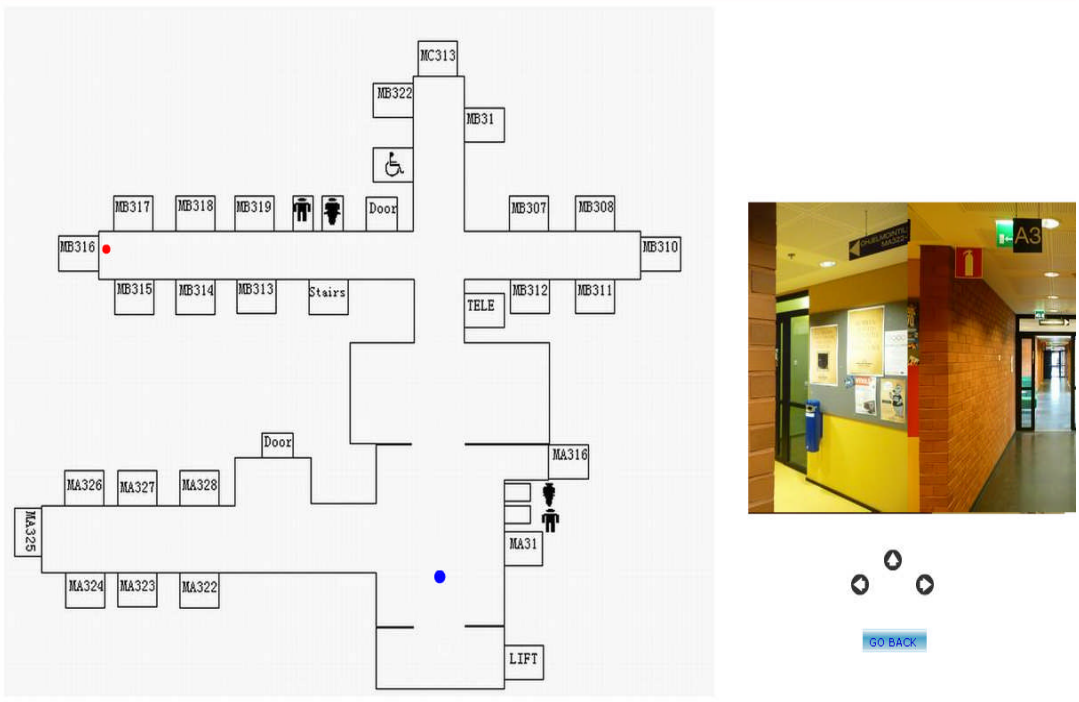

Figure 30 The accordance of the small screen and the vector map

The next work is quite similar to the work. We just did and we need to change the site of the blue point frame by frame until the blue point arrives at the site of the red point. Figure 31 has shown the frames we need before the blue point arrives at the destination.

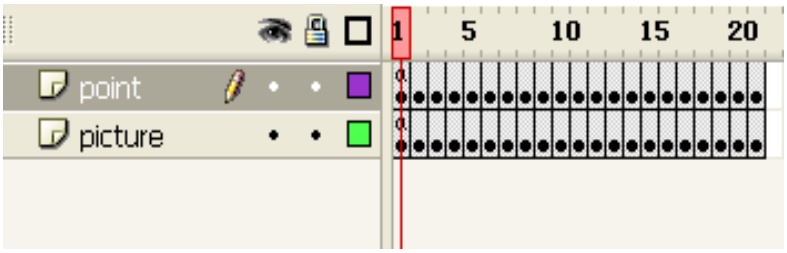

Figure 31 Frames consumed during the route

We can see from the picture that 21 frames have been used during the process that the blue point arrives at the destination. Each frame with a black point is a key frame that indicates the site of the blue point changes.

To make the Flash more convenient to use, add the follow functions the blue point arrives at the location of the red point there will be a sentence informing the user that he or she has already arrived at the destination. Figure 32 shows the situation that the blue point was arrived at the destination.

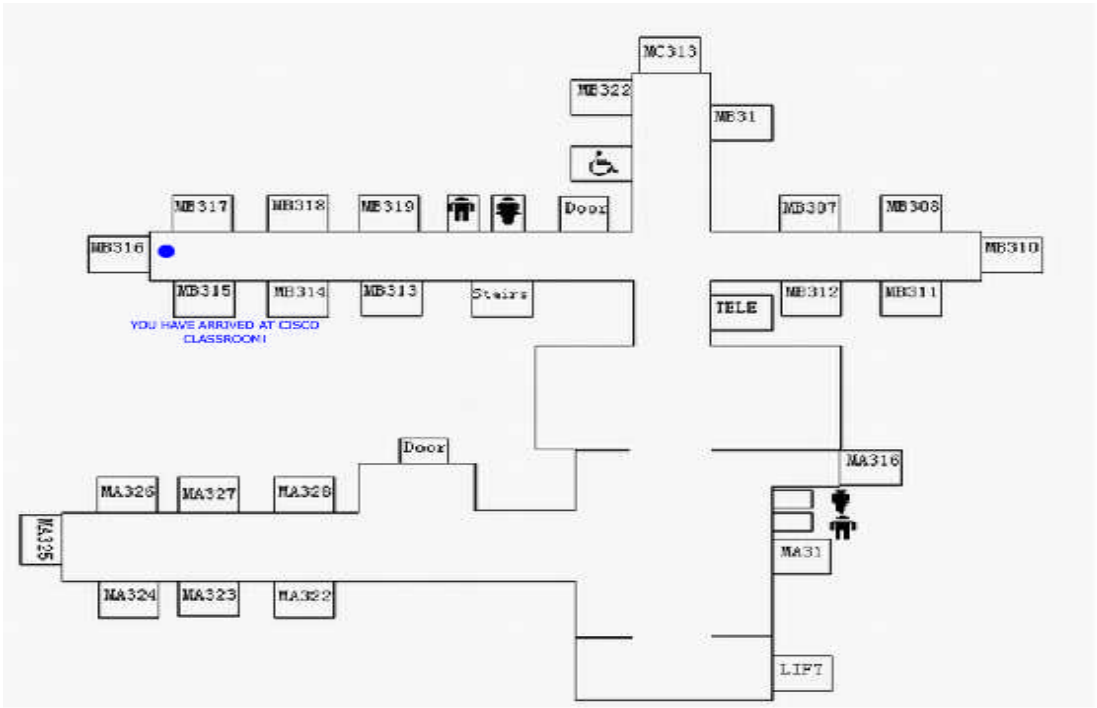

Figure 32 Situation that user arrives at the destination

Now I will explain how to add the sentence into the map. First I needed to create a textbox in the “picture” layer. This step is shown in Figure 33.

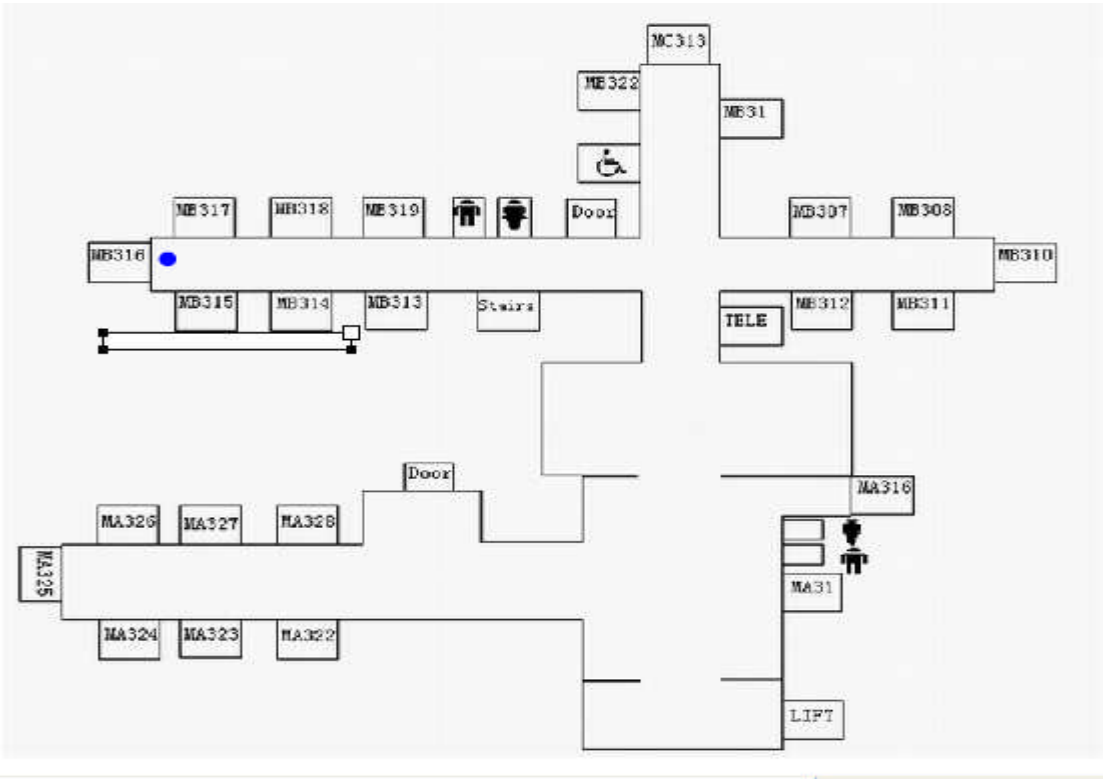

Figure 33 Create a textbox

Then I chose the color of the text that will be enter in the textbox from the tool bar. The tool bar is shown in Figure 34 below. I chose blue as the color of the text that I will enter into the text box.

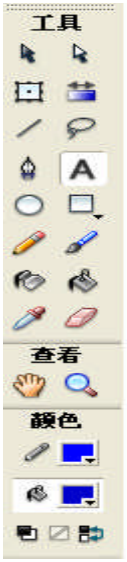

Figure 34 The tool bar

After that I enter the sentence “YOU HAVE ARRIVED AT THE CISCO CLASSROOM！ ” into the text box I have just created before. Now all steps related to creating the vector map movie clip “mapwithpoint” which represents the route to Cisco classroom have been finished.

Now I need to add the movie clip I just created into the main flash. Drag the movie clip “mapwithpoint” into the stage of the second frame of main layer and place the movie clip besides the small screen. The second frame is the frame for the route to Cisco classroom I have added the full-view effect of this route and arrow buttons into this frame before. Now give an instance name “ciscoclassroommap_mc” to the “movie clip we added. Figure 35 shows the main page after these steps.

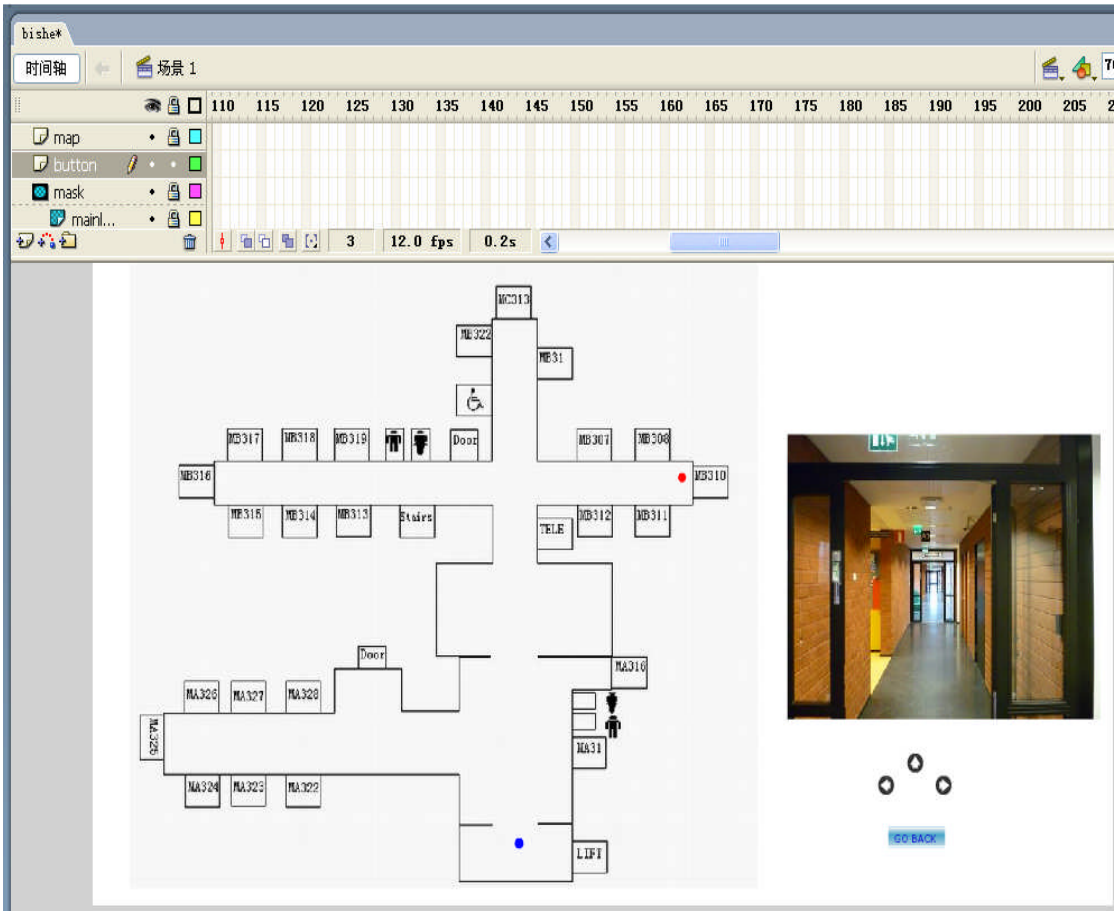

Figure 35 Adding map movie clip into main stage

After that we need to add action to the up arrow button to control the “ciscoclass-roommap_mc” movie clip. The actions added to the up button have been shown below:

```
on (press) { cisco_mc._y=cisco_mc._y+300
ciscoclassroommap_mc.nextFrame ();
}
```

The action: ciscoclassroommap_mc.nextFrame (); is used for controlling the movie clip “ciscoclassroommap_mc”. The meaning of this action is when the user presses the up arrow button, the movie clip “ciscoclassroommap_mc” movies to the next frame.

Now all the steps to realize the vector map function to the route to the Cisco classroom has been done. The method to create the map flashes for the other three routes is quite similar to the method used here so I will not introduce them here. The only difference of the other routes is the vector map which can be seen in Figures 36, 37 and 38.

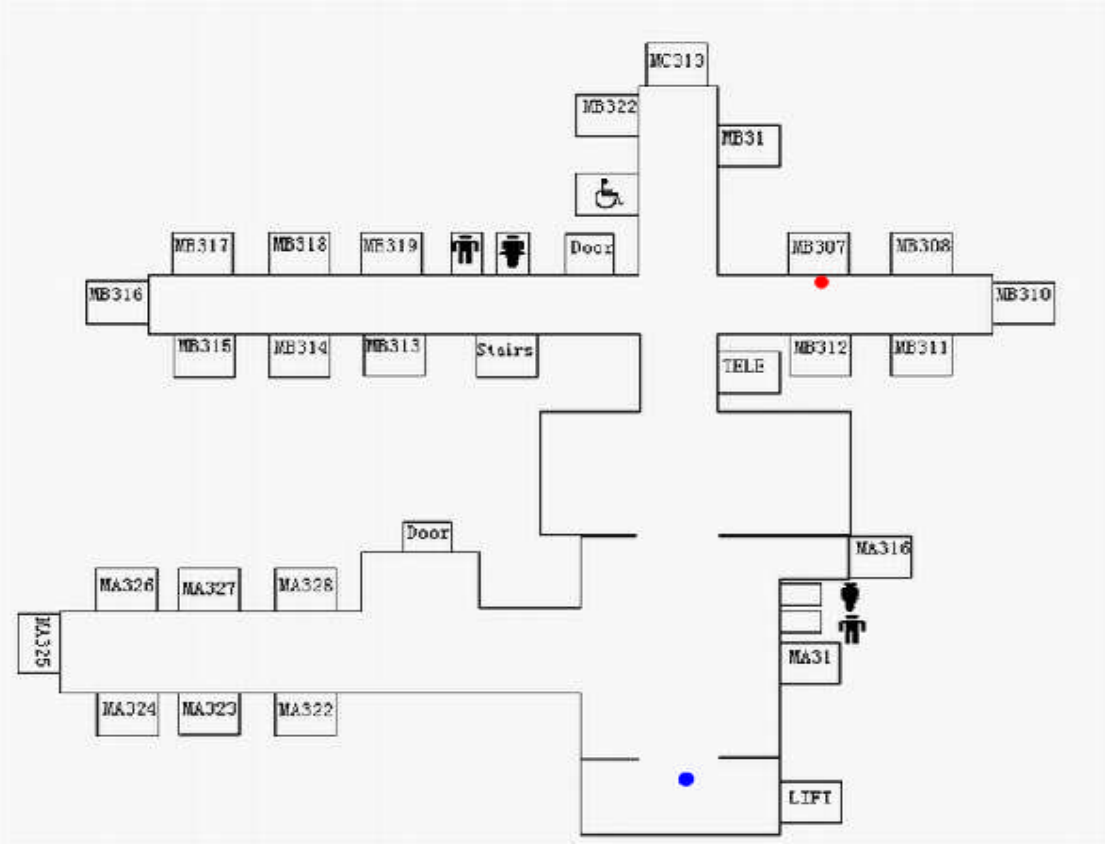

Figure 36 Vector map of teacher Timo and Matti’s office

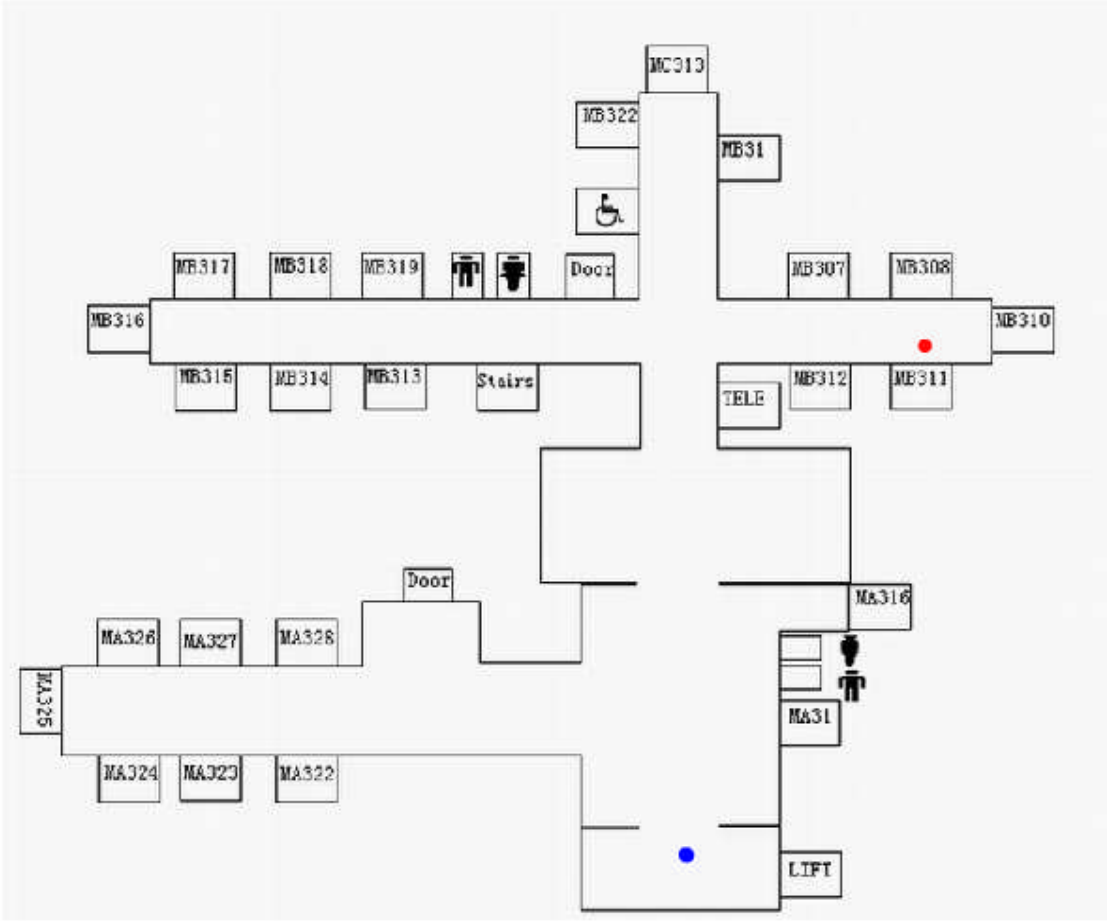

Figure 37 Vector map of teacher Osmo's office

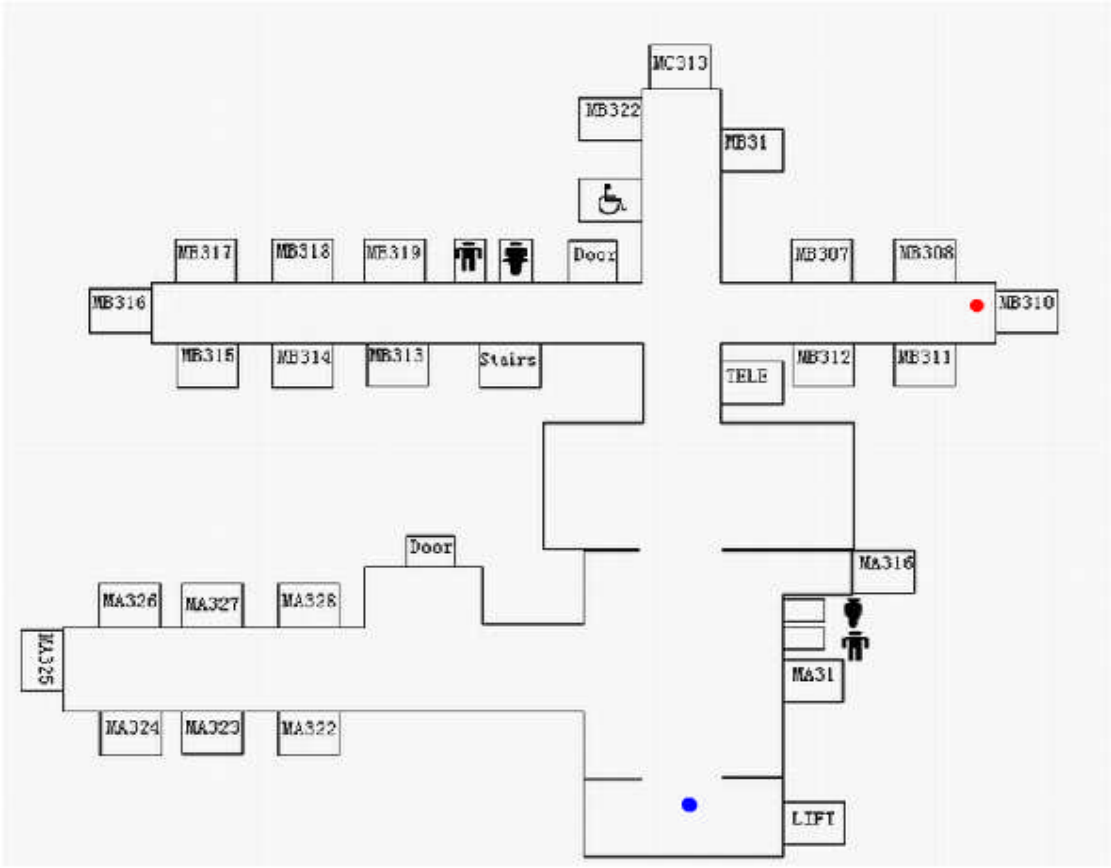

Figure 38 Vector map of telecommunication classroom

7 ESTABLISH CONNECTION BETWEEN DIFFERENT PARTS

The first page (also called main page) is an important part of my project, because the first page of the Flash establishes the relation of the separate routes. Meanwhile the go back button is a small but essential part of the Flash, because this button is used for establishing the connection between the route and main page. In this chapter I will explain the steps to create the main page and go back buttons.

7.1 Create the main page

In the first part of this chapter I will explain the steps of creating the main page of the Flash. We go to the first frame of the Flash. Import the layout map into the stage and place them on the right side of the stage. Then choose a button from the library to import it into the stage. This button library is represented in Figure 39.

Figure 39 Buttons library

I placed the chosen button on the stage of the button layer and copied it three times to get four buttons. I put the buttons to the right places as Figure 40 shows.

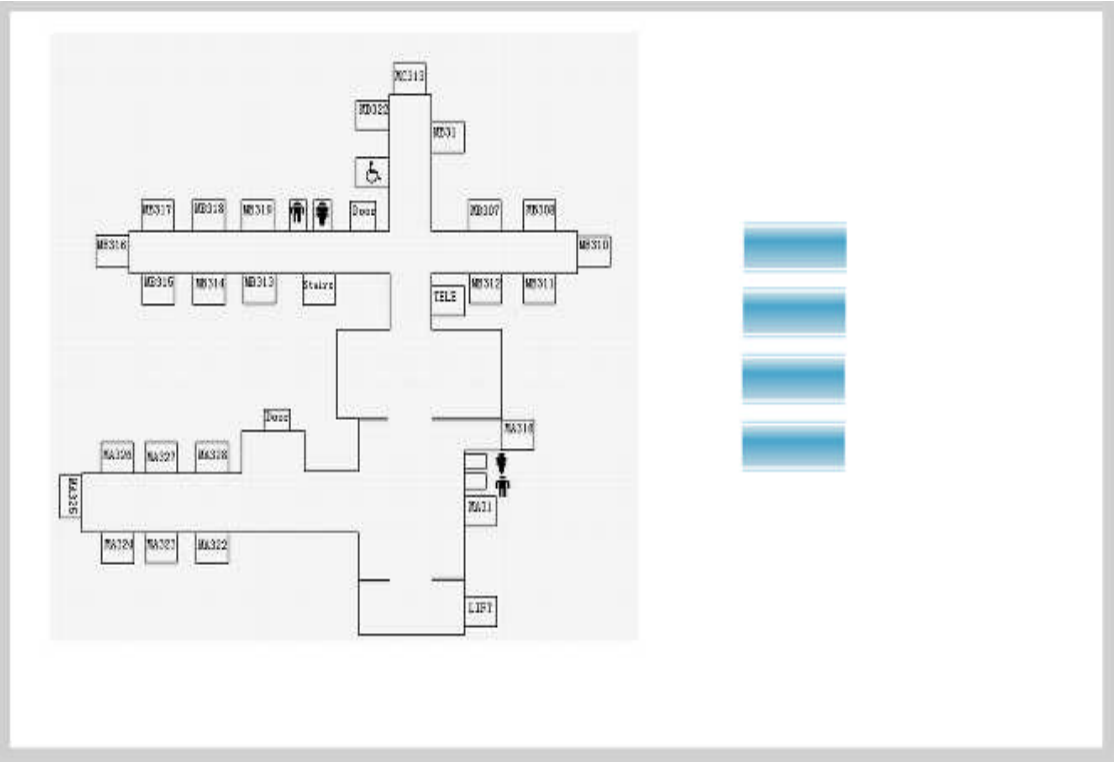

Figure 40 Placing the button in the main page

After that I created text boxes on each buttons and entered the route name in the text boxes. This step is shown in Figure 41.

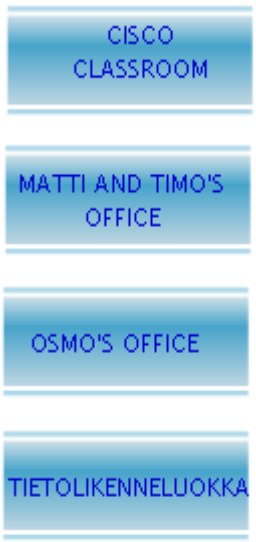

Figure 41 Adding names to button

Now I needed to add actions to these buttons to control the Flash, and I will explain the actions of these buttons one by one.

The first one is the “CISCO CLASSROOM” button. This button is used for linking the main page and the Flash of the route to Cisco classroom. The actions added to this button are:

```
on (press)
{
gotoAndStop(2);
}
```

The meaning of these actions is when a user presses the CISCO CLASSROOM button, flash goes to the second frame. As I arranged the Flash of the route to Cisco classroom in the second frame, so we now have linked the main page and the flash of Cisco classroom with these actions.

The second button is the “MATTI AND TIMO’S OFFICE” button. This button is used for building the link between the main page and the flash of the route to officee of teachers Matti and Timo. The actions added to this button are:

```
on (press)
{gotoAndStop(5);
}
```

The meaning of these actions is when a user presses this button the Flash will go to the fifth frame where the flash of the route to Matti and Timo’s office stays. So these actions create a connection between the first frame and the fifth frame.

The “OSMO’S OFFICE” button is the third; this button is used for establishing the link between the main page and the Flash of the route to the office of teacher Osmo. The actions add to this button are:

```
on (press)
  {
gotoAndStop(4);
}
```

The meaning of these actions is when a user presses this button the Flash will go to the fourth frame. Because of the Flash of the route to teacher Osmo's office stays at the fourth frame. So these actions can create the link between these two frames.

The last button is "TIETOLIKENNELUOKKA" this button is used to create the link between the main page and the flash of the route to the telecommunication classroom. The actions that should be added to this button are:

```
on (press)
{
gotoAndStop(3);
}
```

The meaning of these actions is when a user presses this button the Flash will go to the third frame. Because of the Flash of the route to teacher telecommunication classroom stays at the third frame. So these actions can create the link between these two frames.

7.2 Creating the GO BACK buttons

The GO BACK button is used for returning to the main page from other pages. In this part I will explain the steps to create the GO BACK buttons. The GO BACK button is shown in Figure 42.

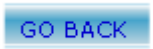

Figure 42 GO BACK button

The first step of creating the go back button is to create a button. Thus I chose the button in the library and created a text box on the button. I entered GO BACK into the text box with blue color. Then I placed the button in the stages of the second frame to the fifth frame. Figure 43 shows the place the GO BACK stays.

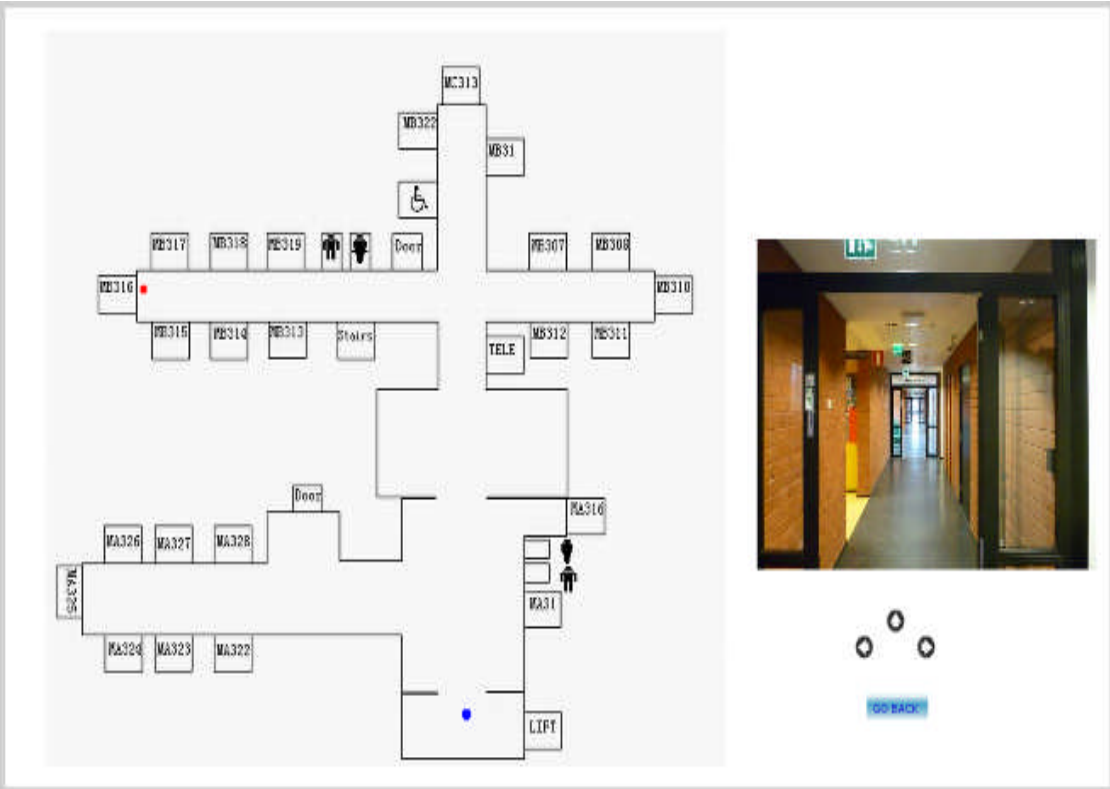

Figure 43 Place the GO BACK button

After that I add the actions below to these buttons:

```
on (press)
  {
gotoAndStop(1);
}
```

Now all the steps of creating the GO BACK button have been finished.

8 CONCLUSION

The aim of my project was to create a Flash which can provide the route from the starting point to the destination the user chose. Meanwhile the Flash has already fulfilled my aim. It can provide four routes and the full-view effects of these routes. With the navigation software I created, the students who come to the M-Building of Mikkeli University of Applied Sciences can easily find their way to the four destinations that are contained in my Flash. Moreover my navigation software is implementing with Adobe Flash which can easily be published in the website. It can be published in the website of our university and make the students who want to study in our university gain a good inside view of the building in the university. At this moment this navigation software can only show a part of the M-Building, however it can be developed further and users can gain the full view of the whole building in the future.

There are lots of navigation tools in our life, such as the GPS, BEIDOU, Google Street View, but there is no navigation software, just like the software I created, for a single building yet. I think the future for this project is bright. This kind of navigation software can be used in a park or a museum. Instead of searching a place in an original map, this kind of navigation software can provide a full-view effects which can give the user a vivid view of the place.

REFERENCES

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(2) http://en.wikipedia.org/wiki/GPS.

(3) http://en.wikipedia.org/wiki/Beidou_navigation_system

(4) http://www.beidou.gov.cn/

(5) http://en.wikipedia.org/wiki/Google_Maps

(6) http://maps.google.com/

(7) http://en.wikipedia.org/wiki/Google_Street_View

(8) http://statowl.com/plugin_overview.php.

(9) http://www.adobe.com/products/player_census/flashplayer/.

(10)http://www.adobe.com/products/player_census/flashplayer/version_penetration.html.

(11) http://en.wikipedia.org/wiki/Macromedia_flash

(12) http://en.wikipedia.org/wiki/ActionScript