

# Appendix

## Avatar creation tool and Social interaction Application

This Chapter explains the functions of the avatar creation tool and the social interaction application, and summarises the execution sequences of these applications. This chapter also looks into the function of each control (e.g. button and menu option) in the graphical user interface of the avatar creation tool and the social interaction application. Section A.1 explains the initialisation of the social interaction application and the avatar creation tool. Section A.2 discusses the function of each control in the graphical user interface of the avatar creation tool and the manipulation of the avatar creation tool. Section A.3 explains the function of each control in the graphical user interface of the social interaction application and the manipulation of the social interaction application. Section A.4 gave a summary of this appendix.

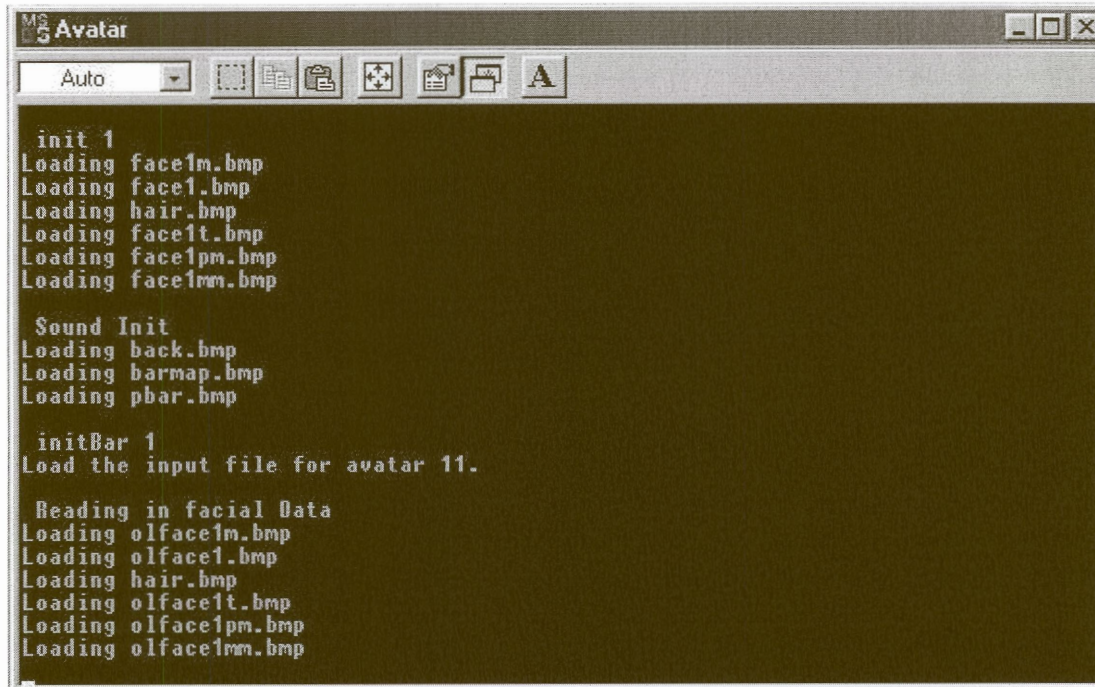
### A.1. Initialisation of the avatar creation tool and social interaction application

Both applications begin with initialisation, which loads the textures, data files and music files of the avatar creation tool and the social interaction application onto the system memory.

Figure A.2 shows that the texture mapping values in the input file are read into the application and then the application loads the textures of the avatar creation tool. Output “Init 1” indicates that the initialisation of the avatar development tool was successful. If the initialisation of the avatar creation tool fails, it will terminate the application immediately. The texture images of the avatar is loaded and after the initialisation process, the avatar is texture mapped with the texture images using the data stored in the input file.

After the avatar creation tool is initialised, the initialisation of the social interaction application commences automatically. The initialisation of the social interaction application load the textures for the graphical user interface (e.g. button textures), the virtual objects, the virtual environment, and the face texture for the barman avatar. Apart from loading textures of the application into system memory during initialisation, the music files of the jukebox and the voices of the avatars are loaded too (indicate by “Sound Init” in Figure A.3). The number of audio files loaded into system memory is large, therefore the application will take longer time to initialise and perform with lower frame-rate on slower computers with lower system memory. Once the audio files is loaded, the texture of the virtual environment, the virtual objects and the application is loaded. A successful initialisation is indicated by the output “InitBar 1” and the application commence with the loading of texture of the barman avatar.

The state of the virtual environment is set to neutral at the initialisation of the social interaction application. (E.g. the position of the virtual objects in the virtual environment is marked as occupied at the floor grid, while the empty grid space is marked as open). The viewpoint (the direction in which the user view into the virtual environment) is positioned in the centre of the virtual environment at the initialisation.



**Figure A.3** Once the avatar creation tool completed the initialisation, the social interaction application commences with its initialisation.

After initialisation is completed successfully, the avatar creation tool and the social interaction tool wait for the user's interactions (the user selecting the controls on the graphical user interface).

## **A.2. Avatar creation tool**

The avatar creation tool window is titled as "avatar builder". The basic controls of the avatar creation tool are on the display screen, while the other controls are in the pop-up menu. The user can select these controls by using the mouse-input device.

The face texture of the avatar is mapped onto the face mesh of the avatar using the texture mapping values in the input file. If a new input file is created the default texture mapping values will be used to map the face texture onto the face mesh of the avatar.

The face texture used for mapping the face mesh is shown on the tool at control number "1" in Figure A.4.



**Figure A.4** The GUI of the avatar creation tool with the controls numbered for easier identification.

The functions of all the controls on the GUI are explained in the following table (Table A.1) and they are shown in the table according to the number in Figure A.4. When the body rotation option is on, the avatar can be viewed from any direction by dragging the mouse pointer on the screen. When the body rotation option is off, the eye of the avatar looks at the direction of the mouse movement.

Control Number	Button Control Function
2	This button control enables and disables the masking mode. When the masking mode is disabled, the pupil mask is not applied to the face mesh, so the eye rotation cannot be animated in the application. The masking mode is enabled at the initialisation of the tool.
3	This button control changes the appearance of the models in both the avatar creation tool and social interaction application to a mesh, or wire-frame, vertex appearance. Initially the button is set such that the model appears in a mesh form.
4	This button can change the speed of the application. The button is set to high at the initialisation of the tool.
5	This button decreases the texture mapping adjustment value.
6	This button increases the texture mapping adjustment value.
7	This button causes the view to zoom out of the avatar.
8	This button causes the view to zoom in of the avatar.
9	This button changes the face expression of the avatar to the previous expression in the tool.
10	This button enables the avatar to perform the facial animation in the avatar creation tool, and enables the avatars to perform the facial and body animation in the social interaction application. During initialisation, the animation option is disable in both applications.
11	This button changes the face expression of the avatar to the next expression in the tool.

**Table A.1 The button control function of the avatar creation tool.**



Figure A.5 The pop-up menu of the avatar creation tool.

In the pop-up menu, there are options that allow the user to perform more complex manipulation than the selection options in the GUI. The function of each selection option in the pop-up menu is explained in Table A.2.



<b>Selection Option name</b>	<b>Function of the selection</b>
“adjustment x”	Adjusts the texture mapping co-ordinates shifting it along the x-axis of the face mesh.
“adjustment y”	Adjusts the texture mapping co-ordinates shifting it along the y-axis of the face mesh.
“adjustment eye brow level”	Adjusts the texture mapping co-ordinates at the eyebrow region. The user can simply move the eyebrows in the texture to the correct position in the face mesh by selecting the adjustment value button or enter the “-“ and “+” key.
“adjustment eye level”	Adjusts the texture mapping co-ordinates at the eye region. The usage of this selection is similar to those of “eyebrow adjustment level” selection.
“adjustment mouth level”	Adjusts the texture mapping co-ordinates at the mouth region. The usage of this selection is similar to those of “eyebrow adjustment level”
“Load Other Face map”	Changes the face texture at any time by selecting this option.
“Switch head/eye rotation”	Switches the mouse drag properties to perform rotation on the whole avatar according to the head direction or rotation the eyes of the avatar.
“Reset head/eye rotation”	Resets the rotation values back to the neutral position.
“Expression”	This option has a sub menu that contains all the basic facial expression of the avatar. When the user selects the expression, the avatar will change its facial expression to the one selected by the user.
“Disable/Enable Grid Background”	Disables or enables the background image.



"Change screen size (500-800)"	Changes the window size between 500x500 and 800x800 size.
"Quit Program"	Closes the avatar tool and the social interaction application together and save the texture mapping data into the input file.
"Gender"	The female or male model is selected
"Add Avatar"	Adds the avatar in the avatar creation tool into the virtual pub environment.
"Print Avatar"	Prints the information of the avatars.
"Color"	Colour selection option that contains predefined colours for colouring the avatar's body.
"Avatar part color"	Enables the user to select the upper body, lower body or the shoes of the avatar and provide a colour for this avatar part.

**Table A.2 The functions of the selections in the pop-up menu.**

Complex texture mapping adjustments on the face mesh are performed using the keyboard, this allows the user to adjust the face texture by fine tuning the texture coordinates at each vertices in the face mesh. The user can increase the mapping value at a vertex by pressing the "z" key, while decreasing the mapping value by pressing the "x" key. The user can move between vertices by pressing "c" to move to the next vertex or pressing the "v" key to move back to the previous vertex. While the "b" and "n" key allows the user to move to the first vertex at the next or previous row of vertices along the face mesh.

### **A.3. Social interaction application**

The controls of the social interaction application are on the display screen and the user can select the controls by using only the mouse-input device.





**Figure A.6 The selection controls of the social interaction application GUI.**

The functions of the selection controls on the Graphical User Interface (GUI) of social interaction application are explained in the following table (Table A.3) according to the numbers in Figure A.6. When the user drags the mouse point on the screen, the camera views will change according to the camera mode selected by the user.

Selection Control Number	Selection Control Function
1	This selection control causes the selected avatar to stop the action that it is busy performing and to remain still.
2	When this control is selected, the selected avatar will initiate a conversation with one of the surrounding avatars.
3	This control causes the avatar to watch the television at



	the wall of the pub.
4	When the user selects this control, the selected avatar will walk towards the jukebox and if other objects or avatars do not block its path, it will play music from the jukebox.
5	This selection control instructs the selected avatar to have a drink.
6	If the selected avatar is a barman, the selected avatar will change the television channel.
7	This control instructs the selected avatar to change the music of the jukebox and listen to this music.
8	When this control is selected, the selected avatar will switch between sleeping mode and active mode. Initially all avatars are in sleeping mode, and avatars can only perform the actions when they are active (Awake).
9	This selection control rotates the avatar at 90 degrees angle.
10	The user can position the avatars in the pub by selecting the direction arrows, and it will move the avatar in that direction.
11	When this control is selected, the initial positions and the face textures of all the avatars in the pub will be loaded into the application.
12	This control switches the camera mode to the camera rotation mode.
13	This control switches the camera mode to the camera pan mode.
14	This control enables the user to select an avatar in the pub sequentially.
15	This control quits the social interaction application and

	the avatar creation tool.
16	The user can move to a previous camera position (centre view, view from the barman, view At the selected avatar and top view) using this control.
17	The user can move to a next camera position using this control.
18	This control re-targets the camera on the selected avatar, after the position of the avatar has changed in the pub.

**Table A.3 The selection control functions of the social interaction tool GUI.**

The selection button controls in the GUI of the social-interaction application can automatically be resized based on resolution set by the operating system at full screen mode and maximised window mode. It is best if the user select the auto-hide option for the taskbar when executing this application at maximised window mode, because the height of the taskbar affects the calculation on the available window space for this application on the desktop. By entering the “ f ” key on the keyboard with the selected application, this will cause the application to run in full screen mode. In full screen mode, the application is not affected by the size of the desktop area, and if the “ w ” key is enter, it will set the application to return to window mode.

#### **A.4. Summary**

This appendix should give the user an overview of the functionality of the controls in the avatar creation tool and the social interaction application, as well as the functions and interactions in both of these application. The avatar creation tool has many selection controls than the social interaction application, because it has more complex manipulation that involve texture mapping the face and setting up the avatar for the social interaction application.