Software Design Document

for
Archaeology Robot
Group 13

Yufeng Bai 1600095	
Dawei Geng 1219181	
Jun Chen 1206265	
Quang Khoi Nguyen 1187070	
Shikai Li 1214223	
Yunyao Yao 1203525	
Yatong Zhou 1204471	

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Revision History

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Dawei Geng	03 Sep 2012	Template	0.1
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Chapter 1

Introduction

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7.1 Overview of the User Interface

The Graphical User Interface is used to communicate with the robot. The GUI is connected with robot, the client is able to control the robot by GUI. When the robot finishes its task, the client is allowed to switch off and disconnect with robot. In addition, the GUI demonstrates the status of the robot. The status includes the speed, the power and the location of the robot. The GUI also shows the obstacles, the "no-go" zone and hidden walls, which is able to be checked on the map window.

The GUI is able to demonstrate the follow functions for users:

- Save map to a XML file
- Load map from a XML file
- Change the control mode
- Demonstrate the Bluetooth and Battery status
- Control the moving direction of the robot(i.e. forward, backward, rotating)
- Demonstrate the Icon of the map
- Demonstrate the Log Information
- Change the speed of the robot
- Demonstrate the coordinate of the robot

The GUI is displayed below:

Figure 11: GUI

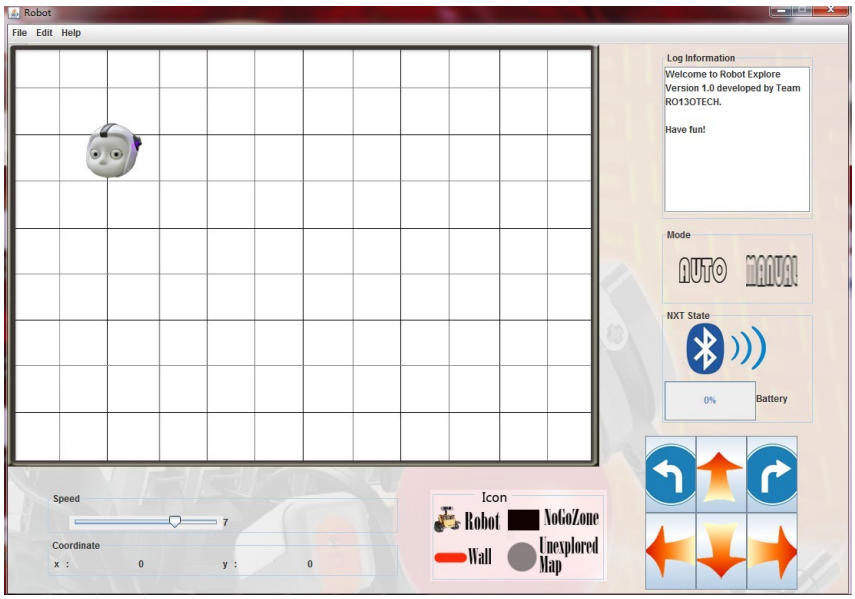

Figure 12: GUI WITH MAP

7.2 Deatiled Design of the User Interface

7.2.1 Save map

The GUI includes a icon which is used to save the map from a XML file. When the client presses the File menu and choose the save option, there is a window jumping out, the client is able to choose the file where the client want to save.

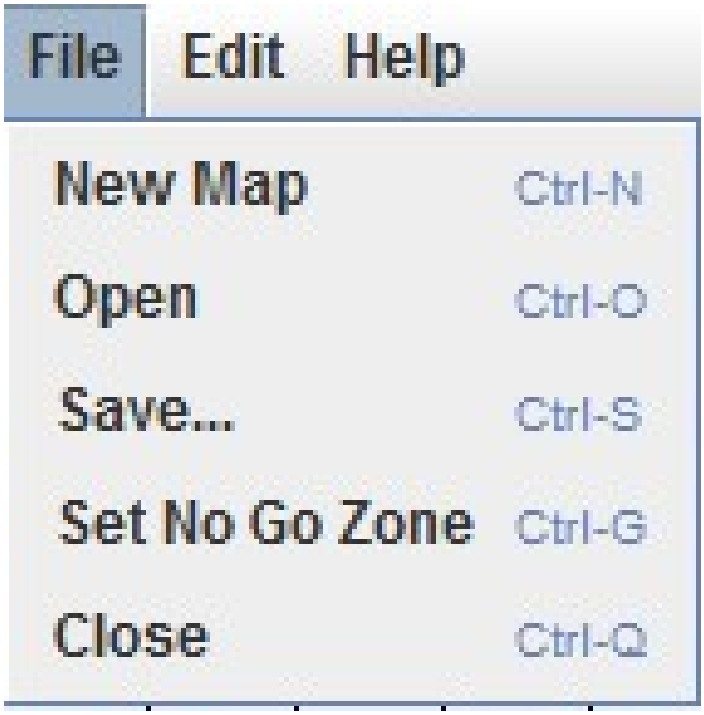

Figure 13: SAVE MAP

7.2.2 Load map

The GUI includes a icon which is used to load the map from a XML file. When the client presses that icon, there is a window jumping out, the client is able to choose the map from there.

Figure 14: LOAD MAP

7.2.3 Change the control mode

The client is allowed to change the control mode by pressing the mode button. When the client presses the Auto mode button, there is a widget jumping out. Then if the client presses "yes", the robot changes to the Auto mode. The client is allowed to do the same operation to change to the Manual mode. The Log information display which mode it is currently.

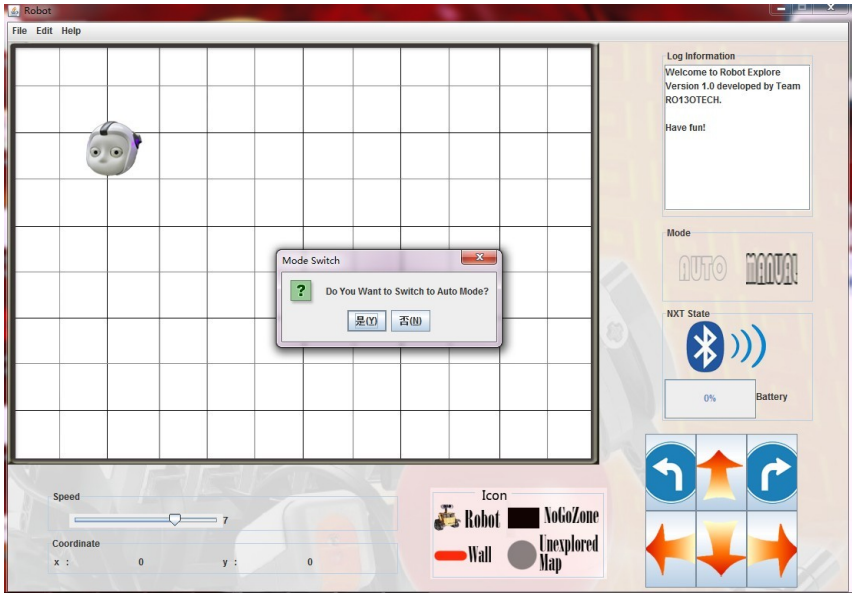

Figure 15: Change Mode

Figure 16: Change Mode icon

7.2.4 Demonstrate the Bluetooth and battery status

The Bluetooth and battery status are displayed on the GUI, if the bluetooth loses the connection, the log information board will demonstrate the lose information. The power of the battery is displayed by the percentage number and the colour of the battery bar will change along with the battery level.

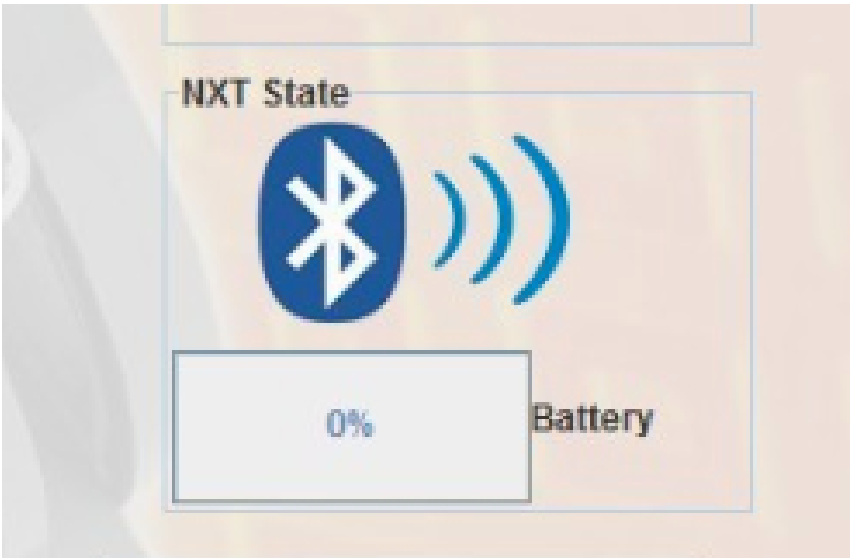

Figure 17: Bluetooth and battery demonstration

7.2.5 Control the moving direction of the robot

The robot is able to be controlled by GUI when the robot is changed to the Manual mode. The client is allowed to press the arrows to move the robot. The robot is able to move forward, backward and rotate(include rotate 90 angles and rotate 360 angles). The moving direction controlling only can be used in Manual mode.

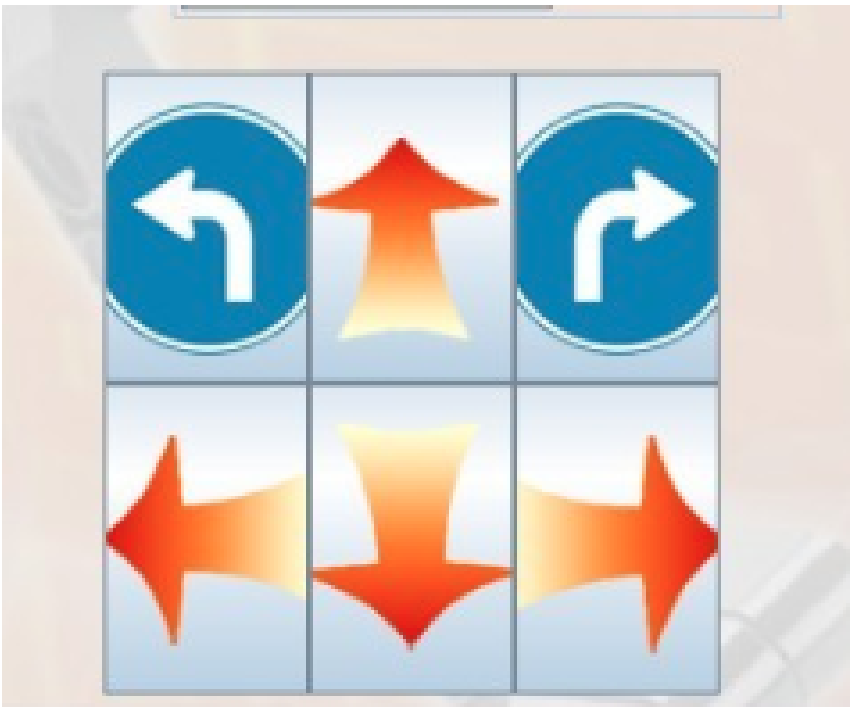

Figure 18: Moving control

7.2.6 Demonstrate the icon of the map

The robot and map information are required to be displayed on the GUI. It is necessary to use different icons to demonstrate the different map information.

Figure 19: Icon of the map

7.2.7 Demonstrate information of the GUI on the log information board

The Log Information board displays the information of the GUI. For example, the Log Information board demonstrates the version and the developers of the robot. If the client changes the control mode, the board displays which mode it is now. The board also is required to indicate the connection information.

Figure 20: The logging information

7.2.8 Control the speed of the robot

The GUI includes a speed bar and one specific number to control the speed of the robot. The client is allowed to change the speed of the robot by change the number of the bar. The larger number means the faster the robot is. If the number is zero, it means the robot stops immediately.

Figure 21: The speed controlling

7.2.9 The location of the robot

The GUI is required to display the specific location of the robot. The map is made up of a lot of grids. The location of the robot is able to display by coordinate, which is more accurate. When the robot moves, the coordinate will changes immediately.

Figure 22: The coordinate of the robot

Chapter 8

Resource Estimates

The resource of the project is estimated according to the Project Description and the client's requirements in every week's meeting. All hardware and software which are used in the project are demonstrated below.

8.1 Hardware

8.1.1 Robot

Name: NXT Robot includes all components of the robot
Function: The robot is used to search the map and find all the obstacles, hidden walls and "no-go" zone. All operations are required to finish by controlling the robot.

8.1.2 Host

Name: PC
Function: The PC is required to demonstrate the searching information of the robot. PC is also used to control the robot on Manual Mode. The programs are uploaded to the robot from the PC.

8.1.3 Connection

Name: Bluetooth and USB
Function: The Bluetooth and USB are all used to connect with the robot. The USB is limited by the length of the cable. The bluetooth is limited by the uploading speed. In this project, the USB is used to upload the program and the bluetooth is used to implement the manual control.

8.2 Software

8.2.1 Operation Environment

Name: Mac, Linux and Windows
Function: This project is not providing the working environment. Any system is able to develop the programs for the robot.

8.2.2 Developing language

Name: Java, latex Function: The codes are allowed to write in java language, which is convenient to be read by any developers. The documents are required to write by Latex, then generating the pdf documents.

8.2.3 Developing tool

Name: Eclipse Function: Eclipse is a better tool to make the program for this project. The Eclipse is used to write the operation commands for the robot and draw the GUI for this project.

8.2.4 Robot Software

Name: leJOS 0.9.1 Function: The leJOS is used to control the robot and developing tool is required to support the leJOS 0.9.1.

8.2.5 Testing tool

Name: JUnit Function: The JUnit is used to debug the code.

Chapter 9

Definitions, Acronyms, and Abbreviations

Acronyms/Abbreviation	Description
API	Application Programmable Interface
BT	Bluetooth
GUI	Graphical User Interface
PC	Personal Computer
SRS	Software Requirements Specifications
SPMP	Software Project Management Plan
USB	Universal Serial Bus
XML	eXtensible Markup Language

Table 1: Acronyms/Abbreviations

Appendix A