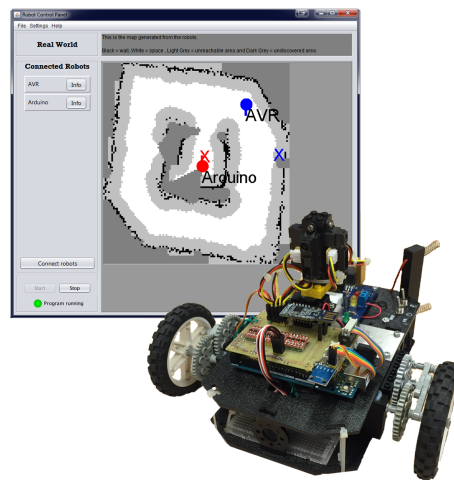

User Manual for “System for Self-Navigating Autonomous Robots”



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1 | Installation

1.1 Connect the dongle

Prior to starting the application, you have to connect the nRF51-dongle to your computer. Take the dongle containing the server software, and insert it into the USB-hub at your computer. Make sure the LEDs at the dongle are flashing before entering the application.

1.2 Find correct COM Port

1.2.1 Windows

- Press the Windows key
- Search for “Device manager” and click on it to open up the manager window
- Expand the “Ports” list and locate the NRF51-port¹

1.2.2 Mac

- Press Command + space to enter spotlight search
- Search for “System Information” and click on it to open up the information window
- Select “USB” in the list and locate the NRF51 port

1.3 Get the application

In the appendices of the project report “Andersen&Rødseth (2016)”, you will find the application in the folder “SSNAR Application”. Copy the “.zip” file to the desired destination folder at your computer, unzip the archive and you are all set.

¹May be named JLINK.

2 | Use

This chapter describes how the main application works, and how to enter the different modes. To learn more about the simulator and its functionality, see project report “Thon (2016)”

Be sure to follow the installation process as described in Chapter 1 before starting the application. Navigate to the folder where you unzipped the archive (section 1.3), and Double-click “SSNAR” to start the application.

2.1 Mode selection

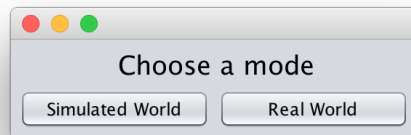


Figure 2.1: Mode selection

The mode selection window is presented upon startup. The two different modes “Simulated world” and “Real world” decides if the application will use a real or a simulated reality. Select the desired mode, and the program continues to the application main window.

2.2 Main window

The main window, see Figure 2.2, is where you will spend the most of your time. It contains a limited amount of information about the different parts of the program and it provides buttons that let you access the programs features.

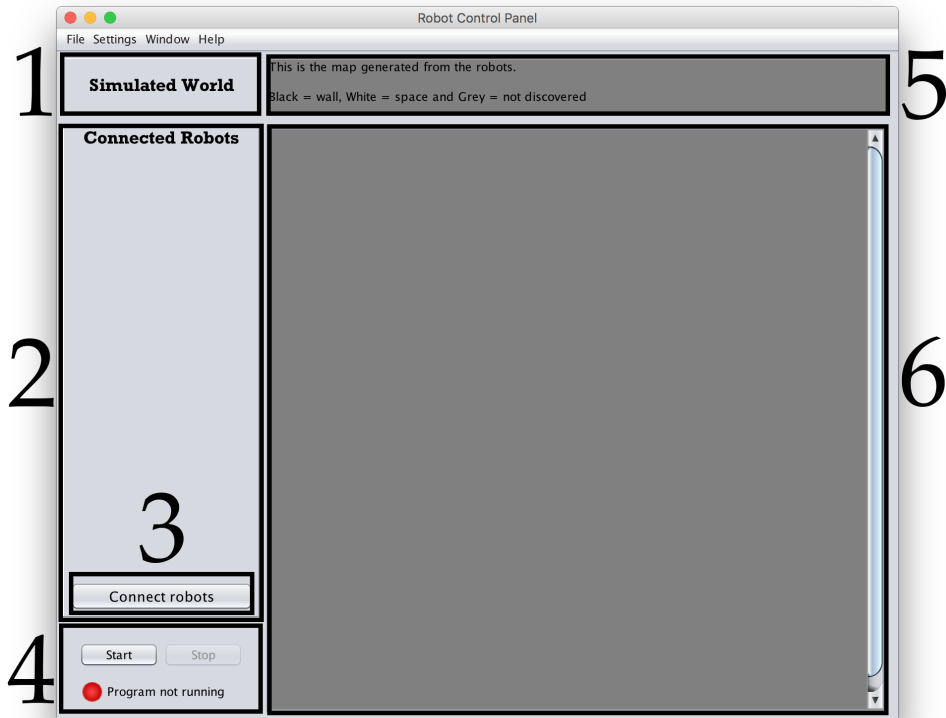


Figure 2.2: Main window

In the following list the parts of the main window are described (See Figure 2.2 for reference).

1. Mode title - This panel tells you which mode the program is currently running in.
2. Connected Robots - This panel will be updated with the connected robots (see Figure 2.7). Clicking the “More info” button will open up the Robot info window.
3. Connect robots - This button will open up the “Connect Robots” window (section 2.3).
4. Start/Stop - The start and stop buttons will start and stop the application. The indicator will light green if the program is running.

5. Info - The information panel will display informative text as the mouse cursor hovers over the different parts of the GUI.
6. Map - The map will be painted in real time as the robots discover new areas (section 2.6).

2.3 Connect Robots

Select the correct COM port from the settings menu before trying to connect to robots (follow the steps in section 1.2 to find the port name).

Clicking the “Connect Robots” button (see number 3 in Figure 2.2) opens up the window shown in Figure 2.3. The progress bar in the upper left corner will show the progress of the search until it is finished. Robots that are found during the search will be listed in the list “Available robots” (see Figure 2.4). If you have not found the desired robots, click the “Scan” button to search again.

Be sure to select all the robots you are going to use before clicking the “Connect” button, cause you will not be able to connect to more robots without disconnecting all connected robots first.¹

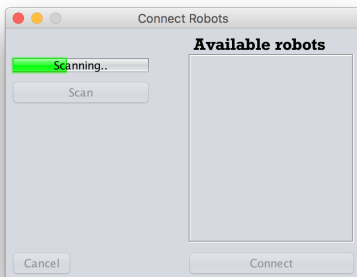


Figure 2.3: Searching for robots

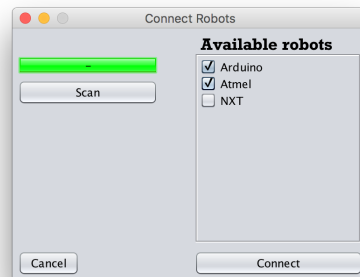


Figure 2.4: Connecting to robots

2.4 Initial values

After the “Connect” button is clicked, the application proceeds to the window shown in Figure 2.5. The position is relative to origo, and the units are in centimetre (angle

¹This is due to a limitation in the functionality of the nRF51-dongle.

in degrees). Be sure to input the correct values for the most accurate mapping of the area.²

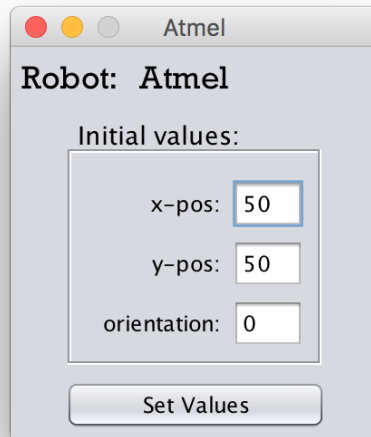


Figure 2.5: Set the robots initial position

²HINT: Let the first robot start in position (0,0) and place the rest of the robots relative to the first one.

2.5 Info

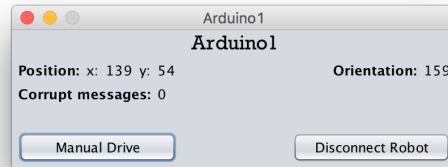


Figure 2.6: Robot-specific information

Clicking on the “Info”-button associated with a given robot brings up the robot specific information window, see Figure 2.6. This window presents information about the robot such as name, position and orientation. The information is updated in real-time.

Clicking the “Disconnect Robot” disconnects the robot. The “Manual Drive” button enables you to send commands to the robot. Enter values for both angle and distance, and click “Send Command” (or press enter alternatively).

2.6 Map

When the robots are moving around and mapping the undiscovered area, the map will be updated in real time (see number 6 in Figure 2.2). The connected robots are shown as different colours with their name attached. Each robot has a pointer that shows its orientation, and a “X” in the robots colours will illustrate where it is heading.

2.6.1 Colours in the map

See Figure 2.7 for an illustration of mapping in progress, and a list that describes the colours in the map.

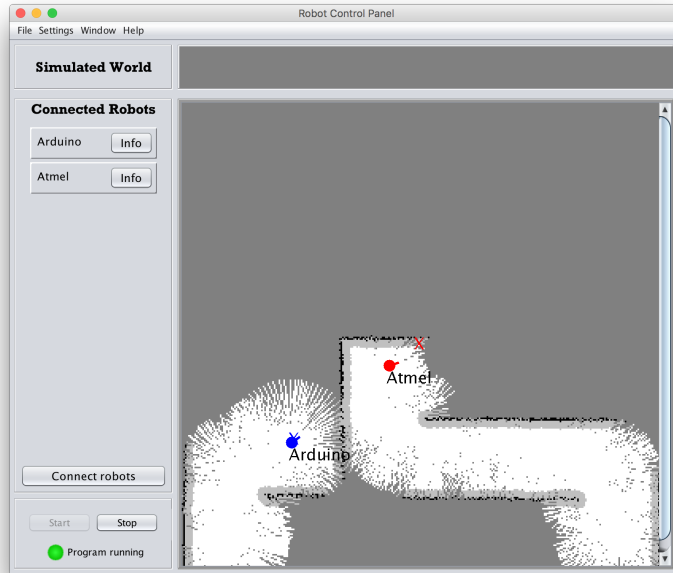


Figure 2.7: Real-time map plotting

- Black - discovered wall
- White - discovered space, no obstacle
- Light grey - unreachable area, due to collision avoidance
- Dark grey - undiscovered area

Glossary

COM Communication. i, 1, 5

GUI Graphical User Interface. 5

LED Light Emitting Diode. 1

SSNAR System for Self-Navigating Autonomous Robots. 3