LpzRobots and GoRobotos

An installation manual

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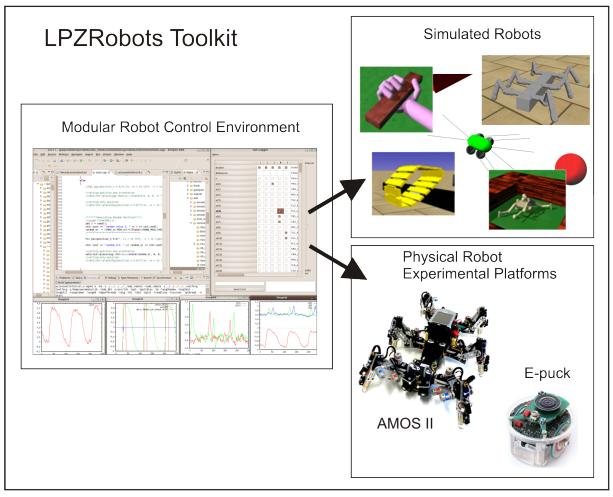
This installation manual shall first provide some general knowledge about the gorobots-Project and the architecture we use. Then this guide will explain step-by-step how to set up your Eclipse, so that you can work with the LpzRobots-Simulation and the gorobots-Project.
In the future, we would like to complete this installation manual in a way, that it will also include manuals for setting up the software needed for AMOSII (Hexapod) and other robots.



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1 Introduction

The LpzRobots-Simulation is a robot simulation programmed at the university of Leipzig. Its main features include the ode_robots, which is a 3D robot simulator, that is physically correct, and the so called selforg, that is a framework for controller implementation.
The important parts of the software architecture are shown in Figure: 1:

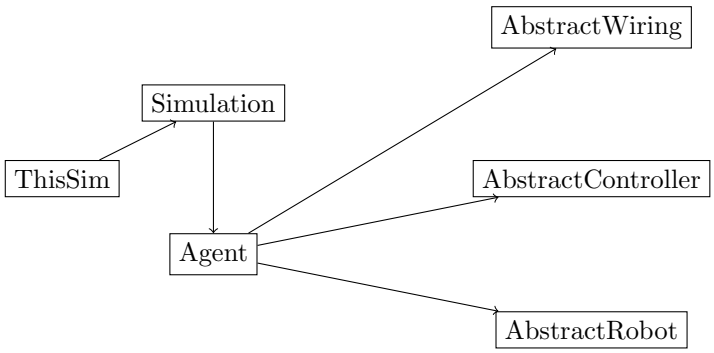

Figure 1: Software Architecture for LpzRobots and GoRobotos

ThisSim will, during a simulation, integrate all elements of this very simulation, which means controlling the environment, the robot, as well as setting initial parameters and plotting or logging data.
Agent will integrate all elements of an agent by using the shown classes, one can for example add sensory preprocessing using a child class of AbstractWiring.

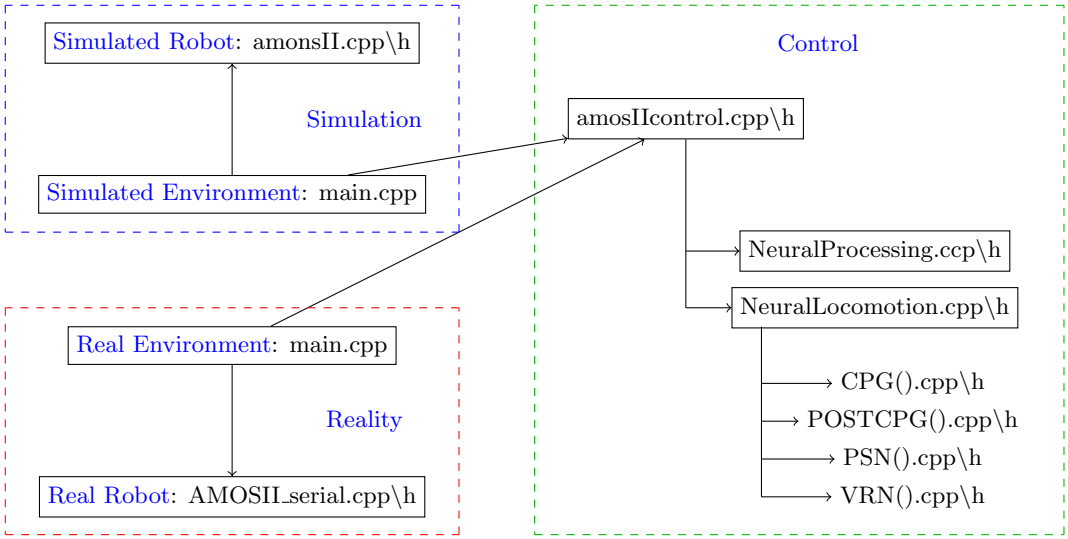

Figure 2: Need name for this picture

For working with the LpzRobots-Simulation, you will need a couple of things:

1. A (preferably up-to-date) UNIX-based Operating System (state of the art: Ubuntu 11.10 or Debian 6.0)
2. The Eclipse-Software combined with the following packages:
   - C/C++ SDK
   - The EGit-Tool-Kit
3. Access to the Assembla-Repository (contact your supervisor for access)
4. The setUpGoRobots.zip file (contact your supervisor for the file)

2 Setting up Eclipse and LpzRobots

2.1 Running setUpGoRobots.sh

From your supervisor, you will receive the .zip-File setUpGoRobots.zip. To begin with, you need to extract the file and the script setUpGoRobots.sh. This script will:

1. Install the required packages on your computer
2. Include important settings to your .bashrc
3. Fetch the repositories LpzRobots and GoRobots
4. Import the project settings file
5. Compile the files

Please note, that you need to be root to install the package via this script!.
After extracting, you can run the script, by typing ./setUpGoRobots.sh in the corresponding directory.

2.1.1 Forking a repository

The script will ask you for the URL of your forked repository. Please read about how to fork a network with Assembla in Section 4.3.

2.2 Setting up Eclipse

2.2.1 Installing Tool-Kits within Eclipse

Before importing the repositories, you need two tool-kits for your Eclipse:

1. To install a tool-kit, go to Help→Install Software
2. The first tool-kit you need is the C++ Development Kit. Work with the following link:
   `http://download.eclipse.org/tools/cdt/releases/indigo`
   and install the so called CDT-Tool-kits.
3. The second tool-kit is EGIT for accessing GIT within Eclipse. You can download it working with this link:
   `http://download.eclipse.org/egit/updates`. Whilst doing so, you have to check the box for Eclipse Git Team Provider and uncheck the box for EGit Mylyn.

2.2.2 Importing the Repositories

Once you have finished running the script and have installed the tool-kits, you are ready to import the repositories into your Eclipse.
To do so, first switch into the Git Repositories - View within Eclipse. You can do this by clicking: Window→Show View→Other→Git→Git-Repositories and hit OK. In this view, you can choose Add an existing local GIT repository. The script will have placed the files at /home/yourlogin/workspace.

2.2.3 Code-Style withing Eclispe

To adapt the Code-Style, go Window→Preferences→C/C++→
Code-Style→Import. Now you choose the file:
`workspace/lpzrobots/codeStyleEclipse.xml` and hit apply.

2.3 Troubleshooting

If you encounter any problems while using the script, please contact Frank or me (c.rauterberg@gmx.de) and send us error output, solutions you found, etc. if possible. Find the install-by-hand-instructions at the end of this manual.

3 Project Structure

We use, as already mentioned, two GIT repositories, LpzRobots and GoRobots. A rough overview of the structure is given below in Figure 4:

Later, the controllers for each robot will be implemented within GoRobots, accessing the robots, which are located in LpzRobots. The folder DEMO will later contain demos of the different robots. Another visualisation of the two repositories and where which file belongs is given in Figure 3.

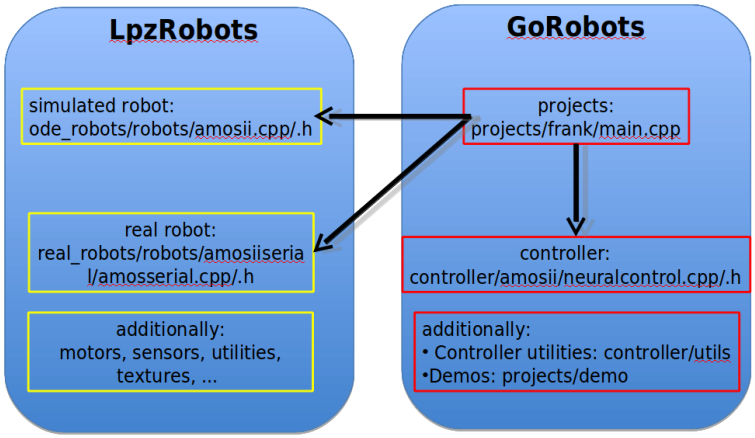

Figure 3: Structure of the two repositories, LpzRobots and GoRobots

You will later work with your own copy of the two repositories.

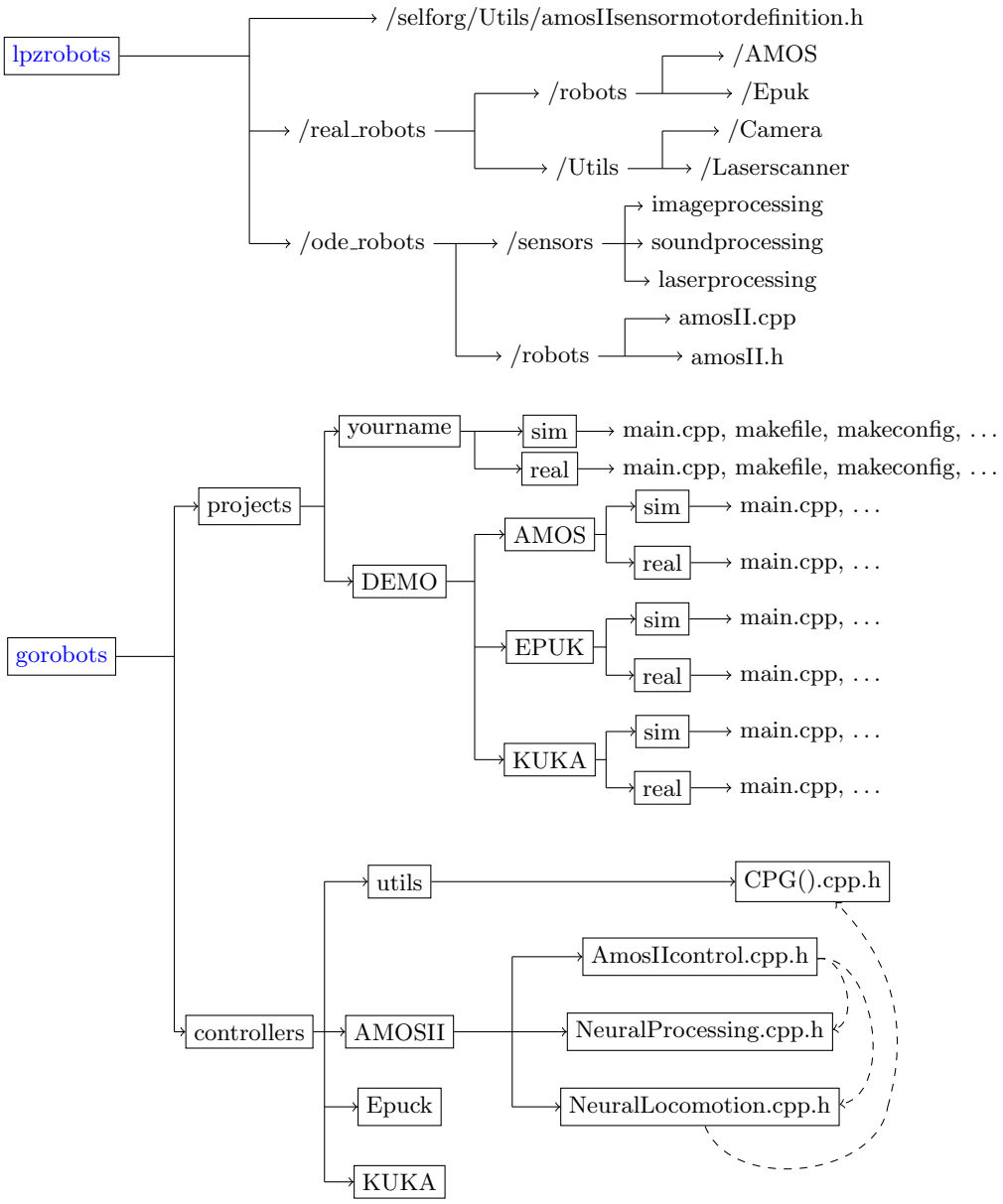

Figure 4: Structure of the two repositories, LpzRobots and GoRobots

4 Working with GIT

4.1 Overview of GIT-commands

The following picture will give a good overview over the workflow and the commands in GIT:
The main advantage in GIT is, that every host has got his own local repository, which

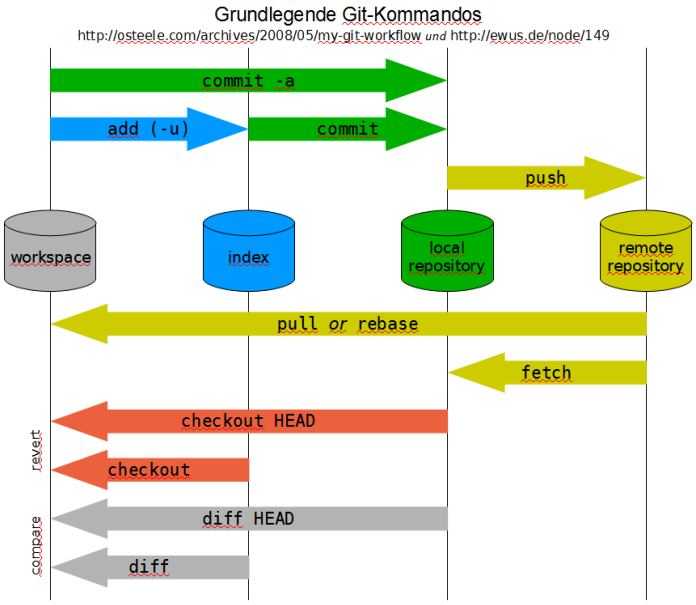

Figure 5: An Overview over GIT commands

in itself is an external repository to another host.

I will give an example, in which I will try, to use most of the commands GIT gives us:

- You create a new file in your workspace in your own branch, that was not under version control before
- Now you first have to add it to the index, which for GIT is just a list of files, that it has to monitor. You can do this using add
- The next step is adding the actual file to the local repository. You can do this via commit
- Now the file is under version control. You can now could get the file from the repository using checkout HEAD
- If you also want to add the file to the remote repository, you can use push
- Now another person can get your whole work using pull, which will provide him with everything, that is currently listed in your remote repository

Please note: Be careful whilst merging, Eclipse will offer you to "overwrite", which is not a good idea, as it does exactly what it promisses instead of merging. We will support this warning with a screenshot if possible! To provide a full overview over the commands, I will list all the commands, that Eduard did show us in his presentation:

- git add: adds file changes in your workspace to your index
- git commit: Commits all the changes listed in the index to the local repository
- git push: Pushes local branch to the remote repository
- git fetch: Fetches all files from the remote repository, that are not in the local repository
- git merge: Merges one or more branches into your current branch
- git pull: Fetches files from remote repository and merges them with local files (equal to git fetch; git merge)
- git rm: Removes a file from your repository

4.2 Setting up your own branch with GIT

Within your repository, you should still create branches for each feature you develop. To create a new branch you simple do:

1. In Eclipse, right-click on name_of_your_fork
2. Select Team→Switch to→New Branch
3. As shown in the picture bellow, select the source: refs/remotes/origin/goettingen_master[1]
4. Choose a name following the scheme yourname_yourfeature
5. Activate the checkbox for checking out the new branch
6. Work away

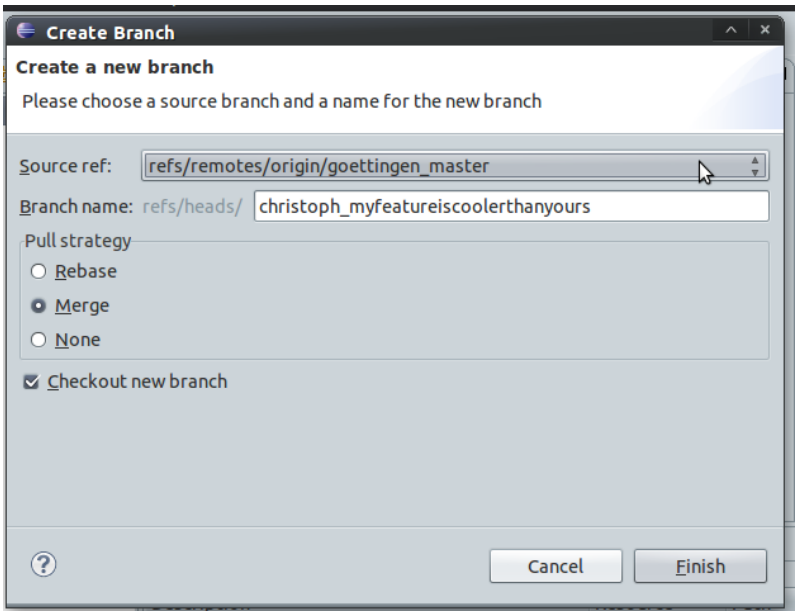

Figure 6: How to create a new branch within Eclipse

[1] By choosing this, you make sure, that you have the latest online version

4.3 Forking a Repository

To create a fork of a repository, you need access to the assembla-website. Once you have logged in, you can choose a repository and then click on the button fork network. One click on the button fork will then create a fork of the repository for you, as shown in Figure 7. You will furthermore be asked for a name of this copy of the repository, remember this name, as you will need it for the setup!

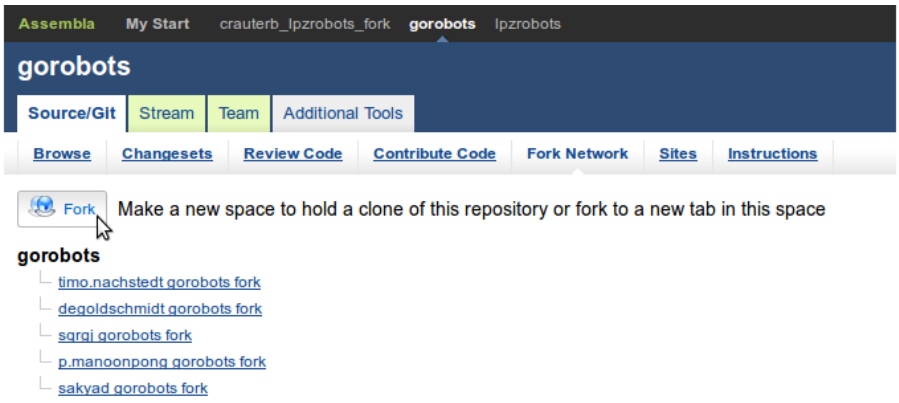

Figure 7: How to fork a repository at the Assembla website

4.4 Merging

Please check with your supervisor, before merging back into goettingen_master

5 Installing LpzRobots by Hand

Before you install LpzRobots, you first need to install a couple of additional packages. You can do this using the following commands:
sudo apt-get install\
g++ make automake libtool xutils-dev m4 libreadline-dev libgsl0-dev\
libglu-dev libgl1-mesa-dev freeglut3-dev libopenscenegraph-dev\
libqt4-dev libqt4-opengl libqt4-opengl-dev qt4-qmake libqt4-qt3support gnuplot[2]
Also, you will need this package:
sudo apt-get install binutils-gold[3]
Furthermore, you will need to add some lines to your .bashrc:

```
# definitions for lpzrobots
export CPATH="$HOME/include"
export LIBRARY_PATH="$HOME/lib"
export LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:$HOME/lib:/usr/lib/osgPlugins2.8.1
export PATH=${PATH}:$HOME/bin
```

Now you are ready to install the LpzRobot-Simulation.
As Eclipse has now synchronized its workspace with the GIT-Repository, you can find the setup-files in your workspace.
To install LpzRobots, go to workspace→lpzrobots and run make (all).
Install it to /home/YOURLOGIN and choose install as developer,
which is the shortcut d

[2] You can also find this list of dependencies in the repository lpzrobots
[3] You may need this only for newer Ubuntu-Versions (>= 11.10), as the linker does not link anymore

6 FAQs

6.1 Encountered errors

The error messages was:

```
> ./start
> ./start: error while loading shared libraries: libode\_dbl.so.1:
  cannot open shared object file: No such file or directory
```

The solution was:

```
> source ~/.bashrc
```

6.2 Errors using setUpGoRotobots.sh

I encountered the problem whilst cloning the git repositories:

```
Cloning into crauterb-lpzrobots-fork...
Password:
remote: Counting objects: 25478, done.
remote: Compressing objects: 100\% (6030/6030), done.
remote: Total 25478 (delta 19211), reused 25478 (delta 19211)
Receiving objects: 100\% (25478/25478), 19.97 MiB | 716 KiB/s, done.
Resolving deltas: 100\% (19211/19211), done.
warning: remote HEAD refers to nonexistent ref, unable to checkout.
```

The solution was simply, that the reference in the git clone command was set to master, but for lpzrobots, there is no master, so I had to change the command to:
git clone https://$crauterb@git.assembla.com/$crauterb-lpzrobots-fork.git -b goettingen_master

6.3 Problems with GIT

Poramate came across some difficulties whilst setting up GIT within Eclipse. Find a number screenshots, that solved the problem, attached in a .zip-File.