\chapter{Introduction}

\label{ch:introduction}

In the 21st century, Brain-Computer-Interfaces were big topic of research. This technology currently helps many paralyzed patients accomplish many tasks just using their brain signals. On the other hand, it also carries a lot of promise within itself to also help normal people with their daily tasks. Although this technology is still in its early development phases for daily usage, it is certainly one of the milestones to successfully control and navigate certain objects. Our thesis stands upon the idea to navigate a NAO robot using signals our brain sends to our muscles to cause movement inside our body, also called motor-movement.

\section{Electroencephalography}

Electroencephalography (EEG) is a method to observe the large-scaled movements inside of our brain by placing electrodes onto the scalp. Using EEG, one can monitor how the voltage on certain points of the brain change as a result of certain brain activities. It is possible to observe, which parts of the brain are affected by different brain impulses. These characteristics of EEG also help diagnose certain brain disorders in the medical world.

\section{NAO Robots}

Nao Robots are humanoid shaped programmable robots that are widely used in research and for general education. They are 58cm long, nearly 5.5 kilograms and have 25 degrees of freedom. Nao robots are known for being the robot used for the Robocup Standard Platform League. As these robots highly resemble the humans, they are also used in child education or the medical care of the elderly.

\subsection{NAOqi}

The Nao Robots are function based on a Linux-managed Operating System called NAOqi. NAOqi also has a framework within itself, which takes care of the low-level maintenance of the robot such as parallelism, communication between modules, synchronization and resources. This framework can be programmed using Python or C++ languages and gives developers the chance to program diverse parts of the robot. In our project we have put the Python SDK into use.

The Python SDK can use modules from NAOqi such as Motion, Perception, Audio and Sensors. We have used the "ALMotion" module inside our project to navigate the robot according to the commands it gets from another script. The details for this script will be explained in the further pages of this report.