

# Dutch Nao Team

Explanatory paper about the educational value of Robotic Programming  
[www.dutchnaoteam.nl](http://www.dutchnaoteam.nl)

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## Introduction

The Dutch Nao Team was founded in 2010 by several Artificial Intelligence students in order to participate in the RoboCup. RoboCup is an international research and education initiative, attempting to foster Artificial Intelligence and Robotics research by providing a standard problem where a wide range of technologies can be integrated and examined, as well as being used for integrated project-oriented education.

The team consists of Artificial Intelligence Bachelor and Master students supported by senior staff-member Arnoud Visser. The Dutch Nao Team is the continuation of the Dutch Aibo Team; a cooperation of several Dutch universities, which began in the year 2004. The Dutch Aibo Team has been successful, both in the competition and with a number of publications [6][8][10][13][14][15].

The official name of the project is “Robot Programming” and BSc students can attend from the 2nd year. The student will participate in the project during the whole year and will help write several publications. The final paper will be assessed and graded by the senior staff member. The project already accomplished great results in the Standard Platform League, and is a great addition to the current AI curriculum as offered by the University of Amsterdam and we strive to become even better. This paper will give the reader some insight as to why the Dutch Nao Team is important for the University of Amsterdam, our recent accomplishments made by our teammates and to share our future plans.

## Educational goals

### Academic writing

The Dutch Nao Team strives to document all progress made by its team members and does so by a variety of reports. The most important is the annual Technical report at the end of every academic year which contains a description of all the accomplishments of that year. It gives a short overview of competitions attended, code implemented, a quick guide on how to use the written code and future goals in relation to the code [1].

All students have to document their progress, which consists of recognizing the problem, the tools that are used to solve the problem and the outcome of their solution. Students get a good sense of how to document their progress, but also how to show their end product [3][4][5] to the rest of their teammates and to compare their improvement to the code of earlier years.

Bachelor and Master students working with Dutch Nao Team will write their own thesis [2][7][9][11][12][16], which will be integrated in the final report.

## **Cooperation**

The Dutch Nao Team gives students a first experience with working in a large scale project in their bachelor. Each student can give his or hers preferred field to work in and will expand his or hers knowledge on this subject for a couple of months together with a small subgroup. In practice these tasks are divided into improving existing algorithms and implementing and experimenting with new ideas and additions. By working in a large group where there are multiple tasks to complete; the students learn working in a team environment and to communicate with their fellow programmers. They have to plan how they are going to handle their project by setting deadlines and to be able to present their findings and defend these to the rest of the group. The Dutch Nao Team strives to meet once every 2 weeks to talk about new developments in each project and to increase team building.

The Dutch Nao Team differs from the current projects presented throughout the Bachelor and Master because of scale of the project; it is an ongoing project where experience is build up over the years, which requires much other skills than those needed for one month projects that are part of the curriculum.

The team also offers a place to develop project management skills; coordinating the groups, PR, collaborating with the University, companies and other teams, organizing trips around the world and building on the future of Robotics.

## **Experimentation Skills**

As most of our senior teammates have found out for themselves; not all theories work as good as expected in practice. A lot of the things we learn at school work great in theory and safe class room environments. However experimenting with this knowledge in real life can give quite different results. Working in the Dutch Nao Team gives that bit of practical experience where you often don't have enough time for in the day to day courses. This is an important part of research and gives students some new insight in how to think outside the box or combine different theories. It sharpens their intellectual thinking skills, all the while documenting all their progress.

## **Programming**

Although we do some programming in the AI study, we do not get a lot of practical experience with large software projects in a team-like environment. Most programming exercises are small scaled and one-time only so you don't get much real work-experience. The Dutch Nao team is quite a large-scaled software project where all code is combined in a multi-threaded system. Students need to think about the best structure for combining their code, what programming language to use, what code is most efficient and how to implement their code themselves. Most of the time new territory will be discovered for

students while working with Dutch Nao Team. They learn a new programming language and deal with problems that most researchers and programmers will face as well, without being able to rely on a student assistant that knows all the answers in advance.

## **Exposure**

The RoboCup is an inherently international event and this is a great opportunity for representing the Universiteit van Amsterdam. Throughout the year, several countries organize RoboCup Opens. These Opens are hosted all over the world, in places such as Germany, Italy and Iran. They're attended by teams from all over the world, and are an excellent way of encouraging contact between universities. Once a year there's a world championship, for which teams have to qualify. Simply qualifying for that is already an achievement in itself, and doing well is even more prestigious.

All of these tournaments are an excellent place for the University and teams to expose themselves, which will gain a good reputation in the field of robotics. Currently being the only standard platform league team in the Netherlands, we're one of the few places that have Nao robots, and the expertise to program them. This gives us the opportunity to give demonstrations or workshops at various events, or even at companies. For example, we've already given demonstrations at the Science Center Nemo, at open days and at the bachelor days at the Science Park, which all attracted a large crowd and were received very well. It's hard to talk about Artificial Intelligence (AI) without mentioning robots sooner or later, and seeing our team can be very motivating to prospective AI students, making them more likely to choose to study at the Universiteit van Amsterdam.

As mentioned before we also release papers and compared to other teams an impressive publication record<sup>1</sup>.

## **Expencenses**

The Dutch Nao Team, travels across the world to participate in competitions. At the beginning of every year the team makes a budget on the upcoming expenses and how we will try to solve them. For instance, a sponsor document has been made with several offers. In 2011 the members paid to travel to Rome, Iran and Istanbul, paying for their own rooms and the expenses of the stay at those cities. The team paid for their own shirts, additional hardware (for instance material to make our field and goals) and once a month we try to have a team building event.

## **Vision for the future**

Dutch Nao Team aims for a full integration in to the Artificial Intelligence study at the Universiteit van Amsterdam. Full integration means that it will become an elective one year project for BSc students and an elective Master thesis project. Both accounts should be fully acknowledged in the study guide, giving the recognition that both parties need each other.

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<sup>1</sup> <http://www.dutchnaoteam.nl/index.php/publications/>

The University will be able to use Dutch Nao Team as promotional tool, think in terms of: study, research, press, link between the University and other institutes (as for instance our partner TU Delft).

The more support Dutch Nao Team gets the more likely it will be able to get higher rankings in the RoboCup giving the University even more credit. And as the RoboCup is growing it's getting more popular every year. It will only be a matter of time until the RoboCup teams will get worldwide recognition when the progress of the league will get at its peak and they are able to defeat the Human Team that won the World Cup (scheduled for 2050).

By that time Dutch Nao Team will be a cooperation between the University and companies investing in Robot technology, giving the University a new revenue.

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