



Intelligent Robotics Lab
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1 Introduction

The Intelligent Robotics Lab (IRL) is a students' initiative of the University of Amsterdam (UvA) to guarantee the continuation of the robotic teams of the university. It acts as a governing body for all the robotic teams of the university, which participate in various leagues of the RoboCup and the International Micro Aerial Vehicle Competitions. This initiative will enable collaboration between the teams, as most state-of-the-art techniques in the field of Robotics can be applied in all leagues.

The IRL arose in 2012 from the Dutch Nao Team, since several students wanted to compete in other competitions. The Dutch Nao Team has already written an explanatory paper about the education value of Robotic Programming [1]. In order to organize these teams, a board of students was formed to organize the activities of the teams and to take responsibility for all the activities that involve the lab. The main goals of the IRL are Education & Development for students and Outreach & Public Awareness for the university. This document will briefly describe the current activities of the IRL that fulfill these goals and the long-term vision for maintaining these goals.

2 Goals

As mentioned in the introduction, the IRL has two main goals it tries to fulfill and these goals are:

Education & Development In the lab several Bachelor and Master students come together to develop their personal skills next to the regular educational programme. Students have the opportunity to learn more about Artificial Intelligence and Computer Science techniques and learn how to apply these techniques in robotics. Furthermore, students develop several programming skills and learn to work in a team. The lab provides Bachelor and Master students

with a C++ course and several projects involving current problems in robotics. Additionally, the lab is in contact with several companies¹, which are visited to show students what it is like to work at a company. Moreover, students have the opportunity and are supported to arrange an internship in one of these companies.

Outreach & Public Awareness The students of the lab give several demonstrations and workshops spread over the country to promote the university and robotics in general. These demonstrations and workshops are given at big events and at a smaller scale in high schools and other educational institutes. We also offer a yearly summer school to learn students more about robotics and to interest them for the Artificial Intelligence and Computer Science programme of the university.

3 Teams

The IRL currently has two active student teams, namely, Dutch Nao Team and Maneki-Neko. This section shortly describes the origin of these teams and in what leagues they participate. The main focus of both robotics teams is to write intelligent software to create smart applications.

Dutch Nao Team 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 Dutch Nao Team competes in the Standard Platform League, which is a RoboCup robot soccer league, in which all teams compete with identical robots. The robots operate fully autonomously, i.e. there is no external control, neither by humans nor by computers. The current standard platform used is the humanoid NAO by Aldebaran Robotics.

The team consists of Artificial Intelligence Bachelor and Master students, supported by senior staff-member Arnoud Visser. The Dutch Nao Team participated in several competitions and published on several occasions². The Dutch Nao Team participated in 2010 at the German Open [7]. In 2011, the Dutch Nao Team participated at both the Mediterranean Open and the Iran Open. In the 2011 World Championships, a top 16 position was achieved [3]. In 2012 the Dutch Nao Team participated in the Iran Open, achieving a shared third place, and partook in the RoBOW, organised by Berlin United. At the 2012 World Championships in Mexico the team [4] was eliminated during the intermediate round. Also in 2013 the RoBOW was visited, which resulted in dancing the Harlem Shake in Dortmund. During a more serious session the Dutch Nao Team won a third prize at the Iran Open 2013 competition.

Maneki-Neko The team Maneki-Neko was founded in 2013 in collaboration with the National Aerospace Laboratory, NHL University of Applied Sciences and Delft University of Technology. The goal of the team is to collaboratively participate in the International Micro Aerial Vehicle competitions (IMAV). The IMAV is an initiative that attempts to share and demonstrate new micro aerial vehicle technology. The competitions emphasize on flight dynamics and autonomous flight. The IMAV consists of an indoor and outdoor competition, where

¹i.e. National Space Laboratory (NLR), Netherlands Organisation for Applied Scientific Research (TNO)

²See for an overview: <http://www.dutchnaoteam.nl/index.php/publications/>

these aspects are extensively tested in the various challenges. The high level of autonomy is stimulated in this competition as the rules give significantly more points to teams that operate autonomous flights. Maneki-Neko focuses on the intelligent applications that are onboard of the flying systems. The current platform used by the UvA is the standard platform AR.Drone 2.0 by Parrot.

The UvA part of the team consists of Artificial Intelligence Bachelor and Master students supported by senior staff-member Arnoud Visser. The UvA participated previously at 2011 competition [2]. The team participated in the Iran Open 2013 [6], where it won the technical challenge for autonomy and published a paper [5].

4 Equipment

The IRL is equipped with a number of facilities and robots, which are briefly described in this section.

Laboratory The IRL has a fully equipped laboratory, where students can perform tests and experiments with the robots. The laboratory contains several robots, a robot football field and various sensors (ie. a Kinect, a laser scanner and an omnidirectional camera). The Laboratory is a very stimulating environment, where Bachelor and Master students work closely together to learn as much as possible from this inspiring field, using the best tools and knowledge around.

youBot This is an omni-directional mobile platform containing a manipulator created by KUKA. The robot is used for applications in industry and the IRL has ambitions to participate in the RoboCup @Work league, which stimulates research in this area. Furthermore, this robot will be used in the course ‘Search, Navigate and Activate’, where students have the assignment to make the robot play chess in a intelligent way.

NAO Robot This is a humanoid robot developed by Aldebaran Robotics. This robot is mainly used by the Dutch Nao Team in order to play football at the RoboCup. Furthermore, students did various self proposed projects with the NAO during a project month, thesis or in their free time.

AR.Drone AR.Drone is a radio controlled flying quadrotor helicopter built by Parrot. The Parrot is mainly used by the Maneki-Neko team to fly autonomous missions in the IMAV. Furthermore, students did various self proposed projects with the AR.Drone during a project month, thesis or in their free time.

AIBO This is a four-legged dog robot developed by Sony. The AIBO is the predecessor of the NAO in the Standard Platform League. The AIBO now is mainly used for small projects and demonstrations.

5 Activities

Over the past years the students working in the IRL have been active in the various competitions. Besides participating in the competitions, the IRL hosted several workshops, performed demonstra-

tions, gave inspiring talks and even hosted a robotics summer school. Table 1, shows an overview of all the activities of the IRL in 2012 and 2013. This section describes shortly the various activities.

Date	Event	Location	Activity
6 June 2013	Night of the Nerds	Eindhoven	Demonstration
4 June 2013	TEDx Brainport	Eindhoven	Demonstration
22/23 May 2013	RoboNED Conference	Eindhoven	Demonstration
17 April 2013	Nerds on Stage	Rotterdam	Demonstration
5-7 April 2013	RoboCup Iran Open	Tehran	Competitions and Presentations.
23 January 2013	Delft Robotics Institute	Delft	Demonstration
3 November 2012	Workshop Education and Robotics	Amsterdam	Demonstration and Brainstorm
25 October 2012	Kenniscafé Flevoland	Almere	Demonstration
16 October 2012	NAO European Tour	Amsterdam	Presentation
6 October 2012	Night of the Nerds	Amsterdam	Demonstration
9-12 July 2012	Summer School Robotics	Amsterdam	Workshops and Presentations
18-24 June 2012	RoboCup Mexico	Mexico-City	Competitions
15 May 2012	Overall Robots	Den Haag	Demonstration
3-7 April 2012	RoboCup Iran Open	Tehran	Competitions and Presentations.

Table 1: All the activities of the Intelligent Robotics Lab in 2012 and 2013.

C++ course In 2012 the IRL initiated a C++ course in order to provide students with sufficient knowledge of programming for robotics. After this course students can participate easily in one of the robotic teams. The course was very well evaluated.

Competitions Both student teams of the IRL participate in the international competitions of the RoboCup and IMAV. Every year both teams travel to one or more local competitions to prepare for the international competitions. The students of the IRL travelled to Berlin, Dortmund, Eindhoven, Istanbul, Mexico-City, Rome and Tehran to participate in RoboCup and IMAV competitions.

Demonstrations and Talks The IRL gave several talks and demonstrations all over the Netherlands in which the main goal is to inspire the audience with our work in robotics. Moreover, we promote the university and the robotics field. We give interactive demonstrations, where visitors actively can participate.

Internships IRL is in contact with various companies and organisation, which offer several internships in the field of robotics. The IRL supports students by introducing them to the company and finding a supervisor in the university to ensure the academic quality of the internship. The past year, three students did an internship in the National Aerospace Lab and two students did an internship at Kennisnet.

Summer School In 2012 a summer school was organized, where high school and university students learn the basics of robotics. The summer school consists of lectures and practical assignments, which are assisted by students of the robotics teams.

Workshops The IRL collaborated with Kennisnet to explore how robotics can be a useful tool in primary education. Together with Kennisnet, a workshop was organised, where experts, teachers and students brainstormed together about this question. The outcome of the workshop resulted into internships for two students of the IRL.

6 Future

The IRL aims to maintain their goals by continuing the various activities it has been doing so far. The laboratory is a inspiring place, where students pitch ideas to each other and support each other in their projects. The coming years the IRL has the ambition to grow in the following aspects:

- The IRL aims to continue to participate in the various robotic leagues.
- The IRL aims to collaborate more closely with the information science Bachelor and Master programmes in order to align the activities.
- The IRL aims to find financial support for the robotic teams. Currently, students pay most of the travel expenses.
- The IRL aims to collaborate with the communications department of the university to align demonstration activities.

References

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