

March 2008

Introduction

RoboLab is the centre of activities related to robotics and automation at the Faculty of Engineering. The lab is the home of a number of major research and development projects including researchers, students on bachelor and master programmes and industrial partners.

The lab is located in 'Hal J' at Niels Bohrs Allé 1.
The newsletter will report on activities at RoboLab.

Hannover Fair 2008

Bus trip 23-25 April

This year also RoboLab organises a two-day trip to the industrial fair in Hannover. The trip is arranged as a cooperation between RoboCluster, IDA Fyn and the Faculty of Engineering. Both students and other interested are encouraged to participate.



The annual industrial fair in Hannover is the largest of its kind in Europe and it contains everything one can imagine in machines, materials, processes, technologies, design and research, all which are related to industry.

You can find all the newest and hottest in the area of industrial design, CAD/CAM, control, sensors, data acquisition, motors, automation, PLC's, metals, plastics, machining, etc.

Website: www.hannovermesse.de

Programme for the trip:

- Departure on Wednesday 23 April at 1.30 am from Niels Bohrs Allé 1

- Arrival at the fair Wednesday at 9 am
- Wednesday at 5 pm: leaving the fair by bus
- Wednesday at 7 pm: dinner at hotel
- Thursday at 7 am: departure from hotel
- Thursday at 9 am: arrival at the fair
- Thursday at 6 pm: dinner at Münchener Halle
- Thursday at 9 pm: departure from the fair
- Friday at approx. 3 am: arrival at Niels Bohrs Allé 1

Prices:

IDA student member: 250 DKK.

IDA member: 600 DKK.

RoboCluster member: 600 DKK.

Others: 1200 DKK.

The price includes transportation, 1 night at hotel in a double room, dinner Wednesday and breakfast Thursday.

You can find a more detailed programme on <http://robolab.tek.sdu.dk> under Upcoming Events.

Registration not later than 31 March by email to dorthe@mmmi.sdu.dk



Formula Student

What is Formula Student? 'Formula Student is about building future engineering talent by designing and producing a single-seater racing car, not just in design and manufacture, but in many of the management, marketing and people skills so vital in the modern world, across all sectors of employment.' (www.formulastudent.com)



Example of the final product

This is the way the introduction of Formula Student is described generally, but perhaps it would be a good idea to give a bit more information on this subject?

The concept is about 10 years old here in Europe. It started out in the USA at the Society of American Engineers (SAE) where it still exists today and is very successful. From a learning perspective it is a very interesting concept, since it involves so many of the demands which the students are going to be facing later on in their work as professional engineers.

Depending on the level of ambition for each team, there are five classes running in the UK/Europe. Because the UK has such a high level of motorsport industry, this country was also the first to bring Formula Student to Europe and the IMechE (Organisation of Mechanical Engineers in the UK) has made a huge effort to get the whole concept as close to a real life experience as possible.

The five possible classes are:

Class 3: This is the basic entry class for teams new to Formula SAE style competition. It is for projects at the design and

component/model validation stage. Points are awarded for design, presentation and cost.

Class 2: This is for teams that have progressed beyond initial design concepts into manufacture of complete vehicle systems. The minimum entry requirement in this class is a complete chassis. Points are awarded for design, presentation and cost. In general, more complete vehicles are likely to score more points than less complete vehicles.

Class 1: This is for a fully constructed and running vehicle as defined by the Formula SAE rules. Points are awarded for design, presentation, cost, acceleration, skidpad, sprint, endurance and fuel economy.

Class 1 (200 Series): This is for further development of Class 1 cars, as defined by the Formula SAE rules. Points are awarded for development, presentation, acceleration, skidpad, sprint, endurance and fuel economy.

Class 3(A): This is a new class introduced for the 2006 competition. The "A" stands for "Alternative" and this class is for teams to assess the feasibility of alternatively fuelled vehicles taking part in future Formula Student style events (2007 and later). "Alternatively fuelled" in this context means any propulsion system not currently permitted within the FSAE Rules, e.g. electric, hybrids, bio-diesel, fuel cells, etc. Points are awarded for technical understanding and presentation.

To encourage continuous learning and project development, universities entering in one class one year will not normally be allowed to enter the same class the following year unless they have also entered with a higher class vehicle.

In order to make sure that the different universities compete on the same basic level, there is a 125 pages set of rules that needs to be followed very closely. If something on the car is not in accordance with the rules, the team will not be allowed to compete. Furthermore, the rules are made to make sure that the different safety requirements are fulfilled as well. For example, it is not allowed to use an engine bigger than 610 ccm, which is why a fair amount of the teams use a 4-cylinder motorcycle engine since this engine type

has a relatively high power output, but also a torque level matching the weight of the Formula Student race car.



The SDU car begins to take shape

Since 1 September 2006 the Faculty of Engineering, University of Southern Denmark has been running the Formula Student project and is currently in the process of building the actual car. A short status of the project so far is that the chassis has been welded and are about to be painted; the engine (Honda CBR 600RR) has been bought; steering, brakes, wheels and many other bits and pieces have been purchased. There is an established team structure and the official team name is SDU-Vikings (www.sdu-vikings.dk). As stated above in the class description, it is an on-going project which means that once the generation 1 car is finished a new generation 2 car will be build. The goal is to have the current car up and running for the Silverstone competition 2008 which will take place from the 10-13 July.

The project itself has a high level of interdisciplinarity, which is also indicated by the fact that three engineering programmes are involved: Mechanical Engineering, Integrated Design and Electronic Engineering. The team changes members each semester but somewhere between 25-30 students looks like a typical number and a high level of different nationalities are present. Typically, between six and nine nationalities are present which of course explains why the official language in the team is English.

In Denmark it is currently only SDU and AAU that participates in the competition - in fact SDU was the only Danish team represented at the Silverstone competition in 2007. A total of 100 teams and 2000 students from all over the world were present at the competition on Silverstone in 2007.

To have more information about the competition and Formula Student, go to the web-page www.formulastudent.com.

You will be updated during the spring of 2008 how the team is progressing and on the result of the competition in Silverstone.

Jesper Tønnesen
jet@ib.sdu.dk



Field Robotics vehicles

The Institute of Chemical Engineering, Biotechnology and Environmental Technology is developing a new Computer Assisted Slope Mower Robot in collaboration with RoboCluster, the Technological Institute and several commercial partners.

You may have seen it already, the little yellow Lynex remote controlled slope mower taking a test drive on the lawn outside the Faculty of Engineering or parked in the RoboLab. Soon it will be joined by another slope mower. Both vehicles are part of the Plant Nursing Robotics project.

The Computer Assisted Slope Mower Robot, in short just CASMOBOT, is the next generation slope mower application. The idea is to add autonomous features to the remote controlled mowers in order to assist the driver performing his job much more efficiently. Today he must manually control the slope mower at all times, but soon he will be able to drive it just once around the lawn, and then the mower will take care of

the rest, efficiently cutting all grass inside that area.



CASMOBOT is able to determine its current position and attitude using a high accuracy RTK GPS system and attitude sensors. An advanced dynamical route planning algorithm running on a small linux computer will ensure that the grass is cut at all parts of the area. Even at high slopes the CASMOBOT will do the job crunching through the high grass.

The Institute of Chemical Engineering, Biotechnology and Environmental Technology is also involved in several other projects related to plant nursing, high precision farming, eco-efficient production, etc. If you are a bachelor or master student interested in writing a thesis about mobile robotics related to environmental technology, please contact us and let us discuss your possibilities.

Kjeld Jensen
kjen@kbm.sdu.dk

CASMOBOT project website:
<http://www.casmobot.dk>

Currently Present at the RoboLab

SDU Institutes: Institute of Industrial and Civil Engineering (IB), Institute of Chemical Engineering, Biotechnology and Environmental Technology (KBM), The Maersk Mc-Kinney Moller Institute (MMMI), Institute of Sensors, Signals and Electrotechnics (SENSE)
External partners: MPN, RoboCluster, Scape, Teknologisk Institut, Universal Robots, Odense Technical College (OTS).

Coming events

- 23-25 April: Bus trip to **Hannover Fair 2008**.
- Wednesday 7 May at 2 pm: **Plant Nursing Robotics**. Kjeld Jensen and Rasmus Jørgensen from the KBM institute talk about ongoing projects in the area of field robotics vehicles.

Colophon

This newsletter is published by the RoboLab at The Faculty of Engineering.

Editorial team

Palle Hermansen (pahe@mmmi.sdu.dk)
Anders S. Sørensen (anss@mmmi.sdu.dk)
Anders Bøgild (andb@mmmi.sdu.dk)
Dorthe Sølvason (dorthe@mmmi.sdu.dk)
Janne Valdgård Petersen (jvp@tek.sdu.dk)



From Hannover Industrial Fair 2007