Fontys University of Applied Sciences Symposium
Integrated Product Development IPD / ASIA / Mechatronics 3D Printing &Minor Electric drive
July 6th, 2016

Fontys University of Applied Sciences
Building: Rachelsmolen R5
Address: Rachelsmolen 1
5612 MA Eindhoven
The Netherlands

***For information please contact*:**
Fontys University of Applied Sciences
Herbert Veenstra
Phone 08850 75 515
E-mail H.Veenstra@fontys.nl or engineeringeindhoven@fontys.nl

Keynote Speaker: Micaela dos Ramos CEng

Executive Director of the Royal Netherlands Society of Engineers

(Koninklijk Instituut Van Ingenieurs – KIVI)

Today we live in a world that is marked by complexity and change. The challenges we are facing as a society are becoming ever more intertwined, and cannot be solved anymore through a singular and one track view. One of our most important competences will be the ability to understand and appreciate that complexity, and to be part of solutions that are created by professionals from multiple disciplines. In teams that have diversity in every way possible.

At the same time, change is all around us and is constantly modifying our reality. What is here today, may be gone tomorrow. The world changes so fast around us, that we need the combined talents of all in order to be successful. As an engineer you will need to find a balance between retaining expertise in your discipline and at the same time being able to adopt and be part of a multidisciplinary approach, and all the skills that go with it.

As engineers we typically do our job within an industry that is part of a demand and supply structure, and within a society that also has its own demands. More than ever we need to realise that we as engineers are part of a social and economic reality that may have different drivers from our own technological perspective. We therefore will need to understand these drivers, be aware of the context and most of all: be connected. We will not be able to create successful products, and truly serve society, if we are not.

Given the diverse and integral view needed to navigate today's complexity and change, this project in Integrated Product Development may be one of the most important projects that you will do in order to prepare yourself for that reality. Very much so in terms of skills acquired, as well as in terms of the very product that you develop. Made by and for diverse views, all integrated into one. To create a product that is state of the art in terms of engineering and addresses a current need, but also within the context of a business that should want to sell it and a customer that should want to buy it, possibly after a successful campaign to stimulate that need.

It is an exciting way to combine what you have learned in your engineering education and tie that to the real world out there. I look forward to talking to you about it.

Micaela dos Ramos CEng studied Chemical Engineering at Delft Technical University and the University of Amsterdam, and graduated both on catalysis systems and the improvement of problem solving skills among chemical engineers. She is the Executive Director of the Royal Netherlands Society of Engineers (KIVI). She is also a Member of the Executive Board of FEANI, the umbrella organisation of European professional organisations for engineers. She is passionate about professional development of engineers and is the founder of the chartered engineer structure in the Netherlands.

The KIVI AWARD

The KIVI Nomination for the AWARD

KIVI congratulates all students who have successfully completed their project today.

KIVI is the Dutch association for engineers and engineering students. With 20.000 members KIVI is the largest engineering association in the Netherlands. All engineering disciplines are organized within KIVI. KIVI offers the opportunity for every young professional to find his or her way in the world of engineering. As such we are also very interested in what the future engineers of Fontys University are achieving in their projects.

We are both proud and enjoy to attend the presentations of your projects today. This year KIVI made a 2016 prize available for the best project. A jury consisting of KIVI engineers has reviewed the projects and selected the best one(s).
From the first symposium on the 28th of January 2016, a student group was nominated for the KIVI
award 2016. Today there is a second IPD/ASIA symposium and again student teams will be nominated for the KIVI award. On the 6th of July 2016 the team members of the winning project are rewarded with the KIVI AWARD 2016.

As the network for engineers and other highly educated technical professionals in the Netherlands, KIVI's primary objective is to support engineers in their professional development and to promote the importance of the role of engineers and technology within our society. This ensures continuity in adequate investment in education, research and innovation. To meet this objective, KIVI conducts the following core activities:

- **Member services** – to provide services that assist members with the development of their professional careers
- **Network** – to stimulate contacts and exchange of knowledge between engineers
- **Promotion** – to promote the role of engineers and technology in general

KIVI provides professional services to its members all over the world and organizes a large number of activities throughout the year. Of course this also counts for engineers from abroad who wish to work or study in the Netherlands.

From KIVI South
dr.ir. J.M. (Jan) Vleeshouwers
dr.ir. E. (Eric) Persoon

www.kivi.nl

Programme IPD/ASIA/Objexlab symposium
Wednesday July 6th , 2016
Fontys University of Applied Sciences

Rachelsmolen 1
Building R5
5612 MA Eindhoven

12.30 hrs	**Registration and coffee**	**R5 Foyer**
13.00 hrs	**Welcome Herbert Veenstra, chairman of the day**	**R5 Aula**
13.05 hrs	**Key note speaker: Micaele dos Ramos**	**R5 Aula**
13.30 hrs	**MED 1: : Developing an EV for off-road usage**	**R5 Aula**

13.55 hrs **Split up to parallel sessions**

	R5 0.22	**R5 Aula**	**R5 0.23**	**R5 136**	**R5 135A**
14.00 hrs	***IPD 13*** *ABB Conveyor Picking*	***ASIA TN16-A1*** *Quality Rontgen Pictures /Hospital*	***IPD 16*** *Bicycle Gear hub efficiency*	***Objexlab 1*** *A new product carrier concept*	***AR 1*** *C.A.S*
14.25 hrs	***IPD 14*** *Robot safety*	***ASIA IPD 7*** *Sun heated wall*	***ASIA TN16- A2*** *Measurement E-Plant*	***Objexlab 2*** *3D printed wheel chair*	***AR 2*** *Autonomous Driving*
14.50 hrs	***IPD 15*** *Smart Desk*	***ASIA IPD 6*** *Glow Next*	***ASIA TN16-A8*** *Innophysics Fluido system*	***Objexlab 3*** *Flexible/rigid grid structures*	***AR 3*** *Cooperative Robotic mapping*
15.15 hrs	**Break:**				**R5 Foyer**

	R5 0.22	**R5 Aula**	**R5 0.23**	**R5 136**	**R5 135A**
15.45 hrs	***IPD 18*** *High perform Oscilloscope tablet*	***ASIA IPD 10*** *Automatic sun protection Truck drivers*	***ASIA TN16-A3*** *Organ on a Chip device*	***Objexlab 4*** *Bearing for aircraft landing gear*	***IPD19*** *Modularity*
16.10 hrs	***ASIA TN16-A9*** Noicec *Cansceling*	***IPD 11*** *Monitoring people with disabilities*	***ASIA TN16-A4*** *Microfluidics*	***Objexlab 5*** *Manifold in a water cooling system*	***IPD 21*** *Gripper*
16.35 hrs	***IPD12*** UBI display	***IPD 17*** *Zigbee*	***ASIA TN16-A5*** *Medical printing Fantoom Investigation*	***Objexlab 6*** *Sensor for children with urine loss*	***IPD 20*** *Epson arm*

17.00 hrs	**End of presentations and "collaborative" drink**	**R5 Foyer**
17.15 hrs	**KIVI AWARD** . **After award party**	R5 **Aula** **R5 Foyer**
18.00 hrs	**The end**	

Project **MED 1: : Developing an EV for off-road usage**

Organization: **Fontys University of Applied Sciences;**
Minor Electric Drive

Logo:

Company contacts: **Siemens, VDL, Bicon, Volvo, Tesla**

Tutor(s): **Mr. M. Raijmakers**

Team members:

Students	Institute	Department
Thomas Apeldoorn	Fontys School of Natural Sciences	Engineering Automotive
Ruud Boudewijns	Fontys School of Natural Sciences	Engineering Automotive
Bram Donkers	Fontys School of Natural Sciences	Engineering Automotive
Jeroen Duijsens	Fontys School of Natural Sciences	Engineering Automotive
Dennis van den Ende	Fontys School of Natural Sciences	Engineering Automotive
Dylan Gerritsen	Fontys School of Natural Sciences	Engineering Automotive
Tim Grootes	Fontys School of Natural Sciences	Engineering Automotive
Elco Hendriks	Fontys School of Natural Sciences	Engineering Automotive
Cas van den Hoek	Fontys School of Natural Sciences	Engineering Automotive
Steven van Klinken	Fontys School of Natural Sciences	Electrical Engineering
Xavier Lamée	Fontys School of Natural Sciences	Engineering Automotive
Arsen Porosjan	Fontys School of Natural Sciences	Engineering Automotive
Pim Rijkers	Fontys School of Natural Sciences	Electrical Engineering
Quint Smeijsters	Fontys School of Natural Sciences	Engineering Automotive
Tim Verdonschot	Fontys School of Natural Sciences	Engineering Automotive

The Project

The key vision for this minor is to develop a new environment in which professionals and young talents are challenged to both grow in close cooperation and contribute to new innovations in the region. Significant developments are currently seen in the sustainable energy and efficiency branch, dynamic correlation between students and professionals will stimulate this innovative development.

Therefore we, a 15 member student team from Fontys University of Applied Sciences is building an electrically propelled buggy during the minor. First we endured 5 weeks of critical theory, alongside we visited several companies which showed us their specialism and we followed certified trainings. Now, the team has 15 weeks to complete the task to engineer and build an off-road vehicle. Within the team multiple divisions are derived: the drivetrain, electric controls, vehicle dynamics and battery unit are the most vital elements of this vehicle system.

Project **ASIA_TN16_A1: Beeldkwaliteit van röngenfoto's**

Organization: **Maasziekenhuis Pantein Boxmeer**

Logo: maasziekenhuis Pantein

Company contacts: **Ms. Sonja Voorn**

Tutor(s): **Mr. Ton Hülsman**

Team members:

Students	**Institute**	**Department**
Jim Eppink	Fontys School of Natural Sciences	Engineering Physics
Jozef Gleizer	Fontys School of Natural Sciences	Engineering Physics
Niels Runge	Fontys School of Natural Sciences	Engineering Physics
Nina de Werd	Fontys School of Natural Sciences	Engineering Physics
Steve Kooiman	Fontys School of Natural Sciences	Engineering Physics

The Project

The hospital Maasziekenhuis Pantein has two regular and two dedicated X-ray devices, one regular device will be replaced in the feature. Therefore the following question arose: is it possible to use a dedicated X-ray device to achieve the same results as with the regular X-ray devices? The goal of our project is to measure the three critical image quality parameters from the produced images of the different devices. The parameters are the spatial resolution, contrast resolution and the signal-noise-ratio. The determination of the parameters is done numerically, performed with self-written software.

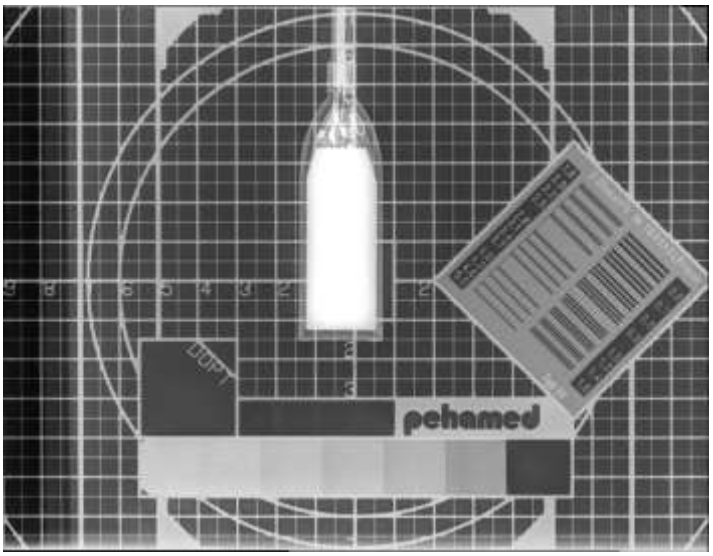


Figure: An X-ray image of a phantom. Each device will take an image of the same phantom, from each of these images the parameters will be determined.

Project **ASIA TN16-A2: Measurement E-plant**

Organization: **Plant-E**

Logo:

Company contacts: **Mr. E. de Reeder**

Tutor(s): **Mr. T. Hülsman**

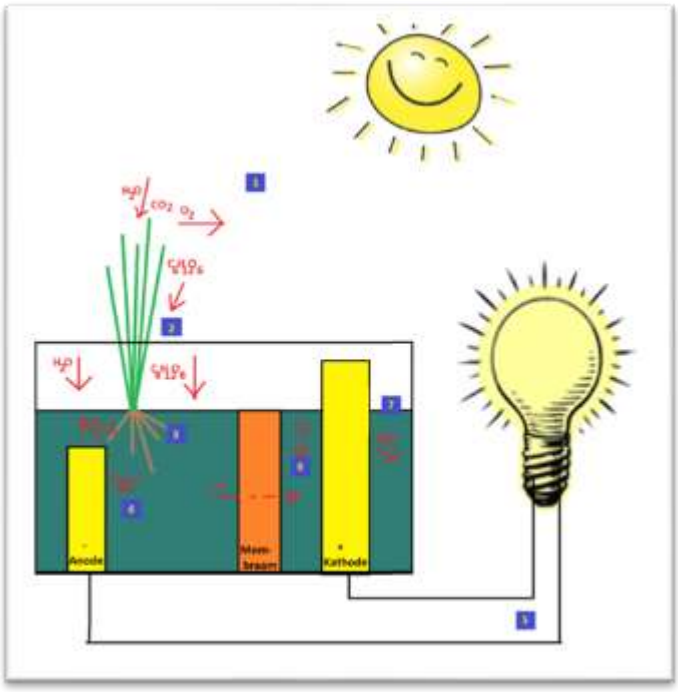
Team members:

Students	**Institute**	**Department**
Stijn van de Ven	Fontys School of Natural Sciences	Engineering Physics
Kyle Oude Bekke	Fontys School of Natural Sciences	Engineering Physics
Saskia Hardeman	Fontys School of Natural Sciences	Engineering Physics
Simon Thiele	Fontys School of Natural Sciences	Engineering Physics
Daphne van Zanten	Fontys School of Natural Sciences	Engineering Physics

The Project

For a long time, electrical energy has been required in order to carry out various processes. Coal and oil will eventually run out and are responsible for CO2 emission, but the energy demand is increasing. That is why in the last decades, the need for renewable energy has grown. Besides energy from the sun and wind, a plant microbial fuel cell (PMFC) is a renewable way to produce electrical energy. Plant-e is a startup company which develops these PMFCs.

The objective of this project is to learn more about the theoretical background of PMFCs and finally to write a Labview program which collects the data for certain parameters needed for testing Plant-e's PMFCs. These measured parameters are voltage between cathode and anode, voltage between both cathode and anode and an electrode, pH level of the soil and oxide level of the soil.



Project **S7_ASIA_TN16_A3 Lab-on-a-chip device: C. elegans**
Organization: **Expertise Centre Thin Films & Functional Materials**

Logo:

Company contacts: **J. Bernards**
K. Planken
Tutor(s): **E. Moerman**
Team members:

Students	Institute	Department
Tim Bijsterbosch	Fontys School of Natural Sciences	Engineering Physics
Bram van den Brink	Fontys School of Natural Sciences	Engineering Physics
Lizette Lamers	Fontys School of Natural Sciences	Engineering Physics
Bram Martens	Fontys School of Natural Sciences	Engineering Physics
Huib Schaaik	Fontys School of Natural Sciences	Engineering Physics
Meander van der Weijst	Fontys School of Natural Sciences	Engineering Physics

Organ-on-a-chip and lab-on-a-chip devices are used to research the response of human cells or other organisms to varies liquids. These devices contain chambers to place cells or organisms inside and a number of canals leading the fluids to the camber. The devices are made of a transparent material so the cells can be studied under a microscope. Organ-on-a-chip devices are a physiologically better simulation than cells cultured in petri dishes[1]. These devices are used for different kinds of research purposes, an example is drug testing. Testing drugs by using organ-on-a-chip devices is an accurate alternative to animal testing. It is also used in the cosmetic industry and for the development of vaccines.

Figure 1, C. elegans worm

This project focusses on a specific lab-on-a-chip device used to study the Caenorhabditis elegans (see figure 1). This is a small, non-parasitic nematode (roundworm). Adult worms reach about 1 millimetre in length, however for studies young worms are used, which are a lot smaller. The worm is transparent which makes it easy to study under a microscope. Besides this it is mostly used for its relevance to the human body. Difficulties in using these worms are its mobility and small size. Glue can be used to immobilize the worm, this however limits the measurable behavioural outputs. Preferable the worms are contained in a camber. To allow fluids to reach the worms, the worms are surrounded by pillars, functioning as a fence. Due to the small size of the immature worms the pillars cannot be separated more than 5 micrometres.

The Expertise Centre Thin Films & Functional Materials is looking for a method to produce this C. elegans device. Ideally the production method should be fast and inexpensive. The resolution should be high enough to accurately produce the small structures that are needed in the device. The only production method meeting these resolution requirements is soft lithography.

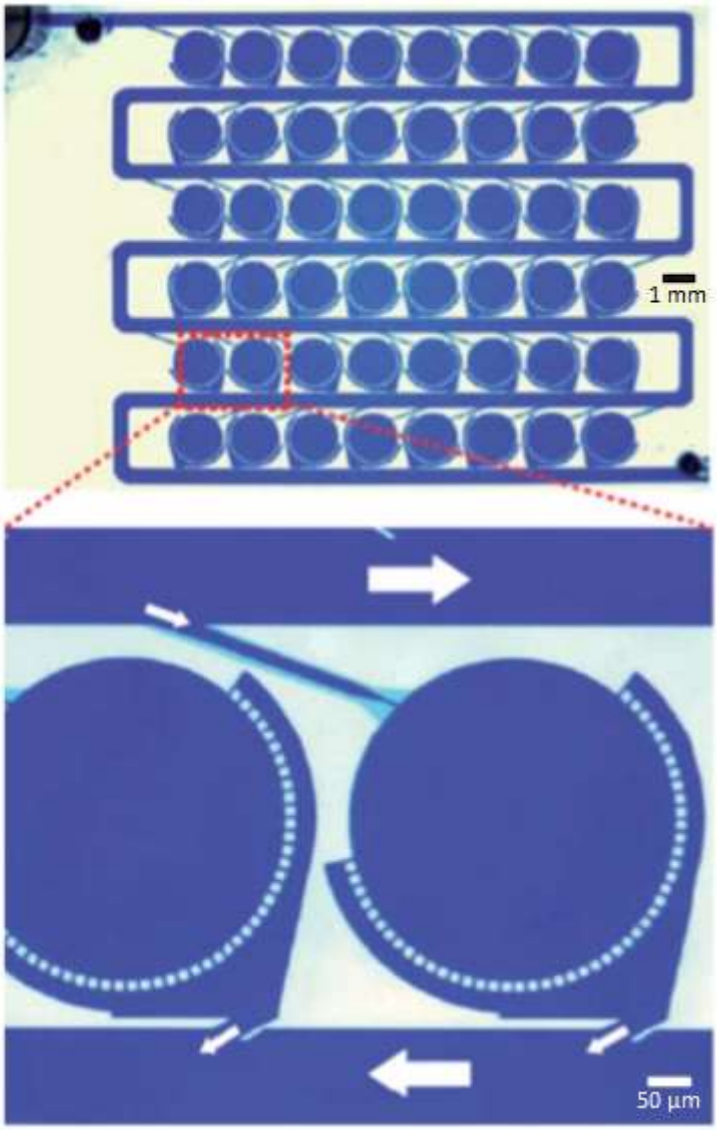


Figure 2 The upper picture shows a series of 48 worm chambers. Individual chambers are 1,5 millimeter in width. Between the rows, fluid canals can be seen. The lower figure shows an enlargement of two chambers, the white arrows show the fluid streams.

Project : **ASIA_TN16_A4 Transparent 3D-printed microfluidic devices**

Organization : **Lectoraat Thin Films & Smart Materials**
Logo :
Company contacts : **Mr. Jan Bernards, Mr. Karel Planken**
Tutor(s) : **Ms. Jacomien Brocaar**

Team members:

Students	Institute	Department
Carl Simons	Fontys School of Natural Sciences	Engineering Physics
Laura Manders	Fontys School of Natural Sciences	Engineering Physics
Matthijs Bekendam	Fontys School of Natural Sciences	Engineering Physics
Erwin Scheidt	Fontys School of Natural Sciences	Engineering Physics
Chiel Schilder	Fontys School of Natural Sciences	Engineering Physics

The Project

There are developed small chips for performing diagnostic tests for the use outside a laboratory (lab-on-a-chip technology). An important component of the microfluidic chip is a mixing channel for mixing liquids. For instance there are chemical reactions due to the mixing of liquids that can be analyzed. Because the mixing is done on a small scale, additional methods are needed to accelerate the mixing process. An example to speed up the mixing process for the liquids is by applying small structures in the mixing channel. Whirls are created inside the mixing channel.

The mixing channel can be made with a lithography method, but 3D-printing is much cheaper. Previous research realized a 3D-printed mixing channel, however there are still some limitations in the design. The main goal of this project is to improve the current 3D-printed mixing device. First the 3D-printed material should be transparent so light can pass through to improve the analyzing of the mixing pattern. Secondly a sufficient method is needed for the optical measurement. Also the mixing device has to be sealed with a transparent material to avoid leaking.

Project : **ASIA TN16-A5 - Medical Printing Fantoom**

Organization : **Fontys University of Applied Sciences & Catharina Ziekenhuis Eindhoven (CZE)**

Logo :

Company contacts : **Mrs. Mette Stam & Mr. Tom Schiffling**

Tutor(s) : **Mrs. Sonja Voorn & Mr. Hein van de Vrande**

Team members:

Students	Institute	Department
Jelle Timmermans	Fontys School of Engineering	Engineering Physics
Queeny Wong	Fontys School of Engineering	Engineering Physics
Brian de Cock	Fontys School of Engineering	Engineering Physics
Chester Maessen	Fontys School of Engineering	Engineering Physics
Lex Heijnen	Fontys School of Engineering	Engineering Physics
Richard van Hest	Fontys School of Engineering	Engineering Physics
Robert-Jan Gras	Fontys School of Engineering	Mechanical Engineering

The Project

Up to now it has been difficult to create complex phantoms with close similarities to a human organ, and those who do have resemblance are overpriced. With the improving technology, 3D printing, all kinds of new possibilities have been created. Holding these two together in mind, creates the following situation.

The clinical physicists of the Catharina ziekenhuis (CZE), a hospital in Eindhoven, The Netherlands, requested whether it was possible to print a heart phantom in 3D to use for calibration purposes. The goal of this project is to print a phantom heart with the current technology of 3D printing technique. This basis of the heart will be acquired from an existing Computer Tomography scan (CT). This heart phantom is going to be used in Magnetic Resonance Imaging (MRI) and if possible for CT and nuclear scans.

figure 2 Second printed prototype (ABS with support materail).

Project ASIA IPD 6 GLOW Next

Organisation: **Glow**
Logo:
Company contact: **Tom Weerts**
Tutor: **Ellen Moerman**

Team members

Students	Institute	Department
Shannon Declerck	Fontys School of Natural Sciences	Engineering Physics
Elisa Driessen	Fontys School of Natural Sciences	Engineering Physics
Charlotte in 't Veld	Fontys School of Natural Sciences	Engineering Physics
Robbin van Wijk	Fontys School of Natural Sciences	Engineering Physics
Yannic de la Fuente	Fontys School of Natural Sciences	Engineering Physics
Martijn Meeuwessen	Fontys school of Engineering	Electrical Engineering
Tess Peters	Fontys school of Engineering	Electrical Engineering
Dion Meeuws	Fontys school of Engineering	Mechatronic Engineering
Bas Wouters	Fontys school of Engineering	Mechatronic Engineering

The Project

The goal of the project can be stated as follows: '*A new and innovative object needs to be designed for GLOW 2016. Light is the main aspect that needs to be included within the object.*'

In the beginning a light snake will be started and will walk over a led strip. This light snake will go to an object, so the object will start a process. The light snake goes through a circuit with many objects and comes back at the beginning to start again. Between bigger objects, a few little easy objects can be placed in the circuit. Which makes it more attractive to look at the led strips and when a large distance needs to be overcome. This makes the circuit less boring. In **Error! Reference source not found.** is shown a sketch of the circuit with different big bjects.

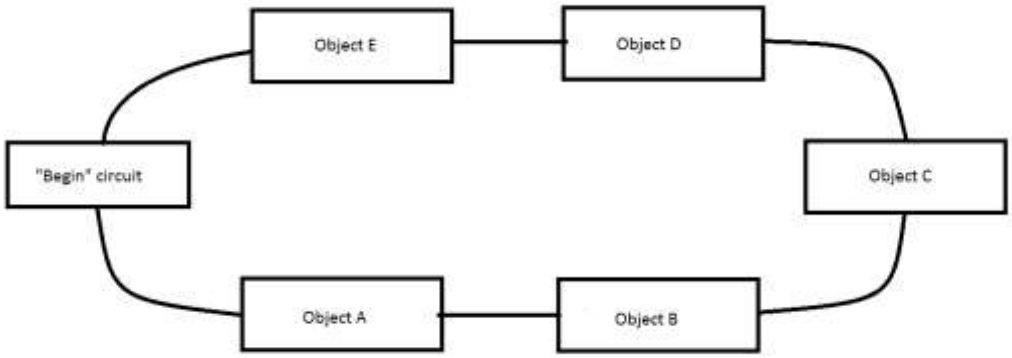


Figure 1 Sketch of the circuit with different objects

Object A to E could be anything made for the light circuit. The objects must be start with the idea of "light has mass" and at the end the light must be back to a led strip. This set-up is changeable for different space and theme. Like in a big fabric or a narrow hall.

Project : ASIA IPD7 - Room Heating Using Solar Vacuum Tubes

Organization: : Vision Dynamics
Logo :
Company contact : Mr. Hugo de Haan
Tutor : Mrs. Jacomien Brocaar

Team members:

Name	Institute	Department
Timo Visser	Fontys School of Engineering	Mechanical Engineering
Tom Couwenberg	Fontys School of Engineering	Mechanical Engineering
Jurgen Schreuder	Fontys School of Engineering	Mechanical Engineering
Jef Kerkhofs	Fontys School of Natural Sciences	Engineering Physics
Pim Luijten	Fontys School of Natural Sciences	Engineering Physics
Bob van Keulen	Fontys School of Natural Sciences	Engineering Physics

The Project

There are several applications in existence for the processing of solar energy. Of all of these, solar vacuum tubes are in the least used of all. A working application will be researched and build in this project. The assignment as stated by Vision Dynamics is to find an application for the solar vacuum tubes in which the tubes can be placed on empty areas on sides of buildings to gather heat. This heat will be transported into the building via hot air to reduce costs of heating. The application will be able to be used all year round because it works solely on solar power.
This project is a collaboration between Mechanical Engineering and Engineering Physics. The combined expertise provides the needed tools for research as well as development of the application.

Project **ASIA TN16-A8: Fluido system**

Organization: **InnoPhysics**

Logo:

Company contacts: **Mr. J. Schep**

Tutor(s): **Mr. P. Philipsen**

Team members:

Name	Institute	Department
Harun Dzafic	Fontys School of Natural Sciences	Engineering Physics
Mel Ploum	Fontys School of Natural Sciences	Engineering Physics
Mourad Doudouh	Fontys School of Natural Sciences	Engineering Physics
Maartje Koumans	Fontys School of Natural Sciences	Engineering Physics
Job van Galen	Fontys School of Natural Sciences	Engineering Physics
Gido Mooren	Fontys School of Natural Sciences	Engineering Physics

The Project

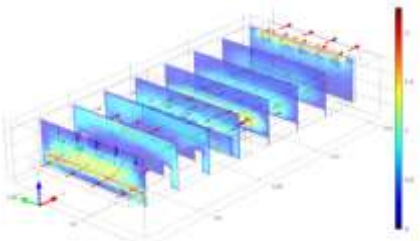
This project is done for the company Innophysics. InnoPhysics B.V. is a company in the Netherlands specialized in the development and fabrication of plasma equipment for surface treatment. Plasma is used to print in order to activate, etch or deposit materials on surfaces. It is possible to make the surface treatments visible when vapour is condensed on a treated surface. InnoPhysics is working on a setup to condensate water on surfaces.

The water droplets differ due to the difference in surface energy between the treated and untreated surface. However, comparing pictures is difficult because the reproducibility of the measurement setup is not adequate. Some concerns may include: moisture content, homogeneity of the droplet field, pollution by the setup itself, substrate properties, exposure to the environment and its factors. These things are the main problems this project will deal with.

The **goal** is to create reproducible pictures of the treated area, with the available setup and making suggestions to improve the setup.

The **sub goals**:

- Changing the controlling parameters to improve the reproducibility of the setup.
- To critically investigate the currently used sensors and if necessary improve them.
- Providing quantitative information about the differences between the treated and untreated areas.
- To create a protocol about proper use of the setup.
- To gain a better understanding of the air flow and the operation of the setup using a simulation in COMSOL.
- A new design and/or improvement(s) for the design of the setup based on the findings.



Project **ASIA_TN16_A9 Noise Canceling**

Organization: **Fontys University of Applied Sciences**

Logo:

Company contacts: **Mr. A. Dommels**

Tutor(s): **Mr. A. Dommels**

Team members:

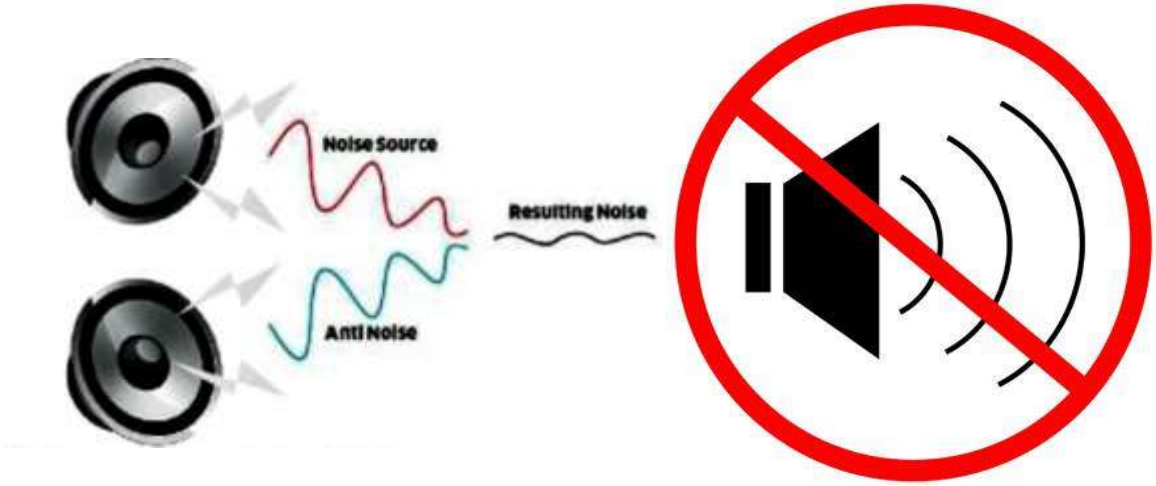
Students	Institute	Department
Tamara van Beuningen	Fontys School of Natural Sciences	Engineering Physics
Davy van Haperen	Fontys School of Natural Sciences	Engineering Physics
Remy Missiaen	Fontys School of Natural Sciences	Engineering Physics
Dave Leurs	Fontys School of Natural Sciences	Engineering Physics
Joep Keijsers	Fontys School of Natural Sciences	Engineering Physics
Remco Schoenmakers	Fontys School of Natural Sciences	Engineering Physics

The Project

Current society is growing fast. It's getting busier everywhere, which results in much more noise. When people listen to music through headphones, this background noise or ambient sound can be annoying. Due to the ambient sound, people tend to increase the sound level of the music too much, which can cause hearing damage. To filter the unwanted ambient sound a Noise Cancelling system can be used.

Noise Cancelling can be divided into passive and active. Passive Noise Cancelling is the physical damping of ambient noise. Passive Noise Cancelling mostly damps high frequencies. In order to damp low frequencies, active Noise Cancelling can be used. To realize active Noise Cancelling, ambient noise needs to be measured. When the measured noise gets inverted, anti-noise can be created. The anti-noise will be send out and cancel the ambient noise. To achieve both passive and active Noise Cancelling, a prototype can be made.

The prototype will passively and actively cancel noise. The prototype will be made up of an over-ear headphone and an electrical circuit. The over-ear headphone itself will cause passive Noise Cancelling. The electrical circuit will cause active Noise cancelling. This active part can be achieved with an analog and digital circuit. Both analog and digital circuits will be realized.



Project ASIA IPD 10 Automatic Sun Protection truck drivers.

Organisation: **Fontys University of Applied Sciences**
Logo:
Company contact: **Pieter Koole**
Tutor: **Herbert Veenstra**

Team members

Students	Institute	Department
HansElzinga	Fontys School of Natural Sciences	Engineering Physics
Jochem van den Brand	Fontys School of Natural Sciences	Engineering Physics
Bennie Godschalk	Fontys school of engineering	Mechatronic Engineering
Peter Bazelmans	Fontys school of engineering	Mechatronic Engineering

Driving at sunrise with a truck to Munich in Germany is dangerous because you are driving to the east and the rising sun is blinding your sight. The truck driver mr. Koole tried to find a solution for this problem. He mounted a disc on a pole. Took the pole in the hand and positioned the disk in front of him between the blinding sun and his eyes. He concluded that there must be a better solution for this problem. He contacted Fontys Engineering and asked them to develop a real engineering solution. An automated system able to prevent the sunlight to blind the eyes of a truck driver. This project delivered a development result and a prototype. Due to the confidentiality further details are not given.

Project IPD11: Monitoring people with disabilities.

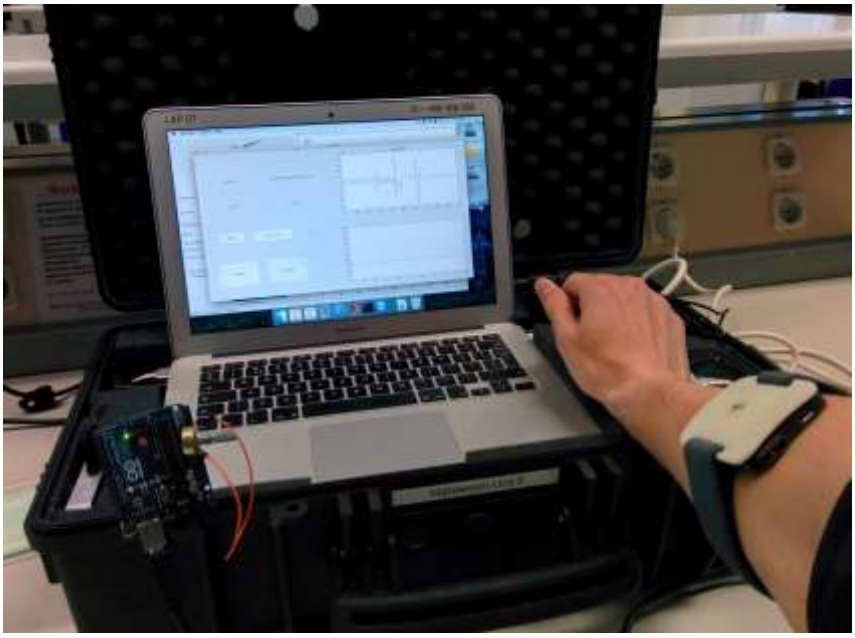
Organisation: **Stichting Severinus**
Company contact: **Erwin Meinders**
Tutor: **Geert Langereis**

Team members

Students	Institute	Department
Marthijn Feddes	Fontys school of engineering	Electrical Engineering
Renato Reis Brasil	Fontys school of engineering	Electrical Engineering
Lars Feijen	Fontys school of engineering	Electrical Engineering
Tomas Salachov	Fontys school of engineering	Electrical Engineering
Emiel Delissen	Fontys School of Natural Sciences	Engineering Physics
Thiago Furletti Hoffman	Fontys school of engineering	Electrical Engineering
Martijn van der Linden	Fontys school of engineering	Electrical Engineering

Severinus is a care giver where people with a mental disability can find support to live a normal life. People with intellectual disabilities are often unable to express and regulate their mental state or discomfort like pain, stress, and anxiety. The proven method to assess mental health is to use signalling plans, which are based on registering sensory perceptions and behaviour. With such plans, the mental state of a client is estimated so interventions can be taken if needed. These plans are subjective and inadequate in some cases, for example when the environment prevents a good observation of external characteristics, or if there is no proper assessment of the state of mind is possible. Therefore, within this vulnerable group there is a need for an objective early warning system so that escalation can be avoided and thus the quality of life is improved.

Currently the concept of an objective warning system is being investigated within Severinus. The system is based on wearable sensors, for example around the wrist. The wearable sensor unit collects data of physiological parameters of both the patient as the care giver.



Project: **IPD 12 – Ubi Display**

Organization **: Philips**

Logo **:**

Company contacts **: Kunigunde Cherenack, Bertrand Rigot**

Tutor **: Wiely van Groningen**

Team members:

Students	Institute	Department
Jordan Davies	Fontys School of Engineering	Electrical Engineering
Pieter Donkers	Fontys School of Engineering	Electrical Engineering
Wesley van Osch	Fontys School of Engineering	Electrical Engineering
Tom Verbeek	Fontys School of Engineering	Electrical Engineering
Nikolaj Zukov	Fontys School of Engineering	Electrical Engineering

The Project

With technological advances improving our lives in many ways, it's time for these advances to revamp the office and make them a more productive place. Philips has tasked Fontys with the chance to research the usability of a new platform that is years ahead of the current market. This platform is called Ubi Interactive.

By using a combination of a Microsoft Kinect, the software from Ubi interactive and a projector you can transform any solid surface into a touchscreen display.

The group working on this project has been tasked to create an application which will demonstrate the feasibility of the Ubi display. This application will be created for a division within Philips who are using creative thinking about products and modeling business flows to bring ideas to life.

Project **IPD13: Robotic Pick & Place from conveyor**

Organization: **Kenniscentrum Mechatronics & Robotics**

Logo:

Company contacts: **Mr. Randy Kerstjens**

Tutor(s): **Mr. Antoon Pepping**

Team members:

Students	**Institute**	**Department**
Mark Vissers, M.I.	Fontys School of Engineering	Mechatronical Engineering
Niels Elsen, N.J.M. van de	Fontys School of Engineering	Mechatronical Engineering
Marcel Wensveen, M. van	Fontys School of Engineering	Mechatronical Engineering
Daan Widlak, D.M.A.	Fontys School of Engineering	Mechatronical Engineering
Tim Broek, T.A.J. van de	Fontys School of Engineering	Mechanical Engineering
Joost Frijns, J.J.M.	Fontys School of Engineering	Mechanical Engineering

The Project

The assignment is to adapt the ABB robot cell as a system, the gripper and the vision system. This in such a way that the robot system can handle a larger variety of products and works more robust. This includes adjusting the vision system, in such a way that it can recognize new objects faster.

Project IPD 14: Robot safety

Organization **Fontys University**

Logo:

Company contact: **Falke Hendriks**
Coach: **Chris Remmers**

Team members:

Students	Institute	Department
Job van Hoof	Fontys School of Engineering	Mechatronic engineering
Joris van Rodijnen	Fontys School of Engineering	Mechatronic engineering
Coen Timmermans	Fontys School of Engineering	Mechatronic engineering

Project description.
Nowadays technology is used in every aspect of our life. Both in the industry as in our personal life. The way we interact with technology has changed over the years. Interaction becomes more and more personal. This personal interaction with technology comes with great safety responsibilities for the producing company.
These safety responsibilities give us a broader view on how to approach interaction between humans and robots or technologic products. How far can we go with this interaction. What rules are already established and are these rules enough to guarantee a safe environment

The project group has been testing the safety of the prior made UR5 robot setup in combination with the Xbox Kinect camera. This setup is made that the robot can work in an environment where a human can safely interact with the robot. Over this setup the group has been working out a FMEA so that all safety failures which the robot might still be involved with are accounted for. These safety risks are found and written down using the machine guide lines and multiple ISO norms.

The goal of this project is to make the UR5 robot as safe outside of a safety cage as it is inside of the safety cage.

Project **IPD 15 : Smart Desk**

Organization: **Mikomax**

Logo:

Company contacts: **Mr. Mark Tak**

Tutor(s): **Mr. Wiely van Groningen**

Team members:

Students	Institute	Department
Rudy Coppens	Fontys School of Engineering	Electrical Engineering
Stefan Teley	Fontys School of Engineering	Electrical Engineering
Thijs van Wegberg	Fontys School of Engineering	Electrical Engineering
Lars Petterson	Fontys School of Engineering	Electrical Engineering

The Project

With the Project "Smart Desk" Mikomax wants to give the way of working behind your desk a new dimension. Many people still have a lot of problems with their body because of sitting not in the right position or sitting to long in one position. The idea is to auto adjust the desk and chair to the right dimensions depending on your body dimensions. If you enter the office for the first time, you have to walk to a room to measure the dimensions of your body. This measurement data will be stored on your phone. You pick a desk and place the phone on the table. The table moves to the right height and also the chair will do the same. If you want, there will be every few hours an alarm to ask you to stand up and work for a while standing. There are more groups working on this subject but our group takes care of the overall system description, specifications and the interaction of the smartphone with the desk.

Project IPD 16 Bicycle gear hub efficiency

Organisation: **Fietsersbond**

Company contact: **Kees Bakker**
Tutor: **Henk Hulshof**

Team members

Students	Institute	Department
Brian Eijgelsheim	Fontys School of Natural Sciences	Engineering Physics
Mathijs van Laarhoven	Fontys School of Natural Sciences	Engineering Physics
Jarco Beek	Fontys school of engineering	Mechatronic Engineering
Tim van Harten	Fontys school of engineering	Mechatronic Engineering

Project description:
The Dutch bikers association wants to improve and expand the cycling possibilities for the common bicyclist. By improving the quality of cycling in the Netherlands the use of bicycles can be increased. This involves; accessibility by bike, the quality of the bicycle, safety and service to cyclists. Currently the Dutch bikers association counts 33.000 members. They want to improve the quality of the bicycles by giving good information to cyclists. They focus on all bikes except the real sport bikes like racing and mountain bikes.

To further encourage the use of bicycles, the Dutch bikers association wants to inform her members about different gear hubs. Currently the cyclist can choose between two different gear systems, derailleur and hub gears. Hub gears have a lower efficiency than derailleurs. But how much lower is hardly known. The Dutch bikers association want to know the relative efficiency of each gear hub. The derailleur and hub gear are displayed in Figures 1 and 2.

Figure 2: Derailleur, gear system one.

Figure 1: Hub gear, gear system two.

For the final product the IPD group needs to deliver a working measuring device to measure the efficiency of various bicycle gear hubs. The accuracy is to be determined and a measurement procedure will be written. The measuring device should also be tested on commonly used bicycle gear hubs.

Project **IPD 17 : Zigbee**

Organization ` **Fontys University**

Logo:

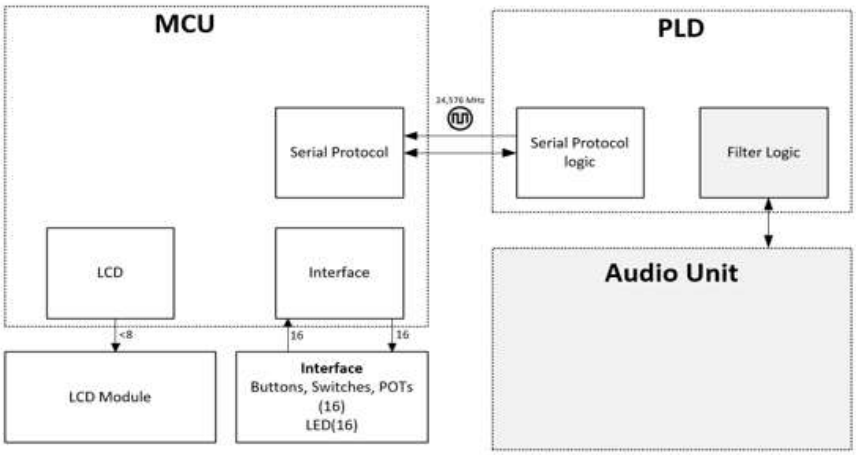
Company contact: Wim van de Valk

Team members:

Students	Institute	Department
Bob Clephas	Fontys school of engineering	Mechatronic Engineering
Luuk Spin	Fontys school of engineering	Mechatronic Engineering
Luuk Voesten	Fontys school of engineering	Mechatronic Engineering
Rick Jonkers	Fontys school of engineering	Electrical Engineering
Satrios Kargas	Fontys school of engineering	Electrical Engineering
Stef van Lierop	Fontys school of engineering	Mechatronic Engineering

Project description.

The design main goal is to provide a versatile interface to the audio processing unit. For this reason the interface is not functionally explained, instead the number and the nature of sensors and actuators comes as a requirement. The processing unit must be in position to receive all the changes from the sensors in order to change parameters of the algorithm and provide information about its state through the actuators. The data exchange between the processing unit and the interface must be handled by an intermediate unit that communicates the changes with a custom serial protocol. Additionally the intermediate device encodes the changes from the sensors and decodes the messages from the processing unit into a number of data words that compart the communication frame. There is no limitation regarding the frame rate or the speed of communication.



Project **IPD 18 : High performance Oscilloscope tablet**
Organization: **Fontys University of Applied Sciences**

Logo:

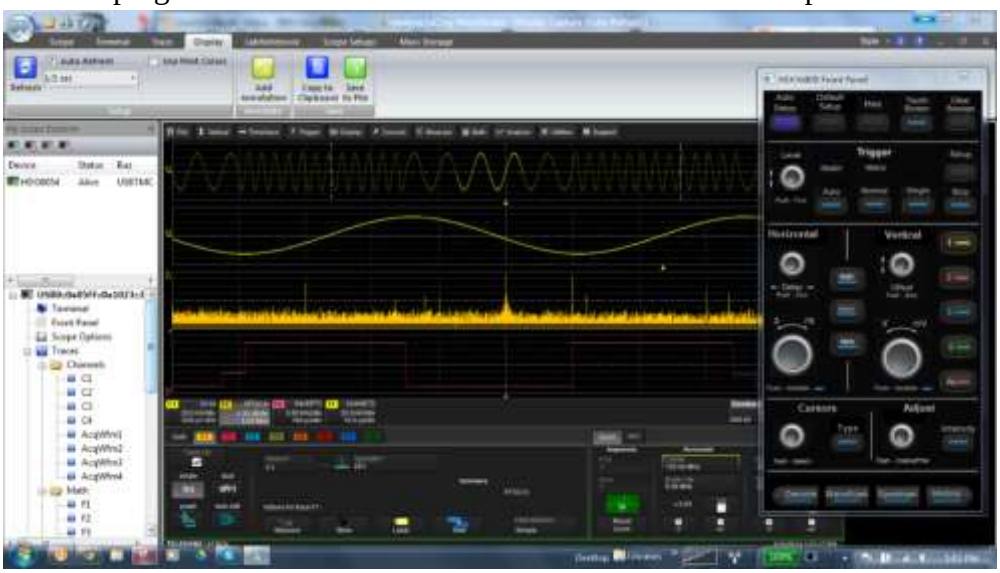
Company contacts: **Mark Hendriks**
Tutor(s): **Mark Hendriks**

Team members:

Students	Institute	Department
Lars Krammer	Fontys University of Applied Sience	Electrical Engineering
Merijn Verschuren	Fontys University of Applied Sience	Electrical Engineering
Bjorn van der Meulen	Fontys University of Applied Sience	Electrical Engineering
Kevin Janga	Fontys University of Applied Sience	Electrical Engineering
Jonathan van Eijs	Fontys University of Applied Sience	Electrical Engineering

The Project

An oscilloscope is a vital instrument in any electrical engineer's arsenal. It has been around for the longest of times and has gone through a lot of development since its initial introduction in the 1920s. In recent years the development of data acquisition tools has moved from analog instrumentation to digital tools, and with it opened up the possibility for efficient wireless data acquisition tools. This builds on the trend in consumer electronics where wireless when possible has become the standard. However, when it comes to oscilloscopes, switching to wireless presents the challenge to preserve the quality of the measured signal while coping with the limitations that wireless data transfer imposes.



Project **IPD19_Modularity**

Organization: **Mechatronics Department**

Logo:

Company contacts: **Mr. Onno Puts**

Tutor(s): **Mr. Remco Hutten**

Team members:

Students	**Institute**	**Department**
Leonardo Teixeira	Fontys Engineering	Mechanical Engineering
Erikas Bedulskis	Fontys Engineering	Electrical Engineering
Isabela Boechat	Fontys Engineering	Mechanical Engineering
Rodrigo Carvalho	Fontys Engineering	Mechanical Engineering
Diogo Stabel	Fontys Engineering	Mechanical Engineering

The Project

The UR5 is a universal robot which is widely used In line with the current trend for Adaptive robotics, the arm is easily programmable and has integrated safety features that allow it to collaborate with people. The gripping of differently shaped and sized products requires the use of different grippers. While the flexibility in employing this robot arm is a great advantage, the process of switching between grippers is inflexible and time consuming. The grippers have to be removed and fixed using bolt connections and electrical interfaces have to be disconnected and re-connected.

The objective of this project is to create an attachment to robot and grippers so the robot could interchange the grippers with one single “click” action. By this it is meant that the grippers can be mechanically released and electrically de-connected, as well re-connected to the robot-arm. In addition to this, the grippers have to be stored in a magazine from which the robot can interchange grippers without any human intervention. This means that the connection and de-connection actions have to be automated.

Project **IPD #20: EPSON Robotic Arm**

Organization: **Mechatronics Department**

Logo:

Company contacts: Mr. Onno Puts Tutor(s):
Mr. Reza Hosseini Team members:

Students	**Institute**	**Department**
Ana Carolina Rosa	Fontys School of Engineering	Mechanical Engineering
Felipe Lombardi	Fontys School of Engineering	Mechanical Engineering
Franco Serafim	Fontys School of Engineering	Mechanical Engineering
Guilherme Barros	Fontys School of Engineering	Mechanical Engineering
Stephanie Mazzone	Fontys School of Engineering	Mechanical Engineering

The Project

Two EPSON robotic arms were given to Fontys, so the students from group IPD_20 should assembly them and turn them on. After this task and with the knowledge of Materials, Industrial and Mechanical Engineering, they should make the robotic arms work, alone or together, with an industrial function

Project IPD 21: Gripper

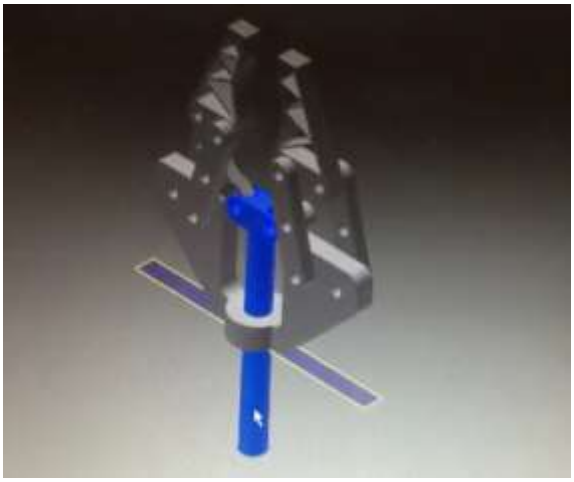
Company contacts: **Mr. Onno Puts**
Tutor(s): **Mr. Bert Huis in 't Veld and Mr. Antoon Pepping**
Team members:

Students	**Institute**	**Department**
Borja Martinez Haya	Fontys School of Engineering	Mechanical Engineering
Juan Mugica López	Fontys School of Engineering	Mechanical Engineering
Thiago Ximenes de Mesquita	Fontys School of Engineering	Mechanical Engineering
Victor Vilaça Padilha Pinto	Fontys School of Engineering	Mechanical Engineering
Vytautas Bindokas	Fontys School of Engineering	Electrical Engineering

The Project

Fontys owns a UR5 robot arm. The UR5 represents one of the most significant technological achievements coming out of the robotics community in decades, which enables automation of repetitive and dangerous tasks. Due to their low weight, the UR robots are easily moved around the production site to complete new automation tasks and can operate in very small production areas.

This robot is designed to be widely usable, it is easily programmable and has integrated safety features that allow it to collaborate with persons. Since this kind of robots are designed to take over some human tasks in a production environment they should be able to pick up and place a lot of different objects with a large variety of shapes. In order to employ the robot for these tasks we are designing and manufacturing a two finger gripper and a three finger gripper.



Objexlab 1 – Team M40

Project : The development of a new product carrier concept

Organization : AEE B.V.

Company contacts : Mr. Joost van Bussel
Tutor(s) : Mr. Eric Rutjens

Team members:

Students	Institute	Department
Martin Stroetinga	Fontys School of Engineering	Mechanical Engineering
Joep Giebels	Fontys School of Engineering	Mechanical Engineering
Gijs Bardoel	Fontys School of Engineering	Mechanical Engineering
Marcel Verspaandonk	Fontys School of Engineering	Mechatronical Engineering
Guus Clephas	Fontys School of Engineering	Automotive Engineering
Kees Lagerberg	Fontys School of Engineering	Automotive Engineering

The Project
AAE is a company that is specialized in the construction of high precision mechatronical machines. One of these machines is designed to print text on plastic tubes for the medical sector. These plastic tubes are pressed on a pin (called a product carrier) which transports the tube trough the machine. The problem is that as a result of the production process, the diameter of the tubes is not always the same size. When the diameter is too large the tubes are not fixed properly on the pin and this can result in the tube falling of the pin before the print process is finished.

The question of the company is the following:
Can we produce a product carrier by means of metal 3D printing where there is a flexible structure implemented in the product so that the plastic tube is always fixed on the pin.

Objexlab 2 – Team Murphy's

Project : 3D printed wheel chair

Organization : HDB Groep

Company contacts : Mr. Hans de Beule, Mr. Harrie van Bijsterveld
Tutor(s) : Mr. Hein van de Vrande

Team members:

Students	Institute	Department
Jeffrey Cornelissen	Fontys School of Engineering	Automotive Engineering
Bart van Zijl	Fontys School of Engineering	Automotive Engineering
Luuk Jeurgens	Fontys School of Engineering	Mechatronics
Ted Bender	Fontys School of Engineering	Mechanical Engineering
Marten Sterken	Fontys School of Engineering	Mechanical Engineering
Marco Teeuwen	Fontys School of Engineering	Mechanical Engineering

The Project
HDB Group, founded by Hans de Beule, is a company focused on sustainable development. His goal is to create a custom wheelchair by use of additive manufacturing. To achieve this goal, the project focusses on the client Harrie van Bijsterveld. Harrie, a friend of Hans, is bound to a wheelchair which has been custom fitted to his particular needs and wishes. His current wheelchair is a relatively small and lightweight chair made of titanium.
The project team is asked whether they can develop a wheelchair with the use of 3d printing and how this new technique might improve the current design for wheelchairs.

After the initial research, some boundaries are set for the assignment. The main focus for improvement is on comfort, including damping, support, (dynamic) seating & weight reduction. Also some limitations are set to the various parts of the wheelchair. The main part is the seat of the wheelchair and also the frame taken into account. Therefore, the arm and foot rests, wheels and accessories are excluded at first. The goal is to achieve a functional prototype for the seating and a 3d & scale model for the frame and rest of the wheelchair.

Objexlab 3 – Smart Product Da Vinci's

Project : **Development of and determination of flexible/rigid grid structures**

Organization : **PLT Products**

Company contacts : **Mr. Rick Broshuis**
Tutor(s) : **Mr. Hein van de Vrande**

Team members:

Students	**Institute**	**Department**
Niels van der Heijden	Fontys School of Engineering	Mechatronics
Ivo Bovendeerd	Fontys School of Engineering	Mechatronics
Gert Huijben	Fontys School of Engineering	Engineering
Cas Candel	Fontys School of Engineering	Mechatronics
Michiel Vriens	Fontys School of Engineering	Engineering
Niels Kessels	Fontys School of Engineering	Engineering

The Project

The project comes from the company P.L.T. products. They are the number one in the shoe insole market. They create custom insoles based on 2D or 3D scans. These scans are uploaded to a computer, on which they are edited to suit the customers needs. The changes that are made exist out of all kind of different modules. Now they are trying to make insoles with a different technique, that technique is 3D printing. They want to use 3D printing because they want to use as little material as possible to make lightweight insoles for athletes. In comparison with the old method, called milling, the 3D printed insole can't be changed by the podiatrist. With the foam they were able to change it by grinding it, but with 3D printing they use as little material as possible, so they aren't able to grind the insole. This is why P.L.T. is looking for a mechanical way to change the modules on the insole. Our project is to design an insole which can be 3D printed, where the position of the specific modules can be adjusted after the production process by a podiatrist.

Objexlab 4 – 3D Tech

Project : **Design of a monolithic spherical bearing for aircraft landing gear.**

Organization : **Fokker Landing Gear B.V.**

Company contacts : **Mr. Peet Vergouwen**
Tutor(s) : **Mr. Sjef van Gastel**

Team members:

Students	**Institute**	**Department**
Cuijpers, S.	Fontys School of Engineering	Mechatronic Engineering
Geers, M.B.M.	Fontys School of Engineering	Mechatronic Engineering
Emonds, R.H.J.	Fontys School of Engineering	Mechanical Engineering
Riansyah, A.	Fontys School of Engineering	Mechanical Engineering
Gulzar, T.S.	Fontys School of Engineering	Mechanical Engineering

The Project

When flying at high speed, aero dynamics is very important. To improve this, the landing gear is withdrawn during the flight. To (with)draw the landing gear, bearings are needed that are capable to absorb a large radial force. It is desirable that this bearing has a certain freedom so that the landing gear can overcome miss alignments.

Because of the high radial forces which must be taken with a bearing in combination with a design that is as light as possible, is currently done with expensive and maintenance sensitive bearings. Therefore Fokker wants to work with students from Fontys University Engineering to developed a new spherical bearing. Since Fokker expected that long-term 3D printing is going to occupy an important role in the (aerospace)production world, it should be a 3D printed bearing.

The ultimate goal is to apply this bearings in safety critical parts.

Objexlab 5 – Team Go

Project : **Design of a manifold in a water cooling system for a transmission electron microscope.**

Organization : **FEI Company**

Company contacts : **Steijn van de Boom, Mr. Ron van den Boogaard**
Tutor(s) : **Mr. Sjef van Gastel**

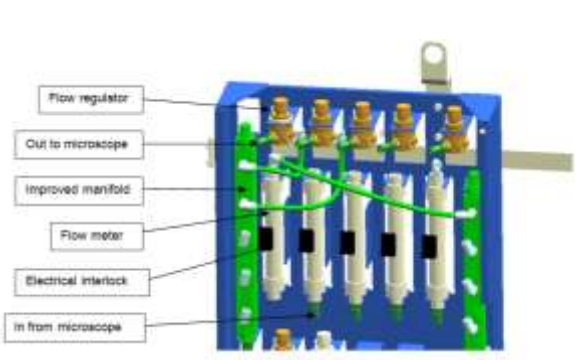
Team members:

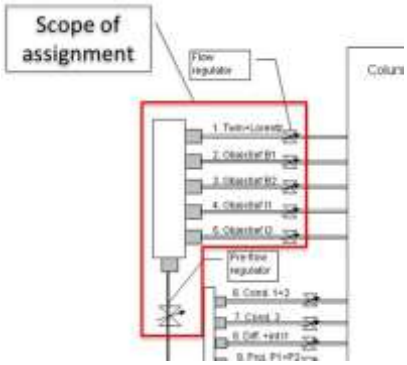
Students	**Institute**	**Department**
Saskia Jansen	Fontys School of Engineering	Mechanical Engineering
Tom van de Laar	Fontys School of Engineering	Mechatronic Engineering
Wisse Mertens	Fontys School of Engineering	Mechanical Engineering
Jurgen Miedema	Fontys School of Engineering	Mechanical Engineering
Perry Verstappen	Fontys School of Engineering	Mechatronic Engineering

The Project
The project was commissioned by FEI, a company that specializes in development and production of electron microscopes. For this assignment the focus lies on the improvement of one of their most accurate electron microscope, the TITAN S/TEM, Scanning/Transmission Electron Microscope.

One of the main components of these microscopes are the electromagnetic lenses in the electron optical column. Because these magnetic lenses produce a lot of heat, as a result of the current through them, they need to be cooled down. This is done by several low noise pipelines. Any vibrations in these pipelines affect the accuracy negatively.

The goal of this project is the following;
Analyze the current manifold and flow regulator of the water cooling system and redesign this with reduced noise and the use of additive manufacturing.





Objexlab 6 – PrinThink

Project : Solution for children with urine-loss.

Organization : LifeSense Group

Company contacts : Mr. Valer Pop, Ms. Julia van Zanten
Tutor(s) : Mr. Thijs van Diessen, Mr. Fons-Jan Luijten

Team members:

Students	Institute	Department
Niels Duijkers	Fontys School of Engineering	Mechatronic Engineering
Luc Hems	Fontys School of Engineering	Mechatronic Engineering
Nick Wienholts	Fontys School of Engineering	Mechanical Engineering
Thomas Jansen	Fontys School of Engineering	Mechanical Engineering
Jason Mertodikromo	Fontys School of Engineering	Mechatronic Engineering
Dries van der Lee	Fontys School of Engineering	Mechatronic Engineering
Lars Beuving	Fontys School of Engineering	Mechanical Engineering

The Project description

As part of the minor in the 3rd year education of Engineering at Fontys University in Eindhoven, the following project is described by LifeSense and group PrinThink.
In the past period, a group at Fontys made a 3D printed wearable design for healthcare application. This application named Carin, is made by LifeSense Group. Carin wearables is designed for women with urine loss and stress incontinence who want better bladder control. Carin helps to track, exercise and protect yourself from urine leaks.
This project is divided into five sub-questions:

- What kind of materials are available on the 3D print market?
- Is it possible to get 3D printed material water- and shockproof?
- Is it possible to make a 3D printed prototype where the printed parts can be snapped onto each other without a lot of failure?
- Are there other production techniques available for making the wearable design?
- Does the prototype has to be customizable? If so, is 3D-printhing the best option compared to other production techniques?

Project AR1: Composite Automation System (C.A.S.)

Organization: **ROBOCOMPO**

Logo:

Company contacts: **Mr. Michiel van Osch**

Tutor(s): **Mr. Michiel van Osch & Mr. Onno Puts**

Team members:

Students	Institute	Department
Jeroen Rikken	Fontys School of Applied Sciences	Mechatronics Engineering
Ruud van Dommelen	Fontys School of Applied Sciences	Mechatronics Engineering
Wout Kanters	Fontys School of Applied Sciences	Mechatronics Engineering
Lorenz Janssen	Fontys School of Applied Sciences	Mechanical Engineering
Cas van Hoof	Fontys School of Applied Sciences	Automotive Engineering

The Project

The process is about making products with composite materials which require a complex producing method which costs a lot of time. So the first question was: which part of this process can be automated with the available material the robotics lab? The following parts of process were interesting for this project which are: product polishing, cleaning the surface of the mold, and putting a gel coat. The purpose of this project is to deliver a working demonstrator that is able to detect a certain object and follow the surfaces. A scara robotic arm is given to use for this goal. An extra axis is needed to be able to reach all over the object. To detect the object a vision system will be designed.

- A working SCARA arm which is capable to follow XYZ (+R(z/y/z)) coordinates controlled by ROS.
- A system which is capable to convert an object to a pointcloud and turn this pointcloud into a movement plan for the end effector.
- A clear overview of the system and making sure the various components can be adjusted separately and not changing the whole. Also a calculation of the dynamic features of the SCARA arm.

Figure 1 The Scara arm which will be used in the project

Project AR2: Autonomous driving by traffic light, traffic sign and line recognition

Organization: A-team Eindhoven

Logo: 

Organization contact: Jos den Ouden

Tutors: Randy Kerstjens & Falke Hendriks

Team Members:

Student	Institute	Department
Masoem Yusofi	Fontys engineering	Automotive
Luca Jeucken	Fontys engineering	Automotive
Gijs van Rozendaal	Fontys engineering	Automotive
Ralf Hermans	Fontys engineering	Mechanical engineering

The project:

The A-team is a student group who are working on an autonomous driving Toyota Prius. In this project we will produce some aspects of the autonomous driving for them. This project contains reacting on speed signs and traffic lights together with the horizontal stop line. Better specified this project contains detection of traffic light and its colour, speed signs and its value and horizontal stop lines and its distance to the car. With this detected information the car will react to this scenarios. This happens with a algorithm built in the car. This algorithm is able to receive the input of the detection, process this, and give outputs to the Cruise control and brakes of the car. In one sentence we could say: The Cruise control of the car will be set to the detected speed limit on the sign, or would be turned off when a red traffic light was detected, and the brake algorithm will take over to make sure the car stops before the stop line near the traffic light.

Project AR3: Cooperative Robotic Mapping

Organization: **Fontys Engineering**

Logo:

Company contacts: **Dr. Ir. M. van Osch**

Tutor(s): **Dr. Ir. S. Alers**
Dr. Ir. J. Jeedella

Team members:

Students	**Institute**	**Department**
Ion Iuncu	Fontys Engineering	Electrical Engineering
David Heurtaux	Fontys Engineering	Electrical Engineering
Jasper Mulder	Fontys Engineering	Mechanical Engineering
Stan Verbeek	Fontys Engineering	Mechatronic Engineering
Luc Ahrens	Fontys Engineering	Mechatronic Engineering

Project assignment

The goal is to deliver 3 mobile robot platforms which are programmed to cooperatively build a map of an unknown environment. These robots need to be outfitted with the necessary sensors to be able to map an environment and determine their own location in this map. The robots should explore cooperatively in a smart manner. All data needs to be regularly updated to an overview station (e.g. laptop). The software needs to be modular in a way that, without much effort, any amount and diversity of terrestrial robots (equipped with vision sensors) can be added to the network in which a map is build.