Year 37 | Edition 2 | April 2019

VONK

MAIN ARTICLE
A TRIP THROUGH HISTORY

JUNCTION
A CHAT WITH JURRIAAN SCHMITZ

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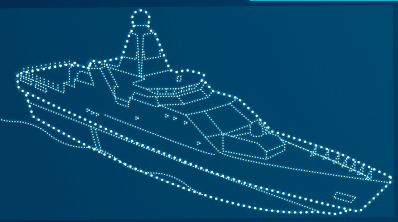

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ACTIVE IN DEFENCE, TRANSPORTATION SYSTEMS AND CYBER SECURITY

THALES
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Presidential Note

Author: Ewout Baars

Dear Scintilla Member,

What goes the time fast, the first half year of this study year has already past. You might wonder where the time went and what you have achieved in the first half or regret all the decisions you made this far. At this point the board takes a step back to look at the things they tried to do and the things they actually did.

As you might know, we are quite fond of the bananas on the swiped list of Scintilla as well as of our new fridge. Therefore, it seems nice to give you a bit more information about our fridge, what a banana is and of course the most important question why are they crooked? According to the website of Chiquita, it is a quite difficult process but they think they have the answer. Bananas grow, as you might know, hanging on trees. But since bananas are striving high, they want to aim at the sky, or the sun so to say. This is why they grow towards it, which is called negative geotropy. Now your question has been answered, I can give you some more information about the Swiped part of our bananas, the fridge.

Scintilla is part of the newest developments in the world of technology. The new *Smart Fridge* Scintilla has bought, is one of those *future promising technologies*. With the *smart sensing technology,* it is able to detect and recognize all your products inside the fridge. Creating more insight in a handy and fast way in the quality and quantity of your snacks. Technology is developing very fast, especially in the field of *Internet Of Things*. This *future promising technology* makes it possible to check, control and steer your technology all around the world from one home base. Scintilla is part of *IOT* as well. The Samsung family hub is integrated in the *smart grid* which makes it possible to control the temperature, check the food inside and stream music from your home base. All the data collected by the fridge is pushed immediately to *the cloud*. With use of *cloud computing,* this *big data* is stored and processed automatically by our *'in the cloud'* servers. This *big data* is used for further research on the popularity of each snack. By extrapolating this data, the future perspective of each individual snack can be foreseen. This gives the possibility to create a well-designed snack individualistic strategic plan in order to create the optimal situation for the greater good. The *Artificially Intelligent* fridge knows when your food will expire, learns what you put into it and can combine this information into recipes. This *smart fridge* can interface via the *smart grid* with other *artificially intelligent* fridges. This is how it can create a *block chain* of fridges with a wide spread information capacity of stored food. In the future every *smart home* should have such a fridge. Combining those would create a whole *smart city* where each home is interfaced with each other via their fridge.

In total it can be said that this fridge is definitely *future proof*. Where it might be *revolutionary* now, it will be normal after our big *digital transformation*. It also encourages the transformation of industry 3.0 to *industry 4.0*. Let the computers do the work for you instead of you working for the computer.

I hope you have now more insight in swiped, bananas and the new fridge. If you have any questions with regards to these or any other subject, we will be in the Scintilla room to answer them.

Dames en heren,
Op de koningin, op Scintilla!

Ewout Baars
President of the 89th Board of E.T.S.V. Scintilla

Masthead

De Vonk

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08 Main Article

We paid the association behind the historic study-collection of the faculty of EEMCS a visit. Read all about the very diverse, unique and interesting collection on page 8!

20 Junction

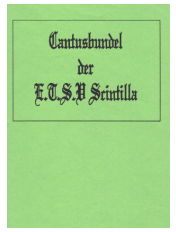
In this edition's junction, we have interviewed professor Jurriaan Schmitz, who is currently head of the research department of Integrated Devices and Systems.

STUDI 16

Maarten shares some views on education and the role of Scintilla's Taskforce for University Developments and Improvements.

Cantus Scintillae 32

Over a hundred Cantus Scintillae have been organized over the past decades. The current form is known to most of us, but what was the first edition like? Read about it on page 32.



Editorial

Dear reader,

On March 12th, we launched our new website. We were very content with the reactions we have received and will continue working on the platform to improve it further and further. Updates to the platform will role out in the near-future and new content will be published on a weekly basis (hopefully...). If you feel excited about helping us out with this new platform, don't hesitate to reach out to us, we can always use some help!

For now, the familiar format on paper will exist in parallel with the online platform. This edition already marks the start of the last quartile of the academic year 2018/2019. But just before starting the last leg of the race that comprised this year, it might be nice to have some relaxing stories to read. Even if you need some motivation on why you would actually continue putting all that hard work into developing new electronic systems, there are stories in this Vonk that show you the vast progress we have made over the last century alone in the hope to provide that last bit of motivating to finish this year.

Luckily, April also marks the start of spring, with positive changes in temperature and hopefully enough time to relax and have fun outside.

The only thing left is to wish you all the best of luck with the coming quartile.

See you around,

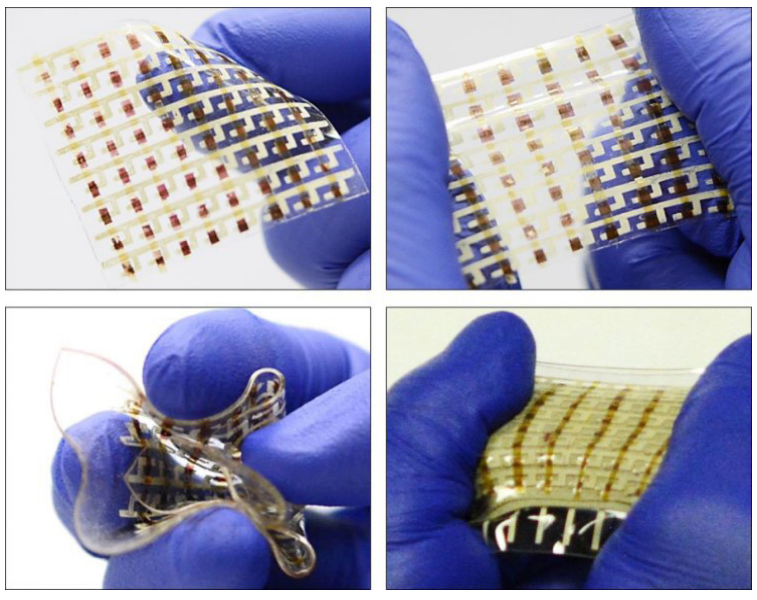
Stef

News for the Electrical Engineer

Author: Maarten Thoonen

Researchers from the University of Houston have reported significant advances in stretchable electronics, moving the field closer to commercialization

In a paper published Friday, Feb. 1, in Science Advances, they outlined advances in creating stretchable rubbery semiconductors, including rubbery integrated electronics, logic circuits and arrayed sensory skins fully based on rubber materials.



The work could lead to important advances in smart devices such as robotic skins, implantable bioelectronics and human-machine interfaces. Yu previously reported a breakthrough in semiconductors with instilled mechanical stretchability, much like a rubber band, in 2017.

This work, he said, takes the concept further with improved carrier mobility and integrated electronics. "We report fully rubbery integrated electronics from a rubbery semiconductor with a high effective mobility ... obtained by introducing metallic carbon nanotubes into a rubbery semiconductor with organic semiconductor nanofibrils percolated," the researchers wrote. "This enhancement in carrier mobility is enabled by providing fast paths and, therefore, a shortened carrier transport distance."

Carrier mobility, or the speed at which electrons can move through a material, is critical for an electronic device to work successfully, because it governs the ability of the semiconductor transistors to amplify the current.

Previous stretchable semiconductors have been hampered by low carrier mobility, along with complex fabrication requirements. For this work, the researchers discovered that adding minute amounts of metallic carbon nanotubes to the rubbery semiconductor of P3HT -- polydimethylsiloxane composite -- leads to improved carrier mobility by providing what Yu described as "a highway" to speed up the carrier transport across the semiconductor.

In addition to Yu, the paper's researchers include first author Kyoseung Sim, and co-authors Zhoulyu Rao, Anish Thukral and Hyunseok Shim, all of UH, and Hae-Jin Kim, a former postdoctoral researcher at UH who is now with Gyeongsang National University in Jinju, Korea.

Future work, Yu said, will involve further raising the carrier mobility and building more complex, hierarchy and high level integrated digital circuits to meet the requirements for integrated circuits, biomedical and other applications.

University of Houston. "Advances in stretchable semiconductors, integrated electronics." ScienceDaily. ScienceDaily, 1 February 2019. <www.sciencedaily.com/releases/2019/02/190201142400.htm>.

A New Ideal Diode for Low- and Medium-Voltage Power Supply Circuitry

Analog Devices has released an IC that provides high-performance diode functionality for automotive applications, portable devices, computing equipment, and photovoltaic systems.

An important part of the journey from student to professional engineer consists of a series of sobering realizations regarding the nature of real electronic components. A resistor is not just a resistor; it also creates noise. A capacitor is not just a capacitor; it also has series resistance. A PCB trace is not just a PCB traces; it also has inductance, and resistance, and capacitance.

The process of awakening to the nonideal reality of electronic devices is particularly discouraging when it is contemporaneous with the gradual—or not so gradual—realization that the world in general is a rather nonideal place. Fortunately, this article offers us a respite from all this nonideality.

The Problem with "Normal" Diodes

Diodes are extremely useful devices and are incorporated into a variety of circuits in which, for one reason or another, current must flow in only one direction. This task is referred to as rectification, and diodes are also known as rectifiers.

The trouble with diodes is that they can't rectify without dropping a bit of voltage. At some point most of us probably learned that diodes drop 0.6 or 0.7 V when they're conducting current. This is a major oversimplification, and it's downright erroneous if you don't specify that we're talking about a silicon PN junction diode, because Schottky diodes offer significantly lower forward voltage.

In many applications the diode's voltage drop is easily ignored, but in high-current situations—such as power supply circuits—this voltage can translate into a significant amount of wasted power. Power, as always, is equal to voltage multiplied by current. If the power supply needs to deliver a certain amount of current for the load circuitry, our only option for reducing the diode's power dissipation is to reduce forward voltage. Using a Schottky diode instead of a typical silicon rectifier is certainly a step in the right direction, but can we do better?

An "Ideal" Diode

The LTC4376 is described as "an ideal diode with reverse input protection." As you might have guessed, though, it's not quite ideal, and furthermore, it's not really a diode. The LTC4376 is an integrated circuit that provides diode functionality using a MOSFET. It is described as a diode because it rectifies, and it is described as ideal because the forward voltage drop, though not zero, is much lower than what you could get even from a Schottky diode.

The device's internal circuitry controls the MOSFET such that the voltage drop from input to output is 30 mV—this might be an order of magnitude lower than the forward voltage of a comparable Schottky diode.

If you're wondering why anybody uses diodes when we can obtain better performance from a MOSFET, take a look at the LTC4376's internal block diagram. Apparently it takes an awful lot of circuitry to turn a MOSFET into an improved version of a diode.

Ideal Diode Applications

Power supply circuits commonly employ rectifiers for reverse-polarity protection and "ORing." In both of these situations, potentially high amounts of power supply current are flowing through the diode, resulting in potentially high amounts of wasted power. Also, in low-voltage systems, the voltage drop itself can be problematic.

Rectifiers protect against supply reversal by ensuring that current cannot flow in the direction corresponding to the improper voltage polarity. The LTC4376 can perform this task while reducing the amount of voltage lost across the "diode," extending battery life, and generating less heat.

The term "ORing" refers to the practice of connecting the outputs of two power supplies. This provides redundancy—if one supply fails, the other automatically takes its place and supplies current to the load.

Author: Robert Keim
Retreived from https://www.allaboutcircuits.com/news/a-new-ideal-diode-for-low-and-medium-voltage-power-supply-circuitry/.

main article

A Trip Through History

On location at the historical study-collection of the faculty of EEMCS

Author: Stef van Zanten, Nahuel Manterola

In February, the foundation behind the historic study collection of the faculty of EEMCS, Ampère, celibrated the 40th anniversary of the faculty's historic collection. Over these 40 years, the collection has steadily grown to the impressively diverse collection it is today. We've paid the foundation a visit and are very excited to share some stories behind the historical devices present in their collection.

About Ampère

Martin Beusekamp is one of the volunteers helping out with maintaining and extending the historic collection. He guides us through the various rooms on the 5th floor of the Carré building, which houses the collection. Together with the other volunteers, Martin contributes to the preservation of historically relevant (mostly measurement) devices that are related to academic work done in the areas of Electrical Engineering, Computer Science and Mathematics. Ampère was founded in 2007 to professionalize the preservation of the historic collection. The association is independent of the University of Twente which allows them to acquire funding in order to maintain the collection. Next to acquiring devices to extend the collection, time is also invested in getting to know the devices by performing tests and collecting manuals.

Nowadays manuals can easily be found on the internet. Back in the early days of the University of Twente, these manuals were only published on paper, so the association also tries to collect and digitalize these manuals. In addition, there is a large collection of year reports by several companies that published technilogical innovations on paper every year, such as Philips.

Over the last 50 years, a lot of different components have been used in electronic devices. Present in the historic collection are capacitors of all different types and size, and devices such as vacuum tubes and transistors and many, many more. Together with the rest of the collection they are maintained to preserve the heritage of the faculty of EEMCS.

Next, let us show some exciting and/or surprising devices from their collection.

Philips DC Voltage Supply PE 4804 (1966)

Martin: 'This DC supply unit is one of the power supplies present in the historical collection. Built back in 1966, it was originally used at Hollandse Signaalapparaten in Hengelo, this company later became Thales Hengelo. What makes this device so special is that no silicon transistors have been used in its design. For the past half century we have designed circuits predominantly using silicon devices, but just before silicon became the workhorse of electronic circuits, there was a short period in which devices were designed using germanium transistors and selenium rectifiers, this power supply originates from this period.

And it works! Not all devices in our collection are still operational, but some are. Unfortunately, we lack the time to thoroughly test each device, so we cannot determine for each device if it still works and if not, what exactly is broken. Transistors and ICs in a plastic encapsulation are vulnerable to moisture diffundating through the plastic. The moisture could be diffundated out again by turning the device on and leaving it on for a few hours, but we don't want to put the devices on time clocks. And if we would, the UT wouldn't, and if the UT would, the fire brigade wouldn't want us to do so.'

Next to the DC supplies, the collection also houses some high-frequency devices that have been used in the past. The collection of oscilloscopes is very diverse consisting of all kinds of different devices, such as an oscilloscope that has removable plug-in units to change its functionality.

Vacuum Tube Collection

In addition to the measurement devices, also a lot of historic components have been acquired in Ampère's collection. The picture below shows some old-fashioned vacuum tubes that used to be present in electronic devices back in the days. The historic decrease in component size cannot only be seen in the collection of vacuum tubes, but also in the collection of transistors, capacitors and ICs.

Intel Corporation 8755 Universal PROM Programmer (1975)

Martin: 'In our computer collection, we keep many historical models of personal computers and accessories. Since the computer has been among us almost just as long as we have been working with these devices, our collection on this front is quite extensive. One of these devices is this historic PROM programmer. PROM stands for programmable read-only memory, which can be programmed only once (then it is fixed). Using the Zero-Insertion Force sockets in the front, the user could programme the device.'

We found that the manual also nicely describes this very innovative technique to easily insert new code into the machine:

"On the front panel of the Universal PROM Programmer are mounted two zero-insertion-force sockets one 16-pin, the other 24-pin (UPP-IOl). Each socket is driven by a printed circuit board within the PROM Programmer that contains the electronic circuits required to program a particular class of PROMs. These printed circuit boards with the device-related circuitry are referred to as "personality cards". The Universal PROM Programmer can contain two different types of personality cards at any given time (one associated with each socket). The personality cards are easily exchanged to allow users to reconfigure their UPP, as required to program the PROM devices."

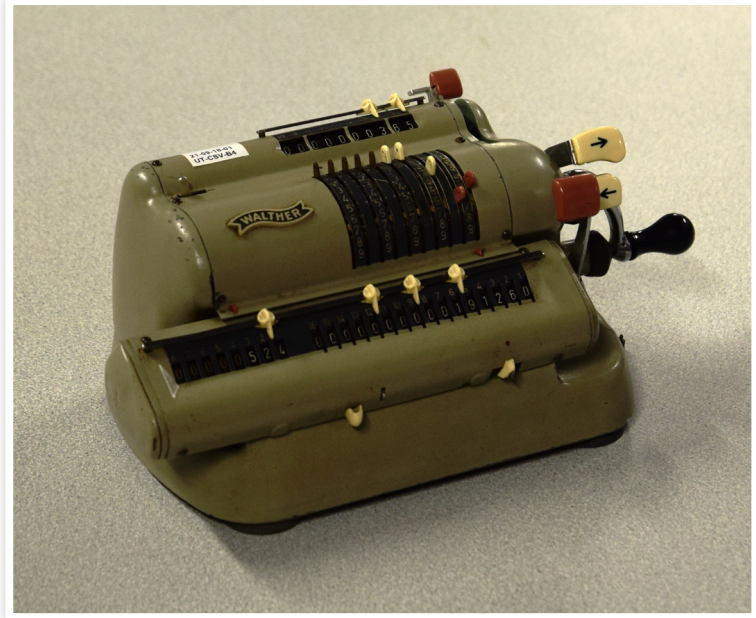
Gandalf Modem (1970)

The Gandalf modem is the historical version of the remote-desktop protocol that we that we nowadays often use at Scintilla.

Martin: 'It acts as a communication device to a central computer that does the calculations. In the current Cubicus building, this central computer used to be present. On your desk you only have a keyboard and display, the Gandalf modem then communicates to the central computer over the telephone line.'

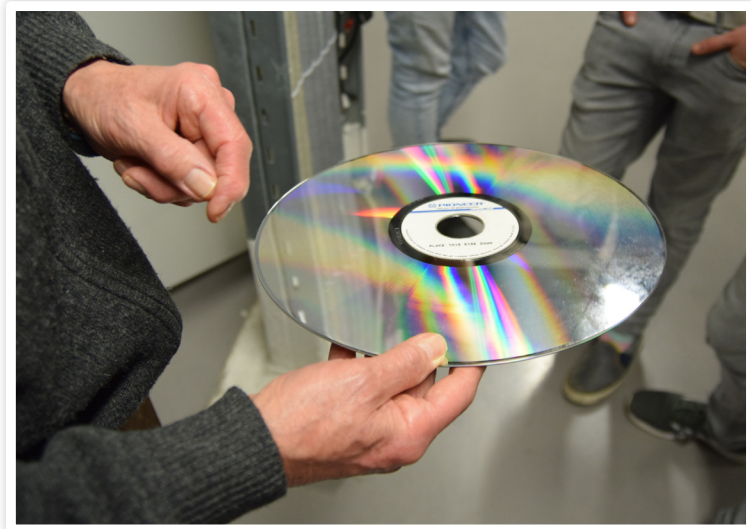
Walther RMKZ (between 1931 and 1952)

Martin: 'Our historical collection of calculators contains several categories. We have some purely mechanical calculators, some electromechanical in which a motor did the work and several purely electronic pocket calculators. This Walther model is one of the mechanical calculators, you can enter a number and by turning the handle several times you can change the number it should multiply with and the result will show up. Turning the other way around yielded the result of the division operation and there were also all kinds of tricks to take the square root.'



Laser Disks

Nearing the end of the visit, we discussed the predecessor of the CD and DVD media: the laser disk. Laser disks are analogue media that store video audiovisual content on a disk. The processing is done entirely analogue based on information on the brightness and colour stored on the disk. This also means that the smallest mistake present on the device yields an error in the footage. For interactive use the discs contained one image per rotation. Reading out frame numbers, clever programmes could then be made that allowed for random access to all stills and video footage on the disk. In this mode every side of the disk could store 36 minutes of footage. For feature films the discs could be recorded in a way that both sides of the disc contained one hour of material. This allowed for some of the first interactive courses used in industry and education. The laser disks were later replaced by more advanced ways to show footage, such as the DVD.



Has your interest been sparked by this article, and would you like to know more about the historic collection? On the website of the historic collection, many, many more information on historic devices can be found: studieverzameling.utwente.nl.

Feel free to contact the people maintaining the collection with any further questions at studieverzameling@utwente.nl.

Solar Boat Twente

Flying boat on solar power

Author: Mark Heimgartner

9 minutes left. The deadline came closer and closer. Even though I already finished my motivation letter, a little part of me was still doubting. Am I making the right choice? Will the coming year really add to my development and above all: will it be fun?

My parents were a bit hesitant too. I mean the word "delay" commonly isn't inherently positive. Frankly, they changed their minds very quickly once they saw the first solar boat build by Solar Boat Twente. All I can say is that this year has been great so far and I can't wait to see our boat crossing the finish line in Monaco!

Deep down I always wanted to be part of a team that works towards one goal. An entire year you are working hard to work out ideas from concept to the final product. Especially once all is starting to take shape, you can be proud. Proud of the accomplishments as a team. Something that characterises Solar Boat Twente is that there is still room for realising completely new ideas. This year, for example, we decided to place the motor underwater in a special housing. This so called pod motor is one of our major projects and the application is quite unique in the solar boat scene. Commercially it isn't applied much either. Nevertheless, we decided to take on the challenge together with a few partners. The motor will be custom made and housed in a nacelle, which is made out of milled aluminum. At first the design seemed quite doable. But then, a few weeks later, the real engineering kicks in! Out of the blue you have to solve problems you didn't think of at first. That's what makes being part of a student team interesting.

Personally, that is one of the biggest reasons why I joined Solar Boat Twente.

> "Working out your idea from sketch to product and solving problems along the design process."

The goal is to race for a podium position in the Solar Sport One competition in 2019. By the middle of the 21st century, harbours worldwide will be filled with yachts and motorboats powered by solar energy, that is the objective of the Solar Sport One competition.

Besides, we try to encourage environmental awareness by the application of renewable energy in the maritime sector. The year basically is divided into 4 periods: designing, manufacturing, testing and racing. The design phase takes the longest: from September up to February. As the design and manufacturing phase are being completed, the coming months we will mainly focus on testing, visiting big events such as Hannover Messe, and eventually racing.

A race consists of three different aspects: endurance, slalom and sprint. During the endurance race the idea is to cover the largest possible distance in a given time. Then the slalom focuses on manoeuvrability and the sprint boils down to directing 10 kW of power through the electric motor. Finally, speeds up to 50 km/h can be reached during sprint while the cruise speed is set to 30 km/h. Instead of having one race, we have several. The first race is in Akkrum at the end of May and several more will follow in June. Then, at the beginning of July, the moment is finally there to participate in the World Championships in Monaco! Here we will compete in an endurance race, sprint and slalom. After the prize-giving ceremony there will be a fancy diner to conclude the, hopefully successful, race season!

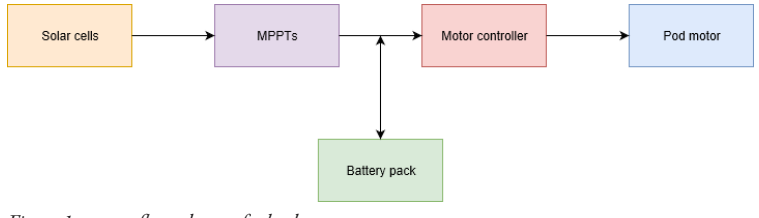


Figure 1: energy flow scheme of solar boat

> *"A solar boat without electronics and software would simply be a floating vessel."*

Really, the electronic and software system is the beating heart of the entire boat. The energy flow scheme can be visualised as follows (see figure 1).

Solar energy is harvested by the solar panels. Then a set of Maximum Power Point Tracking (MPPT) devices extract maximum available power from the solar cells. In order to measure the power generated by the solar deck and to be able to turn on/off single PV modules, a sensor with relays has been designed. The energy flows from the MPPTs to the battery pack or directly to the motor controller. The battery pack includes a Battery Management System (BMS), relay and some connection hardware. This way energy can be safely stored and utilised. From the battery the energy flows to the motor controller. This apparatus basically converts a DC current to an AC current, with which we can power the three-phase electric motor. Subsequently, the pod motor drives the propeller. Additionally, peripheral devices such as the board computer, data acquisition display, sensors, fans and a pump are part of the energy system.

This year our electronics department focussed on realising a more efficient solar deck and improving the data acquisition. Currently Frank Somhorst and Sander Oosterveld are responsible for our electronics and software system. Sander mainly focuses on coding software which includes data acquisition and connection to all the different interfaces such as the board computer, BMS, motor controller and hydrofoil control system. Besides, Sander has designed the PCBs. Frank has been busy with designing the power electronics system which comprises programming the BMS and motor controller, spot welding the battery pack and soldering all connections. In conclusion, being part of the electronics and software team gives the opportunity to combine both practical and design skills. For the coming year enough challenges lay ahead such as possibly realising two pod motors in combination with a contra-rotating propeller.

Do you want to be part of a highly motivated team in which you can come up with an idea and also realise it? Solar Boat Twente is looking for new members to form the third team since the foundation in 2016. Want to know more about what a year at Solar Boat Twente looks like? Get involved and visit our website to read more about this years experiences. Moreover, we will organise an interest lunch in the beginning of April. Make sure to check out our social media for further info and come by if you're interested! Get involved and apply at apply@solarboattwente.nl

Tracking world's largest animals

Author: Matthijs van Minnen

If you were tasked with finding and tracking a 25-meter long object, you could probably apply your Electrical Engineering skills to devise a range of different methods. Whilst these methods might work on land, applying them to an aquatic environment causes problems. Conventional techniques - involving the transmission of (RF-)signals - are quickly eliminated by the attenuating properties of water (at roughly 9dB/mm [1]). This is a major problem for marine biologists who seek to track marine animals and their migration movements.

High in the sky

Fortunately, there are aquatic animals that fit the '25-meter long object' description, namely the blue whale. With the largest specimen measuring a 27.6 meters [2], it is an significantly large animal which also significantly simplifies tracking. The WorldView-3 satellite from the British Antarctic Survey (BAS), which was actually applied for whale-tracking, can manage a (panchromatic) resolution of 31cm [3] making these large whales 'easily' recognisable in pictures from space. Naturally, covering an area of 5000km2 is not an easy feat. Finding slightly darker spots on the ocean's surface is not easy, but doable nonetheless.

Currently, resolution in imaging from space is limited by legislation, not necessarily technology. The tracking herds of animals and the tracking of armies can be considered quite similar, which is something the world's largest powers dislike. Hence, promising techniques, such as Short Wave Infra-Red (SWIR), can unfortunately not be performed in the highest resolution.

Acoustic observations

Whale observations are also possible from earth's surface however. Being marine biologists, the researchers want to stay close to their field of research and often reside on boats to perform observations. As it so happens, whales can also be spotted from on-top of these research vessels. Sightings could be used for population counts, but are not a very efficient method. Hence, it is often used in conjunction with different techniques such as acoustic measurements, which record acoustic calls from the whales. These are performed using hydrophones (basically underwater microphones) and validated using the manual sightings. The hydrophones can be placed in an array, enabling the opportunity to perform beamforming in the same way one would using antennae, to perform more accurate directional measurements. This technique is promising, but limited to the vicinity of the research vessel. Therefore, it is (nearly) impossible to observe the entire ocean.

Global positioning

Wouldn't it be great to observe these animals from a distance such that you don't have to be close with your boat? Sure, there is an engineering solution for that. It comes in the form of the Argos project which originates from the end of the seventies, but is still the most used system for this purpose. In contrast to GPS-systems which need three (but preferably four) satellites to 'trilaterate' an object, the Argos systems uses only one. To provide a position within 150 metres accurate [5], the Argos system makes use of the Doppler shift of the signal received at the satellite. It takes a number of measurements as it orbits earth's surface and measures the frequency of the signal. Since the satellite is moving, the perceived frequency will be varying between measurements. With this data, the object can be localised.

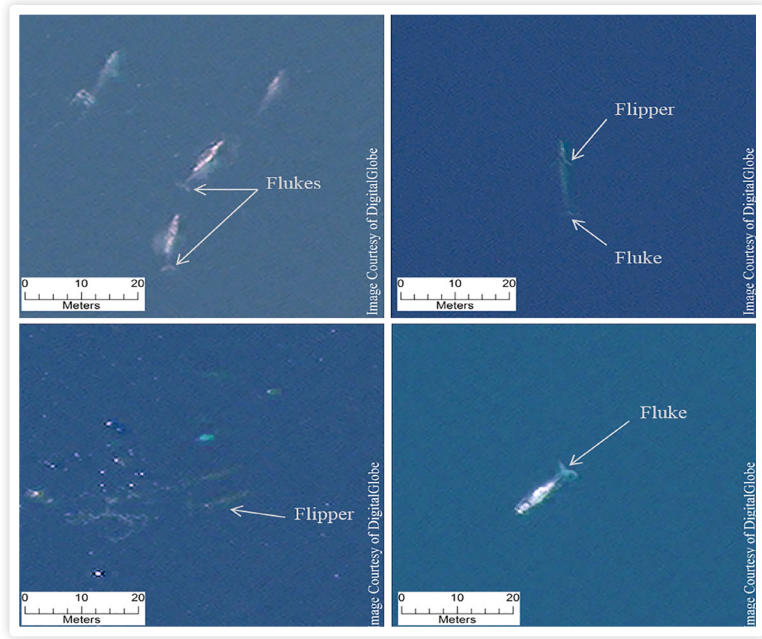


Figure 1: Images of different species of whales, shot using the WorldView-3 satellite. Source: [4].

As mentioned before, the attenuation of water throws a spanner in the works of this plan. When the whales are deep below the surface, no signals can be sent or received. Therefore, the so-called pop-up satellite archival tags (PSATs) were created. They can log a variety of different variables (such as: temperature, magnetics, acceleration, light level, oxygen levels and pressure) and transmit them using the Argos system when the tag is at the surface.

Figure 2: A pop-up satellite archival tag, with antenna on the right which points upwards when the device is floating on the headlike part. Source: [6].

Unfortunately, the tags cannot send transmissions when submerged, so localisation cannot be done using Argos' Doppler technique. Instead, an estimation of the position is based on light and magnetic fields. The tag measures the time it receives light to determine the length of a day. The length of a day can then be matched to a latitudinal position with an accuracy of 1 degree, or approximately 111 kilometres. This method is based on light that penetrates water. In colder areas where plankton (krill feeds on plankton and whales feed on krill, so the areas where whales live) is more abundant in the water it is difficult for light to penetrate deep into the ocean.

Luckily, there are two major factors 'keeping the whales afloat', namely their need to breath at the surface and their source of food, the krill, which live at a depth of around 100 metres. Hence this method is viable for our blue whales. Alternatively, for species that live deeper down in the ocean, the tag could measure the magnetic field of the earth to determine it's approximate latitudinal position by contrasting it to a known map of earth's magnetic field. This is accurate to within 65km, so significantly better than the light-based method.

Using the light data, and after deriving the length of a day, the average time can be determined. This is set as the noon-time. Using the noon time, it is possible to make an estimate of the longitudinal position. Thus creating a complete position of both latitude and longitude, which can be transmitted at the earliest opportunity when the tag reaches to ocean's surface.

Whale tracking seems to be a hot-topic for marine biologists, but for Electrical Engineers more so. Research of marine biologists is based on the measurements made with the different tools that are available to them. By increasing accuracy of instruments across the field, it becomes easier and cheaper to track whales.

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Scintilla's Taskforce for University Developments and Improvements

Author: Maarten Bonnema

My name is Maarten Bonnema and since the start of this academic year I had the honour to become the chairman of Scintilla's Taskforce for University Developments and Improvements (STUDI), Scintilla's education committee. For seventeen years the committee was called StOEL, but due to internationalisation and recognisability of the committee we decided to change it. Although I am pleased with the new logo and acronym (and full name), the old logo (a spider in a web) had some strong symbolic meaning. Educational committees are in the centre of numerous educational bodies, safeguarding, evaluating, and protecting the quality of education at the university. This article will describe an on-going hot topic in education that closely bonds all these educational bodies and institutions.

Background

Since September 2015, the Dutch government decided to reduce the total study financing by terminating the study grant, a monthly payment of multiple hundreds of Euros for up to four years. In order to partly compensate for this, the government grants all universities a budget of multiple hundreds thousands Euros per year (WSV-money). This money should be used to enhance the quality of education for the students, through themes like; teacher quality, educational facilities, guidance of students, and some more. The main idea is that (at the end) the students receive the original money through the university and its education. Such that not everything is spent on beer and parties, as if this would be remotely possible with these cheap beer prices.

At STUDI

"But what has STUDI to do with this?" I can hear you think, well, as the educational committee we have received various complaints over the years. Some complaints that we receive more common are; lack of study places, over-crowded Edu-Café (thanks Starbucks), improper level of English of teachers, high study costs, etc. Complaints of these types are complex to resolve on the short-term as they often require structural changes and loads of money, and thus stick around for years. Issues with teachers, examinations, and course content are easier to resolve, which is what we are primarily busy with through many conversations and evaluation sessions.

> "First of all, and perhaps also the most concrete one, is the sponsoring of the myDAQs."

In the Faculty Council

As the Faculty Council (FC) we monitor the activities of the Faculty board, by means of (unsolicited) advise and right of assent. The WSV-money is part of the financial plan of the faculty, and therefore extensively (being) discussed in the FC. My aim, together with other members, is that students benefit from this budget as much as possible. The annual total budget comprised of approximately €385,000, to be distributed over all five Bachelor programmes and their Masters in the faculty.

Of course there are structural changes that will positively impact multiple, if not all, programmes. Some ideas have already been presented; in order to compensate for the loss of quiet work space in Edu-Café (the merciless jazzy, hipster jams of Starbucks, sigh), the faculty has reserved €10,000 to create new, quiet, working spots. Another plan is to subsidise faculty wide courses, which could be organised by the study associations or other parties, to enhance the soft-skills (no relax, this has nothing to do with philosophy) of the students. These courses could address topics like; scientific writing, paper writing in LaTeX, presenting, making a proper Curriculum Vitae, job application courses, and many more.

We also have proposed various plans specifically for the Electrical Engineering programme. First of all, and perhaps also the most concrete one, is the sponsoring of the myDAQs. I can remember in my freshman year we were unpleasantly surprised that we had to buy the myDAQ ourselves, for a whopping €250. Nowadays the programme receives €20,000 each year to buy the myDAQs, and they lend it to the students for a simple deposit. Money will be reserved to hire more EE lecturers while providing them with more training in both didactics and language, but also the Student Assistants trainings will receive extra money for professional skills and competences. Furthermore, the limited capacity of the Westzaal is being addressed as the study keeps on growing, multiple plans have been raised. One plan is to upgrade the existing Westzaal with more workspace, in my opinion only a short-term solution.

> "One plan is to upgrade the existing Westzaal with more workspace, in my opinion only a short-term solution."

Alternatively, with the large scale move of faculties and institutions, think of the renovated TechMed Centre, Hogekamp, and Drienerburg, buildings like Carré and Citadel will be reclassified. This could lead to a relocation of the Westzaal (well, at least its equipment) to the Carré building in the near future. For these issues and more, the FC asks the programme committees to formulate a list of potential ideas for which the WSV-money can be used.

Back to the Programme Committee

The programme committee (PC) is responsible to uphold and secure the quality of education in EE, reviewing module evaluations and come up with plans to improve them. During one of the previous monthly PC meetings, the chairman asked STUDI to formulate a list with potential ideas, as we could best resemble and mandate the interest of the EE students. This finally brings back this entire (high-level) topic back to where it belongs, the students.
In the coming STUDI meetings (March onwards), we, while keeping all the feedback we have gotten until so far in our minds, will discuss this and formulate a list of topics and issues which best coincides with the wishes of the students, and forward this to the PC. This whole issue has made a whacky (bureaucratic) rollercoaster ride through all levels of the university, but has eventually arrived in the hands of the students. In all the participatory councils, the progress will be tracked and, were needed, students will intervene and improve.

In brief, the goal of this article is to give insight in the educational system on three of the four main levels (the last and highest one is the University Council), its entanglement, complexity, and importance, but also how interesting it can be. As a member of multiple educational bodies I try to provide transparency for my fellow students, translate the formal and solemn policies into simple words, closing the gap between all the management levels in the university and the 'ordinary' students. I hope that, through this intriguing (but though) financial topic, you have picked up some understanding what we do in the educational bodies and perhaps become inspired to let your voice be heard. If not, you can always still turn to the picture page and have a laugh at (drunk) Scintilleans ;-).

SCALA Kids Party

SCALA LAN-party

So you think you got the tapfactor on ice in the jungle VIPs

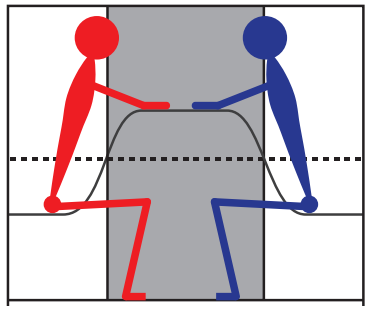
Vonk launch event

Junction

A chat with: prof.dr. Jurriaan Schmitz

Author: Stef van Zanten, Nahuel Manterola

We visited Jurriaan Schmitz, professor in Semiconductor Components and head of the research group Integrated Devices and Systems (IDS). He leads a group of around 35 people working on MEMS devices, transistors, diodes, and basically anything using semiconductors. The group does research on the hardware related to these devices. Questions such as 'which materials should you use and combine to make something?' are commonly addressed by research within the group. With their research, the group is always looking at ways to make transistors faster, cheaper or smaller (preferably all three).



We started the interview with Jurriaan's background and asked him if he could briefly take us back to his youth.

'I grew up in Amsterdam, we moved there when I was five and I've stayed there from kindergarten until I finished my promotion. I did, however, make a little excursion to Italy where I lived for a short period when I was nine. When I was done with my PhD I thought, "if I don't leave Amsterdam now, I might never leave again", so I decided to start working for Philips at their NatLab (from Dutch: Natuurkundig Laboratorium 'Physics Laboratory'). I was lucky, everybody thought Philips was not hiring people back in the days, but I didn't know that. I just handed in my letter of application and got in easily because I was one of the few to try.'

How was your time in high school, and how did you choose what to study?

'I really liked math and physics, a lot more than all the other courses. Thanks to a few of these other subjects I almost had to stay behind a year, haha, I actually passed a year with barely the minimum grades. Choosing between an alpha and a beta direction was therefore very easy for me. I really liked physics, so I started studying that in Amsterdam without thinking about it too much. During my studies I actually realized I enjoyed the electrical engineering part most.'

Did you already have some experience with Electrical Engineering from high school?

'Electricity and magnetism actually were a large part of physics in my first years of high school. When I arrived in 4th grade, a new computer room was opened at my school. We learned to program in Basic with those large vintage arcade screens. My teacher asked me if I wanted to teach the lower grades, because he was so busy, and I had a decent understanding of the matter and from one came the other and I had my first experience in teaching. I also tutored to earn some extra money, but I really enjoyed giving computer instructions.'

How were your studies?

'I'm not sure if I should be too honest about this, haha. I worked a bit less than average and got higher grades than average. I had a great method: before the first lecture I read the notes, and during the lecture I checked if the teacher had anything to add. You very quickly realize that many teachers were just reading out loud their own lecture notes. I quickly stopped attending those classes, which saved me a lot of time. Some other teachers told a broader story about their subject, which helped the students in their understanding. We had a phenomenal lecturer for astronomy. He was so good that half the students decided to follow the astronomy track, even though the subject hardly offered proper job opportunities.

When exams were coming up, I often started studying around the clock, something like two days in advance. I wouldn't do anything else those days and almost always passed. There was one occasion where I didn't pass an exam. I was a summer student at CERN at the end of my studies, so I went to Geneva for three months to work in a research group there. Back in those days, people were just starting to use emailing and I knew only 4 people that actually had an email address. One of them sent me an email saying "Hey! You failed your basic differential equations course". So, I had to come back from Geneva to do a resit. I actually spent slightly longer on my study than necessary, but that was very common at the time. My master was scheduled for four years, and I finished it in five. I also followed a few weird side courses that the exam committee didn't agree with from a content perspective, so they were removed from my list of results.'

What was the most extraordinary thing you experienced during your studies?

'I clearly remember an important learning moment for me. During a practicum, we had to determine an integral to calibrate a setup. We had to do 50 measurements as a function of the frequency and calculate the area under the curve. I told my teacher, "why don't we just make a device that sweeps over the frequency and stick the outcome into an

Jurriaan Schmitz

Age	51
Favourite artist	Prince
Favourite food	Japanese
Favourite Drink	Coffee

integrator?" The teacher said: "Sure, go ahead." It was lots of fun, and he helped me out by sending me to a few people who could help and really stimulated me to think for myself. My courses often had a fixed system, but here I realized there was still quite some freedom, which helped me a lot. I think it's called empowerment these days, right?'

What did you enjoy most during your work at Philips?

'The NatLab had a large number of great scientists and great engineers working there. Something you could call the crème de la crème. I especially enjoyed working with these intelligent people the most and I still look back upon this time with a lot of joy. Well known are also the Bell labs, like the Philips NatLab. There's a few of those labs around the world, with a unique atmosphere of innovation where no idea was out of bounds and NatLab really was one of these places. What I didn't like so much was that my contract with Philips also said I had to move when Philips deemed it necessary. Unfortunately, they suddenly decided to move to Leuven, while I had just had two children so there are other things on your mind than moving to Leuven. I ended up travelling for 1.5 hours each day from Waalre, which was far from ideal. That's why I was so glad I could start working in Twente and if you're going to move, it's nice to also start a new job. Here in Twente, a group was working on semiconductors. When the leader of the group retired, they were looking for a successor and that is how I eventually got here.'

> "I especially enjoyed working with these intelligent people the most and I still look back upon my time at Phlips NatLab with a lot of joy."

Were you immediately involved in education and teaching with the start of your new job at the UT?

'Yes, even already at Philips I taught part of the internal training programme where I explained how the MOS transistor works and how to make it. When I arrived at the UT, I received a crash course on teaching for professors, but it was relatively easy. During my studies I also followed the teaching course, which helped a lot.'

What do you like most about your current job?

'I enjoy the education and contact with students the most, that really makes me happy. I'm also in the honours programme, which allows you to have more contact with individual students because of the small group sizes. This week is coincidentally the busiest week of the year with regard to education. I have to teach 22 hours of lectures and seminars this week. On average it's closer to 3 or 4 hours a week, which is very little, but I teach three courses and they are all in the third quartile. Next to that, I'm working on a few graduation projects but elsewise my educational task is not that busy. This really is one of the main reasons I wanted to leave Philips and come work here: the chance to teach. And I've been doing it for over 16 years now, since 2002.'

What do you like about the university?

'The University of Twente is a small university, which I like a lot. You get to have direct contact with everyone within the organization. I can, so to speak, walk in on the CvB to discuss something if there's a real problem. I also have very direct contact with students and other employees.

The campus also really has a nice atmosphere. When the sun shines, the O&O square is filled with people eating their sandwiches, which is really fun to see. I studied in Amsterdam, where all the buildings are distributed over the city. This gives you much less of a group culture.

Also the entrepreneurial side of the UT makes it very interesting. Here in Twente we find it important to work together with industry. At the UvA, they didn't have an interest in this at all. I come from the seventies, and back in the days, companies had a bad reputation thanks to companies like Shell, helping the apartheid regime in South Africa. A lot of stories went around about how you couldn't expect anything good from companies and industry. That really defined the atmosphere I grew up in. Former Rector Magnificus Van den Kroonenberg changed this aspect in Twente. He has been announcing for ten years that it's important and useful to work together with companies in our research. At first, he met quite some resistance, but in the end he managed to create an entrepreneurial spirit in this university. I like that, because I also worked in the industry and know what it's like, you can expect good results from cooperation.

I also like this area and the opportunities it gives for biking and running. That's something you don't want to try in the center of Amsterdam, haha.'

Schmitz acting as jury member at the 2018 Techniektoernooi in Arnhem (Photo: Patricia de Haan/Stichting Techniekpromotie).

Do you combine your job with any other things?

'Actually, only with my hobbies and my family. I don't have another job. When you're a professor you get quite a few ancillary activities, like joining committees, visiting congresses and working in editorial offices of magazines, but there isn't much time for other things.'

What do you like less about the university?

'I'm sometimes bothered by, how do I put this nicely, the management of this university. Sometimes it really worries me how things are handled. This makes it cost quite a bit more energy than I would want it to.'

Then some more personal questions. What are your hobbies?

'As I already said, I like running and biking. I'm also into music and theatre. Oh, and movies. You can spend quite some time on those already. I often go to the theatre in Hengelo, which is comfortably close, so you can crawl back home. I go to both the Metropool and Schouwburg Hengelo and it's quite relaxed.'

Is there a destination you've always wanted to visit?

'Yes, I have always wanted to travel through the Amazon rainforest but haven't gotten the chance yet. I've seen quite a few places thanks to my work. They send you to almost anywhere, except for the Amazon, since they don't seem to organize congresses there. I would love to take a boat trip on the Amazon river and see everything up close.'

What is the most interesting congress you've been to?

'That's a tough choice, because there are two I really enjoyed. The Future Trends in Microelectronics is only for people who get invited. These people have some sort of authority in the field of study and get to talk about its future. These congresses get organized on an island in the Mediterranean. I've been invited three times, to the islands Sardinia, Corsica and Mallorca. I wouldn't have visited those island myself, so it was really fun to combine a congress with such a visit.

The other congress is about measurements on chips, which has the most interesting content. It's a place for specialists who only do chip measurements. So if you want to know about how a transistor works and what the best ways to measure are, you have to go there. The people who come know exactly what the problems are when a measurement tool gives wrong values and how to solve these problems. Actually it's a bunch of nerds obsessed with doing measurements that talk about it all day long. A nice group of geeks having a really good time with a good atmosphere and high quality content.'

What's the most interesting research you have done at the UT?

'I received a personal grant from the Dutch government for doing research. You can do really wild things with those, so that's what I did. We built all kinds of things on top of a chip, like a radiation detector and a solar cell. The last one means you already have the power source for the chip. That was really fun, but quite a while ago, already back in 2005 to 2010.'

What's currently the most interesting thing you're working on?

'Unfortunately, I can't talk about that. But I can tell you something about another topic. We're working on a really interesting project to see if we can make chips that repair themselves if they get damaged. Self-healing chips, so to say. That's really exciting research because it introduces a different way of thinking than people normally have. Usually people look at the expected lifetime of a chip by measuring how long it survives when damaged. But if a chip can repair itself, it can go on for much longer and be part of more sustainable electronics. It's a very difficult subject, if it was easy it would have been done already, but it's great fun to work on.'

What do you think your field of study will look like in ten years?

'We've recently stopped with the miniaturization phase and transistors are not really becoming smaller anymore. The field is moving in a different direction to try and improve the performance by making smarter architectures, but that has only limited impact. People are looking for something completely new, like a new semiconductor with better properties. I think that's going to have a large impact on the chip industry. We're also looking at chips that don't produce exact results, which is also a very interesting field. Normally we're putting a lot of time and money into moving data so that a chip makes absolutely no errors. Many amplifiers are used to make sure a 1 stays a 1 and a 0 a 0. We're using a lot of resources for two things: data is in the wrong place, and it requires lots of power to move it, and, on a more philosophical note, we really want the chip to make no errors. Approximate Computing is a new approach, which says the outcome of certain calculations can be approximately good, but doesn't have to be perfect. These chips can produce results close to normal chips, but with a much lower power consumption. My group contributes a very small part of this research; we only make the components. It's really fun to solve this problem as a community.'

What do you think is the biggest challenge in the near future?

'I think the energy problem the world is facing. There's a quickly growing need for energy and a decreasing availability. We really need to do something about this, and EE is a prominent field to contribute to it. I'm looking at you, do something! That's also why I think it's really important to train people in this field, because you might be the people who think of a solution. Not all of you, but certainly a few of you are going to make an important contribution to the solution we need. I really don't know anything more important than this. You could say it's more important to prevent war, but war is mostly caused by scarcity. Energy scarcity is definitely about to be a problem on Earth, so let's do something about it.'

What's the most important advice you want to give students?

'I've always had the luck that I could do what I was interested in, that helped a lot to achieve what I have. So if you can, follow your curiosity. Of course it's important to earn a living and that kind of stuff, but if you can combine it with doing something you love that's totally awesome. I always realize: if you're curious about things you're working on, it's way easier to keep on going.'

When is it too much?

Author: Herjan Barkman

Back in the old days, Electrical Engineering students studied a bit longer than nowadays. A way to increase the success rate of students, with lower costs, was the implementation of the Twents Onderwijs Model, TOM for short. This had a lot of influence on students. The different subjects throughout the year were woven into modules. The subjects in those modules were way more coherent and the module itself had a very structured way with a project as the climax. Instead of passing subjects and projects apart from each other, you now had to pass everything in the module to pass the module itself. Only when you pass the module, you get the study points. This had some benefits.

People would study harder as the stakes were higher as well. For example, if you passed everything except the math, you would try even harder to prevent redoing all other parts. Modules were more coherent with modules of others studies and hence collaboration between students of different disciplines; these students could then work together in projects more easily. Also different studies with the same subjects could conjunct and this reduced the costs of the lectures as well. The success rate of people getting their bachelor within three or four years did increase, with reduced costs. TOM seemed a nice solution.

However, some problems came with TOM as well. First of all, redoing a whole module when the student only failed one small part of the module decreased motivation for the passed subjects. Secondly, as the stakes were higher, people experienced more stress. This stress can be useful to get the best out of you, but it has a lot of negative side effects as well. More and more students ended up at the psychologist. Sickness, sleep deprivation and depression occurred more and more. To get an appointment at the psychologist takes weeks nowadays. With these increased mental or physical problems the ability to learn is decreased and grades get lower. With lower grades, the stress rises as you don't want to redo everything. Consequently the student has arrived in a cycle of getting stress, getting bad grades and hence getting more stress again, which lowers the grades even more, etc. Instead of filtering people based on their skills and intelligence, people get more and more filtered based on how much work pressure and stress you can handle. The question: "Is ambition and career more important than a student's health?" rises.

The study is getting segmented again slowly and although the work pressure maybe stays the same, it is organized better and the stress or stakes are reduced step by step. However, the TOM describes only an example of one of society's upcoming problems. More production and efficiency, with lower costs. The work pressure on students, working people, on all people actually, keeps rising by the day because of this. Maybe the costs in dollars and euros get lower, but costs in mental and physical health are forgotten. A problem which can be tackled by creating better work environment. Or just simply hire an extra physiotherapist or psychologist. However, we are sitting in a rollercoaster of technological advancement and innovation. It goes faster than we can adapt to and at a certain moment it will be too much for us. So maybe we should stand still sometimes and ask the question: "When is it too much?" and maybe take a small step back.

advertorial

Advertorial: Thales

Author: Thales

Both working at Thales Hengelo, one a bit longer than the other. Meet our engineers, Frank and Ellen!

Meet Frank

Frank studied electrical engineering at Saxion Hogeschool in Enschede, and now works for almost ten years at Thales. He started in 2009 at Thales right after his studies. “I started working here as a system test engineer. In this position I was responsible for drafting processes , testing systems and detecting errors in systems.” When Frank first began working at Thales he only possessed the basic knowledge. “At Thales, the technology is all very specific. So just out of school, I wasn’t nearly good enough. I have done many courses to gain the required specialist knowledge.” After ten years, he started in a new position as IVVQ manager. “IVVQ stands for Integration, Verification, Validation and Qualification, which means that I’m responsible for the whole test process. Started with the moment that a product is built, assembled, then picked up to the product and finally, delivered to the customer.”

Do you like your job?

“I’m in this position for one year now, so my current function is still a bit new to me. But the test process as a whole, is not new to me. That’s what I’ve been working in, since the beginning of my career at Thales. And now I am responsible for a whole team. But what I overall experience at Thales is that I got a lot of challenges during my work and every day is different. For example, at one moment I am working with software and the other moment I’m working with hardware. I sometimes joke and say: one moment you are the plumber, the next you are an electrician and then you have to get to the system with your laptop to fix something. That versatility positively affects me.”

Was it easy to switch to another position?

“A co-worker really taught me all there is to know. He hired me at the time and together we have grown within the company. The process of getting a promotion really is a natural process. In my case it was easy, because I had been involved in the test process for some time. I never thought in advance that I would be allowed to hold this position with my electrical engineering diploma. But at Thales you discover where your strengths lie and you get the opportunity to develop yourself.”

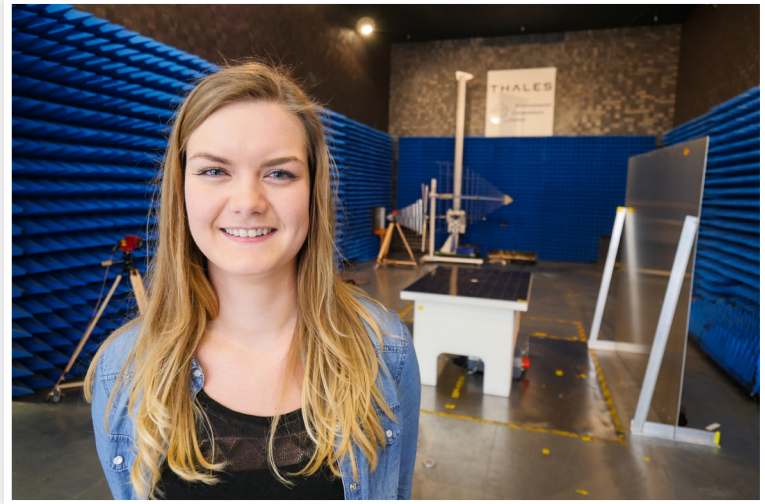
What do you think of the corporate culture?

“At Thales there is a very open and casual atmosphere. Very relaxed actually. Many colleagues have also become friends of mine, because we often have to go abroad during our job. When you are on a work trip, you and your colleagues spend a lot of time together. Perfect to get to know each other a little better and build a connection.”

Meet Ellen

Ellen studied applied physics at Saxion Hogeschool in Enschede. She is only working at Thales for six months now. “Before I started working here, I did my graduation assignment at Thales. During my graduation internship I worked on the thermal level, so I started working with dry air. We want the Thales systems, for example the radar, to continue to function optimally even in warm climates. After I graduated they offered me a job, so I had the opportunity to stick around.”

From July 2018, Ellen started as a Thermal Engineer. “I did not continue my assignment when I started as a Thermal Engineer, but I do notice that I can apply the knowledge to my new position. My graduation also helped me to get to learn the company Thales itself. For example some basics about the internal processes and which people I can ask for help.”



How did you experience your graduation internship?

“I experienced my internship as educational, interesting and enjoyable. Mainly because you can make a connection between theory and practice. I worked on my measurement set-up in the lab and compared the results with the theory. The great thing about an internship at Thales is that you get a lot of freedom to give substance to your assignment. But also get things done yourself and ask for guidance when needed.”

What do you find characteristic of Thales?

“The openness of people. Everyone wants to help you where necessary and people are very friendly toward each other. Sometimes a colleague reaches out to you to ask you to join a certain meeting. Just because it might be important or useful for you in the future. Your co-workers really want to think with you. It makes you feel connected to each other as a team. You also know that you have many opportunities for growth within Thales. People are being stimulated to develop themselves as much as possible.“

Can you hold your own between all those men?

“We currently have two female interns at the department. So that’s nice! But normally I would indeed be the only woman. But I am not really bothered by that. I don’t have the feeling that my male colleagues look different at me because of the fact that I’m a woman. I feel part of the team and they are taking me serious.”

green team

What it is like being part of Green Team Twente

Author: Sebastian Bunda

Let me start out this article by stating that I am not the first and (hopefully) not the last person that writes an article about joining a student team. In my opinion student teams are a way for students to improve their knowledge and skills far more than their study can ever give. For the ones that don't know me, I'd like to mention that I joined the Green Team Twente as a part-time Electrical Engineer. Usually someone joins a student team as either as a full-timer or someone that wants to do a minor. I decided to do both alternatingly, since I am also taking part in the 89th board of E.T.S.V. Scintilla. When I am not paying invoices or working on general board tasks, I'll be working on my projects at Green Team.

Joining a student team can broaden your perspective of what it is like to work with all kinds of different people from different disciplines. You will be part of something bigger than yourself and part of a team that depends on each other in order to succeed. That doesn't mean that you cannot make mistakes. Quite the contrary, I would advise to anyone working on a project (in a student team or not) to make mistakes. An often misconceived subject within your studies is that you can't make any mistakes. Mistakes are the fuel for creativity and improving your knowledge. By making mistakes now, you don't have to make them later, which will make you a much more valuable engineer once you graduate.

You get the possibility to work on all kinds of different projects of your liking such that you can invest time on what you want to improve upon. Nevertheless, you still have to be (or become) a team player, as other team members depend on you for reaching their ultimate goal. Our goal as Green Team Twente is to participate in the Shell Eco Marathon where we must race using the least amount of fuel, in our case hydrogen. When I joined Green Team Twente, I wanted to obtain more practical knowledge and work with power electronics.

The main task of the electrical team is to make sure we stress the fuel cell the least during the race (more efficient) whilst still being able to provide sufficient power to drive the motors. The more power we ask from the fuel cell, the more inefficient the system becomes. So, in order to accelerate we need a buffer to store the excess energy when we are not accelerating. My main task specifically is to make sure the buffer can be charged any time by regulating the output of the fuel cell by means of a DC-to-DC converter. The more power you ask from the fuel cell, the more its voltage will drop.

Working on a project will force you to use the information that you have learned during your studies. For example, the concept of building a boost converter was something you needed for the project of module 2, whilst creating a solar inverter. There are some differences though. At Green Team you'll have more money and time available. This time you can design a PCB to make the project smaller and more efficient. When designing a critical circuit that has to be very efficient, you will have to take the smallest details into account. But don't worry, there will always be people willing to help you if you cannot find the answer. Remember that the solution is never set in stone and sometimes the weirdest solutions can be the best solutions.

What we do as a Green Team Twente

As a member of Green Team Twente, you will work on a car that runs on hydrogen. At first glance this might not seem very exciting, considering the goal we pursue. However, the way we distinguish ourselves from the other student teams at the university is not by driving the fastest, but by driving the most fuel efficient. Being efficiency driven makes for new and exciting challenges that force you to think out of the box. The last few years we have been growing though, not only are we looking at how we can drive on the least amount of hydrogen, but we have also been trying to spread the recognition for using hydrogen-based technology as an alternative to fossil fuels. The team usually consists of +/- 20 students working towards this goal. The fun part is that the team consists of a wide range of different disciplines. This means that as a member of the team you will be working with and alongside Electrical Engineers, Mechanical Engineers, Industrial Designers, Chemical Engineers and many others. Together we will be working together to race at the Shell Eco Marathon, which will be held in London at the beginning of July. During this race we will be competing against more than 200 other teams from all over Europe and Africa.

What can you do as an Electrical Engineer?

If you want to improve your practical skills and want to work on a project longer than only a couple of weeks, joining Green Team Twente can be something for you. By joining Green Team Twente, you can get first-hand experience of PCB design and microcontroller programming. You can get the most out of such a gap year by joining full-time since you can really invest time and energy in bigger projects. Obviously, there are also other opportunities by joining part-time and/or do it as a minor assignment (worth 15 EC). Even by joining as a part-timer you can learn valuable skills and be able to do incredible things.

Interested?

If this article made you intrigued, we are looking for new team members for the challenge of 2020! So, if you want to up your game and want to learn more than from study books, don't hesitate to contact us. You can ask any question at info@greenteamtwente.nl, ask me or any other team member (you can identify us by our distinct green jackets). You can also visit our workshop at the Future Factory (Auke Vleerstraat 3B), during working hours there is always someone present that will answer your questions.

datasheet

What kind of food are you?

Authors: Céline Steenge & Lynn Bruins

The datasheet has had multiple editions already and therefore, we thought it became time to get to know ourselves. Like, what kind of recipe are we actually? Are we more of a muffin, or more like a pasta oven dish. During this quiz you will find out what your true inner spirit is. After you have finished, you can enjoy making your personal food thanks to recipes. Enjoy!

Question 1: How do you start your day?
A. Just some bread with choco sprinkles. Although, I also like the coloured sugar ones!
B. I like my cornflakes cold.
C. Coffee.

Question 2: How do you drink your coffee?
A. At least one spoon of sugar.
B. I usually take something fancier than just coffee. Maybe a cappuccino?
C. Dark as my soul.

Question 3: It is 10 o'clock, time for a snack! What do you grab at Scintilla?
A. Skittles!
B. One of the cookies
C. What is the cheapest?

Question 4: Finally it is lunch time:
A. Again some slices of bread with chocolate or sugar sprinkles.
B. Whatever they have at Appèl
C. Some leftovers from yesterday

Question 5: Next to your lunch, you will have a cup of tea. What taste?
A. Strawberry
B. Lemon
C. Coffee

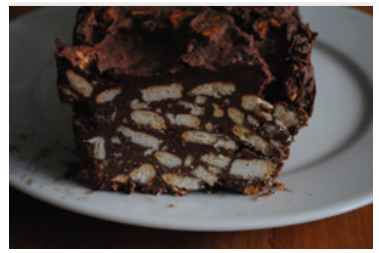
Question 6: 4 o'clock, time for the second snack! This time I choose:
A. M&M's,
B. One of the other cookies
C. This one had its due date yesterday so it is free right?

Question 7: You finally made it home, time for dinner:
A. Something Mexican with lots of corn.
B. I will try one of the Wereldgerechten of the supermarket.
C. My roommates cook and I eat

Question 8: You did fancy today and you made a dessert for your house. You made:
A. Carrot cake.
B. The brownie mix from the supermarket with extra chocolate.
C. I bought some cookies and put them on a plate.

Question 9: Talking about cookies, what is your favourite?
A. Roze koek
B. Chocolate chip
C. Speculaas koek

Question 10: So it is midnight, what is your secret midnight snack?
A. Chocolate
B. Own made hamburgers
C. I will order something



Source: https://unebelleviebeautyblog.wordpress.com/2013/03/09/recept-arretjescake/

Most A?
You are the Arretjescake. You like a sweet life and will also sweeten up someone else's. You don't mind having a few electrons extra in your body, because electrons have a higher mobility than holes right?

Ingredients:
125 gr butter
200 gr oatmeal cookies
400 gr brown sugar
2 eggs
4 tbsp cocoa

What to do:
1. Mix the eggs with the brown sugar
2. Melt the butter
3. Break the cookies
4. Mix the eggs, sugar, cookies and cocoa
5. Add the melted butter and mix even more
6. Leave the cake in the refrigerator for a couple of hours till the cake is solid enough to cut
7. Get diabetes and get fat

Variations: add some melted pure chocolate or even some Maltesers!

Most B?
You are the Kaiser rolls with egg and bacon. You like it chill. You float around from time to time, just waving through the lectures. On the weekends you take the days off (either due to partying or due to sleeping). When having your breakfast, you like to treat yourself. And damn, you're right!

Ingredients (4 rolls):
4 home-final baking Kaiser rolls
4-6 pieces of breakfast bacon
4 M eggs
Some herbs (chives, pepper, whatever you like)
Some cheese

What to do:
1. Pre-heat the oven at 200 degrees C
2. Hollow the Kaiser rolls, make sure there is no hole in the bottom!
3. Put some breakfast bacon at the inner side of the hollow rolls.
4. Add some cheese if you like and press everything a bit into the roll
5. Break 1 egg per roll
6. Add some herbs and maybe some more cheese
7. Bake the rolls for 10-15 minutes in the oven
8. When you like the egg more cooked, cover the rolls with aluminium foil and bake them for another 10-15 minutes.

Variations: this is the easy basic breakfast type, but you can fill the rolls with whatever you like!

Most C?
You are Chili con carne. You like to keep your energy balance up. Studying electrical engineering uses a lot of your battery and therefore, at the end of the day, you like to spend as little energy as possible to still make a great dish. But your roommates do not need to know this of course.

Ingredients (10 persons):
1 kg Minced meat
3 Paprikas
500 g Carrots
1 Leak
1 big Onion
800 g (2 cans) Kidney beans
800 g (2 cans) Chili beans
600 g (2 cans) Corn
400 g (1 can) Tomato pieces
Some spices like: paprika powder, chili flakes, Cajun, parsley, coriander

What to do:
1. Cut the vegetables.
2. Bake the minced meat.
3. Add the vegetables but not the tomatoes!! (Are they vegetables? Are they fruits? I do not care, just do not add them yet).
4. Leak the beans and corn.
5. Add the tomato pieces and the tomato puree.
6. Add the beans and corn.
7. Add the spices.
8. Wait a couple of minutes.
9. Perfect dish is ready!

Variations: change some vegetables or change the spiciness. Also the side dish can change from rice, Turkish bread, tortillas or even tortilla chips.

The Cantus Scintillae

Author: Koen Raben

Cantus: a night full of singing and drinking. Almost all students are familiar with the concept, many have joined one cantus or more in their student time and every institution handles a cantus differently. Already during the Kick-In, students get familiarized with this concept during the Taste cantus and (of course) our own Scintilla intro-cantus. But where does it come from? And why do some people like it so much, while others absolutely hate it?

Trying to explain a cantus to someone who is not familiar with the concept usually results in some interesting looks, which is not surprising when you tell someone you go to an activity where you first dress up formally, after which you will spend your evening sitting on the same spot on a beer bench where you will sing together without any backing track music and when you are not singing, people will bring up humorous anecdotes which almost always result in someone having to drink a beer in one way or another. So where did this behaviour come from?

When looking at trusted sources such as Wikipedia, one can find that the tradition of a cantus has been upheld for multiple centuries already from when it was being held by German student organizations. Nowadays the tradition is mostly found among students in northern Europe with Belgium as a prominent player. And this is also where we can trace back the origins of our own Cantus Scintillae, because in 1989 a delegation of Scintilla members went to Leuven where they attended a cantus which ignited the spark that those people took back to our own Enschede. And so in the summer of 1989 the tradition started at the introduction camp that year. It was not only the first cantus of Scintilla, but also one of the first at the University of Twente. This activity appeared to be amiable enough that it stayed a central part of the introduction camp up until this day.

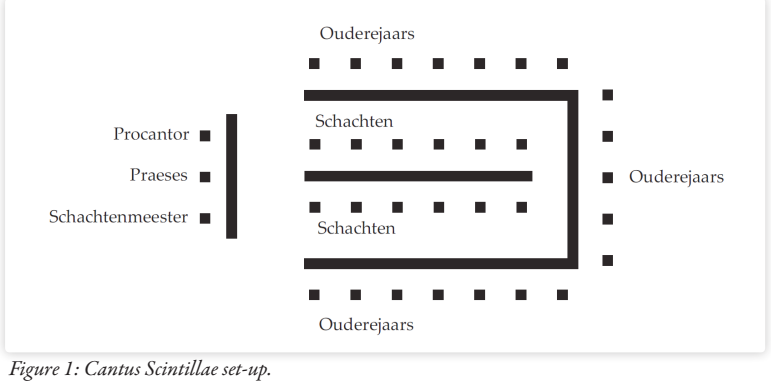


Figure 1: Cantus Scintillae set-up.

In the years thereafter the cantus would stay exclusive to the introduction camp, but at a certain point the members of Scintilla wanted more. And Scintilla said: "Wir schaffen das". Nowadays we are up to a steady trend of five cantus a year, with which we have the most active cantus tradition of all the study associations here at the university.

If you are already this far into this article you probably know how a cantus works in general. But if not, here is a quick overview of a Scintilla cantus:

The cantus layout is divided over 3 subgroups. The senate, which consists of a Praeses, a procantor and a master of novices. They have the highest authority and will guide the cantus in a certain direction. The corona consists of members who already have attended multiple evenings and thus can be considered experienced. At last there are the novices, officially also part of the corona, but seated at a special table. The novices usually consist of first-year students or members new to the cantus. Every group has their own seating position, where the senate is set across from the rest of the corona. It is the job of the senate to keep the corona in check and make the evening flow smoothly.

> "The introduction Cantus appeared to be amiable enough that it stayed a central part of the introduction camp up until this day."

What often differentiates a Scintilla cantus from a cantus of another association is the variety of items used and the balance between the senate talking and people from the corona talking. Many associations have a cantus structure in when the senate is almost solely talking and the content of the cantus consists of a series of pre-determined punishments, often with some ingredients to make it a bit more sensational like mayonnaise or tomato juice. The Scintilla cantus works with a lot more interaction between the corona and the senate. When the senate will call someone forward who will tell an anecdote over how that person misbehaved himself on a drunken evening, the consequences that flow from that story (often comprised of a ridicule way to drink a beer) are often not decided by the senate, but by the corona. The senate will only ensure a proper execution of this consequence. This way an interactive evening can be created where no one can predict how the evening will turn out. Also the Scintilla cantus stays relatively clean, where the only thing that may get into your suit is a "tiny" amount of beer. Within the history of Scintilla there have been over a hundred evenings where this tradition has been continued, some more successful than others. When you ask members what they think of a cantus, the opinions usually range from 'the best thing I have ever witnessed' to 'how can people ever like this?'. But what makes a cantus an enjoyable cantus? Since this is a very subjective matter, consider the next paragraph as my personal opinion. But in my view, the best cantus evening is achieved when the influence of the senate and the corona are perfectly balanced. Meaning that the senate will keep control and make everything that happens go in an orderly fashion, but the things that are happening are decided by the corona.

To get this situation the senate, and especially the Praeses, has to play a very delicate game of challenging the corona to speak up and give their input to the cantus and at the same time maintain enough order so everyone will stay focused on the person that is brought up front.

A large quantity of the fun of a cantus comes from the ridiculous things that the people in the corona bring up. One memorable moment that perfectly describes this is the time where someone had to down a beer through their tie and a member in the corona made the comment: "Well, this could waste a lot of beer. What tactic could be used to reduce this?" And so a scientifically sound mini-report was set up with the conclusion: To have the highest flow of beer into the mouth, the length L of the tie should be as small as possible. None of these jokes came from the senate, but were created by the members of the corona. Some situations are so humorous that they will even be remembered in the next few iterations of the cantus and become running jokes throughout the year. This is only possible with a corona filled with experienced members. Luckily, there are enough people within Scintilla who regularly attend the cantus and even a special committee is in place to maintain the cantus tradition: The Censores Cantus Scintillae.

Figure 2: The first Cantus bundle.

All in all the conclusion can be drawn that a cantus is very delicate piece of entertainment with a lot of aspects that can either make or break the ambience. But to truly appreciate the Scintilla cantus, one should get to know the ins and outs of all the traditions that are used within one evening as it is a big bulk of references. So if you feel like a lot of singing and talking dumb, do not hesitate to join us on one of these beautiful evenings and try to spot all the small traditions and references that make up the cantus Scintillae.

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