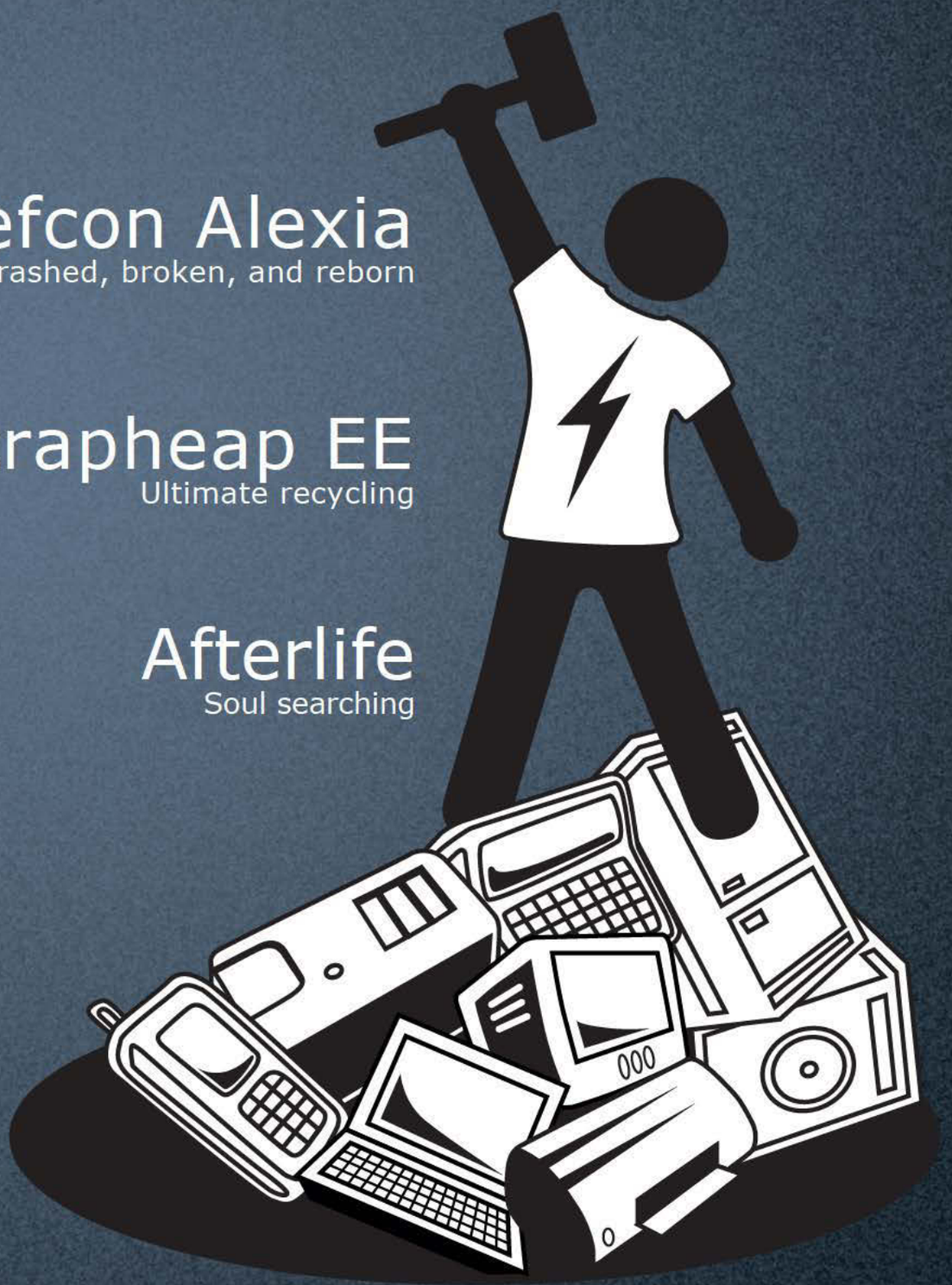
De Vonk

Periodical of E.T.S.V. Scintilla

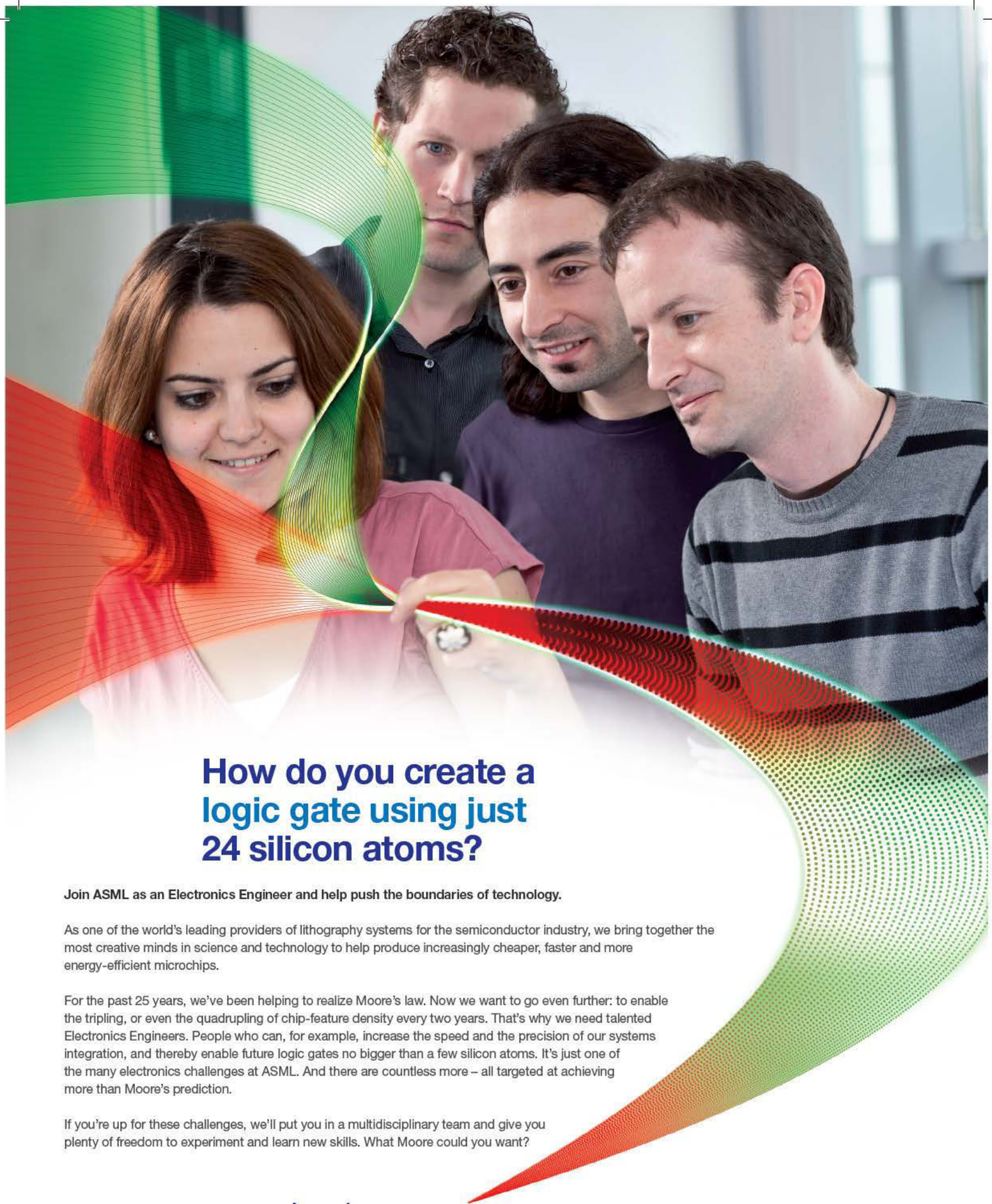
Defcon Alexia
Crashed, broken, and reborn

Scrapheap EE
Ultimate recycling

Afterlife
Soul searching



Year 31 | Edition 3 | June 2013



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For students who think ahead

Running hot

Author: Koen Zandberg

It seems that in the last weeks spring finally arrived in the Netherlands. Officially it has already been spring for a few weeks, but last week the temperatures started to rise. After an extremely cold march this is a welcome change. With this rise in temperature it might get a bit hot in here, but at Scintilla we know how to keep a cool head. Even when faced by sudden digital crisis or a gruelling physical ordeal.

As you may know the Batavierenrace has been run by our own team, Sparks4ever. We finished without incurring a single penalty, a commendable accomplishment, if I may say so. The Bata was a double challenge for scintilla, for when our team was running this race, members of SOT were dealing with a server failure. During this they kept a cool head and at the time of me writing this, everything is operating smoothly ones again. Scintilla can now move healthily forward, into spring.

For most students, this means that there are more exams they have to study for. Although when reading this, the new quartile should have begun. For others, this means the start of their first quartile with normal exams at the end. But enough about exams, this isn't the only thing the passing of time brings us.

For the Scintillakamer spring and summer mostly means that the temperatures are going to rise again. I still remember the heat of from last summer and trying to work in over thirty degrees Celsius. One of the many solutions was to put the temperature scale on the television in degrees Kelvin. It doesn't matter for the actual temperature, but people didn't notice that quickly how hot it actually was. This resulted in fever complaints. For this year, we hope to bring the actual temperature down a few degrees. The last board contributed to this with the insulation around the heating tubes. We chose a different approach to this problem.

A few months back, we've changed the layout of the Scintillakamer. By switching the entrance to the Bestuurskamer from one side to the other the window there is less obstructed. We hoped that this would result in a better airflow through the room. Over the past few weeks it has already proven it's use. We were able to bring the temperature below twenty degrees while it was sunny outside.
Let's hope we can keep temperatures down, it would make our work a lot more comfortable and an air conditioning would be unnecessary.

Op de Koningin, op Scintilla

Koen Zandberg
President of E.T.S.V. Scintilla

Analog beergames
Tuesday May 21st, 2013
19:00h, Abscint

Active members outing
Thursday May 23rd, 2013
15:30h, Hulsbeek

Hitchhiking
Friday, May 24th, 2013
16:00h, Unknown

SCALA's Scavenger Hunt
Monday, June 3rd, 2013
16:00h, Everywhere

Thales End-P Event
Monday, June 10th, 2013
17:31h, Zilverling

Masthead

De Vonk

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In the weekend of the Batavierenrace, the IT facilities of Scintilla were mostly unavailable. Koen, frontman of the Scintilla Operator Team, has written an article regarding this weekend with information about what went wrong. This moment was also used to introduce some new features which should improve the overall stability of the server. Read the article for the full details.

For some students, their student live just begun. Other students however, are finishing their final master assignment and need to prepare for life after college. Therefore, in this edition we introduce a new item "Afterlife", in which someone who just graduated tells about what they did in the year after graduation. In this edition, Lars Zondervan elaborates on his experiences.

In "On Location", the Vonk reports on a visits to a company that does interesting things related to Electrical Engineering. The aim is to give you an impression about the commercial application of Electrical Engineering. This time Tim visited Micronit, a company based in Enschede that specializes in lab on a chip technology and microfluidics. In this article, you can read in detail about what Micronit does and the kind of people that work there.

For an Electrical Engineer a Raspberry Pi is a nice device to have. However, an Arduino is used more often by hobbyists, due to the presence of an easy-to-use I/O interface. In this third edition of "Baking Pies", you can read how you can program and use the General Purpose Input/Output (GPIO) connector of your Pi, giving you brand new opportunities.

Editorial

Promises

A lot of things in life are based on the promises people make. It is important that you can trust someone who makes a promise to you. In a recent interview, our former crown prince Willem Alexander promised that as a king he would accept any law, as long as the parliament proposes something according to the rules of the constitution. As a king, he has the power to refuse to ratify a new law by not signing it. It could be hard for a king to set his own opinions aside and sign in the interest of the nation.

In 1990, the former king of Belgium, Boudewijn, refused to sign a new abortion law due to personal objections. The Belgium parliament then decided to dismiss the king from his function and the new law could become active. After 36 hours, Boudewijn became active king again. We should hope that our new king Willem Alexander keeps his promise, so it is not required to dismiss him to pass a new law.

At Scintilla, a lot of people promise to work in committees. Working in a committee is volunteer work, but this does not make it without obligations. When you join a committee, you promise to Scintilla and your fellow members that you will work for the association and this gives you some obligations. Luckily for all of us, most of these obligations are fun to execute, which makes working for a committee a rich addition to your life as a student.

Let me finish with a small rectification. In last Vonk (31-2), our designer Tom Vocke was not present in the Masthead. However, the great "chain reaction" cover was completely designed by him. Tom, we're very sorry for this mistake and enjoyed your cover a lot!

Erwin Bronkhorst

News for the Electrical Engineer

Author: Maikel Huiskamp

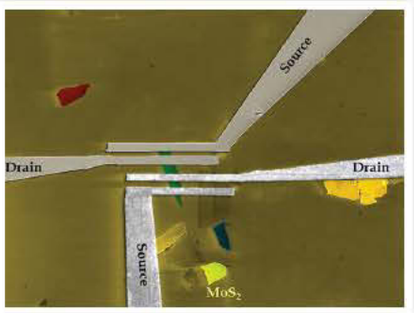
Nano crystals could replace transistor technique

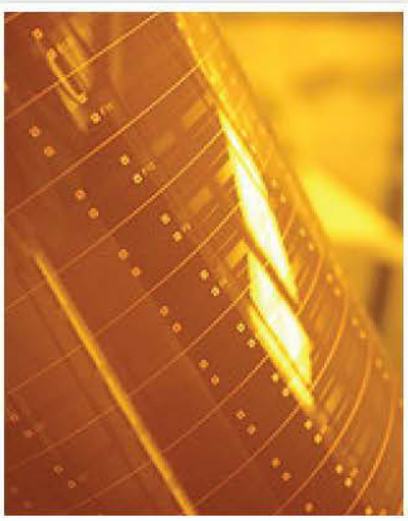
Researchers are developing a new type of semiconductor technology for future computers and electronics based on "two-dimensional nanocrystals" layered in sheets less than a nanometer thick that could replace today's transistors.

The layered structure is made of a material called molybdenum disulfide, which belongs to a new class of semiconductors - metal di-chalogenides - emerging as potential candidates to replace today's technology, complementary metal oxide semiconductors, or CMOS.

The nanocrystals are called two-dimensional because the materials can exist in the form of extremely thin sheets with a thickness of 0.7 nanometers, or roughly the width of three or four atoms. Findings show that the material performs best when formed into sheets of about fifteen layers with a total thickness of eight to twelve nanometers. The researchers also have developed a competent model to explain these experimental observations.

Source: http://www.purdue.edu/newsroom/releases/2013/Q2/layered-2-d-nanocrystals-promising-new-semiconductor.html





Dow Corning and IBM Scientists Develop New Materials for Board-Level Photonics

At the Photonics West conference IBM scientists unveiled a major step in phonics, using a new type of polymer material to transmit light instead of electrical signals within supercomputers and datacenters. This new silicone-based material offers better physical properties, including robustness and flexibility, making them ideal for applications in big data and for the development of future exascale computers.

For the first time the scientists fabricated thin sheets of optical waveguide that show no curling and can bend to a 1 mm radius and are stable at extreme operating conditions, including 85% humidity and 85°C. This new polymer, based on silicone materials, offers an optimized combination of properties for the integration in established electrical printed circuit board technology. In addition, the material can be fabricated into waveguides using conventional manufacturing techniques available today.

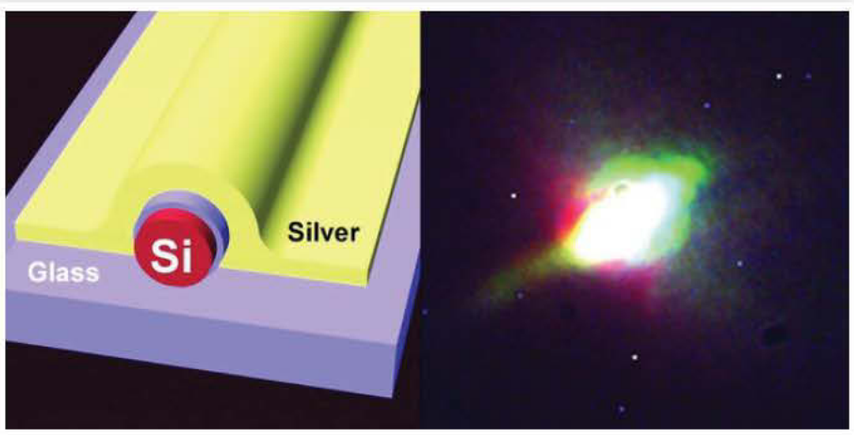
Source: http://www.zurich.ibm.com/news/13/photonics.html

Two-year-old girl receives new trachea made from her own stem cells

Doctors announced that two-and-a-half year old Hannah Warren just became the youngest person in history to receive a bio-engineered organ transplant, a new windpipe made of a synthetic scaffold and her own stem cells. The nine-hour long procedure was performed April 9th, at Children's Hospital of Illinois in Peoria, but the results were only just made public. Doctors expect that Warren will be able to return home in a few months and breathe, eat, drink and swallow using the new windpipe, all of which she couldn't do without the aid of machines until now.

Furthermore, because the procedure was performed using her own cells and no donor organ, there is next to zero risk of rejection. The successful procedure is a huge boost to the hopes of the field of regenerative medicine. "The ultimate potential of this stem-cell based therapy is to avoid human donation" said the lead surgeon, Paolo Macchiarini.

Source: http://www.theverge.com/2013/4/30/4286776/hannah-warren-first-child-bioengineered-windpipe-transplant



Engineers enable 'bulk' silicon to emit visible light for the first time

A group of material scientists from the University of Pennsylvania developed a method to make a light source from silicon. With this technique optical and electrical circuits could be integrated easily.
Silicon normally does not emit light. Most electronic devices are made of silicon while photonic devices are typically not made from silicon. With the possibility to integrate optical circuits in silicon by using its optical properties, consumer-level applications become more feasible.

To get intrinsic silicon to emit light the group wrapped pure silicon nanowires in a coating of glass and the in a coating of silver. The silver coating does not wrap completely around the wire because the glass coated silicon wire was mounted on a separate glass plane. To make the wire transmit light the structure is exited with a blue laser.

Source: http://phys.org/news/2013-03-enable-bulk-silicon-emit-visible.html

Scientists develop cellular DNA computers

Researchers have developed biological building blocks that can perform the functions of biological transistors. The researchers call their biological transistor the "transcriptor". The biological transistors and logic gates should make it possible to build a computer from living cells. The team already developed the other components for biological computers such as storage of digital data in DNA and the ability to transfer the genetic information, e.g. data. The logical building blocks react to stimuli from different chemical substances and the presence of specific nutrients.

Source: http://tweakers.net/nieuws/88172/wetenschappers-bouwen-cellulaire-dna-computers.html

SolarTom

Author: Elmar Peters

06:00, the alarm rings. Today is going to be a long day. We load up the trailer and leave for the test track to be ready for testing by sunrise. Today we are going to test the mock-up, a prototype car which we built to test the parts that we have made so far. Recently we have been very busy, last weekend the whole team worked day and night. It is therefore a very exciting moment, will it work? Will it drive? Or can we pack up and go back to the workplace and possibly the drawing board? While most people are probably waking up right now, we're plugging-in all the wires and running down the checklist.

A laptop is wirelessly connected to the mock-up, this laptop allows us to monitor values from all sensors, battery status, speed and more. So far everything looks perfect, the battery is fully charged and in top condition, the mileage is still set to 0 and the car is all set to make its first meters.

Before we drive we set pylons on the test track, and the driver puts on his helmet. We connect the antenna from the laptop to the van that drives behind the mockup, and test whether the communication over the radio works. "Put the car in drive and try the throttle ... over. " Sounds on the radio. Quietly the mockup starts driving. A great sense of joy, satisfaction and happiness is bubbling up inside the team members. We could not believe our eyes, we have managed to build a working car, and this after just half a year! It is a big milestone, but we don't have time to take it easy and enjoy. While it is still freezing outside, we start logging the sensors. Over one hundred parameters are measured. All parts of the car are filled with strain gauges, accelerometers and linear potentiometers to measure if all the forces applied to the car match our predictions. We do this so that we know exactly whether a component is too strong, too weak, or just right.

We are especially afraid of parts being too strong. At first glance this may seem crazy, what's wrong when a part is too strong? But this usually means that the component is over-engineered and therefore too heavy. Each gram we add to the car wastes extra energy and this is something we can absolutely not afford! Everything is designed on the edge. Our rims for example, have a lower weight than the tire around it! We are pushing everything to the limit and are doing everything to build the best car we can.

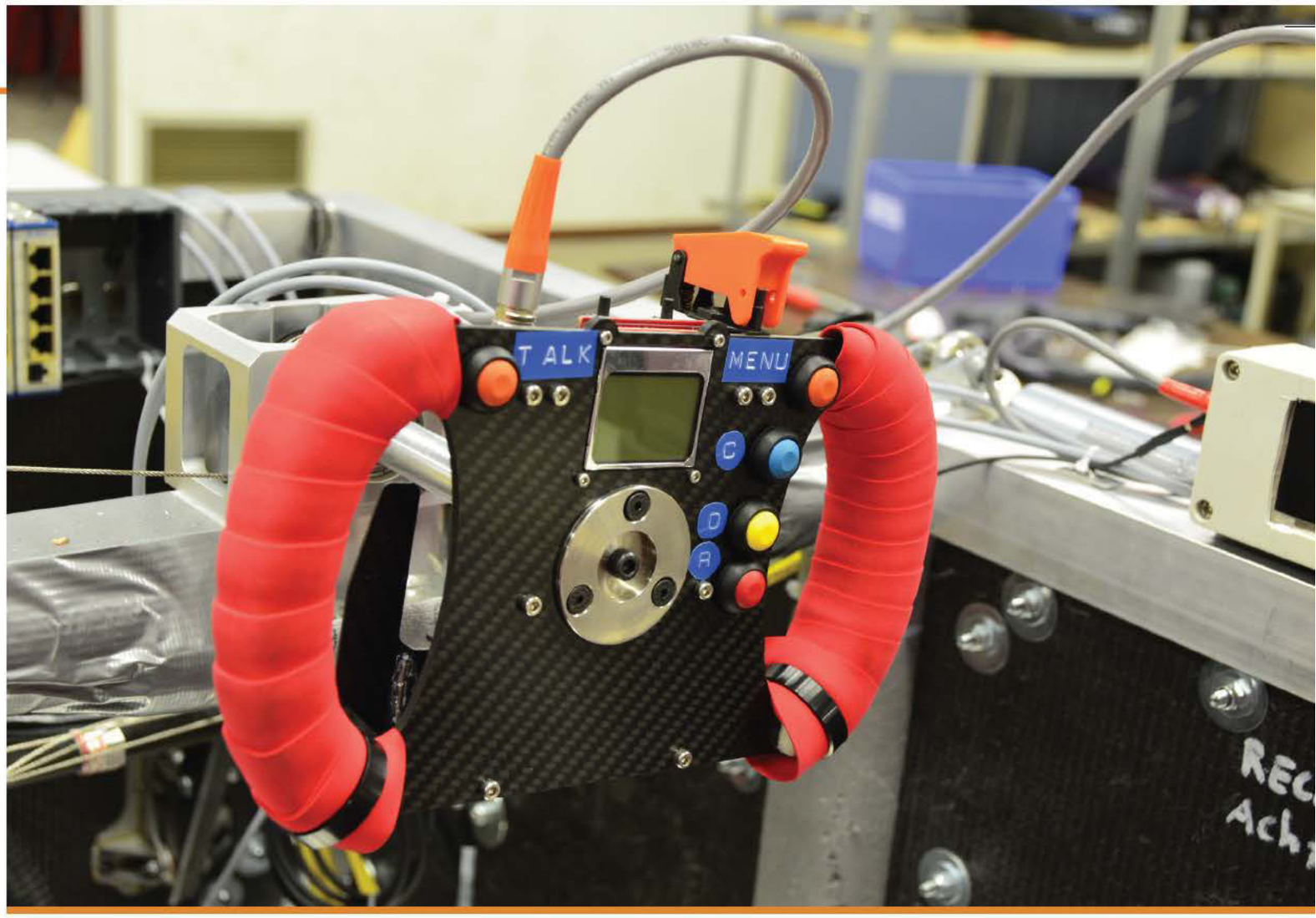
> "Put the car in drive and try the throttle ... over. "

Aside from the mechanical parts the electrical circuits are being monitored. The supply voltages and temperatures of components in the car are all measured to make sure that nothing goes wrong. Extra safety measures are taken with respect to the battery. The battery is the most critical and dangerous part of the car, too high voltages and temperatures in the battery can make it explode. The safety circuit in the battery is very extensive, the temperature and voltage of each individual battery cell is measured, and there are quite a few!

Now that all sensors are logged we can continue with the rest of the busy test planning, the program includes speed tests, a slalom test and even testing with a real cattle grid.
In about half a year the solarcar we are building will race on the Steward highway, in the midst of a scorching desert, surrounded by kangaroos in Australia. It still feels very far away and difficult to imagine, during the tests it was freezing and it even snowed!

Besides that there are many kangaroos in Australia, the road is very poorly maintained. The large road trains that drive across this road cause a lot of damage to the road. They call it a highway, but cattle grids are placed in the road to keep the livestock of local farmers on their properties.
Large cattle grids cause large forces to the solar car. In order to properly test this, we've built our own cattle grid and integrated it into the test track.

All our tests were very successful and useful. Now we can built the perfect solarcar with which we will become world champion in October 2013!



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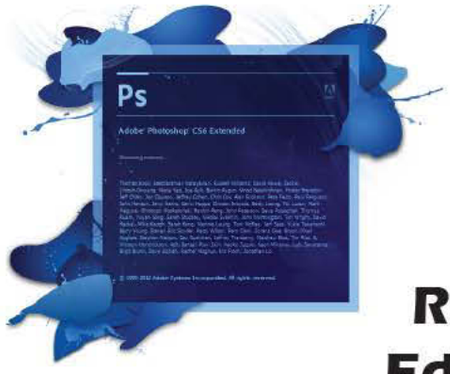

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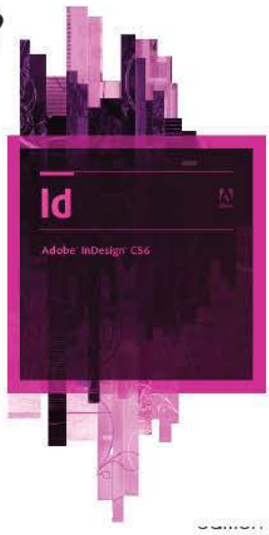


Join us on a Tuesday during the lunch break in the SK.

Afterlife

Soul searching

Author: Lars Zondervan

Most of us just go through their educational programme along the default path. Starting at primary school, on to secondary school, and, if you're clever enough, you decide to study Electrical Engineering at the University of Twente. Then, after an awesome time living as a student, you graduate! Now what? You really have to decide what to do next. But what are the options?
In this multiple piece item several recently graduated Electrical Engineers will tell about their lives after graduation. Some decide to postpone their choice by travelling around the world or decide to study in a foreign country. There are even people brave enough to emigrate. Others just accept the start of their life as a real citizen and begin a 9 to 5 job somewhere in the Netherlands.
However, if you had such a great time as a student and cannot say farewell, there is always the option to do a PhD programme. This is also Lars Zondervan's wish. He is an alumni from the TST group and is currently in the twilight zone between working and starting a PhD.

This... is his story.

Last September the moment I had been working towards finally arrived, after eight years of shamelessly enjoying my student live, my master graduation was upon me. If I remember correctly I already defiled this fine magazine with an article describing my graduation research, so I will not bother you with it again. However, I failed to mention that the real challenge actually starts AFTER graduation: finding your next "raison d'être".

While this is an exaggeration (I definitely didn't exist just to study!) I did notice that my study was at the heart of a lot of different activities I undertook over the last eight years. Not only was my stay in Enschede the result of my study choice, I also discovered my fondness for travel during studytours / internship / conferences, the joy of graphical design and writing in the Vonk committee and even sporting and cultural activities were all linked to student life. With my degree "in da pocket", it became time to reassign these interests...

The time just after graduation was a very peculiar one. The task I set for myself during the last year just disappeared and I could enjoy a great feeling of accomplishment. That is why I first enjoyed a month of actually doing COMPLETELY NOTHING significant. Just reading, playing video games, sleeping and drinking beer with friends felt great for a while. At some point it became harder to enjoy doing nothing and I felt I

Rough nature and vast emptiness on the Isle of Islay

Enjoying the local speciality

Nice view of Kintyre peninsula

had to undertake something (doing nothing becomes boring more quickly that I thought). I had to think things over and rediscover what my interest in life are.

That is why I went hiking for a couple of weeks. I took a flight to Scotland and started walking. Being completely self reliant with just a small tent, sleeping and cooking gear and some good shoes while at the same time enjoying wonderful scenery, felt great. The feeling of only needing so little to have a great time, eat, sleep and explore the world around you is a very liberating one. The void created by this absence of "targets", "possessions", "activities" and "expectations" seems ideal for some meditation and contemplation on the big issues in your life. However, fairly quickly I set off towards the nearest pub to meet some blokes I met on the road and drink some quality Scottish beverages. Apparently I contemplate best with a beer in my hand and some good company!

The funny thing was that when travelling through Southeast Asia, Japan, Canada or Scotland: it didn't matter to me where I was, the feeling of exploration and adventure is just the same. It suddenly becomes very clear what's important: freedom, enjoying your surroundings and the people you meet. And apparently this doesn't require great "study trip budgets"...
After my return home and enjoying a good shower and warm bed, Marco Verhoog had the most luminous idea of partaking in the Student conference on Microtechnology in Freiburg Germany. Me, Luuk van der Velde and Marco Verhoog entered my "death trap on wheels" and drove south for a week of lectures, workshops, Science Slam and general frivolities. It felt a bit like a "mini study tour" were instead of visiting all kind of different companies, these companies and research groups came to the conference venue to present their work and research. The funny thing is that I experienced a similar sense of exploration I felt while hiking through Scotland. Only now it emerged in the form of scientific interest. The presentations ranged from fabrication of sensors for automotive and healthcare to energy harvesting and cloaking devices. Exploring these various fields of engineering and at the same time enjoying the beautiful city, student life and beer culture of Freiburg was not only great fun, but I noticed that this is what I wanted to keep doing. It feels good to meet people from all over the world and have the feeling engineering can change the world and generally explore new stuff.

This "exploring new stuff"' should have already become obvious to me during my

Luuk asking a smartass question, me trying to look intelligent and Marco trying to stay awake

Nice sunny picture of Freiburg's city center

studies, however it wasn't until I finished my studies I noticed how important I find it to keep exploring. Of course I'm glad the time of "following courses and taking exams" has passed, but I'm still excited to learn, research and explore this "new stuff". It seems only logical to stay in academia to keep close to it's source. Sadly the research proposal I wrote with the guidance of Niels Tas wasn't granted and no promotional research place was available at a suitable research group at that moment.

Ok, no research assignment for me. Or at least not at the moment. No worries, I can wait. And maybe it's a good thing to see if I can find the same feeling of "exploration" and learning "new stuff" in a company. This is why I started to look for jobs. I wrote a letter to some companies I had some very pleasant experiences with during my studies. I contacted two intermediates who found some jobs for me and I started visiting companies and doing some solicitations. Although it's not my favourite activity, it is a good thing to do solicitations at a broad range of companies. Some companies are specialised in a very narrow range of products and only want to do some improvements ("our engineer is close to retirement and we want a new one.."). Other companies have extremely ambitious ideas ("'we want to develop our own communications standard, both in hardware as in software"). At some point I noticed I found it hard to find what I was looking for in a company. I decided to wait for a PhD position to open up. Suddenly my perspective to find a job changed as it only needed to be challenging for a limited period of time.

This is how I started at Inventi, the company that produces all the Nedap Electronics. I joined the "Test en Meetmiddelen" team. The company itself consists of four closely located productions sites at which complete electrical products are produced. From SMD placing to component pre-forming, manual component placement, automated soldering and wave soldering, coating, assembling, etc. During this production process each product is electronically tested after each production step. The job of the T&M team is to build both the hardware and software for these machines but also do the maintenance, process optimization etc.

The funny thing was that when I finished EE, I didn't have the feeling that I was actually capable of building something from scratch. And that's exactly what I'm learning at Inventi right now. I never knew how to successfully build a simple stand alone system (with a power source, some good relays, power shuts, measuring equipment, a controller, etc).... you know, a system that doesn't fall apart the moment it falls from the table and is actually reliable and safe enough for the factory floor. A lot of stuff which was very basic stuff for some of my colleagues who studied "HBO EL" or "Installatietechniek" is completely new to me. So for the time being I am learning to build "new stuff" and explore the more hands-on aspects of electrical engineering.

Although there is no satisfactory end to this article, as these travels are nowhere near to finished!, I'll conclude with a hopeful self-fulfilling one liner:

Keep exploring and someday engineer and build some useful "new stuff"!

The Inventi work floor

SMD placers at Inventi

TwenteSat

A space based low frequency interferometer satellite

Author: Roelof Grootjans

Since the first radio astronomy measurement, conducted by Karl Jansky in 1931, science has been busy to get more information about the universe at frequencies invisible to optical telescopes. The problem with this part of the radio spectrum is that the wavelengths are quite large compared to optical telescopes. To achieve a high gain for detecting the faint signals involved in radio astronomy, the antenna needs to be large. Also the angular resolution is improved by using large antennas.

Early radio telescopes used large dish antennas (dishes of more 10 meters diameter are not uncommon) to meet these requirements, but still the angular resolution was quite poor. Currently most radio telescopes make use of interferometry to synthesize a "virtual" large aperture antenna by using a set of smaller antennas spaced apart by a large distance. An interferometer combines the signals from all antennas and out puts a correlation pattern. By using this technique a large aperture antenna is made without the need of a physically huge antenna, this makes it possible to achieve a very high angular resolution even with long wavelengths.

The frequencies that are observed cover the entire radio spectrum from a couple of megahertz to hundreds of gigahertz. However recent trends have shifted to looking at ultra-low frequencies (below 30MHz). Looking at these low frequencies could provide new insights about the "dark ages" of our universe which is the part of the history where astronomers know little about. During the dark ages the universe was filled with neutral hydrogen which absorbs photons causing it to be opaque to visible light. The only way to observe this part is to look at highly red-shifted hydrogen lines (low frequency signals). A downside to using ultra low frequencies is that the atmosphere around the earth is not fully transparent and blocks these frequencies from propagation through it. Also man-made interference is significantly higher at the lower frequencies.

These obstacles at low frequency have led to the introduction of the OLFAR[1] project (Orbital Low Frequency ARray). OLFAR will feature a cluster of satellites that are in a formation around the moon with a large distance between them. Each satellite will carry a measurement payload and use inter-satellite communication to perform the interferometry needed to synthesize a large aperture.

The University of Twente recently started a student satellite project to help with the OLFAR project. Such a project is comparable to that of the successful delfy-c3 satellite of Delft University[2]. The TwenteSat mission will be a nano-satellite which will be a first proof of concept of distributed interferometry at low frequencies in a low earth orbit. The satellite will start with three cubes (10, 10, 10 cm) together which will split up in orbit. The two outer cubes of the satellite will still be conjoined to each other via a tether (space cable). Like OLFAR the satellites will feature a payload for measuring the ultra-low frequency data and an inter-satellite communication link for distributed correlation of the measurement data. It is also important for the satellite to "know" exactly where it is above the earth. This way its known which part of the sky the interferometer is looking at. The idea is to also let the interferometer work at a slightly higher frequency to make correlation with interferometers on earth possible (such as the low frequency array of ASTRON[3]). Next to all the electrical subsystems, the satellite also needs systems that can stabilize the two halves from spinning too much and to keep the tether tight. An impression of such a nano-satellite can be seen in the picture.

[1] Rajan, R.T. and Engelen, S. and Bentum, M.J. and Verhoeven, C. (2011) Orbiting low frequency array for radio astronomy.

[2] http://www.delfispace.nl/index.php/delfi-c3/delfi-c3-mission

[3] http://www.lofar.org/about-lofar/about-lofar

Scrapheap Challenge EE

Author: Erwin Bronkhorst

In Scintillian culture something becomes a tradition when it occurs three times. Hopefully, the same thing holds for the Scrapheap Challenge Electrical Engineering. After a successful first edition in 2009 and a second one in 2011, even the worst mathematician can extrapolate that 2013 had to be the year for the third edition of this great event. Thus, thanks to a dedicated committee, a new tradition was born and last March. The Scrapheap Challenges took place once more hallowed grounds of the Westzaal.

For the people who do not know what the Scrapheap Challenge Electrical Engineering is: it is an event that lasts two days during which enthusiastic students (and former students) try to create a device out of scrap. These contraptions have to complete a task, which is kept secret until the evening before the event. The scrapheap itself consists of a large pile of old electronic devices and components, providing enough useful parts to create any device you can imagine.

This year's edition started on Friday evening. During this evening all competitors got a booklet with instructions and the challenge that had to be completed was revealed. The nine teams started reading the rules and regulations and soon thereafter each team started brainstorming and designing their winning device. With cold beer served by the Borrel to provide some valuable inspiration, a large variety of designs were concocted.

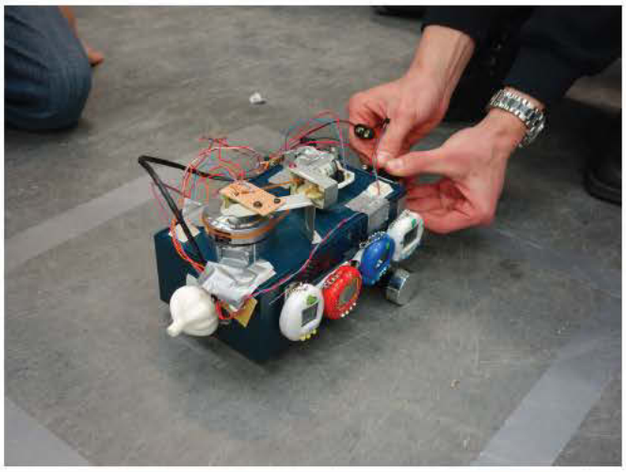
The challenge of this year was to make a device that could complete a course along the floor, without any physical contact between the device and a participant. The device had to be controlled wirelessly, or had to operate autonomously. The track was roughly 20 meters long and half a meter wide, with several corners in it. The track was drawn on the floor of the Edu-café, with black tape on the dark grey floor. The farther a device could follow the track, the better the score of the corresponding team was.

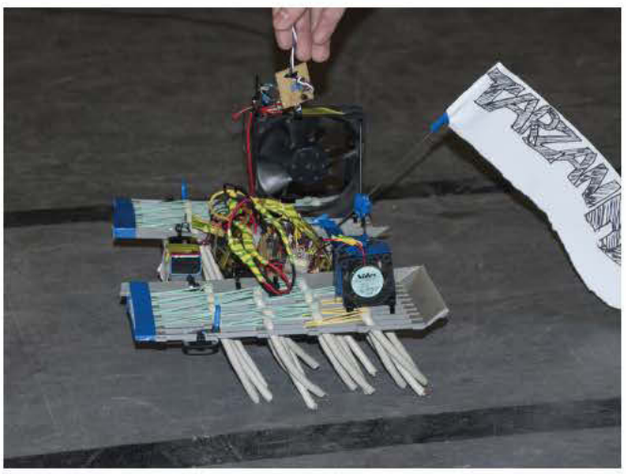
When all teams got inspiration for their design (this was quite hard, because at that moment, there was no knowledge about the scrap on the scrapheap), all participants enjoyed their drink and finally went home for a good and refreshing sleep.

The next day, at 09:30 the building phase began. All teams got in line in front of the large pile of scrap, that was blocked by a red and white ribbon. The organisation gave the latest instructions and allowed one member of each team to approach the ribbon. After a countdown the contestants ran towards the heap, trying to get the electronics they needed most. In no time, the heap shrunk to about one tenth of its original size. Each team started to build the design they came up with the night before. The construction part of this Saturday took until 22:00, with a one hour lunch break and a one hour dinner break. After the construction area was closed, a brainstorm session started in Abscint, again with refreshing drinks served by the Borrel.

At this moment it became clear why some teams participated in this event. Some teams were discussing their biggest challenges with eachother, so the next day they could quickly continue and be as productive as possible. These teams went to bed after a few drinks, so they could be on time the next day. However, other teams were less serious and continued to converse until the early hours. These participants ended up turning off the lights in Abscint at around 5 o'clock in the morning.

The next day, which for some people was just a few moments later, the construction hall opened at 09:30. There were less people attending than the day before, but all teams were still present. Over the next few hours more sleepy faces joined their team and just after lunch, all teams were complete again and finishing their design. The scrap heap became smaller and smaller, and a lot of



devices on the pile were missing a print or some electrical components. These had now been given a new life in a completely different device. After the dinner the last half hour of the construction phase took place, but as always some teams needed just a little bit more time to get their device ready to drive. The organisation was kind and gave all teams a bit more time to finish their device. However, some teams were already confident their device was working properly, so they used the time to rest and mentally prepare for the final showdown.

Finally, the moment of truth was there: the challenge. Each team got a chance to set their best time on the track. Were some teams did quite nice by driving through the first corner, other teams barely knew how their device operated, resulting in a start in the wrong direction. Luckily for everybody, each team got the opportunity to beat their first time in a second chance. Most teams scored better in this second chance, but the order of the teams on the score board barely changed.

The applied design philosophies were quite diverse. Most teams used a classical approach, with a car-shaped device on three or four wheels which was remote controlled. The remote controls were based on infrared signals from a television remote, or radio signals. One team tried to make a winning design by creating a device with just one wheel. This team kept the way they wanted to change direction a secret and unfortunately, did not manage to implement this feature. Also, the way of controlling the device, apart from turning it on and off, remained a mystery. The most original solution of propelling the device, came from a team whose device was called "Tarzan HD". The name was derived from the fact that the device vibrated and, due to a nifty construction of stiff wires, moved forward.

In the end team 'CONIO' (short for Cataclysmic Obsolete Ninja Intelligence Organisation) won this edition of the Scrapheap Challenge. They had a quite simple solution with a device on three wheels, including one swivel castor. This wheel could be steered with a magnet in the hand of the "driver". The device itself drove at a constant (low) speed, giving the handler enough time to correct for his own faults and the deviations of the device.

After a short deliberation, the jury invited the winning team to collect their trophy. Furthermore, the most original design with the vibrating Tarzan was rewarded by the jury with a nice originality prize. After this ceremony, the event was officially closed and the contestants and spectators retreated to Abscint for the final drink.

This is us

De Vonk committee

Dear reader,

You're about to find out what it is we do to make this magazine great!
My role as editor-in-chief is to keep everybody happy, focused and productive. I've also tried to bring and encourage some innovation both on the graphical and literary front. With the introduction of new items like "On location", "Afterlife" or "Chain reaction" I think we've done a great job bringing you some new and exciting stuff to read.
That's it for me, read on to find out what the others have to say.

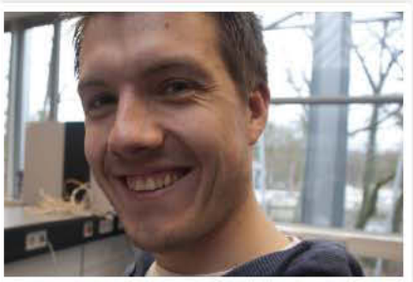
Yours,
Marcel

Erwin - Managing Editor

My name is Erwin Bronkhorst and I am the managing editor of De Vonk. Since my first appearance in De Vonk a lot has changed, like the layout, the workflow and most recently the language of the periodical.
As a "grammar nazi", I initially joined De Vonk as spell checker. My lack of design skills made me a bad layouter. However, with the change to English, I could not do my job as spell checker anymore and I started to layout articles. I had some experience with making Scintilla year books in InDesign, and with a bit of OCD I can do this job quite well.
My specialities are creating vector-images of simple pictures and perform the final check on a new edition, before it is sent to the printer.

Arno - Lead Designer

Although De Vonk you are reading right now has a simple and clean layout, there goes a lot of work into the designing and styling the magazine. You can think about different fonts, colours, margins, image styles, quote styles, etcetera. My job is to make sure the templates for the articles are easy to use, look good and most importantly are consistent, so the editors can layout the articles as efficiently as possible. Moreover I am responsible for guiding the designers editing the non-textual content, for example the cover and the photo pages. So if you don't like the look of De Vonk, I'm the guy to blame!

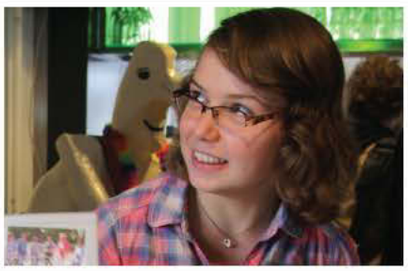


Rowan - Editor

De Vonk receives a lot of articles and unfortunately English is still difficult for a lot of people. That is where I come into the picture. Writing articles, making fancy images and layouting aren't my specialties. Nope, my job is more on a common (English) sense level. Every article we receive is checked with this common sense resulting in less embarrassments for authors who don't read their own article before submission. As you can imagine it is always lots of fun read the draft versions and interesting at the same time!

Tim - CCP

When I started at De Vonk, I did mostly editorial tasks. It was better suited to my skill set, as I had considerable difficulty with the layouting of articles. Right now, as a board member, I am the CCP at De Vonk. As CCP the most important part of my work at De Vonk is the aquisition and collection of Ads and Advertorials. Furthermore I still try to do my editorial tasks at De Vonk. My layouting skills have only gotten marginally better, but with only sparse practice this was to be expected.



Fieke - Designer

Making De Vonk consists of two different parts. De Vonk is produced four times a year with different articles. For every new issue, new content has to be found. To obtain these articles you sometimes have to contact people and sometimes you write it yourself. There is always room for new ideas and topics. When all the articles are received, De Vonk has to be layouted. Even though the style of De Vonk is the same for every page, every single article has to be edited. Besides the text articles, also the photopage has to be layouted. First the interesting photos are selected, before they are placed in the middle page of De Vonk.

Ray - Editor

My job as an editor mainly consists of looking for articles, which range from internship experiences to DIY projects. When all the articles are received, they need to be placed in the layout. This was for the most part my job for De Vonk issue 31-3. It's a bit of a puzzle sometimes to fill the pages with the text, the quotes, the photos and the diagrams while still maintaining a bit of structure throughout the article. An editor's work at De Vonk is quite diverse, since it's not limited to getting articles and layouting. If you like it's even possible to visit all kinds of companies (throughout the Netherlands and Europe) as a reporter of De Vonk. In my second year I joined De Vonk and even now that I'm nearing the end of my student life I still enjoy creating a new Vonk each quartile.

Peter - Designer

As a designer my main job is the design and layout of the content in this magazine. During my year as board member I remember the intriguing discussions with the editor-in-chief about the style of De Vonk in comparison with other periodicals. We also talked a lot about the design and impact of the cover. After my time in the board I decided I wanted to be a part of De Vonk committee. All this was a year ago. This year I helped think about the new table of contents and some of the covers, written content about the Raspberry Pi and tried to make consistent and awesome layouts.

Vera - Editor

I just joined De Vonk recently. Therefore, this piece of text is the only thing I contributed to this edition of De Vonk. For the next edition I will write an article. For this article, I will interview a (hopefully) interesting person, who has something to do with Scintilla or Electrical Engineering, but is not very well known yet. Besides that, it is my tasks to kick some people, to make sure they will finish their piece and hand it in on time.

Maikel - Editor

Two Vonks ago I became a member of De Vonk. So, what do you do when you are a new member of De Vonk? Well, it is actually the same as what all the other members do. You write text and spellcheck text, layout pages and you ask other people if they want to write about something for De Vonk. So there are many things you can do, and many things you can learn. In a couple of months I sort of learned to use Indesign, but the program still has some curiosities for me. So if you want to learn many things about writing and layout, join De Vonk!

Micronit

Author: Tim Broenink

For this edition of On Location, I visited a company called Micronit, located on the Kennispark just opposite of the university campus. It is a company of about fifty people. Micronit specialises in lab on a chip technology and microfluidics.

When I entered the building I got an immediate impression of space. It was a very large and spacious building. I met with an Electrical Engineer working there, who gave me a short introduction on the working of Micronit.

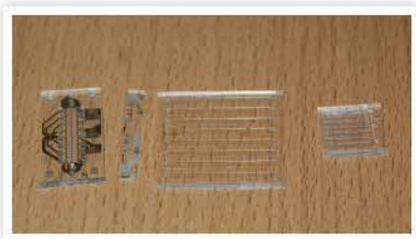


Figure 1: A few of the chips made by Micronit.

As I said before, Micronit specialises in microfluidics and lab on a chip technology. This was very apparent in the samples I was shown, figure 1. At Micronit they design and create microfluidic glass chips and supporting technology. From the basic creation of simple channels, up to complete setups with integrated electrodes inside the chips. Their method of operation includes the whole research and development chain and even the production of large numbers of chips. As I wrote in my previous On Location, I thought of large numbers for local production as a few thousand. That time I was proven wrong, this time however, I was proven right. For Micronit the large number of products was indeed a few thousand pieces. The production of these chips involves the etching of different glass layers, which are subsequently fused together to create the microfluidical structures. But more on that later.

First I will tell you a bit more about the company itself. Micronit has about fifty employees. Of which about half are technical staff, at this location. Within this technical staff there are mostly Mechanical and Chemical engineers. But luckily for me, there was at least one Electrical Engineer. As was explained to me, there wasn't really that much of actual Electrical Engineering going on. There was a lot more of Physics, Mechanical and Chemical. However as one

On the growth of machines

As Micronit is a quickly growing company there are a lot of new machines purchased. One of these machines is one used for the making of holes in glass wafers.
As one can see in the pictures, the first one has a metal box casing which appears to be held together with duct tape. The new one, to the left has a very nice designed look. Here one can see how quickly a company can grow and what a difference it can make.

Figure 2: A sensor for determining lithium concentrations in blood.

might know from presentations from Miko Elwenspoek, there is more to engineering than simple electronics. You get an insight into effort and flow, a understanding of dynamical models. This can be useful for more than electronics. If one understands how to model fluidics in the same way it becomes trivial to work with them.

But enough of the theory, as was told me there, there is a big difference between working at this company and the university, one has to produce real products here. There were a lot of different finished products that they could show me. First of all a glass chip that was made for another company located at the Kennispark, Medimate. A chip to analyse blood to determine lithium concentrations, see figure 2. Another product that was shown to me, was a system to easily work with fluidic chips in lab settings. It was a system designed to be able to switch out different chips from a setup for different measurements, without the need of advanced technical skills. The chips were encased in cartridges in order to be easily handled, these cartridges were then inserted into a special clamp to which tubes where attached, this was then closed tightly using a clamp. This will seal the tubes to the chip. A simple and effective system, see figure 3.

After these products it was time for my tour of the facilities. We started with the Kennispark location. I got a tour of the research department; a few labs at the first floor of the building. These labs contained a lot of nice mechanical and fluidic setups for testing and research purposes. But not everything was simple testing and lab work. As was said before, actual products had to be produced. So one of the things I saw there was the packaging of complete systems for people to start working with the Micronit system, see figure 4.

Figure 4: A complete system.

The second part of my tour took me to the clean room at the University campus. I could sadly take no pictures in the clean room. In here there was a clear trend visible. It was visible in the replacing of the lithography machines by newer versions. It was visible in the new laserwelder technique, in the testing machines and in the rooms used. Mircronit as a company is growing fast. I look forward to see how the company will develop in the future. I hope I have given you an impression on Micronit.

Figure 3a: the chip holders used in the system.

Figure 3b: The clamp to place the chips in.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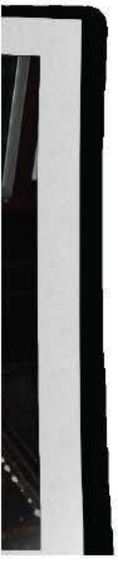
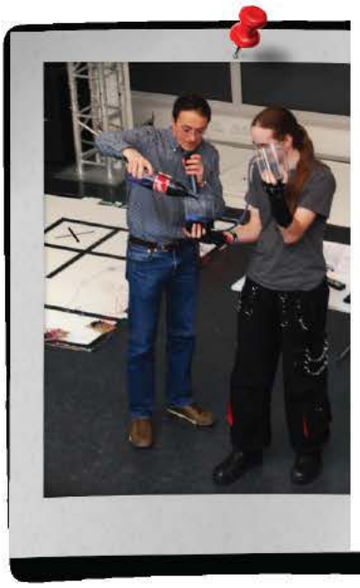


Parents day



Junction

Haarith Bakkich

During the practical of electronics for the first years I met a lot of new students. They come in a large variety, some from the Netherlands and some from the other side of the globe. While most of the students don't leave a lasting impression, one of them certainly did. He is an international student with a strong opinion, born in the Netherlands, but doesn't speak Dutch and his name is Haarith Bakkich. If you are as curious as I am read on!

Where were you born?

I was born in Rotterdam, but my parents moved back to Morocco because of my father's job. When I was 14 we moved to the United Kingdom and I finished my study there. I also lived in France for 6 months.

> "I also applied for Eindhoven, but they asked a lot of annoying questions."

Why did you decided to come back to the Netherlands?

I wanted to study in the Netherlands because I was born here. We spend most of the holidays here to visit my mother's and father's side of the family. Also my father wanted me to study in the Netherlands. And since we were here almost every summer I was already used to the Netherlands.

Why did you choose for the University of Twente?

I applied for different universities in the Netherlands. I was allowed to Delft, but when I called they were surprised that I didn't speak Dutch. And since Delft doesn't have an English program I didn't go to Delft. I also applied for Eindhoven, but they asked a lot of annoying questions, so I also didn't go there. So that is why I study here.

What do you do when you are not studying? Do you have any hobbies?

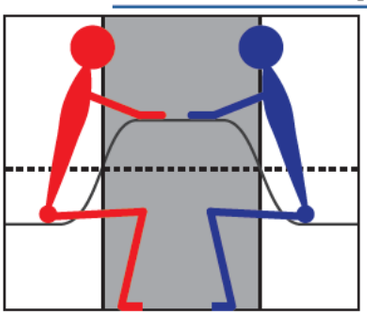
When I was in the UK I used to play football, but since most EE students don't do sports, I don't do that much anymore. The study also takes a lot of time, but when I have time left I play videogames.

Why did you choose to study Electrical Engineering?

I chose Electrical Engineering because of the combination of math and physics. Last year I had a gap year where I applied for the Imperial College in London. I only wanted to attend the college and not do the exams, but that was not allowed there.

Then I applied at London Metropolitan

Author: Maikel Huiskamp



University where I was accepted. I studied Computer Science and Electrical Engineering until February. It was very different from the study here. The tests were much harder. You had to get 45 out of 100 points to pass the subject, and for simpler subjects you had to get 50 or 55 point out a 100. But still I got very good grades. I did some basic electronics with capacitors, resistors and coils and some differential equations. The level of math is much higher there than here. After that year I left the UK and came to study in the Netherlands.

> "If think the new system that they use here is shitty."

Do you like the study here?

I think the new system that they use here is shitty. I passed all the subject of the first quarter except for programming, so I failed that entire quarter. If I knew about the system I wouldn't have come to study here. But apart from the new system I like everything here.

Haarith Bakkich

Age	Nineteen
Study year	First
Birth place	Rotterdam
Favorite movie	Saw
Music taste	Metal & rock

Also the method of teaching here is very different. In the UK the professors did their lectures without any sheets. They didn't even bring paper, so when they had to write something down they asked a piece of paper from the class. Also they wrote everything down on the blackboard. One time they extended the lecture with four hours just to explain something that was unclear, and they let everyone stay until they were finished with the explanation.

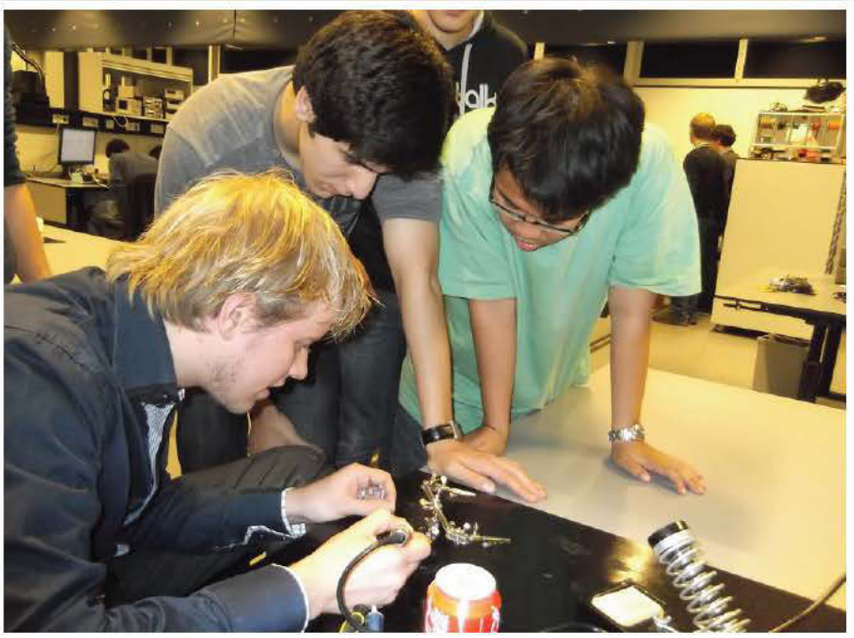
> "I want to go to Sweden to study nuclear energy."

What do you want to do after Electrical Engineering?

When I finish my study here
I want to go to Sweden to study nuclear energy. I want to do this because nuclear energy is really powerful stuff, and as a nuclear engineer you are worth a lot of money. When I was younger I always thought that nuclear power plants where cloud makers because of the white smoke that came out of them.

If this is not possible I want to do a study in renewable energy because that is the new thing. If you add solar or wind energy to a design you can come up with many new ideas.

When both nuclear energy and renewable energy aren't possible maybe I want to study applied mathematics.



Defcon Alexia

Crashed, broken, thermonuclear war and reborn

Author: Koen Zandberg

Friday, the 29th of April 2013, Alexia, one of the three main servers of Scintilla crashed. Because of this, many services were unavailable until Tuesday evening half a week later. So what exactly happened and what was done to fix this. Many people asked us, while working on it, what happened and why we couldn't just reboot the system and continue. This write-up should answer many of these questions.

This problem didn't actually start on the 29th of April. For this we have to go back a few days earlier. The 23th, the maintenance evening of the SOT, we noticed that the backup somehow stopped working. More accurately, it stopped mailing the results. The last mail was from the 17th. Our backup server, Benedictus does it's job every night. He accesses both Utelscin and Alexia and backups everything important. The backup is intelligent enough that it makes incremental backups. It detects changed files and only backups those that have changed in the mean time. With this we have multiple backups, each of a different day, week, month until a half year back in time. So, on this evening, a few backup processes hanged on Benedictus. We killed them, then assumed that it would make a good backup the next day.

The next day there was still no mail from Benedictus. Everyone in the SOT was busy so this issue was postponed until the dreaded Friday morning. Noticing that the backup still failed we started to investigate again. It seemed that the backup stopped working in the process of scanning every file. Trying to reproduce this problem, we found out that on the disks of Alexia there was a folder we could not access. Maybe the file system was broken there, but nothing seemed to help. The folder was part of the file system the thin clients use. It was a not actively used, but still something that was accessible from the thin clients. There was thus nothing that had accessed it for a while. Wanting to see if it was possible to access it from the thin client, one curious SOTmember of which we will not reveal the name, accessed it. Unfortunately this caused the Network file system (NFS) daemon on Alexia to crash. Since NFS is the main method used by Scintilla to distribute the storage to the other servers not long after this, the home directories, the committee directories and most of the other storage was inaccessible.

> "The 23th, the maintenance evening of the SOT, we noticed that the backup somehow stopped working."

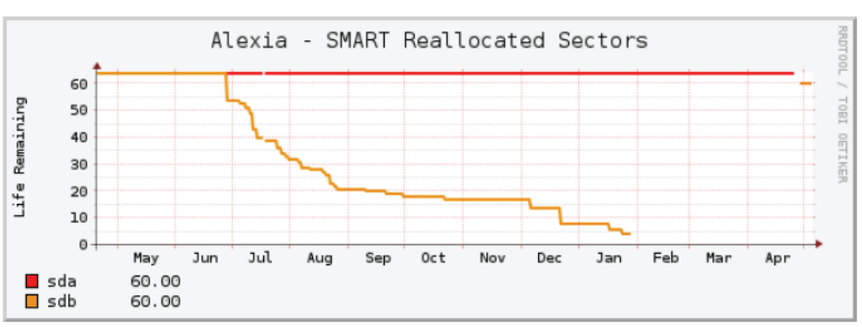


Figure 1: We could have seen that coming. The graphs shows that from June 2012, bad secors occured on the drive.

This was the beginning of the problems. With the storage down, a lot of services go down immediately. The obvious fix we've tried was rebooting Alexia, then trying to fix the file system. Here started problem number 2. After 309 days without reboot, Alexia didn't want to boot anymore. Halfway through the start-up it stopped. Around 12:30, we were able to put a bootable USB stick in Alexia. With this we could investigate the file system and whether there were any other problems. Soon a SMART readout of one of the disks told us that it was near breakdown. In fact, the problems were there for almost a year, according to Figure 1. Since that time, bad sectors appeared on one of the drives, but the SOT

has more to do than just watching graphs. Fortunately the disks in Alexia are in a RAID1 setup (mirror), so no data loss was risked. But since both disks are the same and probably from the same manufacturing batch, we feared that the other one would soon follow. We explained the board the situation, and shortly after we were looking for new disks. A few quick decisions and some bargaining by the commissioner of External Affairs delivered us two brand new 2TB disks for Alexia. A bit later we had access to HalB again to remove Alexia from her rack to replace the drives (Figure 2).

> "The SOT wouldn't be the SOT if it made a few ingenious solutions for the problems encountered."

With Alexia, many services went down. The services within the scintilla network that run on Alexia went down, but also a few more that depend on them. The services that run on Alexia are: File storage (home directories, Committee storage, commonly used files and temporary files); The thin clients boot from Alexia; The account system; a MySQL database for member administration; an internal website for member administration and the samba shares (windows file sharing for Linux) for Winscin. On top of this a few more things that went down were the mail system, Winscin and the website. This happened because these depend on the services provided by Alexia. The mail delivery system needs files from the home directories of users for per user forwarding or sorting of mail. The website needed the database to show who is in which committee. Winscin went down after a while because it couldn't query the account database anymore and obviously the thin clients stopped working because their network file system wasn't provided anymore. In short, the IT facilities of Scintilla came to a halt. Since the computers in STORES also use Alexia to start up, even STORES was unable to open to sell anything.

Between the time that Alexia went down and we had her removed from her rack, we were busy migrating a lot of services from Alexia to Utelscin. Everything that runs on Alexia and Utelscin is run on virtual machines. We were able to recover most virtual machines from the backup, a backup from 17th of April, and run them on Utelscin. We were able to migrate the account database, the MySQL database and the internal website. With this we got a lot up and running again. Unfortunately, Utelscin doesn't have the space to accommodate the 1TB storage from Alexia. Everything that needed this storage was not functional. We preemptively shutdown our mail server, letting the mail server of ICTS queue our mail.

Figure 2: The cause of all problems. The broken ('stuk' in Dutch) hard drive.

We decided to reinstall Alexia. Before the crash, she was running Ubuntu 10.04 on a 2.6.32 kernel. The virtualisation technology we use for Alexia (OpenVZ) does not support newer kernels. We choose Debian for testing Alexia. The day ended with Alexia in the Scintillakamer with two new disks in her ready to get Debian installed.

> "Fortunately, because of the Batavierenrace nobody needed our systems."

Saturday (27 April 2013) we didn't do anything because we were busy the whole day with the Batavierenrace. Fortunately, because of the Batavierenrace nobody needed our systems. We continued to work on Sunday. At 11 o'clock Debian was installed on Alexia. Except for a boot partition, the whole file system was used for a logical volume group (see Vonk issue 31-2) in RAID1. With this we can make flexible partitions on the disks of Alexia at runtime. Instead of OpenVZ we choose to switch to Qemu for the virtual machines (Figure 3). This so we can run newer kernels on Alexia and we think Qemu is a bit more matured, stable and in combination with libvirt easier to manage. For Alexia we compiled the kernel ourselves. This in order to have a kernel that is optimized for Alexia and has everything necessary for the things she has to run. The kernel is a so called hardened kernel, it has a few security patches, mainly PaX and grsecurity compiled in. One of the things this does is restrict users from seeing things they don't need to see and implement a least-privileges approach for memory. It randomises pointers and flags data memory as non-executable and program memory as non-writable. This prevents a lot of security exploits like some buffer overflows and direct code execution. After compiling the kernel a few times (somebody forgot to include a module needed to boot from the disks) it was happy and running.

Figure 3: Part of the activities was the migration from OpenVZ to Qemu virtualisation.

OpenVZ and Qemu differ quite a bit. With OpenVZ a virtual machine shares the kernel and hardware with the host, while with Qemu the host simulates hardware for the guests and still keeps this hardware efficient enough to mitigate most of the losses introduced by simulating hardware. Qemu uses the hardware instructions for virtual machines that are included with most modern processors. This switch in virtualisation technology required that we had to convert all virtual machines from Alexia to a format that Qemu understands. Or rather, from a system that runs on OpenVZ to one that can run on generic (simulated) hardware. After some trial and error, it appeared that it was necessary to reinstall a few low level packages, mostly hardware detection and disk detection. Things like udev and initialisation scripts were mostly destroyed by the initial installation on OpenVZ. With these packages reinstalled, the virtual machines were willing to start up on Qemu. Thus in the evening we had our account database running on a Qemu test virtual machine.

> "In human language this translates to shouting around that you can now be found at an other place than previously known, not waiting for somebody to ask it again."

Furthermore, the home directories and the committee data was safely copied to the new raid array. The home directories now keep quota's on the space used by users and makes sure they don't go too far over their limit. For now we have the limits configured relaxed, so most users shouldn't notice them, but in the future we will actively use them to prevent users from taking all the space. One thing still needed for that is windows reports per user usage and limit and not the total usage like it does now. We don't plan on limiting the committee directories because this might hinder the committees in storing their data and encourage them to use alternative storage systems.

On Monday we continued. We had a clear plan how to convert the OpenVZ virtual machines to Qemu. The conversion process took most of the day. This because it is a manual process needed to be done for every virtual machine. For this we build a virtual machine that boots from an installation disc. It then mounts the new disks for the virtual machine to be converted. Transferred to the new disk, it is then possible to fix the packages once destroyed by OpenVZ. After this, the conversion virtual machine was shut down and the new disk was used to boot the new virtual machine. Most of the time this worked in one go, but a few stubborn machines needed a few more fixes to get them to boot. The SOT wouldn't be the SOT if it made a few ingenious solutions for the problems encountered. Because the OpenVZ virtual machines don't need there own kernel, they share the one from the host, they didn't have one installed. The solution for this was to compile one kernel for all virtual machines and let Qemu directly boot this kernel, skipping a virtual bios. With this we only have to install new kernels once and reboot the virtual machines. A side effect of this is that we can't use a modular kernel on these virtual machines, the modules would have to be separately installed on every virtual machines, making a kernel upgrade still tedious work and beating the purpose of this centrally installed kernel.

> "ICTS kindly asked us if we could bring our mail server online again."

Early in the morning we were disturbed by a telephone call. ICTS kindly asked us if we could bring our mail server online again. Apparently their monitoring was complaining about a large mail queue (Figure 4). In order to bring up our mail server again, it would need access to the ".forward", ".procmail" and ".qmail" files in the home directory of all users. These files tell the mail server what kind of filtering and forwarding the user wants. So we temporarily copied these files from the old disk of Alexia to our mail server, storing these files locally. With this in place it was safe to turn the mail server back online. Soon the drop in the mail queue of ICTS got visible on their monitoring. Of course our members were happy to receive their mail again, some

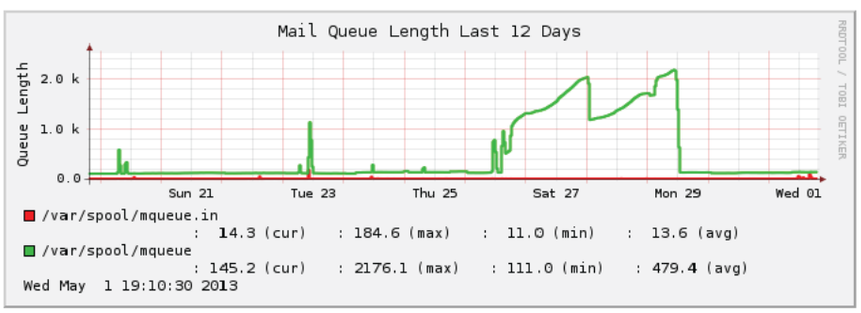


Figure 4: The mail queue at the University of Twente (ICTS). You can clearly see when the mail server of Scintilla did not accept mail.

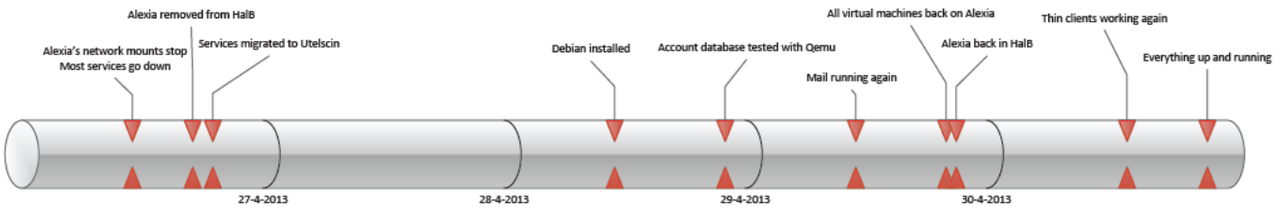


Figure 5: A timeline of the events during the downtime.

shouting: "yay, I'm receiving mail again, oh, it is spam". Unfortunately, because Utelscin had a queue of around 2000 mails to process, scanning each for spam, the load rose to around 4 times what it should be able to handle normally, but after everything was processed it went back to a normal load.

> "It took us a few hours before these two understood each other and the thin clients were able to make secure connections again."

The evening was used to migrate every virtual machine back to Alexia. While doing this we encountered a nasty problem. Since the virtual machines depend on the host machines for their networking, the address resolution is also done by the host. Whenever a machine is looking for a virtual machine, the host it is residing on will answer the address resolution requests for the virtual machine, practically telling everyone that they can find that host via him. After migrating the virtual machines from Utelscin back to Alexia, the routing still went via Utelscin. Utelscin dropped the packets because they were, of course, not for him or any of his virtual machines anymore. Thus these packets never arrived at the virtual machines. It took a few hours for the first machine to get his packets back via Alexia. The last few were fixed with a so called gratuitous arp packet. In human language this translates to shouting around that you can now be found at an other place than previously known, not waiting for somebody to ask it again. We verified it with ICTS and their core router keeps the address resolutions cached for around four hours, thus explaining our problem. We left that evening with most virtual machines up and running again. The only thing left was to fix the thin clients and make every network share available again.

The thin clients were a tough nut to crack. When a thin client starts up, before they load anything. They acquire a network address from the network and ask it for a so called TFTP server to boot from. They will get pointed to netboot-alexia which provides them with a few choices. When the normal image is chosen, they get a kernel and an initial ram disk from the server. The initial ram disk is a small file system which does some preparation before the real file system can be accessed and booted. In our case they first set up a secure connection with Alexia, then mount their file system as an NFS share. The problem here lies in the secure connection. This is done with IPsec, a protocol for making encrypted connections on IP level. For this we previously used a program called racoon, but because this is out dated and hard to configure, we wanted to switch to Strongswan. It took us a few hours before these two understood each other and the thin clients were able to make secure connections again. While working on this, one of our new members fixed a new graphical menu for the thin client boot options. Now every member can just walk through the menu to other boot options instead of having to memorize the options.

The data on Alexia used to be divided over three disks, the so called data, data2 and data3. With the move to only one large disk, the original divided data structure was kept. We now decided that it was time to merge these into a new folder structure. This makes everything much clearer for us, but only time can tell what depended on this folder structure and what breaks now it has been changed.

The next thing to do was to distribute the data from Alexia to everywhere necessary again. This was done by NFS. Here we also optimized a few things. Now instead of having access to all data, each virtual machine is only able to access what he needs. Sometimes this is only the home directories, however for example the Netboot virtual machine needs access to the file systems of the thin clients, but our web server does not. Previously, everything had access to all the data, now only the data they really need. When the necessary data was distributed back to Utelscin, we could restore most functionality there. With the home directories and the committee directories in place, virtual machines that are public for members like virtuscin and chat-utelscin were operational again. Restoring the samba file server made everything accessible for Winscin again, giving users access to their files again from our Windows environment. A full schematic overview of all the events that occured during the activities of SOT can be found in Figure 5.

> "With this hopefully everything was restored again and peace returned to Scintilla."

With this hopefully everything was restored again and peace returned to Scintilla.

“Croon: We leven elektrotechniek”

Auteur: Croon Elektrotechniek B.V.

Al meer dan 135 jaar is Croon Elektrotechniek niet meer weg te denken uit de top van de Nederlandse installatiebranche. We staan aan de basis van vele technologische ontwikkelingen. We zijn verantwoordelijk voor de complete elektrotechnische installaties in duizenden gebouwen, talloze schepen, vele industriële complexen en tienduizenden andere projecten in allerlei marktsectoren.

croon
TBI techniek

Sluiskiltunnel

Met de aanleg van de Sluiskiltunnel wordt het grootste verkeersknelpunt in Zeeland van dit moment opgelost. De Sluiskiltunnel onder het Kanaal van Gent naar Terneuzen wordt een geboorde tunnel met twee buizen van elk 1.145 meter lengte. De lengte van de totale tunnel wordt 1.330 meter, het diepste deel ligt ruim 33 meter beneden NAP. De diameter van de nieuwe tunnel is circa tien meter en gelijk aan die van de Westerscheldetunnel. Daarnaast komt er zes kilometer nieuwe hoofdrijbaan (N62) met twee ongelijkvloerse kruisingen. Croon is verantwoordelijk voor de tunnel technische installaties.

A15 MaVa project

Het A15 MaVa project is de grootste opdracht die ooit door Rijkswaterstaat is aanbesteed.

De A15 is een belangrijke verbinding tussen het uitbreidende Rotterdamse haven- en industriegebied en het Europese achterland. In totaal wordt 85 kilometer extra rijstrooklengte aangelegd in de vorm van parallelwegen en uitbreiding van de bestaande rijstroken. De nieuwe Botlekbrug wordt breder en bijna 2 keer zo hoog. Daarnaast worden de Botlektunnel, Thomassentunnel en 36 andere bouwwerken, waaronder viaducten, gerenoveerd en komt er over ruim 35 kilometer een dynamisch verkeersmanagementsysteem.

Croon is verantwoordelijk voor de specialistische tunnel technische - en verkeerstechnische installaties. De overeenkomst heeft een looptijd van 25 jaar.

5 vragen aan Young Potential Rick van Akkeren

Rick van Akkeren heeft de opleiding Elektrotechniek gevolgd aan de TU Delft en is momenteel trainee bij de Sluiskiltunnel en het A15 project.

Waarom heb je gekozen voor Croon?

“Croon is werkzaam in verschillende gebieden van de techniek, zoals infra, industrie, utiliteitsbouw en marine & offshore, dit spreekt mij erg aan. En als je kijkt naar het aantal projecten dat Croon heeft uitgevoerd en waar ze momenteel aan werken is de keus al snel gemaakt.”

Hoe bevalt jouw traineeship bij Croon dusver?

Het bevalt zeer goed, we krijgen als trainees heel veel vrijheid binnen projecten en worden overal bij betrokken. Je input wordt gewaardeerd, en meegenomen. Dankzij mijn traineeship krijg ik de kans om te kijken waar nou echt mijn interesses liggen en welke functies er allemaal zijn. En ik mag aan de grootste projecten van Nederland meewerken.

> “Ik mag aan de grootste projecten van Nederland meewerken.”

Zijn er doorgroeimogelijkheden voor jou bij Croon?

Doorgroeimogelijkheden zijn er zeker. Binnen de infrastructuur vindt momenteel een grote verandering plaats. Waar het vroeger

alleen om de uitvoering ging, behoren nu ook het ontwerp en de maintenance tot de contracten. Hier liggen veel kansen en mogelijkheden voor goed opgeleide TU'ers.

Hoe zou je de sfeer omschrijven van Croon?

Het viel mij erg op dat er een hele open sfeer heerst binnen Croon. Het is heel transparant, je wordt betrokken bij dingen die er spelen. Hierdoor is de samenwerking met collega's optimaal.

Zou je het collega TU'ers aanraden?

Absoluut. Bij Croon krijg je de kans om aan grote projecten mee te werken, tel dit op bij de open sfeer van de organisatie en je hebt een ideale werkplek veel te leren en vele indrukken op te doen binnen de verschillende werkgebieden.

Kansen voor 'Young Potentials'

Je bent bezig met een studie Elektrotechniek of je hebt je diploma al binnen, en je wilt niets liever dan werken op de meest uitdagende projecten. Die projecten vind je bij Croon.

> "Hierdoor is de samenwerking met collega's optimaal."

Croon biedt jaarlijks een aantal WO'ers met geen of enige werkervaring een goede start voor een uitdagende carrière. In twee jaar tijd maak je kennis met diverse onderdelen van onze organisatie. Je gaat jezelf ontwikkelen op een combinatie van theorie en praktijk en je krijgt te maken met alle facetten van techniek, commercie, processen, financiën en projectmanagement.

Zo word je in een tijdsbestek van 2 jaar klaargestoomd voor een stevige positie binnen onze organisatie; Jouw inzet, motivatie en ontwikkeling bepaalt waar jij binnen Croon terecht komt.

Net als Rick werken aan indrukwekkende projecten in Nederland?
Kijk op www.werkenbijcroon.nl en schrijf je in!

Internship in Finland

Author: Dennis Alveringh

Finland uses, as the only northern Europe country, the Euro, but doesn't participate in the NATO. Finland has only five million people living in a country the size of Germany. The Fins don't really care about soccer, but they are fond of ice hockey. And they turn the key in the opposite direction as we do to open the door. They had, for more than 25 years, the same president and they have conscription. Their technology and level of education is as least as high as the beauty of their country. This all makes Finland a European country with a lot of details that are different than we are used to and therefore worth a visit!

An impression of Saint Petersburg.

As a master student at the Transducer Science and Technology (TST) group, it's not surprising that I was searching for an internship in a company or research institute that is developing microelectromechanical systems (MEMS). A few years ago TST worked together with the MEMS Sensors group of VTT (Valtion Teknillinen Tutkimuskeskus) and this gave me the opportunity to do my internship in Finland.

My internship at VTT

VTT is a Finnish national research organization (like TNO in the Netherlands). There are approximately 3000 people working there in different fields of science and technology. I participated in the MEMS Sensors team consisting of eight people. It was very nice that my colleagues saw me as a real team member too and this resulted in a lot of different and challenging assignments and the possibility to participate in meetings and company parties.

I worked on different projects consisting of different types of sensors. I have, for example, made models for the heat generation and magnetic fields for the calibration coils of the magnetometers that are probably going to be used in the nuclear fusion plant in France (the famous ITER project). But I also did measurements on piezo actuated resonators in the cleanroom. This made my internship anything but boring and provided me experience in different fields of practical research.

The participation in meetings may sound dull, but at VTT it's not that annoying: most large meetings are done at a lake or at the seashore and always end with drinks, food, sports, swimming and sauna.

Living in the neighborhood of Helsinki

I lived in an apartment in Otaniemi (a district of Espoo in the south of Finland) owned by VTT with two other people of my age working for VTT: a Basque (Spanish) guy and a girl from Germany. The Basque

There are people who own an island in Finland with just a house.

A vacuum chamber with probe station for easurements on piezo actuated resonators.

guy was living there for a year when I arrived, so he knew a lot of people and places to go.

Finnish people are, compared to the rest in the world and especially compared to the Dutch, shy and honest. It is not uncommon that people are quiet when they are having lunch. They are also not pushing to get into the bus. However, they are very helpful and kind when you need to know the way and they will easily invite you for lunch or other activities. So, it didn't take long to make some friends over there to take trips or relax at home with.

It takes about twenty minutes to go from Espoo to Helsinki by bus. Helsinki has a lot of small sights that are maybe not that exciting as the ones in Paris or Istanbul for example, but still well worth a visit. There is, for example a Russian-Orthodox church and a fortress on an island in the sea. There is not much to do in Espoo itself, except for the Nuuksio national park. There are, of course, a lot of lakes and untouched nature. And while it's not very common, it is even possible to meet a bear in this national park too...

Living in Finland is, by the way, more expensive than most European countries. Just because people simply earn more money, but also because of the VAT of 23% and the fact that all the products have to be imported by ship or plane via Europe. Students therefore, often take a boat to Estonia to buy cheap alcohol and other stuff.

Before my internship, my supervisor told me that autumn is the worst period in Finland with only clouds and rain. But fortunately, I was lucky to experience the snow. The snow in Finland doesn't go away for a few months. Hence, all cars have tires with

Snow on and around the building where I did my internship.

metal needles, spikes. The snow also gave me the opportunity to go cross-country skiing with one of the professors at VTT. The winter sports that involve a mountain are not very popular, because there are no real mountains in Finland. There is also not much light at the end of autumn, so almost all people are using vitamin D supplements and are even more happy than the Dutch when the sun is shining. They are even very happy when there is snow, because it's reflecting more light from the ground!

Finally, about living in Finland, there is the language: it is nothing if not weird! There is really no other language I know that comes close to Finnish (except for Hungarian maybe). Fortunately, all Fins know this, so they are very good at English. They are, by the way, using different keyboards than us: there is an 'ö' and an 'ä' in the place of our semicolon and apostrophe, because they believe that those are real individual characters. They combine multiple words in to one word, even more than we do. Electrical Engineering is for example, Sähkötekniikka. Try to pronounce that!

Possibilities for travelling

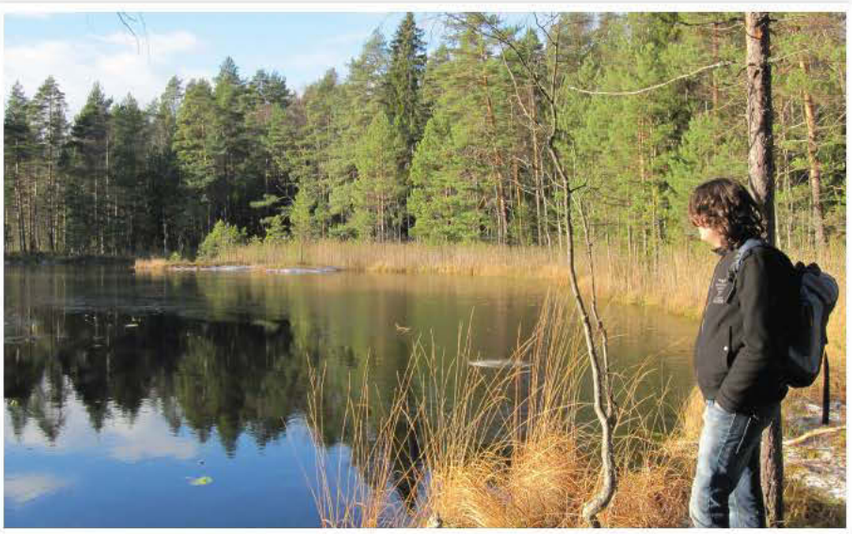
Helsinki is quite nice to live, but it's small and you will have seen everything after a few weeks. Fortunately, there are very good possibilities to travel in Finland. One can take a flight or train to the north of the country (Lapland) for example. I haven't done that because of time restrictions, but I have gone on a boat trip to Tallinn. Tallinn is a medieval city and the capital of Estonia. Another exciting trip I did was to Saint Petersburg in Russia, for there is no visa required when you take the boat. The culture, the architecture, the churches and the Hermitage museum gave a unique experience.

Your internship?

It sounds almost like a travel brochure, but it is not that difficult to arrange an internship to Finland as well. VTT is quite fond of foreigners doing an internship. Especially when you are into MEMS sensors, because the team leader was very positive about having an international student working for them. As there are not many students interested in MEMS in Espoo.

If you want to learn more, feel free to contact me by e-mail [1] or read my blog [2] (in Dutch).

[1] d.alveringh@student.utwente.nl
[2] http://alveringh.student.utwente.nl/finland



One of the thousands of lakes in Finland.

Baking Pies-Part 3

Wiring your Pi

Author: Erik de Wit

This time we will bake a pie like none before, the wiringPi. This library enables you to use a Raspberry Pi in one of your electronics projects. WiringPi is an Arduino-like library written in C and is usable with C, C++ and many other languages. Because many of us have experience programming microcontrollers in C this is very handy[1].

The Raspberry Pi has a 26-pin General Purpose Input/Output (GPIO) connector and this carries a set of signals and buses. There are 8 general purpose digital I/O pins – these can be programmed as either digital outputs or inputs. One of these pins can be designated for PWM output too. Additionally there is a 2-wire I2C interface and a 4-wire SPI interface (with a 2nd select line, making it 5 pins in total) and the serial UART with a 2 pins connection header.

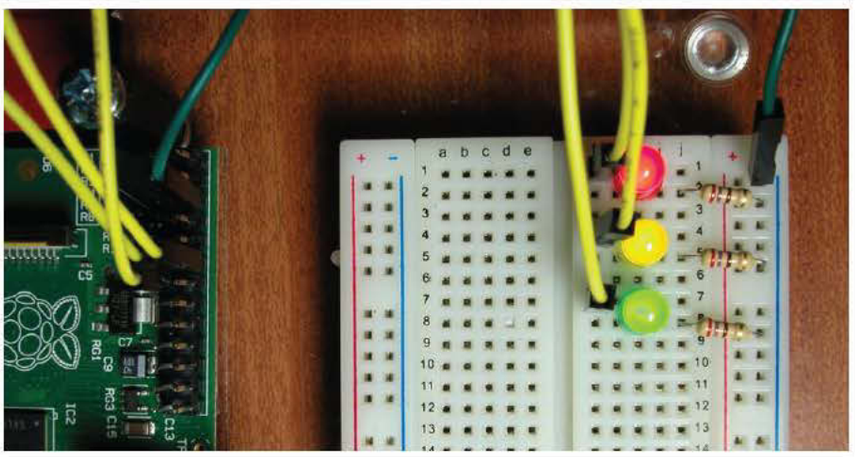
> "If you are familiar with the Arduino program language you will recognize these functions."

The Revision 2 Raspberry Pi has an additional 4 GPIO lines on a separate connector which you have to solder onto the board.

The I2C and SPI interfaces can also be used a general purpose I/O pins when not being used in their bus modes, and the UART pins can also be used if you reboot with the serial console disabled, giving a grand total of 8 + 2 + 5 + 2 = 17 I/O pins.

To get started with the software we are going to install the library, we assume you have some kind of Debian release running on your Raspberry Pi. To get the wiringPi library we need GIT, this can be installed with:

```
$ sudo apt-get install git
```



If you got any errors, update your version of Raspbian with:

```
$ sudo apt-get update
$ sudo apt-get upgrade
```

Then we can obtain wiringPi using GIT:

```
$ git clone
git://git.drogon.net/wiringPi
```

Now go to the directory where you downloaded wiringPi and build the library with:

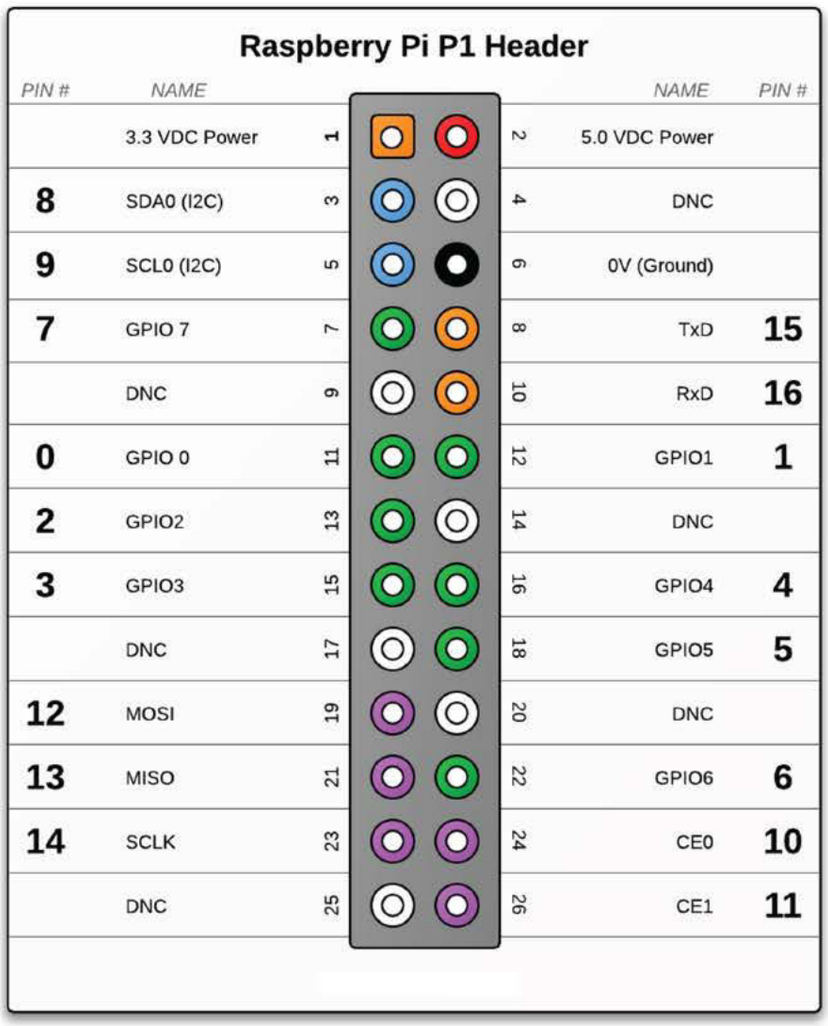
```
$ ./build
```

After this is complete (grab a coffee in the meantime) you can test the installation by using the gpio command with:

```
$ gpio -v
$ gpio readall
```

This should return the version of wiringPi and all the accessible pins with their modes and current values. If there are no errors here, and there shouldn't be, we can go use wiringPi[2].

WiringPi uses different pin names/num-



bers than the original BCM (Broadcom) numbering. The layout of the pins with the corresponding names can be seen in figure 1. If you have revision 2 of the Raspberry Pi you have additional pins with a layout as shown on the website[3].

To use wiringPi for the first time connect a led and a resistor to wiringPi pin 1. Use the following commands to test the connection of the led and toggle it on and off[4]:

```
$ gpio mode 1 out
$ gpio write 1 1
$ gpio write 1 0
```

Now we can write our first program for the GPIO of the Raspberry Pi, which of course will blink the led. A program with wiringPi should at least include the wiringPi library, the standard I/O library, the standard C library and of course a main loop. This should look like:

```
#include <wiringPi.h>
#include <stdio.h>
#include <stdlib.h>

int main (void) {

        while(1) {

        }

        Return 0;
}
```

To blink the led use the functions:

```
pinMode('pin','mode');
digitalWrite('pin',
             'state');
```

If you are familiar with the Arduino program language you will recognize these functions. More functions and explanation can be found on https://projects.drogon.net/raspberry-pi/wiringpi/functions/[5].

Navigate to the directory where you saved your program and compile the program

```
$ gcc  -o myprog  myprog.
c -I/usr/local/include -L/
usr/local/lib -lwiringPi -
lpthread -lm
```

using the following command:
Because wiringPi accesses the GPIO on a low-level the program needs to be run as root. You can also run the program as normal user but this costs a lot of effort and so we won't discuss how to do that here. If you are interested you can find it on the wiring-

```
$ sudo ./myprog
```

Pi page. To execute the program use:
Congratulations, if everything went alright you'll now have made a blinking led with the Raspberry Pi. If you need more information about wiringPi, pins and their function and libraries go to https://projects.drogon.net/raspberry-pi/wiringpi/.

Links

[1] https://projects.drogon.net/raspberry-pi/wiringpi/
[2] https://projects.drogon.net/raspberry-pi/wiringpi/download-and-install/
[3] https://projects.drogon.net/raspberry-pi/wiringpi/pins/
[4] https://projects.drogon.net/raspberry-pi/wiringpi/the-gpio-utility/
[5] https://projects.drogon.net/raspberry-pi/wiringpi/functions/

Educational update

Author: Laurie Overbeek

In the last few weeks Koen and I (and all the other student associations) have been busy with negotiating a new book contract. Starting upcoming academic year some things will change: You will still receive a big discount when you order your books through scintilla, but you will not be ordering your books at the ibbs2 application. At this moment a new web shop is being developed where you will be able to order your books for the first quarter for next year. You can still pick up your books at STORES but you will have to pay up front for your books. You can also choose to have the books delivered to your home (though a disadvantage of this is that you may not be home when your books are being delivered). More information will come to me over the next few weeks so if you want to know more about the new system just ask me when you see me in the Scintillakamer!

As you have probably seen by now scintilla has it's own blackboard page. This page was created to keep you updated on all educational changes that might be relevant to you. Since there are a lot of changes going on it is important to know what rules may affect you in your study. An advise for this year is to follow all practical assignments of the first year, because the practical assignments may be given differently next year. At this moment meetings are being held about possible transition rules for the upcoming year for students who haven't passed a course yet in the last year before the modules are introduced. When available, more information will be posted on the blackboard page.

Next year changes are finally coming for the programming course! In the first module of next year freshmen will learn the programming language C. The course will start with a "hello world" program so that everyone can start from scratch. This course has already been used successfully at the University of Delft for several years. It will now be translated to English so it can be used coming year in the first module. This course will be given by Bert Molenkamp.

> "Join the board and take on the great task of keeping the education good!"

At the 20th of march the Educational award ceremony was held. The three nominees of this year were Mike Boldy, Raymond Veldhuis and Arjan Meijerink. As most of you know Arjan Meijerink won this year so we would like to congratulate him with this success! We wish Arjan Meijerink success during the central education prize award ceremony!

During my year at the board I attended a lot of different meetings, such as the educational program committee and the curriculum meeting (for the new modules etc.), all to make the educational system better and represent the opinion of the students! Do you want to do this next year? Have people listen to your opinion and make a change in the educational system! Do you want to take care of the books next year so that everyone can study using the right books? Join the board and take on the great task of keeping the education good! Besides all the other cool things you get to do during your time in the board the function of commissioner of education gives you lots of insight in the bureaucracy of the university and you can make changes where you think it is necessary!

Vonk Forge

The time is right

Author: Vulcanus

One could wonder if this item, the Vonk Forge is already known by our readers. The last Vonk, which introduced the item, hasn't been available for long. With the busy life an engineer (in training) has, it can be difficult to find the time to invest in your hobby or meaningless tasks. This bring me to the next challenge, a machine that does important and time consuming work, the Epibrator.

The word Epibrator comes from the Dutch word "epibreren", which can be traslated as "Perform a seemingly very important task, while actually doing nothing at all." This will be the primary directive of the Forge challenge this time.

So now as a challenge to make something that doesn't do anything won't be a challenge at all for a clever electrical engineer, we will add a few requests or guidelines, to make this challenge even more interesting.

For one, the epibrator has to do seemingly important work, it has to look so impressive that a mere mortal will be distracted and impressed by its important and improbable functioning. If one would need more of a challenge then to make the most impressive machine ever, there are a few restrictions.

Figure 1: A way to turn machines on and off

- The machine has to be safe to operate near humans, even if left unattended. One can assume that safety instruction like "Do not touch" will be followed.
- The machine can be powered using a standard wall socked. One can also use the various portable power sources available.
- The machine has to be placed on a surface no larger than a square fifty by fifty centimetres (50x50cm).
- The machine should be able to be turned off, figure 1.

With these three criteria one might derive my plan for this mighty machine. The best epibrator provided to us will be placed on the balcony in front of Scintilla. Where it's seemingly undefinable functions can baffle the weak of mind and distract one from the temptations of coffee and tea.

Beside these restrictions, I have some advice for the potential builders of usefulness. For to make an awesome machine is a task worthy of everyone, one can always use a few tips in making it better.

- More lights are more distracting and more leds equals more betters.
- Liquids are electronics worst enemy, one could always show a war.
- Strive for progress, not perfection. Show progress.
- Insanity: doing the same thing over and over again and expecting different results.
- Time is only wasted, if you don't look awesome wasting it.
- It shouldn't be obvious that the machine is useless, subtly waste their time. figure 2.

With these suggestions one can make a machine to make me proud, to make yourself proud and to make the world proud. Show them a waste of time.

I hope that my challenge has lit the spark of inspiration within you. You can send submissions, questions, or even suggestions to vonkforge@scintilla.utwente.nl. You can also use this address to make an appointment to measure, show or test you wonderful contraption.

May the forge be with you

Figure 2: This would be way to obvious

Engineering

Sparks, Power and Metal

Author: Tim Broenink

If I look at the way I can attach metal to metal, I'm not really dissapointed. I can solder metals together, Ducttape them or even screw them together. If you look closely at this list you will notice one method missing, one of the more awesome ones if I may add. I can't weld. So in this project I am trying to fix this by making a high current spot welder.

First a bit of background information on spot welding. Spot welding works by applying a high current to two sheets of metal. This is done on a small area, typically by using sharp electrodes. Due to this current the metal sheets will heat up and be melted together. In order to control this process one would have to control the energy delivered to the welding spot. If there is not enough energy, the metal won't melt or would create a bad weld, if too much energy is used, the metal will melt away completely and a hole will be created.

So we need to deliver a measured amount of power in a short amount of time, the easiest way that springs to mind is to use a capacitor bank. We will have to charge this capacitor bank and then discharge it through an electrode. All of this will have to be carefully controlled.

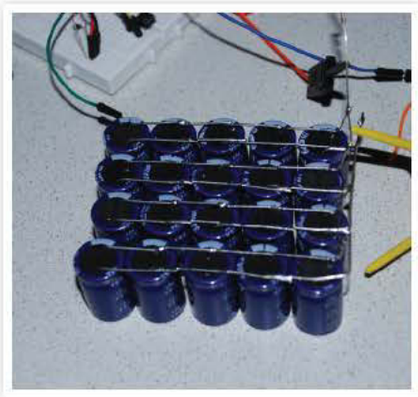


Figure 1: Capacitor bank

This results in the following different parts for this project:

- A capacitor bank
- A way to charge the bank
- A way to quickly discharge the bank
- An electrode
- Control logic

If we can combine these parts in a semi intelligent way, we will have a welder.

> "While the controller was busy charging the capacitor bank I heard a popping noise and then the room went dark."

My first experiment to make this welder will be a small one, even if bigger equals better, it will only have a capacitor bank of about 600 mF. I made this bank by soldering together twenty 33 mF 36 V capacitors, as you can see in figure 1.
So now the next step is charging the capacitor bank. I have decided to use a single power pmos, the IRF9530. This mosfet is rated for 100 V, 12 A and I think this should be enough to charge our capacitor. To discharge the bank I have used my remaining IRF9530, I had three left.
In order to drive all of these mosfets quickly I needed a driver between my controller and the gates. For this driver I used a l298 motor driver module. This module can drive up to four channels, I am now using two. This results in the schematic in figure 2.

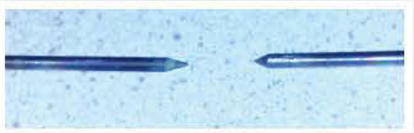


Figure 3: Electrodes

For the first test I manually controlled the pmos in order to charge the capacitor bank, then I shorted the terminals of the bank, which resulted in a noticeable (and suprising) spark. I then had to pull lose the cable I used to short the bank with quite a lot of force, so the welding part should work.
After repeating this experiment a few times there was quite a bit of residue on the capacitor terminals, as can be seen in figure 1. The electrodes used are tungsten welding electrodes, sharpened to a point. These electrodes should be able to handle the heat and are shown in figure 3.

The control logic was a pretty simple matter to program. I connected a button to the controller. When the button is pressed the controller will cycle the different transistors in order to charge and discharge the bank. At first I tried to charge the bank for 100 ms before switching on the discharge mosfet.
This is where my first problems began. I was using a ATX power supply, rated for 18 A on the 12 V rail. When it was used to charge the capacitor bank it immediately activated it's short circuit protection and turned off. This was a bit of a problem. I fixed this problem by changing my charging scheme a bit. I charged the capacitor bank for about 2 ms

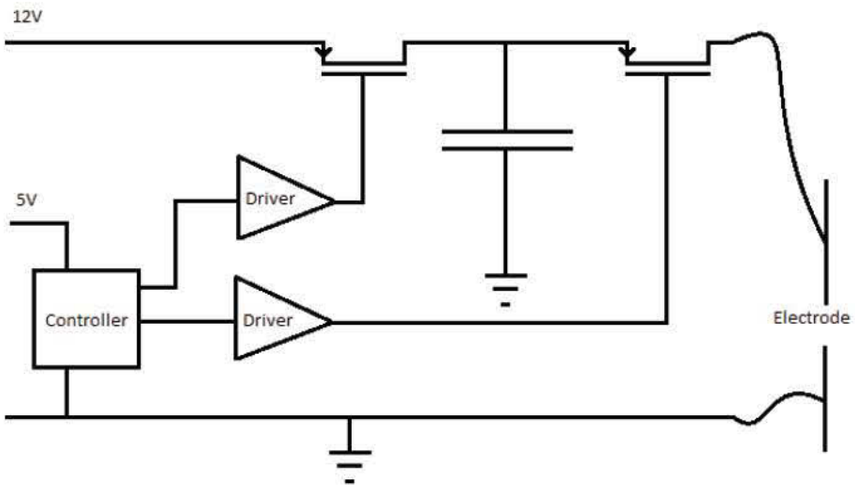


Figure 2: Schematic

and then waited for 2 ms, this prevented the short circuit protection from activating.

The discharge effects could now be tested. When I discharged the bank through the electrodes the spark was a lot smaller then expected. The more electrically capable of you will probably have noticed the problem here. The pmos discharge state could only discharge the capaciter bank down to 4 Volts. This should be a problem on itself, but due to the large Ron of the discharge stage the amount of current discharged is lower for a given period of time, this resulted in a smaller, barely noticable spark.

> "After a few failed attemps to isolate the problems and a few blackouts later, I had found the problem."

This was a bigger problem. I could of course increase the size of my capacitor bank, but I wasn't done yet. I could probably get a few nice results if I could rapidly generate sparks on a metal surface. It might even leave a visible mark, then I could use it to draw.

I changed the parameters of the charging cycle. While the button was held it would use 25, 4 ms cycles to charge the capacitor bank, then it would discharge for 10 ms. This resulted in a few sequential smaller sparks, however this was not enough to even mar the metal. I would really need to increase the size of my capacitor bank. But even so, I could create tiny sparks and that was fun to play with. But while playing with the sparks, disaster struck!

While the controller was busy charging the capacitor bank I heard a popping noise and then the room went dark. I had blown a fuse. After disconnecting my power supply and resetting the fuse, I tried to find the problem. After a few failed attemps to isolate the problems and a few blackouts later, I had found the problem. The power supply appeared to be broken. So as a real engineer, I tried to take the power supply apart.

After dissasembling the casing of the power supply, I tried to spot the problem, looking for blown capacitors or transistors. I could not find anything. Finally I spotted the problem, indicated by the stains on the plastic below the print, there were two blown transistors, as you can see in figure 4. I can easily replace those, I thought. But my plan was easily foiled, as you can see in the picture, the cover of the transistor was completely destroyed. I wasn't able to determine the type of transistor, but if someone has any good suggestions to determine it, feel free to contact me.

As far as the welder goed, you will have to wait until I have aquired a new power supply. Then I can work out a way to protect my power supply from the welder and continue this project.

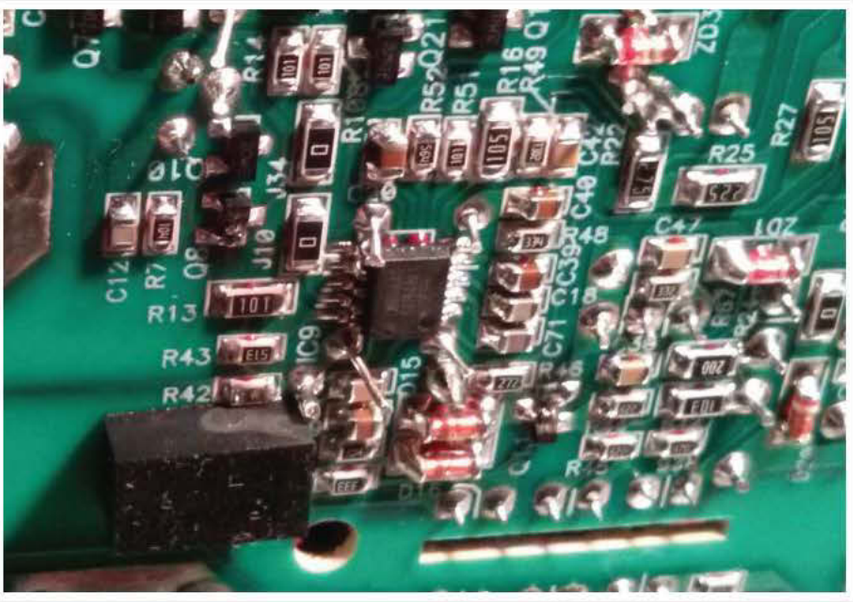


Figure 4: Blown transistors

Smindows

Author: Marcel Wenting

Since January of this year I am the proud owner of a Samsung series 9 laptop. By default it came installed with Windows 8 and the usual shitload of bloatware. Not wanting to be hateful I gave the system a go and It took me a full week to get irritated enough with the UI to revert to installing Ubuntu.

Now, I know that Ubuntu has its disadvantages, but out of the major OSs it fits my workflow best. That said, while I haven't run into any insurmountable problems with my desktop for five years now, a laptop is a different story. For some strange reason laptop makers insist on putting together a package that only works without problems with their special software. That is why I just reinstalled windows for the 3rd time even though I knew I would first have to recover it, only to then reinstall Windows again from within Windows, to get rid of the bloatware. And I don't like that the standard memory usage after clean boot is 1.4 GB (double that of Ubuntu). There are, no multiple desktops. A clean install takes up more than 20 GB plus an additional 30 GB for the recovery partition, which is a lot on a 128 GB disk. Even though it came with the laptop, Windows is in principle not free and I'll have to pay for a next version. The software center only serves to have to pay for programs that were previously free. Almost every installer first asks a thousand irrelevant questions I don't want to answer and comes with a toolbar of some sort.

Despite all of that I figured out how to incorporate the hot-corners and all the other windows weirdness into my workflow, but I can see why people don't get the new stuff. Users get confused between an internet browser and a file browser, how are they supposed to cope with the desktop and metro environment?

Oh, and even for power users there's a new treat, because it seems that it has become a custom that every new version of Windows ships with another type of settings menu. So now there's still the traditional settings all the way from XP which were mutated and then polished in Vista and 7. But you can now also go to "change PC settings" accessible through the charms bar and get into a whole new interface for settings. Except of course when you actually want to do something, because then you're nicely redirected to the old control panel.

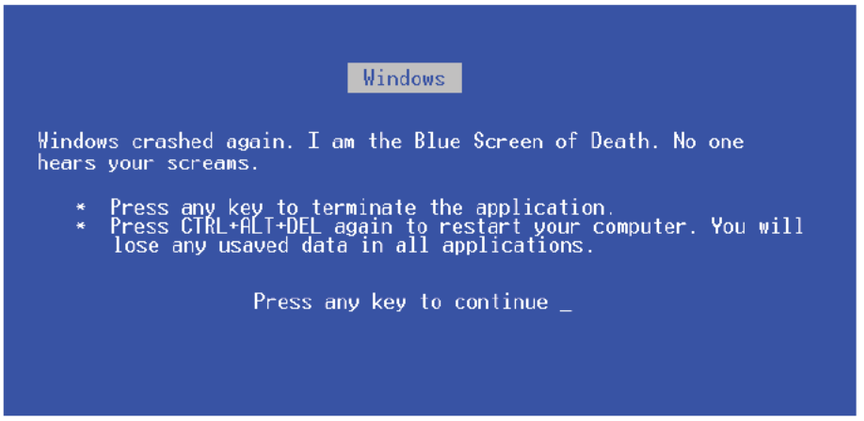
> "I've come to realize the pleasure of hating Windows."

All in all, It seems that Microsoft has once again (95, 98, ME, CE, XP, Vista) managed to make a shitload of money from an unfinished product. Buying itself valuable time to spend on fixing this version.

So why am I currently running Windows? Well for starters just because the flipping hardware support is better. It automatically updates all the firmware. All my function buttons and Mac-style swipe gestures work, thanks to extra software from Samsung. It boots in under 10 sec, though shutting down takes a minute because Windows cheats by actually going into hibernation.
But mainly I've come to realize the pleasure of hating Windows versus wanting to make everything work on Linux. In Windows I never feel the need to edit some config file to adjust the software to my liking. Firstly because I wouldn't know where and secondly because it is so broken I just don't care. That enables me to be productive again, whilst cheerfully cursing Windows.

Where does this leave me? I'll probably be going back and forth between OSs every few months. Getting too annoyed with Windows for being shit and Linux for distracting me with basically writing the software Samsung wrote for Windows.

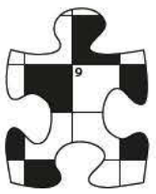
Like a wise friend of mine always says: "Das Leben ist kein Ponyhof".



Puuzle

Author: Truusje

Dear puuzlers. I hope the puuzle of the previous Vonk has enlightened your intellectual capabilities. From the great amount of submissions this time I have selected Ronald Meijer as the victorious one. Congratulations! In the near future, one of my gremlins will surprise you with a delicious cake.



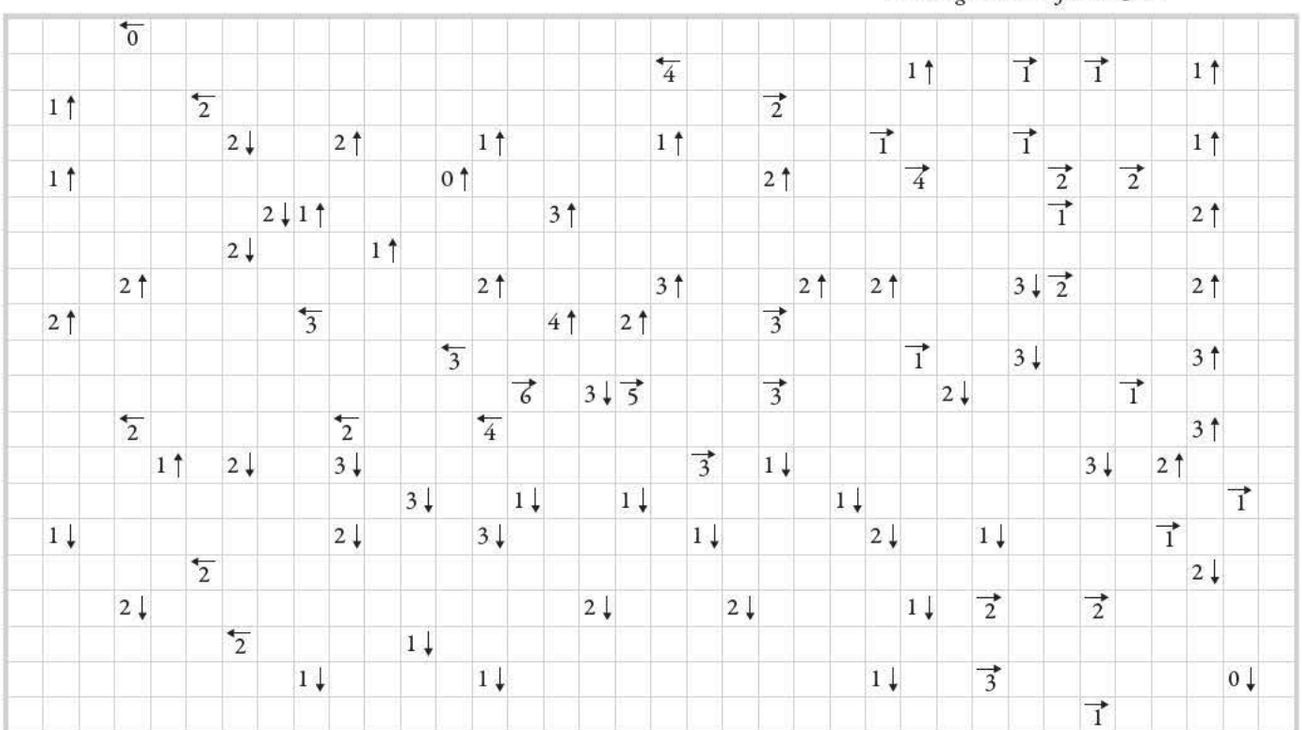
For the ones that cannot stop puuzling I have prepared yet another challenge. This puuzle is called 'Yajilin' or 'Arrow Ring'. As you can see, the puuzle consists of a square grid in which some cells are numbered. The goal is to create a single loop, connecting the centers of all white cells, considering the existence of yet to be disclosed black cells.

The following rules apply:

- The loop consists of horizontal and vertical line pieces, connecting neighboring cell centers
- The loop never branches off, crosses itself or goes through the same cell twice
- The numbers indicate the number of black cells there are in the direction of the arrow
- The loop cannot pass through the black or numbered cells
- Black cells cannot touch horizontally or vertically

Send your solution to truusje@scintilla.nl or deposit it in the Vonk mailbox in the SK. Good luck and have fun!

Diederik receives the Vonk-cake for his winning solution of Vonk 31-1



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