

TAYLOR VISION

*Summer is on
Precision is gone?*

August 2023



About us



Mark Baken

Maurits Neele

Paulien Laninga

Niels Beaufort

Jelle Smit



Disput Taylor

3ME faculty

Room 34 G-1-365

Department of Precision and
Microsystems Engineering

Mekelweg 2

2628 CD Delft



CONTACT:

+31 (0) 15 2786850

taylor-3me@tudelft.nl

BOARD

Chair

Secretary

Treasurer

Internal Affairs

External Affairs

LOCATION

HISTORY

Taylor is the study association related to the department Precision and Microsystems Engineering of Delft University of Technology. The association was founded in 1988 to enhance the study experience of the students. The Taylor Foundation, in its legal form, was subsequently founded in 1992, making it an official organ in the TU Delft. During this time, the department changed its name from "Production Engineering" to the PME you are all familiar with. In contrast to what many people think, Taylor is not named after the famous mathematician known for the Taylor expansion. It is named after the mechanical engineer Frederick Winslow Taylor, who was active in production engineering and industrial efficiency. The logo of Taylor was inspired by the tip of an Atomic Force Microscope, an instrument that requires technology from all the divisions of the department. Taylor aims to enhance the study experience of the students by: trying to improve the relation between the students and the department staff, bringing the students in contact with the industry, providing the department with student feedback about courses and, last but not least, organizing recreational events to de-stress from the hard working life as a PME student.

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From the board

Dear HTE'ers,

The summer vacation is drawing to a close, marking the impending start of the new academic year. We hope you've been having a wonderful time during the summer holidays so far. As board we also took some time off to unwind. Our activities ranged from a hiking vacation in the Swiss mountains to attending a wedding in Spain, showcasing the diversity of our experiences.

Our activities during the fourth quarter were also very diverse! The Connect event, Girls night, Taylor drinks, and a delightful potluck filled with delicious food were all highlights. We truly enjoyed each of these events and

were thrilled to see the enthusiastic participation from students and PME staff.

For now, enjoy your last days of your summer holidays and maybe find a short moment at the beach, in the jungle, or even at a unique location like a (Japanese) toilet, to read through this new Vision.

We hope to see you all soon at PME square (because it is bit quiet without you at the moment).

On behalf of the Taylor Board

Mark Baken (Taylor 22/23)



Recent graduates

5/4/2023	Victor Jaarsma	Efficient manufacturing of P (VDF-TrFE-CTFE) actuators for a robotic fish
12/4/2023	Chihao Kuo	Fabrication methods of a novel 3D hybrid stiffness scaffold for neuro mechanosensing
13/4/2023	Jim Sluijter	The development and geometric analysis of an origami-based constant-height walking locomotion system
19/4/2023	Wieland Juch	Development of a suspension system for a hydrostatic bearing operating on an undulating surface
21/4/2023	Tieme Moens	Design and testing of a controllable hinge for a flapping-wing micro air vehicle
25/4/2023	Flip Colin	Variable thickness and initially curved flexures for improved flexure mechanisms
25/4/2023	Dennis van de Ketterij	Noise robustness improvement of reset control systems using measurement line filtering
26/4/2023	Yu-Xuan Chuang	Shape correction for 3D laser marking
11/5/2023	Sam van den Oever	Analysis and design of a sprung rotational energy harvester for wrist-worn wearables subject to a range of low frequency excitations
12/5/2023	Kasper Bulstra	Design of non-mixing two-fluid heat exchangers with density-based topology optimization
25/5/2023	Jasper Pels	Towards shape morphing structures
25/5/2023	Martijn Mooiweer	Visualisation of ultrasound waves in air to support acoustic levitation
25/5/2023	Martin de Jong	A single input contact-based compliant switching mechanism
1/6/2023	Haolang Ding	Compliant mechanism based nonlinear spring design for inducing mode coupling
2/6/2023	Victor Struijk	Single cell bacterial oscillators

13/6/2023	Dilpreet Singh	Optimization of the hot-filament chemical vapor deposition setup
21/6/2023	Mike Menkhorst	Atalanta flying prototype: The design, fabrication and testing of an uncontrolled resonant flapping-wing micro air vehicle using a linear frequency divider
21/6/2023	Tim van Zee	Deposition prediction model to improve the quality of SERS substrates fabricated using aerosol direct write
23/6/2023	Bas van Vliet	Towards vertical docking of an autonomous underwater vehicle to an unmanned surface vehicle in rough seas
27/6/2023	Julian Bleeker	Multilayer thin film thickness measurement method to measure thickness of liquid thin film within a layer stack
27/6/2023	Bram Wielaard	Designing a visual effect to replace the needle indicator of an advanced mechanical stopwatch function
28/6/2023	Eric Hsu	Design of an integrated photonic distributed force sensor
28/6/2023	Arun Thamban	Deep symbolic regression for nonlinear dynamical systems

Congratulations!

Upcoming activities



29/8 |

Taylor summer drinks



4/9 - 8/9 |

Introduction Week



14/9 |

Lunch Lecture Prodrive



21/9 |

Excursion Settles



28/9 |

Lunch Lecture Hittech

Deloitte Case Study

Deloitte, one of the leading consulting firms, recently hosted an engaging case study event at TU Delft on Wednesday 26 April.

The session started by a presentation by four enthusiastic Deloitte employees, who provided valuable insights into the company's activities and the significance of strategic engineers. The participants then tackled a series of puzzles in groups, which closely resembled the challenges faced by Deloitte professionals in their daily work. Solving each puzzle granted access to additional slides containing valuable information. The event concluded with a final presentation on the topic of selecting the ideal location for Lightyear's first rollout. Overall, the Deloitte Case event at TU Delft offered an enjoyable morning of learning and collaboration for all attendees.



TAYLOR

Drinks

What to do? What is that interesting that I can work on it for a year? That's the question in everyone's mind in the afternoon of the first Monday of Q4.

Organised by the PME department, the thesis market filled the PME square and labs with professors, PhD's and PD's presenting their master thesis topics. Every focus was represented. Afterwards, the students could process everything and relax a bit at the Taylor drinks.

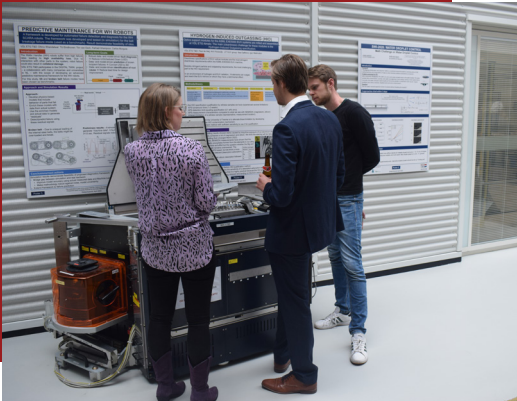


VDL

Excursion

We kicked off the month of May in style, by going to the VDL Enabling Technologies Group's headquarters in Eindhoven.

VDL is a group of more than 100 companies, the 'five worlds of VDL' are Science Technology & Health, Mobility, Energy & Infrastructure, Infratech, and Foodtech. We were picked up in a VDL-made bus and drove to Eindhoven. There we were met with a presentation about VDL ETG, this high-tech company provides solutions in sectors of semiconductors,



medical, analytical and more! Specifically, there was an engineer presenting their magnetic levitation precision stage that was still in the process of designing and prototyping. The engineer got really in-depth, which was fascinating. Afterwards, we got a tour around the facility. Did you know VDL does a lot of production in-house? The range of milling-, turning- and other machines was impressive. We even got a sneakpeak of the cleanroom where the chambers that create the EUV light for ASML's machines were being assembled. At the end of the day, we had the opportunity to talk with VDL ETG's engineers and ask them how it is to work there. It was a very exciting day!

Sioux

Lunch Lecture

In the second week of this quarter we were joined by Sioux.

Sioux is a high-tech engineering company offering solutions for many different markets. After a short introduction to their company one of the engineers took us through the process of one of his recent projects. The project in question was a tool to prepare samples for cryo-EM. For some processes it is important to freeze cells to preserve their structure for study. The customer wanted a tool to automate part of that process to make it easier and faster for operators. The engineer told us about what the process is like to go from customer wishes to product specifications, which is not always easy when the customers are not also engineers. In this case, it meant determining what kind of forces the tweezers holding the specimen needed to be. We were then taken through the challenges involved in freezing something to close to absolute zero in a very short timeframe. Especially the process of going from a very simple 2D model to a more evolved 3D model using real-life tests for evaluation was very interesting to learn more about. Something that was very clear at the end of the lunch lecture, is that Sioux is definitely a very good place to work at if you want to do interesting and very diverse projects!



Recipes

Vegan rendang curry



By Maarten Jankie

Cooking instructions

1. You need about 2 large yellow onions which you slice up into wedges. After heating up a pan to a medium heat pour in some oil and slowly start frying your onions on a low fire.

2. Next we are going to put in the rendang boemboe (spices) don't be afraid to put in a little much, you want that intense flavour (in this step you can also add some aromatics like minced garlic, ginger, or pepper) you put these on a low heat just to release some flavour, don't be afraid if it sticks to your pan a bit.

3. Now we'll wash our jackfruit thoroughly to get rid of the canned sour flavour, it is really important to rinse it very well before using it. After washing it just put into the pan, it will still be quite hard and not yet have the texture you want it to have.

4. Finally we'll add the coconut milk which will release the sticky spices from the bottom of the pan. It is best to not be too conservative in this step since this will make your rendang nice and creamy.

5. Let it simmer for about 20 mins on a low heat, after which you can take a masher and easily mash the jackfruit into small pieces. After you have mashed it put the lid back on the pan and let it simmer for another 10-20 mins making sure there is some moisture left from the coconut milk.

6. enjoy, perhaps with some rice, atjar, kroepoek, and green beans.

Thai Okra

By Paulien Laninga

Ingredients:

(For 2 persons)

250 grams okra

125 shiitake mushrooms or oyster mushrooms (or a mixture thereof)

1 lemongrass stalk, halved lengthwise

2 kaffir lime leaves

1 teaspoon of sea salt

1 tablespoon sesame or other vegetable oil

2 cloves of garlic, grated

5 cm ginger, peeled and grated

2 tablespoons tom yum paste

400 ml coconut milk

100 ml water soy sauce, to taste

1 red chili pepper, in rings

3 spring onions, sliced

Serve with quick-cook noodles or rice

Cooking instructions:

Preheat the oven to 200 °C. Place the okra and shittakes with the lemongrass, lime leaves, salt and oil in a small roasting tin and toss to combine. Place it all in the oven for 15 minutes.

Stir together the garlic, ginger, tom yum paste, coconut milk and water. Pour the coconut mixture over the vegetables after 15 minutes and put everything back in the oven for another 15 minutes.

Taste and season with soy sauce, sprinkle with chilli and spring onion and serve with noodles or rice.

Taylor Girls Night

On the 2nd of May the ladies of High-Tech gathered together for a pizza and painting night!

This time Mareen made a delicious pizza for us. In the meantime, we did a special activity. With the 11 of us we watched a Bob Ross video and made paintings... None of them really looked like the paintings from mister Ross, however they were still wonderful! It was a great evening!

Please contact Paulien if you want to join the activities! :))



hittech

masters in improvement



Do you have a passion for mechatronic engineering?

Do you want to create the technology of the future?

Do you like working in multidisciplinary teams?

Then Hittech Multin is the place for you!

For more information visit: hittech.com/hittech-multin



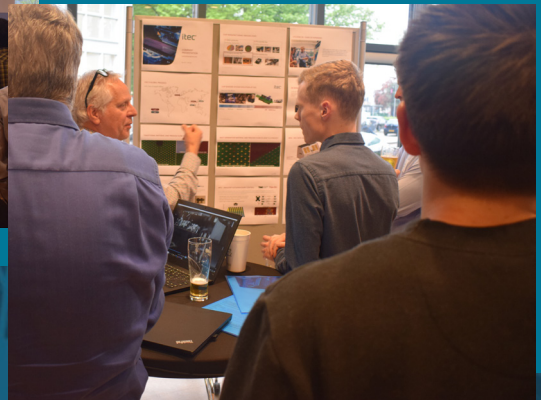
See your ideas develop from rough sketches to a fully realised design, and be involved through every step of the process



Connect

The Connect Event 2023 was a great success!

Nine companies, working in different fields, presented themselves with a pitch for 90 of our students. It was nice that so many of you were able to join. During the information market a lot of small talks were made and good questions were asked. Hopefully this networking might result in a research assignment or maybe a job for a few of you! After a nice meal from Eazie and a lot of beers the drinks ended and we look back at an amazing afternoon and evening. Thank you Relitech, TMC, Primaned Projectadvies, ITEC, Spectral Industries, VIRO-group, Royal Houdijk, Port of Rotterdam, and Femto Engineering!



Event 2023



Taylor Trip Pre-activity

With the Taylor Trip in sight, the trippers met up to get to know each other better and fantasize about Japan.

We gathered in the Delftse Hout with picnic blankets and drinks to have a gezellige evening. There were some intense games of Kubb going on. Camila hit the killing blow to the king! We threw frisbees and played football. The Taylor football team could learn a lot from these players. The group was awesome and we're looking forward to going to Japan with you.

Thanks to the Taylor Trip Committee for organizing a great evening!

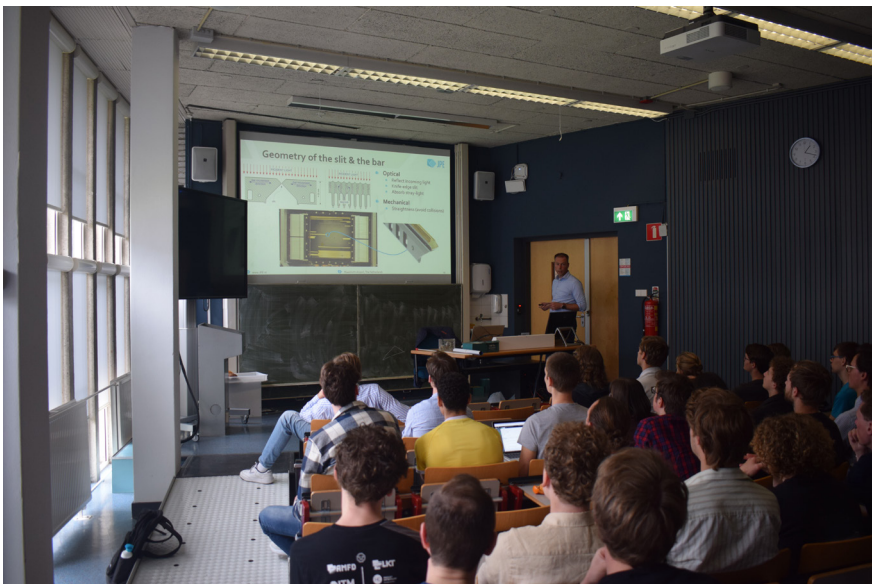


JPE

Lunch Lecture

JPE showed an interesting case of precision engineering in Earth's largest telescope

Janssen Precision Engineering (JPE) engaged the audience at a lunch lecture held at TU Delft with one of their most remarkable project contributions. Sharing insights into their role in building the largest telescope on Earth, located in the Canary Islands, JPE showed their expertise in precisely moving a multitude of bars within a challenging cryogenic and vacuum environment, to create a slit for starlight detection by stellar spectroscopy. Their novel work made significant contributions to the field of astronomy.



Interview

WITH

Hassan Hossein Nia Kani

What was it like growing up in Iran?

I lived in the north of Iran, in a city surrounded by the Alborz mountains and the Caspian Sea. It had one of the best climates in Iran, very moderate. It was the go-to destination for all Iranians to travel and spend their leisure time. With its sea, mountains, and abundance of delicious food, it was a wonderful place to grow up, despite not belonging to a wealthy family. This meant that we had to be economical in our approach to things. However, I was fortunate to have a very supportive family. Their top priority was our education, and they were willing to sacrifice everything to ensure we had the opportunity to study.

This value placed on education stemmed from my father's personal story. He had a deep passion for learning but was unable to pursue it fully. He loved learning, but he was also needed on the family farm. My grandfather believed he was wasting his time studying instead of helping on the farm. One day, when my father went to study, my grandfather punished him and forced him to return to the farm, thus ending his education. This experience left a lasting regret in my father's heart, and he wanted to ensure that we had the opposite experience. He dedicated himself to supporting and helping us with our studies, even during times of financial hardship.

Although we faced difficult economic circumstances at times, we never felt their

impact heavily because of my father's unwavering support. While he is no longer with us, I am eternally grateful for his influence in my life. Growing up in such a family environment instilled in me a strong motivation to excel in my studies and prioritize education.

If I were to paint a picture of the environment I grew up in, it was not a time when computer games consumed our lives. Our activities took place outdoors, engaging in various games. Early in the morning, we would venture out to spend time with our friends. During my elementary school years, from ages 6 to 13, we had around 40 children in our street. It was like a small community of its own when we all gathered outside. While some kids had bicycles to play with, my family couldn't afford one, so we participated in group games instead. In our family, taking a nap after lunch was an important routine. However, my siblings and I couldn't resist the temptation to sneak out once our parents had fallen asleep. We would spend the entire day outside, full of energy and never growing tired.

Did you already want to be an engineer when growing up or did that come later?

I wasn't sure if I wanted to pursue a career in engineering when I was a child, but somehow things fell into place. Let me start from the early years. In any country, there is a demand for various professions like carpenters, waiters, chefs, and more, but these jobs are often not

considered as lucrative as others. That's why, culturally, there was a strong emphasis on studying to attain a better life. From a very young age, children are encouraged to pursue education for a brighter and happier future..

When I entered high school, I had to dedicate more time to studying math, but it still came more naturally to me compared to other subjects. In Iran, we have three major fields to choose from: social sciences, mathematics and physics (which leads to becoming science

Throughout high school, I often questioned why we had to study certain topics in math. Some teachers would explain that these subjects formed the foundation of engineering if one aspired to pursue that field. While some teachers couldn't provide a satisfying answer, I remained curious. One day, a teacher introduced us to the field of robotics and explained how the math we were learning played a crucial role in designing robots and the underlying electronics. That revelation was enough to solidify my



One of the memorable moments captured is my wife and I savoring a glass of wine after a week-long endeavor installing our new kitchen last year (the first image). The highlight of that experience was undoubtedly the apron personalized with my name, a delightful gift for someone who adores cooking. Speaking of which, the second image portrays my wife, a friend, and myself indulging in a barbecue party in my garden. Cooking is not just a pastime for me; it's a passion that brings us immense joy.

teacher or engineer), and biology (which leads to becoming a doctor). I knew that biology wasn't my fun, and as I struggled with memorization, social sciences didn't interest me either. However, mathematics was my passion, so I decided to continue my high school education with a focus on math and physics. The more I progressed, the more I immersed myself in the subject, and the more I enjoyed it. It became a challenging puzzle that I had to solve, which further fueled my enthusiasm.

interest in engineering because I realized that mathematics alone wouldn't satisfy my curiosity. When you start asking questions like "Why am I solving this differential equation?" it's likely that you'll continue asking more questions, so it's better if the subject matter is connected to practical applications.

Although I didn't have a definitive answer until the end of high school, my inclination towards engineering had developed gradually from my early years in elementary school to my final years in high school.

So after high school where did you go to study engineering

In Iran, after high school, we have a big entrance exam. 4 hours exam about math, physics, chemistry, English and literature. At that time, there were around 500 thousand people from the math field competing, and out of those 500 thousand, only 20 thousand could get into university. The rest had to compete the following year and in the subsequent years. Universities in Tehran are higher ranked and better equipped compared to universities in other cities, which have lower quality and fewer resources. If you wanted to go to Tehran, you had to be among the top 500 or even the top 300 students. The good news is that I was not among the top 300, but I did make it to the top 10 thousand. To me, that wasn't particularly impressive, but it still allowed me to get into university and pursue my studies. With my ranking, I didn't have many choices, so I started studying in a city in the southwest of Iran. It was a city adjacent to Afghanistan, precisely during the war between the US and Afghanistan. I was only 18 years old at the time, and it was a very challenging situation for me. However, I went there and began my studies in electrical engineering. I studied electrical engineering for about 2 years, which led to an associate degree. Then I had to take another exam and moved to another city. This time, my ranking was higher, and I got into one of the two universities that offered an Associate to BSc degree program.

I completed my bachelor's in electrical engineering, but the more I delved into the field, the less I liked it. The reason is that the education system in Iran heavily focuses on theory, and my imagination is not particularly strong. Simply discussing motors or generators and sketching them out was not enough for me. I needed to see things in action to truly understand them.

This lack of practicality made it difficult for me to enjoy the subject. However, there was one professor who played a significant role in shaping my career. He taught us system and control, a challenging course that involved a lot of math. I took this course during my last year, the fourth year of my bachelor's degree. During the summer before that year, I decided I wanted to do something enjoyable, so I picked up a book by Ogata. Ogata is the renowned author of a book on modern control, which extensively covers linear control theory and MATLAB function for control theories. It was during this time that I became interested in MATLAB coding and started learning it on my own using an old computer with an early version of Windows. I dedicated myself to coding and learning every day, making progress each day. By the time the academic year started, I already had a strong understanding of the course. When I attended the class, the teacher further sparked my interest. He was a highly talented instructor, and I managed to achieve the highest grade in that course. This success was enough to make me believe that control engineering might be the field I wanted to pursue for my master's degree.

I pursued a master's in control engineering, taking various control courses, including one on nonlinear control, which further fueled my interest in the field. It involved a significant amount of mathematics. I began my thesis in a combined area of nonlinear control and a newly emerging calculus called fractional order calculus. Throughout my master's, I had an excellent supervisor and mentor who also gave me the opportunity to assist younger students. In our year, there were only two master's students in control engineering (unlike here, where there are typically 100 to 200 students per track). The number of master's students was determined by the number of professors available. Therefore, at that time, there were only two students, and

the following year, the number increased to six. We formed a fantastic team of six or seven master's students, and due to my seniority, I led the team in a research theme focused on "fractional order control." In 2008, we submitted six or seven papers, and all of them were accepted for a conference. We had the opportunity to travel together to the conference, and that was the moment I realized I would not stop there. I discovered that I truly enjoyed innovation and research.

It was in 2008, at that conference, that I met my future Ph.D. supervisor. It happened during the Gala dinner night, and we discussed the possibility of pursuing a Ph.D. I mentioned that I was looking for an opportunity to do a Ph.D., and he responded positively, asking me to send him an email the following day. At the time, I thought his response might be because he was in high spirits during the Gala dinner and had consumed some drinks. However, a couple of months later, I found myself in Spain.

How did you end up in Delft after doing your PhD in Spain?

I focused on more practical control theory during my Ph.D., delving into applied aspects of the field. My time in Spain was filled with cultural experiences that I truly enjoyed. I even learned to salsa dance.

After completing my Ph.D., I realized that I didn't want to remain at the same level. I desired growth both economically and scientifically, and Spain didn't provide enough opportunities in those areas. Despite my love for the place and the close friendships I had developed, I made the decision to move to Sweden and work in the industry for a year.

My intention was to explore whether the industry would be a better fit for me than academia, as I appreciate the practical

aspect of developing theories that work in real-world applications. However, I soon realized that being confined to a single topic wasn't suitable for me, even though I was involved in the research and development (R&D) department of the company. I have a natural inclination to explore wide fields, and that quality is both my weakness and my strength. Additionally, I discovered that I truly enjoyed educating and mentoring students, an opportunity that wasn't readily available in the industry.

This realization prompted me to apply for a position here, and I was fortunate enough to be hired as an assistant professor of Motion Control for Mechatronics in 2014. Mechatronics was the application area I specialized in during my Ph.D., and motion control is a field I have been always truly passionate about. Therefore, I felt that this position aligned well with my interests. I underwent an interview process and was lucky to secure the position. TU Delft provided me with the platform to grow and develop. Establishing my own group required immense dedication and hard work, but now I have reached a point where I no longer recognize myself solely as a control theorist. Instead, I see myself as a mechatronics system designer, with a more specialized focus on the "tronic" part of mechatronics.

Author: Maurits Neele

TAYLOR

Drinks

The sun was shining so it was time for drinks!

On Wednesday 7 June we got together at the back of PME for some cold beers and crispy chips. It was so hot that we had to get extra ice because it was melting too fast. New York Pizza brought us pizzas (credits to Stan) which were gone in no time. It was a good time at the last Taylor drinks before the final exams. But don't worry, we're going to have more in August and September!



Prodrive Excursion

Impressive mechatronics at Prodrive.

After long waiting in the sun the bus arrived to bring us to the Veldhoven. When we arrived at Prodrive we were welcomed with a nice muffin and some smoothies which we could enjoy while listening to the presentation. After this the exciting part begun. We all got a nice safety jacket and



got a large tour through their factory, where a lot of interesting high-tech machines were shown. The tour ended with a large line of automated actions performed by robot arms, amazing! After we enjoyed a nice meal, we returned to our beautiful city Delft.



ITEC Lunch Lecture

Need to put a lot of chips in the right place? Call ITEC!

At June 9, ITEC gave us an insight in which technical challenges they work on. ITEC is specialized in semiconductor equipment in automation. They showed some videos with high-speed, high-accuracy and high-quality machines which are used for semiconductor finishing solutions. This is an application where all High-Tech skills can be applied, that is why a lot of interesting questions were asked by the students!



Puzzle

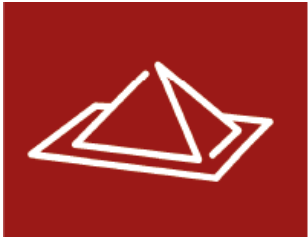
FILLOMINO

This editions puzzle is a Fillomino. Be warned: this is not an easy puzzle! However, you have the entire summer to solve it before the next edition!

Here is how it works: you have to fill all the empty spots with numbers 1-9. The numbers must be part of a region of numbers of the same value, with a size equal to the value of the number. So a 4 must be part of a group of 4 fours. Two different regions of the same number cannot be touched horizontally or vertically (two regions of 4s together would make 8 fours, but they must make a region of 4 fours!). To make it interesting, not all regions have pre-printed numbers. Lastly, it could be that a region contains more than 1 pre-printed number.

Send an email to taylor-3me@tudelft.nl with your solution and you might be the lucky winner!

7	2		4			5	5	3	
				5		5		1	
		4	3		2			6	2
			5			2	3		
	3		4						
3			1					2	
	1			5	3			5	6
	3				1		2		
	4				7	4		3	
2			6	7					



Taylor

