

Study Tour 2013

# Thunder



**TU/e**

Technische Universiteit  
Eindhoven  
University of Technology



## Final Report

# EATON

*Powering Business Worldwide*

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Almost a year ago a group of enthusiast students decided to organize a study tour. At that time the destination was unknown as was the period in which we wanted to go. The only thing we knew was that the study tour should provide the participants with new knowledge both technical as cultural.

After some debating we settled on the United Kingdom. The destination was set. Now it was time for us to search for companies that could help us with funding and excursions. As the departure date slowly grew closer the pressure of finding more and better excursions grew, but in the end we succeeded and delivered. I think I can speak on behalf of the committee that we enjoyed organizing this study tour and we gained a lot of extra insight in organizing such events.

This final report shows the things that we have done during our stay in the United Kingdom, but also gives the impressions of our participants. And at last a thanks to the participants and companies that made this study tour a success.

Roel Oomen  
Chairman of the Thunder study tour



## Sunday 10 February

*Departure from Eindhoven*  
Cliffs of Dover 8  
*Arrival in London*

## Monday 11 February

University College London (UCL) 9  
London Eye 10

## Tuesday 12 February

Science Museum 11-12  
Jack The Ripper Tour 13

## Wednesday 13 February

Tower Bridge 14  
*Departure from London*  
Oclaro 15  
*Arrival in Cambridge*

## Thursday 14 February

University of Cambridge 18-19  
Cycling and Punting 20

## Friday 15 February

ARM 21-22  
Last Night in Cambridge 23

## Saturday 16 February

Harwich 24  
*Departure from England*  
Boat Trip 25

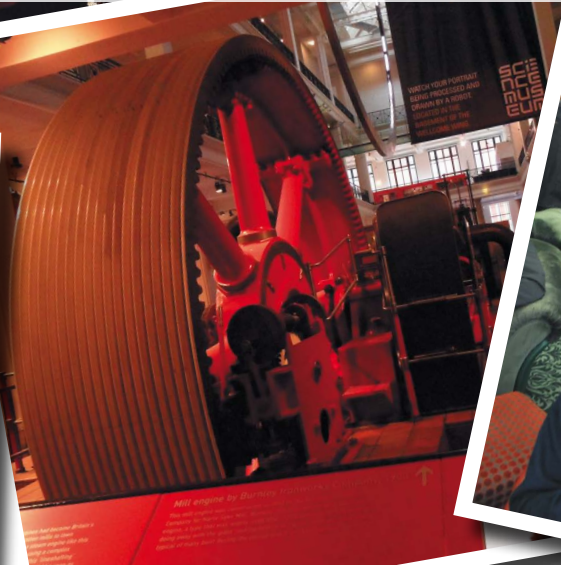
## Sunday 17 February

*Arrival in Eindhoven*





# London



By: Michael Heidweiler

Sunday morning before the break of dawn our journey to England started with a bus trip from Eindhoven to Calais. This part of the trip took us to the magical roads of Belgium to get us ready for motion sickness. After a drive of a few hours we arrived in Calais, where we took the ferry to Dover. Here we drank our first pints of ale and played some cards. Some hoped that, if they were drunk, they would not notice the ships motion.

At our arrival in Dover we had the real British blistering sunshine which made it possible to visit the world famous cliffs of Dover. The white cliffs had a nice breeze on them and we were lucky there was sea wind otherwise some participants would had to prove there swimming skills.

At our arrival in London we were lucky to see the Chinese New Year celebrations. The amount of fireworks was a little bit disappointing, but the dancing dragons were nice to see.

After an evening of drinking Irish and Belgium beers in the hostel, we had a good night sleep to rise early and visit Regent Park. This is a nice London park with probably a really



beautiful rose garden and fields of green. Unfortunately, we were here at the eleventh of February so it was snowing and everything was in winter state of being. The layout of the park is really big with a little river running through it, where, if you stand at the centre of the park on the riverbank, it feels like you are on the English countryside instead of the centre of a giant metropolis.

After a good two and a half hour walk we were back at the hostel in time to prepare for the afternoon program.



By: Joost van der Woerd and Yuk Hang Yuen



was used by master and doctoral students. This way, when undergraduates needed help, they could interact easily with the master and doctoral students.

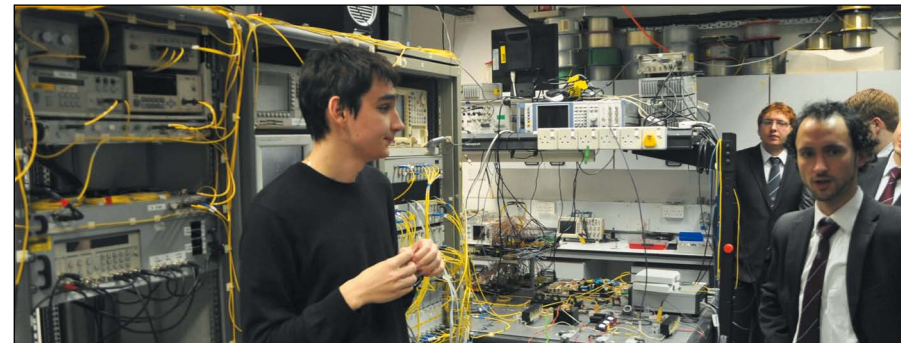
After the nanotechnology lab, we were given a quick tour around the building. During this tour we received some more background information about the history of UCL. At 1826, the time the college was founded, it was the first college to accept both male and female students.

On the second day of the Thunder we had to suit up to go to University College London (UCL). We were welcomed with lunch and an introductory talk about UCL. It became clear that, although the number of EEE(Electronic and Electrical Engineering) students per year is similar to that of the TU/e, there are some big differences between these institutes. Electronic and Electrical Engineering at UCL spans a more diverse group of studies. From Engineering on nanolevel up to the large, applied physics, scale.

When the general tour ended, we arrived at the signal processing department. Here the group was divided in two. One half of the group got general information about the engineering programs while the other group got to see a setup for multi-signal fibre optics research. A PhD student explained the basics of the research about using different bandwidths. After that we had a little presentation from the dean and time for questions.

At the nanotechnology lab they showed us state of the art equipment for the analysis of components on nanoscale. One half of the lab was used by undergraduate students for training technical skills, while the other half

We ended our trip to UCL with a tour across the campus, which started with a tour around the computer science building, where they had an amazing realistic virtual simulation room. We ended the day with the general stuff like the library and student unions.



# London Eye

By: Esmee Huismans and Linda Janssen



On Monday evening we took the bus to the London eye. We split up in different groups to grab a quick dinner, because within an hour we had to be in front of the giant Ferris wheel. Some of us went for the classic pub meal, while others were quite adventurous and had an Indian meal. At a quarter past seven we gathered together to get the tickets for entering the London Eye. With these tickets we first visited the 4D experience. Unfortunately, the experience was a bit disappointing. After this, we queued in front of the London Eye. The group split up

in two different groups, each containing approximately 15 persons.

The London Eye itself was a great opportunity to discover London from above by night. It was a bit rainy outside, but the view was still good enough to get a good look at the skyline of London. Some people suffered from fear of heights, but still enjoyed the ride itself. You could tell that we were with a group of technical students since some of the people were more interested in the workings of the wheel itself than the view.

Once everyone was back on solid ground, the search for a pub started. Having walked about 30 minutes, quite a few people found the Sherlock Holmes pub. The most popular ale that night was, of course, the Sherlock Holmes ale. A few of us played cards, others sat and just talked to each other and most of us had a good laugh.

Around eleven o'clock most pubs were closing and almost everyone took the underground back to the hostel. Once we arrived at the hostel, most of us continued enjoyed the evening with few more beers and laughs.



# Science Museum

By: Gerald Drenthen and Lieneke Kusters



This morning, we woke up fresh and fruity at half past eight. We had been looking forward to the program for this day. First we were going to visit the famous Science Museum and afterwards we would have the rest of the day off to explore the rest of London. In advance, we had learned that the Science Museum was one of the most interesting museums in England and also that it had its own IMAX theatre. We definitely wanted to visit this movie theatre, famous for its extremely large screen and view one of the scientific movies. For the rest of the day, we planned to follow the suggested walking tour through London, which had been prepared by the organizing committee of the study-tour.

After breakfast, we went to the Science Museum, where we split up in smaller groups spreading all over the museum. The first thing we did was, of course, checking the timetable for the IMAX theatre and order tickets for a show. We decided to watch the movie "Sea-Rex" and as there was a special offer, so we also bought tickets for "Apollo 4D", a moon-landing simulation. Unfortunately, the latter was a bit of a disappointment, this simulation had clearly been created some years ago and was outdated. We had already seen similar simulations before which were

actually more surprising (actually even the London-eye we visited the day before had a similar experience in its pre-program). Luckily, the IMAX theatre did meet up to our expectations and maybe even exceeded them. The screen, we were told, was as high as four London double-decker buses and had an area large enough to supply parking space for sixty-four London cabs. Furthermore, the total weight of the speakers would be comparable to the weight of four cows and the lamp used to light up the screen reached a temperature of about 6000 degree Celsius. Ok, so it was all very enormous, but what about the movie-experience? Well, the movie was actually about the 'Mosasaurus', a prehistoric sea-reptile of which the remains have been found not so far from Eindhoven: to wit in Maastricht. Apart from that, the movie did not give many new insights. Besides the educational purpose it was also very entertaining. The dinosaurs were nicely animated and the enormous screen and surround sound system made it an experience definitely worth watching. After we had seen the movie, we visited the rest of the museum, where we saw expositions on space missions, history of mathematical instruments and of course also the exposition on the life and work of Alan Turing. This museum was very spatially organized: the exposition rooms were large and filled with all kinds of large and small machines and



demonstrations. Planes and spacecrafts were hanging from the high ceilings. After we had spent several hours wandering through the different exposition halls, we exchanged the indoor of the museum for the London city walk, which would guide us through the rest of the day.

As we had a long walk ahead of us, it was first time to have a good meal. We decided to take this opportunity to experience our first real "full English breakfast". After this lunch, we were finally ready to start the tour and visit the highlights of the City of London. Unfortunately the length of the tour had been a bit underestimated by the committee and as a result we could not see all of the highlights. In the end we have seen: Harrods, the well-known very prestigious and large warehouse of London. Through Wellington Arch, we walked over Constitution Hill to Buckingham Palace, where we saw, from behind the fence, a glimpse of the palace and its royal guard. We admired Westminster Abbey, close to the royal parliament guarded by its famous Big-Ben. Temple church and the



temple district, with its small, labyrinthine, quiet streets and medieval atmosphere, formed a contrast with the modern, wide and busy roads that we had walked on earlier that day. Finally, when it was already getting dark, we passed by St Paul's Cathedral after which we had to hurry to have dinner and still be in time for the surprise activity of that evening...



**By: Mark Legters and Marco van Zijl**

In the evening the time had come for the surprise activity. At 21:00 we gathered at Tower Hill tube station, curious about what was to come. After waiting for some students that had underestimated the travel time in London, we got the briefing from the BuEx committee for the next day and we were introduced to Barney. He was our guide for the surprise activity: a 'Jack the Ripper'-tour, taking us back to 19th century London. After some background information, where Jasper somehow became the whore in the story, Barney took us on a tour through the sometimes 'Woensel-Zuid-ish' Whitechapel district of London. He told us about the culture back in the 19th century, the life outside the city walls of London in those days, and, of course, the facts on the murders of Jack the Ripper. The guide led us across the various murder sites, pubs where the victims were last seen and an alleyway where the police found two clues about the killings, all to experience the story and sift through the evidence. The tour guide fascinated us all with his vivid descriptions of the merciless murders (even when having Pieter's candy



he couldn't stop telling his story), delving much into detail (like every victim having her intestines hanging over the right shoulder) and showing this not so touristic part of London. In the end Barney concluded with his own theory on the up to now unsolved mystery of Jack the Ripper.

After the Jack the Ripper tour, everyone was free to choose what to do. While some headed towards the hostel to have a drink at the hostel bar or have a good sleep, others headed towards a pub (after gathering some advice from Barney about where to find one), since Dennis' birthday still had to be celebrated.



**By: Edwin Suijkerbuijk and Konstantinos Theologidis**

Today we had to check out at our hostel at Hide Park. After a European breakfast, we left the hostel at quarter past 9 by bus. At around a quarter to 10 we arrived at Tower Hill, but the bus driver could not find a place to park. So after he has turned the bus at two places where he was not allowed to turn and after a manoeuvre through a very small corridor at the back side of a Hotel, we were ready to spend time at Tower Hill. Because it was our last day in London, most of us went to Tower Hill tube station to get the money back from the guarantee of the oyster cards. There was only one information desk there and the deposit of one oyster card took quite some time, so there was a long line.

Another popular place to go was a place to eat English breakfast. That was because of the quality of the breakfast at the Hostel: you would have to roast your bread 5 times before it would be a little bit crispy and there was only jam to put on your bread. For those who went looking for a place to get a proper breakfast, after getting the money back for the oyster cards, there were plenty of good restaurants to go to. The restaurant I went



to had a full English breakfast for about 7 pounds and a nice view of the Tower Bridge. The food was delicious and way better than the breakfast we got at the hostel. It took some time for the food to be prepared, so after we finished eating, it was already time to go back to the bus.

Of course I also walked on the Tower Bridge, on which there is a lot of traffic. From the bridge you had a sight of the buildings next to the Thames. What strikes me was that old and new buildings were built very closely to each other. At a quarter past eleven, it was already time to take the bus to Oclaro.



**By: Duco van den Akker and Steven Beumer**

On Wednesday, day four of the excursion, we went to visit Oclaro. Oclaro is one of the world's largest suppliers and innovators of optical components. After some trouble finding the facility, we arrived almost on time at Oclaro where we were welcomed with an extensive lunch.

When we were finished we got an introduction by Mike Wale. He is a research manager at Oclaro and part-time professor at the TU/e. He told us that Oclaro is 3.5 years old at the moment, and it exists of multiple small factories all over the world with a total of 3200 employees. Oclaro is number 2 in the world when it comes to telecom specific systems.

Oclaro works in the whole range of photonics; they make photonic components, which they use to make optical chips, which they use to make optical modules. One of the important things to make this possible, is the fabrication of chips on wafers and that is something they do at the location in the U.K.

When Mike ended his talk, the group was split into three smaller groups and each group visited the wafer fabrication cleanroom, the testing room and also got a technical talk from Professor Wale.



In his technical talk, Professor Wale told us about the technical principles involved in the making of these photonic devices. Also, he told us about his career and why he decided to join Oclaro.

Before we could go inside the cleanrooms, we had to change into cleanroom suits and got an air shower. In the cleanrooms we saw all the machines that are needed to create wafers; from the ASML wafer steppers to the machines that cover the wafers with metal. Some of us even got the chance to take a blank wafer home.

These wafers have to be tested on functionality so we visited the testing area, where they check every die on a lot of parameters. In the testing area, there was also a robotic arm that was designed to be able to test various dies automatically.

At the end of our visit, Professor Wale waved us goodbye, as we left with the bus to Cambridge.







# Cambridge



# Visiting University of Cambridge

By: Rick van Kemenade and John van Weerdenburg

Our visit to the University of Cambridge was all about electronics and photonics. The section that we visited goes by the name "Centre for Advanced Photonics and Electronics", which is abbreviated to CAPE. The group was warmly welcomed by our host, Amy Leung. We were offered coffee and had some time to look around in the building's main hall, which showcased many posters and publications on impressive current research topics. During the morning, there were several presentations, including a general introduction and three in-depth research reviews. After that, we had a tour consisting of some of CAPE's laboratories.

Professor Bill Milne, head of the department, was present to give us a general introduction of the university and CAPE in particular. He explained the organizational structure of the institute and also told us a few historical facts. Professor Milne acquainted us with Colleges. These are the organizations that provide undergraduate students with housing, supervision and more, and were

a somewhat new phenomenon to students from Eindhoven. Mr Milne also showed us the strong ties CAPE has with industrial partners, and how important these relations are.

Following this introductory talk, we had the opportunity to attend three more presentations, given by academic staff members, on their current research topics. The first was by Prof Chu from the Photonics & Sensors research group. His group focusses on component-level research in photonics, and he paid particular attention to novel display technologies, including holographic displays.

Next on the agenda was the EDM (Electronic Devices and Materials) group, represented by Dr Garcia-Gancedo. This research group puts its focus on material properties, with particular attention for nanomaterials. Impressive research had been done on the growth of carbon nanotubes and their application in sensing technologies.



Dr Garcia-Gancedo also showed us some new developments in the areas of oxide-based and transparent electronics, microelectromechanical systems and sensors and actuators.

The morning's final presentation was by Dr Tatlow from the Electronics, Power and Energy Conversion group (EPEC). This group performs research in the areas of wind energy, wave energy and automotive electronics. One of their projects is a wind turbine that employs a brushless doubly-fed induction generator. The centre has a windmill prototype on the campus for testing purposes. In automotive research, EPEC aims to improve efficiency in power systems. Furthermore, the group does research in the field of tubular linear generators, which can be used to convert wave energy in the ocean into electrical energy. An impressive linear generator prototype was built, but unfortunately it became a victim of the water's forces before any measurement results were obtained.

During the following part of our excursion, we received a tour of three laboratories at CAPE, each belonging to one of the research groups that we had encountered during the course of the visit. In the photonics

laboratory, we had the chance to see some measurement set-ups and were introduced to, among others, a new technology to print optical waveguides onto printed circuit boards. We were also taken to the centre's cleanroom facility. Here, we were able to peak into the various chambers and received extensive explanation on all the steps in the manufacturing process of EDM group's prototypes. Finally, the scientists of the EPEC laboratory showed us various experimental set-ups, including the previously introduced brushless DFIG generator and a chamber to measure heat losses in power electronics.

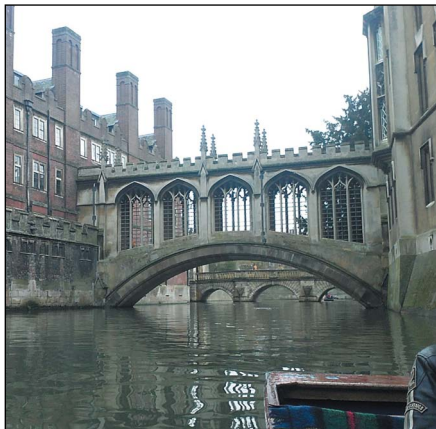
To conclude our visit, we were once again welcomed in the seminar room, where our visit had started earlier that morning. A generous lunch was waiting for us. Whilst eating, we were able to review the morning and talk informally to some of the people we had met during the visit. Altogether, our group has been given an excellent overview of what currently goes on at the CAPE centre. We are grateful to our host, Amy Leung, for her organizational efforts and hospitality during the excursion.



**By: Teun van den Biggelaar and Manon Eijsvogel**

After the fantastic lunch at the University of Cambridge it was time to do some sightseeing in Cambridge. For the afternoon program, the committee had arranged some bikes for us to cycle on. After a short walk we arrived at the place to be. Although cycling is a piece of cake for us Dutch people, we encountered a problem: instead of riding on the right side of the road, we had to cycle on the left side. Some students had no problem with this, but others kept cycling on the wrong side. It was a miracle no accidents happened.

However, there are a few things worth mentioning. Someone managed to pop his bike chain of his bike in a downpour and another student couldn't cycle anymore because he broke his pedal. Some other group arrived late because they were too busy shopping and last but not least, someone managed to get her clothes dirty in a playground. But alongside these events, everyone agreed it was a nice way to see the city in a short notice. Everyone had time to see the colleges from the outside and some even from the inside. Also the city centre of Cambridge was worth seeing during this trip.

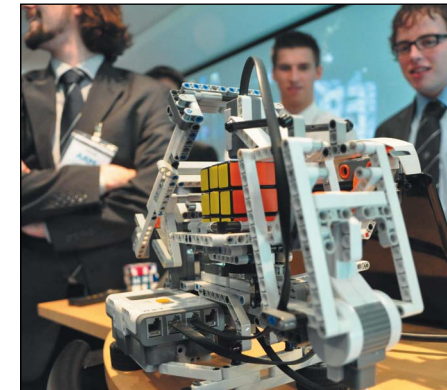


After the cycling, we went punting over the rivers of Cambridge. A punt is a gondola-like boat which propagates through the water with just pushing a pole against the bottom of the river. A guide pushed us through the river and told us some interesting facts about the University of Cambridge, while we sat down in a punt watching the colleges from another point of view. The President of Thor got a little bit wet by some trespassers, but unfortunately it didn't escalate and no one landed in the river...



**By: Tom Geelen and Rob Verhaart**

Our last full day in the UK, our last company visit and our last full day in Cambridge started quite early. For most of the people a little bit too early perhaps. After a peptalk from Roel Oomen in the bus everyone realized we were going to see some interesting stuff today and worth the fight to wake up and stay awake. When we arrived at ARM a group of around the 25 Japanese business students already arrived (it was a combined visit) and was having breakfast in the lecture room. Our group could just enter the line and soon everyone was enjoying his or her breakfast.



At 9 o'clock the first speaker of the day started with an introduction of the core business of ARM. ARM is the world's leading supplier of semiconductor intellectual property. One of the messages from our speaker was that we all should update our smartphones as often as possible, since every smartphone contains several ARM technology based chips (the main processor, the processor for the camera, GPS processor etc.). Another interesting point was that ARM is one of the few semiconductor companies that is UK based (instead of having a base in the US or the Far East).

At 9.45 Kirsty Gill started her presentation about working at ARM. She started off with the statement: 'ARM, a great place to work'. After the presentation we tend to believe this statement. Another interesting fact during Kirsty's presentation was that there were working exactly 2447 people worldwide for ARM that day, she counted it that morning. Apparently the Japanese students weren't really interested in working at ARM, at 10 o'clock 4 of them were sleeping. During all the presentations of the day it was interesting to see the culture differences between the Dutch and Japanese students:

we were all trying to pay attention and listen quietly, while some of the Japanese students were sleeping and others were working on their tablet/laptop/smartphone.

The last presentation before a short break was from a Dutch employee, Vincent Kostanje. He was working on the department for software marketing. His presentation was less technical and more concerned with how ARM works and sells their products to the wider world.

After a coffee break of 15 minutes David Gilday showed us his hobby, building Rubik's cubes solving robots using Lego. After a short presentation he showed us several robots using different techniques. The first one was a quit slow solver (one of the first designs he made). The robot started by making pictures of the Rubik cube from all angles using a smartphone. After processing these pictures and calculating a way to solve the cube, the robot started to rotate the cube and solve it. Another robot used a color sensor instead of a smartphone. The funny thing about this project is that both the smartphones and the Lego processors are using ARM based systems.



The third robot was even more impressive, it could solve Rubik's cubes quite efficient. Most algorithms need at least 50 moves to solve a cube; David designed an algorithm that can solve the cubes in 21 up to 25 moves. The robot was able to move and rotated the cube impressively fast. The last robot demonstrated was cooperation with another hobbyist. Using 18 Lego based actuators and the same algorithm described above this robot was able to solve the cubes even faster.

After the demonstrations the Japanese students were brought to another lecture room, so we could join a more technical presentation. But first Kirsty Gill, the woman who organized the company visit, was leaving us to go on a well-deserved holiday. Roel gave her Schrobbeleer and stroopwafels to thank her for organizing this visit.

The last presentation started at 11.35 and was given by John Perton. He talked about his work at ARM, which involves designing new ARM architectures. He has a lot of different tasks within ARM, for example he is a leading project which involves 47 people within ARM. He even showed us some 'terrifying' Verilog code. He stated that he is able to read 20 lines of Verilog code per second, which is quite impressive.

After an interesting Q&A session with John we had to wait for the Japanese students to join us for a delightful lunch. The lunch was worth waiting, we had some great sandwiches. Around 1 o'clock we were heading back to our bus. The last company visit of our study tour was worth waking up early; ARM showed us some interesting research and provided us with a clear image of what ARM is all about.



**By: Sjoerd van der Heide and Bart Straten**

The Friday afternoon was one of the more relaxing parts of the trip. Some wandered through Cambridge; others played a couple games at the hostel. At the beginning of the evening, everyone gathered in the town centre for the final activities of the trip; having dinner together and a pub crawl.

During dinner, everyone had time to catch up. Even though you think you might have seen almost everything, others had some interesting experiences themselves. After dinner we split up into two groups for a pub crawl. Wandering through the narrow streets of Cambridge in search of a pub, we saw a little illuminated house in the distance. Music was coming from there; it must be the first pub. Watching our heads while walking through the small doors we saw that the leader of our group, who had the money, was already ordering beer. Throughout the evening we visited several small pubs.

At the end of the evening, both groups gathered at a large pub, the Maypole, where we have gone to before many times. The bar



owner even let some of us into the basement where we could see how the taps were connected to the casks. We were intrigued how the beer is poured into a glass by using a hand pump; something that is not often used in the Netherlands. This was the last night in England, and we spent it together joyfully reminiscing about our trip.



## Passing Through Harwich

**By: Eelco van Horssen and Fer Radstake**

After a great Friday night in “The Maypole”, arguably the best pub in Cambridge, it was great waking up with some “Full English.” After breakfast, the bus took us to Harwich (local dialect: “Herrich”). The THUNDER committee had plotted a route along a number of landmarks in the centre and we would be dropped in the middle of it. After a few minutes of walking along the docks, we discovered we were many miles off the map, not even close to the centre of Harwich. It turned out the committee had mistaken a line on the map designating a local ferry for the Harwich-Hoek van Holland ferry, unfortunately.

Since we didn’t want to spend the whole day in the suburbs of Harwich, we took the boring and a bit long walk to the historic centre. Along the way a nice coffee and lunch room provided us with some magnificent sandwiches, which was the highlight of the walk.

After finally reaching the centre of Harwich, we walked around and took a look at some of the landmarks. After having seen most them in about ten minutes, we decided to find a pub and have a beer.



We ended up in the only open pub we could find: “The Globe,” the oldest pub in Harwich. We had some Guinness and played Metallica (the barwoman threatened to cut off Fer’s hair for anything louder) on the old mechanical jukebox. The kind barwoman made a reservation for us at a local restaurant where we went for a delicious dinner only to return to the pub later.

The committee arranged that the bus picked us up in the centre of Harwich, saving almost all of us the walk back to the docks. At about nine in the evening we boarded the “Stena Britannica” for the final trip back to the Netherlands, ending our stay on English soil.



## Returning to Eindhoven

**By: Dennis Kofflard and Harold Vervoort**

At the end of the study tour everyone was tired and everyone quickly split up looking for their cabins. Soon everyone realized these rooms were the most luxurious of all the rooms we’ve stayed at. The beds were made, there was a TV in our room and there was even a private air conditioner.

After everyone settled they went to the main deck to see if it really was a party boat, as it turned out it wasn’t really a party boat and everyone was too tired to make a party of their own. One group went straight for the bar and ordered a pint and looked around for a nice place to relax. After walking around for a bit they settled down in front of a massive TV wall to watch snooker and soccer.

Another group thought about what to do with their British pounds and figured “Why not try our luck?” so they went for the casino. They pooled all their money and put everything on red, lo and behold, they actually won and doubled all their money so now they had even more pounds which would be useless back in Holland. What to do with all the money they had now? Buy beer of course! They took all the money they won and went straight for the bar and they



ordered all the beer their pounds could buy so they could drink way beyond closing time of the bar.

There was also a third group, a more diverse group, consisting of someone playing music on their laptop, quite some people playing cards, someone reading and two people tasting whiskey from typical Dutch coffee mugs.

After everyone was done relaxing and too tired to go on they went outside to look at the stars in the middle of the night and everyone went to bed. Almost in Holland everyone woke up and enjoyed a good full English breakfast. They all went back on the bus again and within two minutes almost everyone was fast asleep and everyone woke up back in Eindhoven, at Potentiaal.



### Schneider Electric

Als wereldwijde specialist in energiemangement, met vestigingen in meer dan honderd landen, biedt Schneider Electric geïntegreerde oplossingen voor meerdere marktsegmenten. Schneider Electric heeft leidende posities in energie & infra, industrie & machinebouw, niet-residentiële gebouwen, datacenters & netwerken alsmede in de residentiële sector. De focus van Schneider Electric ligt op het veilig, betrouwbaar, efficiënt, productief en duurzaam maken van energie. In 2012 hebben ruim 140.000 medewerkers een omzet gerealiseerd van 24 miljard euro. Onder het motto 'make the most of your energy' helpt Schneider Electric mensen en bedrijven het maximale uit hun energie te halen.

### Onze visie

Wij zien een wereld waarin wij meer doen met minder! Energie vormt een grote uitdaging voor onze planeet. De opkomst van nieuwe economieën is een kans voor onze generatie. Wereldwijd is alles met elkaar verbonden en willen mensen alleen de eenvoudigste en beste oplossingen.

### Onze missie

Wij helpen mensen het beste uit hun energie te halen. 'Make the most of your energy'. Dit doen wij door het bieden van geïntegreerde oplossingen, producten die zorgen voor veilige en betrouwbare energie en die bijdragen aan energie-efficiency. Wij willen dat al onze producten en oplossingen groen, productief, veilig, betrouwbaar en efficiënt zijn.

### Energie is onze prioriteit

Energie vormt de grootste uitdaging voor onze generatie en de toekomstige generaties. Bij Schneider Electric kunnen we iedere dag opnieuw samen het verschil maken. Onze wereld bevindt zich op een keerpunt. De vraag naar energie zal in de toekomst nog explosief toenemen - en dan vooral in de razendsnel groeiende nieuwe economieën. Toch heeft, tot op de dag van vandaag, 1,6 miljard mensen geen toegang tot elektriciteit. De voortdurende exploitatie van fossiele brandstoffen blijft een bedreiging voor de planeet.

Als wereldwijde specialist in energiemangement menen we dat onze onderneming een verschil kan maken. Door met behulp van onze energie-efficiënte oplossingen het energieverbruik in het noordelijk halfrond te helpen beperken en op die manier de koolstofemissies zo laag mogelijk te houden.

**Schneider**  
Electric

As organizer of the trip you already know what to expect during the trip, so there shouldn't be all that many surprises. But still there were some surprises, like the Jack the Ripper tour. It was very interesting and exciting. There was a perfect combination of cultural activities and company excursions. It gave me a new insight into what is going on in different fields of Electrical Engineering. With a small group of the participants I explored the nightlife of London and Cambridge. This proved to be a very fun time. After all it was a great trip.



Roel



Elles

When I would have thought about the United Kingdom prior to the trip, I would think about gentlemen, rain and double-deckers. I had seen the busy rainy metropolis once before, but I had never stayed in London for more than a few hours. And Cambridge was only the name of a world class university to me, I never realized that it was a city as well. Now, I realize that England is much more than the picture of a gentleman with an umbrella in the rain, it is a versatile place to be. The people are proud of their traditions, of their independence and most of all of their country. And after seven days of sight-seeing and meeting people from world-class businesses, I think that they have the right to be.

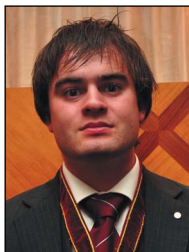
As a member of the organizing committee, I've experienced this trip quite differently from the previous study tour I participated in (the Satori). This time, I was actively involved in the planning of all the activities, which provided me with insight into the country. With the Satori, I was quite passive and enjoyed all excursions organized for me. But by planning the day myself, I've learned quite a bit of geography, organizations and excursions, sponsorships and, my personal task within the committee, bookkeeping. Furthermore, the excursions were mostly themed around optics which matched my current master's program, therefore it was quite interesting.



Jasper



After many months of effort, on the 10th of February 2013 we finally headed to England by coach. I and the other participants were stoked about this trip. Though it is often viewed differently, as a member of the committee that organizes a tour, you are also a participant yourself. You organize a trip for fellow students and yourself. One of the best experiences during this trip was drinking with friends in 'The Porterhouse' in London where they had many Stouts, Ales and Lagers. Next to this I certainly did not forget the educational part of the trip. Companies like ARM and Oclaro were really appealing to me. A successful study trip!



Pieter

After more than a year of preparation for the study tour, it was great to see everything come together. The first few days we've explored the beautiful city of London, which included an excursion to University College London and a wonderful 'Jack the Ripper'-tour. After those few days in London we continued with an excursion to Oclaro while on our way to Cambridge. Then we had a few days to explore Cambridge, with visits to the University of Cambridge, ARM and an exploration of Cambridge by bike. Looking back at a great vacation – yes, it was worth skipping carnival – I can't be more than proud to have organized a study tour to the UK.

## Experience of the Participants



Duco

The journey to England went smoothly. The first hostel lacked some comfort, but London was great, we've seen a lot of tourist attractions of course! The excursion to UCL was the least interesting of the whole trip, but was still a nice visit. On the other hand, Oclaro was a very interesting company, and so was ARM. Cambridge was also very nice, with a lot of wonderful buildings. Our second hostel was, fortunately, better than the first. I've seen a lot, I've learned a lot, and last but not least, I've had a very good time in England!

For me, the THUNDER was an inspiring week full of educational experiences and of course a lot of culture. I really enjoyed the trip from the moment we stepped in our touring bus till the moment I opened my car door to drive home. The most inspiring visit was in my opinion the visit to Oclaro and their clean rooms. The cultural things we did, like visiting many pubs and drinking many kinds of ales, punting, cycling, the London eye and a lot more, will also be remembered for a long time. So, I would like to thank the committee for organizing this trip.



Steven

Still in the mind-set of Carnival we left for England. At that moment I thought: Why... Why did I decide to leave to England for a study tour during Carnival on such an early morning? The cultural and technical excursions made me rediscover that it was a wise decision to participate to this study trip. Otherwise I would have missed the presentations and research by both companies and universities, the technical highlights at the science museum, the sightseeing in London, cycling through Cambridge, an awesome boat trip and much more. Thanks study tour committee for organizing this great trip!



Teun



Gerald

When I first heard of the THUNDER study tour to England I didn't doubt for a second, I just had to participate! Visiting London and Cambridge with thirty 'Thor-apen', who could say no to that?! The study tour proved to be exactly what I was hoping for: a cultural and informative experience, but most of all a lot of fun! All the technical excursions were very fascinating and well organized. On the cultural side the contrast between the enormous metropolis London and the smaller city Cambridge (the city of colleges) was huge and very impressive.

The first city we visited was the leading city of London. It is an authority in arts, commerce, research and development, education, entertainment and moreover shopping. While the rest of the group followed the Tuesday program of visiting the Science Museum, three girls made their own program. The program started at the Bond Street tube station on Oxford Street. Oxford street is Europe's busiest shopping street and has approximately 300 shops. Unfortunately we couldn't visit all 300 of them, because we had only one day for shopping, but we came really close. We visited so many shops and we literally shopped until we dropped. Thanks BuEx, for making this day possible!



Manon



Tom

My most telling experience during the Thunder trip had to be the night where we went out with the whole group in Cambridge for a pub-crawl. Most pubs close at 11 PM, but fortunately there was the Maypole. They didn't only have over 15 different kinds of ales but the pub owner was really cool guy. Teun and I were very curious how an English tap system works and we asked the owner if he could explain it to us. Instead of explaining he told us to follow him to the basement and show us himself. Inside he let us in with the finest details of how it works and how most English pubs function. And at the end of the evening we got a good glass of whisky from the owner. A very good night indeed





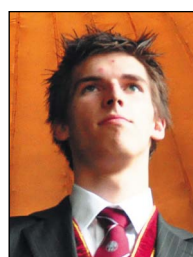
**Sjoerd**

The Thunder study trip was one of the best Thor activities I had the opportunity to attend so far. The trip was a good combination between a much needed holiday and informative excursions. One of the main reasons I liked the excursions so much is that I am very interested in the telecommunications field, and this was the main theme of the trip. Another theme of the trip, getting acquainted with student life in England, appealed to me as well. Visiting great universities such as Cambridge is simply stunning. Therefore, I would like to thank the committee for organising this great trip.

My impression of our trip to England was that the business excursions were really well-organized. Most of the time we had a week of real English weather with a lot of rain, wind and more rain. London was the city of tourists and almost no Englishmen and everything was like an attraction. Cambridge was a mixed city of tourists and students, with a little flair of Englishmen. But in Harwich we found in my opinion the real Englishmen. Beer drinking, foul mouthed and tattooed. Our visit to the Globe, the oldest pub of Harwich, was just a pleasure.



**Michael**



**Eelco**

My first time in the UK was a great experience! The white cliffs of Dover, the majestic buildings and structures of London, the colleges at Cambridge and the historic town of Harwich, were all well-mixed with interesting company and university visits. To top it off, the experience was washed down with full English breakfasts, fish and chips and good times in the pubs. The week quickly passed and only great memories (and some pictures) remain. The UK is definitely a place to go back to. I give many thanks to the committee and all the travel companions who have made the trip even more enjoyable.

The reason I chose to go on the study trip was that I thought it would be nice to have a look at foreign companies and still have a great holiday. I liked being in London again and I liked the different ways of exploring Cambridge. The activities organized were well chosen and I especially liked the surprise event. Furthermore, the visits to the different companies and universities were overall interesting. The day we spent in Harwich was less thrilling than the rest of the week, but I still had an enjoyable day. From the moment we left until the point of arrival I had a great time.



**Esmee**

My impression of the BuEx was that it was a very fun week with a lot of highs. For example having quite a few laughs every evening with a great group of people. Another one was an amazing journey over the cliffs of Dover. Of course there also were a few lows. One of them being me falling in a mud pool and consequently being covered head to toe in mud. Another one was not being able to put on my clean room outfit with my pencil skirt on, and so having to strip down and put it on in my panties. Very charming. Looking back I can say that I had a very fun week and will be looking forward to more trips in the future.



**Linda**



**Rick**

England has a lot to offer and I thoroughly enjoyed exploring as much of it as possible in such a short time. London has all the features of a metropolis, but has never lost its so delightful traditional character. Cambridge, on the other hand, has the same warm and charming British feel to it, but in a much smaller setting. Having the opportunity to see some of the country's leading R&D facilities was a thrill, as was the time that we spent hunting for cultural highlights. The excursions, the group, the culture and the testing of countless different beers during late night pub sessions have left me with memories that will stay for a long time. Thank you Thunder Committee for making this trip successful!

The trip to England was a great experience for me and I wholeheartedly recommend to anyone to at least once experience a trip with Thor. The mix between culture and companies was good and there was a good portion of time available for things you were personally interested in. The company visits were quite in depth and it was very interesting to experience the atmosphere at the companies first hand. We also visited two universities in different cities and it was very interesting to observe how they compare to our own university. It has been a good week en I will go back over it for a long time.



**Dennis**



**Lieneke**

The Thunder study-tour was my first acquaintance with England. And guess what?! They really do drive on the left side on the road, London traffic really seems to be filled only with red double-decker buses and cabs, the food is good but very fat and the beers were actually quite nice (and cold). I finally got to see famous buildings like the Tower-bridge and the Big-Ben for real. Unfortunately, the look of London was not really my cup of tea. Cambridge was much more to my liking. I really enjoyed walking, biking and even punting between the numerous colleges. Concluding, this tour gave me a nice introduction to England and I definitely plan to return as there is still a lot more to be seen.







**Mark**

Looking back at the study tour, I am really happy that I joined. Besides the once again new cultural impressions (even though having been to England for several times), I think enrolling was also a good choice from a, let's say, 'Thor' point of view. I got to know some more (active) members, and thereby also the association itself. This, in combination with the visits and presentations of the companies and universities in Britain, has given me a sort of study boost, making me curious about courses and Thor related things to come. I really look back at a successful trip, and every now and then, while I am attending lectures, I think about the great English language and pronunciation we have heard back there.

My overall experience of the Thunder 2013 trip to England was very positive. The trip to England by bus went smooth and was pretty quick. Also thanks to the Big Bang Theory DVD everything seemed to pass faster whilst being in the bus. Our first stop at the Cliffs of Dover was fun as well. UCL was very interesting even though I could not understand the subjects fully. The trip to Oclaro was the most interesting one and their cleanroom was the most interesting part of the tour. Finally, the ARM Company was pretty interesting but nothing special. Overall it was a great trip!



**Konstantinos**

It is now already a few months ago that I subscribed to the Thunder BuEx. Despite having been to Scotland and Northern Ireland, I had never set foot in England and I was curious as to how the cities of London and Cambridge would be. Even though the weather was perhaps a tad too English, I had a great time in both the bustling metropolitan of London and the laid-back student town of Cambridge. I also thoroughly enjoyed the visits to the companies and universities, some of which were very interesting. Having said the above, this leaves me just with thanking the committee for their hard work and expressing my hope that the next BuEX will be just as good!



**Fer**



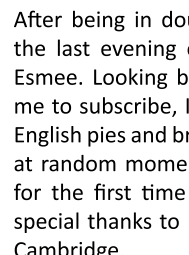
**Marco**

When I first heard an excursion was being organised to the United Kingdom, I instantly became enthusiastic. What is more fun and exciting than visiting interesting companies, experiencing the culture and exploring the nightlife with friends and association members? Not very much, and that's why I decided to join the trip. Now we have been back for some time and I positively say I'm glad I joined. It was a very tiring, intriguing and enjoyable week, but a very successful one, thanks to all the effort the members of the Thunder excursion committee put in this trip. This experience is one I won't easily forget.



**Bart**

When I heard about the trip to the UK, it appeared to me as a great opportunity to explore the professional field of electrical engineering and to get acquainted with some high class companies. However, during the trip I discovered that England has a lot more to offer than just a great working environment. It also houses a great culture, a beautiful environment in the cities and the countryside and some of the best pubs in the world. So concluding, I really enjoyed this marvelous week with my fellow students and Henk the bus driver and I would like to express my thanks to everyone who made this possible.



**Harold**

After being in doubt for several weeks I subscribed for the THUNDER the last evening of the official registration period, under pressure of Esmee. Looking back on the study trip I am grateful Esmee convinced me to subscribe, I had a wonderful time in the UK. All the pubs, eating English pies and breakfast, some interesting company visits, playing cards at random moments and locations and visiting London and Cambridge for the first time of my life all contributed to a memorable week. A special thanks to Roel for guiding me whole week through London and Cambridge.



**Rob**

The Thunder was a cool trip, because everything was new to me: the country, the way of travelling and the people I travelled with. I was not bored for a single moment. The study trip contained a good combination of free time, visiting companies and universities and sightseeing. I got to know a lot more people from electrical engineering. If I had to make a choice between the companies and the universities, I would choose the companies. I thought that they were more interesting, especially the cleanroom at Oclaro. I also had a lot of fun during the evenings when we went to the pubs and clubs in Cambridge. I learned a lot during the study trip and look back at it with a smile on my face.



**Edwin**





John

After visiting China as participant and Japan as organizer of a study tour, one could expect that a one week visit to England would be less memorable. And even though there was not much of a cultural shock, London is still a city that impressed me no less than cities like Tokyo or Shanghai. Also, the fellow students and the enjoyable pub visits were a nice addition to this tour. Although it is not original to write, I would like to thank the organizing committee again for their efforts. I conclude this part with the saying that all good things come in threes, but hopefully this does not hold for the number of study tours I join before I graduate.

Despite that I have been to England numerous times already, the excursion to England was a great and fun experience. The companies and universities were interesting and genuinely welcomed us. The Englishmen were all really approachable. Along with the great pubs and excellent food, the dreary weather was surely outmatched. It was just awesome to be with Thor in a less study-bound environment. I think I never laughed so much in one week, it was a blast.



Joost



Yuk Hang

I really had a good time in England. Okay let's see, writing your impression about Thunder... If I had to write down the first things that came into my mind. It would be something like this: "Dover had a lot of wind", "London's weather setting is stuck on rain", "Clean room is clean" and "Cambridge is awesome for going out". Those clean rooms were really clean and the universities and companies were nice. But what I enjoyed most was hanging out with some friends, and going to the club. My compliments go to the organisation for this excursion.

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