IET Faraday Challenge Days 2016-17 season

Event report

to explore IET Faraday visit www.ietfaraday.org
The 2016-17 season of Faraday Challenge Days was another huge year for everyone involved. We received 273 applications from schools wanting to host one of the 68 in-school events. We also ran 13 events at the IET's Academic Partner universities, and thanks to the overwhelming support from sponsors, we were able to run a total of 139 Faraday Challenge Days reaching 327 schools and 4,692 students in total. Our sponsors included Bosch UK, CRAY, Jack Petchey Foundation, Kitronik, Motorola Solutions Foundation, Queen Mary University of London: School of Electronic Engineering and Computer Science, University of London and the Science & Technology Facilities Council.

The 2016-17 challenge theme was run in partnership with the 1851 Trust – the official charity of Land Rover BAR, the British America’s Cup team led by Sir Ben Ainslie. Teams of six students were tasked with developing two prototypes using a micro:bit computer to improve the performance of the Land Rover BAR sailing team. Students invented equipment to improve human performance such as heat regulators and fatigue monitors, boat performance (for example tilt sensors and compasses) and environmental performance in the form of moisture and wind measuring instruments. After designing and building their prototypes, teams presented their ideas to the judges, as well as their teachers and peers.

Students received scores on every aspect of the day including their planning and research, development and functionality of the product, use of budget, functionality of the coding, the final presentation as well as their teamwork and attitude throughout. Members of the winning teams won an Amazon voucher for themselves, a trophy for their school and their score was added to the league table. The top five teams at the end of the season were invited to take part in the National Final at the Land Rover BAR base in Portsmouth on 12th July 2017.
For the National Final, the top five teams built on their ideas from the Challenge Day, developing one of their products further or coming up with a completely new concept for a maximum cost of £15. The developed or new idea had to be the student’s own work and each team had to exhibit their progression at the final hosted by the IET Faraday team at the Land Rover BAR base in Portsmouth. Teams had 10 minutes to pitch their ideas to the judges who marked them on their creativity, innovation and bravery.

This year’s winning team, Hammersmith Academy from London, presented the ‘Sky Sail’ which is a device that measures the angle of the wind using the compass on the micro:bit and trims the sail automatically to that angle. The team was made up of four girls and two boys.

The four runner up teams were from:
- Alvechurch Middle School, Birmingham
- City of London School, London
- Helston Community College, Cornwall
- Samuel Ward Academy, Suffolk.

All of the students worked extremely hard and were so focused throughout the day. We are positive that some future engineers have been inspired.
Faraday Challenge Days really do inspire students and raise the profile of STEM overall.

Let’s hear from the teachers...

The kids have never had such a big opportunity and their confidence has grown phenomenally over the past few weeks. They loved every single moment and have developed a strong bond.

We are elated for our students, this experience means so much to them (even more than they can possibly comprehend at their young age). Two had to present again to an audience of parents upon arrival, this was one of the proudest moments I have felt in my teaching career.

“Really relaxed, fun final. Everyone felt like a winner.”
“In this ever changing world, we must ensure that the next generation of engineers are equipped with the knowledge and skills required. The earlier they can get to grips with the basics, learning ways to manipulate code and developing ways to go beyond current limitations, the more innovative and pioneering technologies will become in the future.

With that in mind, we decided to challenge the students to use the micro:bit again to see how they had developed their skills over the last year and they didn’t disappoint. Working as engineers for Land Rover BAR, the students used the micro:bit to design a product to aid the team’s sailors in their bid to win the America’s Cup - a theme you wouldn’t necessarily associate with IT and computers. The students rose to the challenge inventing numerous prototypes that could one day be used, not only for this purpose but in everyday life too.

It has been our absolute pleasure to offer the Faraday Challenge again this year and to inspire tomorrow’s engineers. It wouldn’t be possible to reach so many amazingly talented young people without the support of our wonderful sponsors and funders, and to them I send my unreserved thanks.”

“Becky Broadbent
IET Faraday Challenge Leader

“The attractiveness of engineering has long been discussed as a reason for the lack of children aspiring to be engineers. Part of this, in my opinion, is due to the obscurity of engineering within many schools. The IET Faraday Challenge Day is an incredible platform which enables teachers and students to develop a deeper understanding of what engineers contribute to society and the ability to get hands-on with what it means to be an engineer.

I love setting the challenge at the start of the day, the challenge is always big; we ask the teams to complete an entire mini-engineering project, that’s a lot! This means that there is a feeling of excitement and slight apprehension when you first introduce the activity to the students and teachers in the room. A few hours later the room is full of amazing prototypes and presentations. The format of the day allows students to take ownership of their learning while supporting each student to achieve over the day. We encourage all who participate to make all the mistakes that engineers make during projects and problem solve to overcome these challenges. It is an incredible process to witness and be a part of each day.

The last two years have seen coding feature prominently in the Challenge Day, the skills of coding are important for future engineers across many disciplines, but what I have found most fascinating is the opportunity that coding has given for full product development within a challenge. More than ever before students can create real world products, they can bring their ideas to life in a meaningful way in just one school day. The power of this is immense.

It has been a pleasure to work on such an inspirational programme over the past four years, I have met an incredible amount of young people who have challenged my own perceptions as well as having an opportunity to challenge theirs.”

“David Lakin
Head of Education 5-19, the IET

“As we reach the end of our ninth year of running Faraday Challenge Days, the 2016-17 season has been our biggest season to date. This coupled with other IET education initiatives and supported education partners, means we are engaging with more schools than ever before to inspire more young people to study STEM subjects and consider engineering as a career choice for the future.

With around 1.8m engineers required by 2022 and the demand for better STEM skills, The Institution of Engineering and Technology has a mission to INSPIRE the next generation of engineers and we are passionate about providing opportunities for young people such as our IET Faraday Challenge Days. I would like to personally congratulate all the teams who competed in this seasons challenge for their hard work and dedication with a special thanks to all teachers and support staff who engaged with us.”
Headline statistics from the full season

No. of events: 139
No. of students: 4,692
No. of schools: 327 (including 2 special schools)

Student feedback

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge: 95%
- I learnt new things: 97%
- I now understand more about what engineering is: 95%
- I have a better idea about what engineers do and the skills they need: 94%
- Before today I was considering studying or working in engineering: 35%
- Following this event I am now considering studying or working in engineering: 56%
- I’d like to do something like this again: 93%

Student quotes

- “At first I found it difficult but when we worked as a team it all came together.”
- “I had a really fun time and I enjoyed the task and would really love to do it again.”
- “I enjoyed the presentation as I felt like a businessman pitching a product.”
- “I loved it. This taught me so many things I had never known before. I think that we should get more opportunities like this.”
Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years: 99%
- The interest of the students was retained throughout the day: 98%
- The students learnt new concepts and expanded their knowledge base: 100%
- The registration process was straightforward with enough time to plan for the event: 96%
- I would be interested in taking part next year: 100%
- I would recommend the IET Faraday programme to other teachers: 100%

Teacher quotes

- "Really impressed how the exercise captured the imaginations of the students to have them enthused for science."
- "The whole day was excellent. This has been the best engineering activity I have organised. Thank you. This challenge has given the students the opportunity to combine all of the STEM subjects in one day. This is an opportunity they do not get very often. The incentive also kept the students motivated to complete the challenge which is excellent."
- "Excellent day! Well organised, welcome at university was great. Time flew by - they were engaged all day and the challenge was brilliant - loads to do and get their teeth into - thank you."
- "All students remained interested all day. Seemed to 'enjoy' learning."

Overall comments from teachers

Special thanks

The success of this season would not have been possible without our sponsors and supporters – providing funds to run individual events or funding the core IET events.

We are truly thankful to all those who have helped us to achieve our goals this season and inspire even more young people to consider a future in engineering and technology.
Engineering is vital to the UK economy, especially if continued growth is to be achieved. This is why Bosch is so passionate about inspiring teenagers, especially girls who are so very under-represented at present, to consider engineering as an attractive and exciting career. Bosch’s support for the IET Faraday Challenge Days is part of our wider CRS programme, which aims to educate and inspire young students in the UK. We are proud to partner with the IET on this successful initiative and are looking forward to the next season!

Kathrin Moosmann, Bosch UK
Student quotes
- “I found it improved teamwork and overall fun - there should be something like this again.”
- “It was a fun experience and it taught me a lot about engineering. I think it was helpful and I learned new skills.”
- “I really enjoyed today and learnt lots of new skills and I had to really persevere especially with some of the tricky coding!”
- “I really enjoyed how we were treated as professional engineers, I liked how you learnt lots of new things.”
- “I learnt a lot about engineering and it was a really great experience for me. I am definitely considering a career in engineering.”

Teacher feedback
The following stats represent the % of teachers who were in agreement with these statements:
- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years: 100%
- The interest of the students was retained throughout the day: 100%
- The students learnt new concepts and expanded their knowledge base: 100%
- The registration process was straightforward with enough time to plan for the event: 96%
- I would be interested in taking part next year: 100%
- I would recommend the IET Faraday programme to other teachers: 100%

Teacher quotes
- “Very well run programme. Engaging and enthusiastic presentation. A good combination of STEM & other qualities involved. Thank you.”
- “It’s been a great day! The IET and Bosch teams were brilliant and helpful at all points.”
- “Nicely worked through, giving students the chance to work on something different and expand knowledge, having a whole day to really get stuck in. Thanks.”
- “I liked that it was a really open-ended task. Having clear roles for everyone. Really good fun.”
- “I particularly like the absence of school teacher input this year. I also think keeping the project under wraps ‘til the actual day is a very good idea. The IET staff pitched the challenge and instructions at just the right level.”
<table>
<thead>
<tr>
<th>Date (2017)</th>
<th>Host school</th>
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<tbody>
<tr>
<td>24th January</td>
<td>Epping St. John’s</td>
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<td>25th January</td>
<td>St. Olave’s Grammar School</td>
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<td>31st January</td>
<td>Philip Morant School</td>
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<td>2nd February</td>
<td>Basildon Academies</td>
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<td>Petchey Academy</td>
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<td>9th February</td>
<td>St. Mary’s and St. John’s School</td>
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<td>1st March</td>
<td>Boswells School</td>
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<td>Carshalton High School for Girls</td>
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<td>6th March</td>
<td>St. Mark’s West Essex Catholic School</td>
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<td>7th March</td>
<td>Sarah Bonnell School</td>
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<td>Clapton Girls’ Academy</td>
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<td>9th March</td>
<td>William Edwards School</td>
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<td>10th March</td>
<td>Gateway Learning Community</td>
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<td>15th March</td>
<td>University of Westminster</td>
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<td>16th March</td>
<td>Woodford County High School for Girls</td>
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<td>16th March</td>
<td>Oaks Park High School</td>
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<td>17th March</td>
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<td>Evelyn Grace School</td>
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<td>9th May</td>
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<td>12th May</td>
<td>Cheam School</td>
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<td>16th May</td>
<td>St. Mark’s Catholic School</td>
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### Student feedback

**Age:** 11 6 (0.37%), 12 626 (38.7%), 13 956 (59.1%), not specified 29 (1.8%)

**Gender:** Male 719 (44%), Female 869 (54%), not specified 30 (2%)

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge: 95%
- I learnt new things: 97%
- I now understand more about what engineering is: 95%
- I have a better idea about what engineers do and the skills they need: 94%
- Before today I was considering studying or working in engineering: 33%
- Following this event I am now considering studying or working in engineering: 56%
- I'd like to do something like this again: 92%

### Student quotes

- “I've learnt that you can achieve the hardest task by working as a team.”
- “I had a fun day and discovered new things plus a better understanding of engineering.”
- “I enjoyed it thoroughly! Was one of the best workshops/challenges I've been in.”
- “I enjoyed this and learned a lot about engineering. My teamwork, engineering and coding skills have improved greatly.”
- “Very challenging :) I love challenges! I would like to participate again.”

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<th>Date (2017)</th>
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<tr>
<td>17th May</td>
<td>Vyners School</td>
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<td>18th May</td>
<td>Park High School</td>
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<td>The Marjory Kinnon School</td>
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<td>19th May</td>
<td>Kingsley Academy</td>
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<td>22nd May</td>
<td>Frederick Bremmer School</td>
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<td>14th June</td>
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<td>Quintin Kynaston Community Academy</td>
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<td>19th June</td>
<td>Eastbrook School</td>
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<td>19th June</td>
<td>The Ursuline Academy Ilford</td>
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<td>20th June</td>
<td>Our Lady’s Convent High School</td>
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**No. of events:** 50 (+1 Celebration Event)

**No. of students:** 1,713

**No. of schools:** 112 (including 1 special school)
**Teacher feedback**

The following stats represent the % of teachers who were in agreement with these statements:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years: 99%
- The interest of the students was retained throughout the day: 97%
- The students learnt new concepts and expanded their knowledge base: 99%
- The registration process was straightforward with enough time to plan for the event: 99%
- I would be interested in taking part next year: 100%
- I would recommend the IET Faraday programme to other teachers: 100%

**Teacher quotes**

- “Challenge allowed students to work independent of adults while working as a team. It developed numerous (everyday) skills such as budgeting, planning, implementing and presenting. It was a great day!”
- “I was responsible for organising the event for the Basildon Lower Academy and found the support very helpful. Even more so than other events I have organised. The day went smoothly and as expected.”
- “Excellent! Thank you so much. This is a very inspiring, engaging and well run STEM event.”
- “They [the students] are very very proud of what they have achieved and the majority of them would like to take part in the challenge next year! Students who could not take part this time have already registered their interest with me - this is most encouraging for us.”
- “Our students thoroughly enjoyed the experience and the profile of STEM at Park View has hit new heights since hearing of our win last week.”
The winning teams from each of the Jack Petchey Foundation supported events were invited to attend an afternoon event on 6th July at IET London: Savoy Place. This was a celebration of each team’s achievements and an opportunity for students to showcase their products and share ideas. The afternoon began with the students exhibiting their products to the IET judges and peers. Judging took place with all attending students, Jack Petchey Foundation representatives and the IET Faraday team all involved in the decision. The students listened to the Key Note Speaker Rob Tolfts of Land Rover BAR and Trudy Kilcullen, CEO at the Jack Petchey Foundation before the award ceremony took place. During the ceremony, teams were awarded for their success in 6 different categories.

**And the winners are:**

**Team spirit:**
The Grey Coat Hospital

**Innovation:**
Vyners School

**Product design:**
All Saints Catholic School

**Most promising engineers:**
Sydenham School

**Best pitch:**
Park High School

**Team we would most like to spend the day with:**
Gateway Academy
No. of events: 1
No. of students: 35
No. of schools: 6

Student feedback

Age: 12 (74%), 13 (23%), not specified (3%)
Gender: Male (51%), Female (46%), not specified (3%)

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge: 97%
- I learnt new things: 97%
- I now understand more about what engineering is: 91%
- I have a better idea about what engineers do and the skills they need: 91%
- Before today I was considering studying or working in engineering: 37%
- Following this event I am now considering studying or working in engineering: 57%
- I’d like to do something like this again: 97%
**Student quotes**

- “This event taught me a lot and helped me push my knowledge and skills further.”
- “I think that it is a great experience for our generation and would love to do this kind of thing again.”
- “Enjoyable. Friendly staff and cool micro:bits. Hope I can work with them in the future.”
- “I really enjoyed today because it was down to us what we did so we made our own choices and decisions.”
- “I enjoyed the Faraday Challenge, and now I have a much better understanding of what engineering is.”

**Teacher feedback**

The following stats represent the % of teachers who were in agreement with these statements:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years 100%
- The interest of the students was retained throughout the day 100%
- The students learnt new concepts and expanded their knowledge base 100%
- Registration process was straightforward with enough time to plan for the event 100%
- I would be interested in taking part next year 100%
- I would recommend the IET Faraday programme to other teachers 100%

**Teacher quotes**

- “What a great opportunity for students.”
- “Excellent.”
No. of events: 1
No. of students: 33
No. of schools: 4

**Student feedback**

Age: 12 (23%), 13 (74%), not specified (3%)
Gender: Male (61%), Female (36%), not specified (3%)

The following stats represent the % of students who were in agreement with these statements:

- I enjoyed the Faraday Challenge 100%
- I learnt new things 97%
- I now understand more about what engineering is 97%
- I have a better idea about what engineers do and the skills they need 100%
- Before today I was considering studying or working in engineering 52%
- Following this event I am now considering studying or working in engineering 65%
- I’d like to do something like this again 90%

**Student quotes**

- “I really enjoyed today, one of the best school challenges I’ve been to.”
- “Let us work in break... plz.”
- “I really enjoyed the day however please make it for year 9 so we can come and have a great day again.”
- “It was really fun. It could be a little longer.”
**Teacher feedback**

The following stats represent the % of teachers who were in agreement with these statements:

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years: 100%
- The interest of the students was retained throughout the day: 100%
- The students learnt new concepts and expanded their knowledge base: 100%
- The registration process was straightforward with enough time to plan for the event: 100%
- I would be interested in taking part next year: 100%
- I would recommend the IET Faraday programme to other teachers: 100%

**Teacher quotes**

- “An excellent event that allowed all to be involved.”
- “Really exciting and challenging day. Leader was enthusiastic about the Faraday Challenge and enthused the students. Knowledge, time management etc. was excellent. A very valuable and inspiring day for students. Loving the STEM.”
Thank you for inspiring our future coders and software engineers.