IET Faraday Challenge Days
2015-16 season

Event report

to explore IET Faraday visit
www.ietfaraday.org
The 2015-16 season of Faraday Challenge Days was our biggest to date. 319 applications were received to host one of the 68 in-school events available. As well as the 12 events hosted by the IET's Academic Partner universities, we were delighted that a number of organisations also came forward to sponsor an event taking the total tally up to 126 Faraday Challenge Days. These organisations included Bosch, Queen Mary University, Science & Technology Facilities Council, the UK Electronic Skills Foundation, the Jack Petchey Foundation and the Motorola Solutions Foundation.

The 2015-16 challenge was entitled ‘Coding the Future’. Students had to work in teams of six and were tasked with developing two products using their BBC micro:bit for real-world application. Students could work within their chosen theme from a choice of health, sport, travel or home and leisure. At the end of each event the student teams had to pitch their products to the Coding the Future judges.

Students were scored throughout the day on various aspects of their work including their planning and research; development of product; use of budget; functionality of coding; functionality of product; the pitch and teamwork. The winning team from each event won an Amazon voucher for themselves and an exclusive IET Faraday/BBC micro:bit sports watch, as well as gaining a place on the league table. The top five teams at the end of the season were invited to take part in the National Final at Bletchley Park on 15th July 2016.

The aim of this challenge was to introduce students to the new coding platform developed by the BBC and its partners as part of the 2015-16 wider BBC Make it Digital programme. The BBC micro:bit - given free to every year 7 student or equivalent across the UK during 2016 - is a pocket-sized programmable device that can be coded, customised and controlled to bring digital ideas, games and apps to life. Measuring 4cm by 5cm, and designed to be fun and easy to use, the BBC micro:bit can create anything from games and animations to scrolling stories at school, at home and on the go - all that is needed is imagination and creativity!
National Final

For the National Final, the top 5 teams had to develop one of their products from the four themes. This product could build on their best ideas from the challenge day or could be a newly developed product. The development had to be the students' own work and each team was asked to present their product at the exhibition hosted by the IET Faraday Code Crew at Bletchley Park. Each team had a total of 10 minutes for their pitch followed by questions from the Code Crew panel of judges who were looking out for creativity, innovation and bravery.

Each team could spend a maximum of £10 on any additional items required for their BBC micro:bit products.

First place went to Kings’ School from Winchester for their product the ‘No-Nap.’ This design saw the BBC micro:bit attached to a cap so that if the wearer of the cap tilted their head forwards or backwards, i.e. if they were to fall asleep, the No-Nap alarm would sound to wake them up again. The team believed that this would save millions of lives by preventing the wearer from falling asleep at the wheel when driving.

The four runner-up teams included Caedmon College, Whitby; The Becket School, Nottingham; Framingham Earl High School, Norfolk; and Furness Academy, Cumbria who created a revision monitor; a BoBot game; a travel companion and a fire detector respectively.

The students did a fantastic job and there are certainly some future engineers amongst them.
Focus Group participants from a full Faraday programme evaluation managed by Shift Learning between Mar-Aug 2016 highlighted a range of different reasons behind their decision to apply to host or attend a Challenge day including:

- **Inspire students** by introducing them to STEM careers.
- **Raise the profile of STEM** – both in school and more widely.
- **Build links** – between STEM departments in school and with other schools.
- **Gain knowledge of new tech** such as the BBC micro:bit.
- **Encourage healthy competition** amongst classmates and local schools.
- **Encourage teamwork** and “outside the box” thinking amongst learners.
Michelle Richmond
Director of Membership & Professional Development, the IET

"The digital world is evolving all the time - and with it, the demand for more young people with coding and digital skills. The IET has been delighted to support the BBC micro:bit project in its first year to help promote the world of digital creativity and inspire the next generation to get involved with what is fast becoming one of our most exciting and creative industries.

"The IET Faraday Challenge Days for the 2015-16 season have been our largest season to date – with so much interest from students and teachers alike wanting to have some hands-on experience with the BBC micro:bit for themselves.

"Alongside the Faraday Challenge Day season, the IET Education team have also created a series of brand new teaching resources, as well as run a number of CPD sessions for teachers and regional events across the whole of the UK to promote this coding device and encourage its use both in school and at home.

"The response that we have seen to the BBC micro:bit has been phenomenal and I would like to personally thank all of our sponsors and funders who allowed us to run more events in schools and universities this year than ever before reaching out to a record number of students."

Gareth James
Head of Education 5-19, the IET

"With the UK facing a significant skills shortage, and an extra 1.4m digital professionals needed over the next five years, the BBC set up the micro:bit project as part of the wider Make it Digital national campaign which aimed to inspire a new generation of coders and programmers.

"As part of the micro:bit initiative, the BBC partnered with over 29 organisations including Microsoft, Barclays, Kitronik, Samsung and CoderDojo. The IET were grateful for the chance to be part of such a high-profile project and has been able to generate a number of high quality relationships from these partnerships across the technology, education and other related sectors.

"Throughout this project, the IET has been able to bring its expertise to the fore enabling the provision of a successful range of resources and activities directly relevant to the computing curriculum and digital sector more widely. The IET was able to interweave a number of its key aims and objectives into this initiative to drive awareness of this important sector whilst also highlighting the need to develop students’ employability and practical skills to find the right people with the right skills and abilities."

The IET is now part of the BBC micro:bit educational foundation that will take forward the legacy of this project to continue to support teachers and inspire hands-on learning via the use of this pocket-sized programmable device.

Jo Claessens
BBC micro:bit Producer, BBC Learning

"The more students that can experience this Nationwide competition the better.

"BBC Team micro:bit found this challenge a best fit because of its emphasis on hands on learning and problem solving. From mainstream to special schools the ingenuity and creativity of students taking part exceeded our expectations and revealed their passion to make the world a better place for others."

David Whale
Software Engineer & IET Schools Liaison Officer for Essex

"The IET Faraday Challenge is a great way for children to experience what it is like to be an engineer, by experiencing a complete mini project.

They respond well to this tried and tested format, which stretches them outside of their comfort zone, and they show growth in confidence and understanding as a result.

By using real engineering processes, technology is explored with a purpose, that helps children to understand how solutions to real problems can be created and society can benefit from their ideas.

The Faraday team deliver a consistent and enjoyable experience nationally, in a way that is very inclusive across a wide range of abilities.

Children really enjoy the challenge days, creating highly innovative product prototypes. At the end of the day they are buzzing with ideas and excitement, and a real sense of what engineering is about, and what it is like to be an engineer.

This season, the BBC micro:bit provided a simple but credible platform allowing fast prototyping with computer code. Coding plays a huge role in engineering, and to address the shortage of engineers for the future, turning children from technology consumers into technology creators at a young age is a vital step."
Headline statistics from the full season

No. of events: 126  
No. of students: 4,338  
No. of schools: 309 (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 Day: 98%
- I learned new things: 98%
- I now understand more about what engineering is: 96%
- I have a better idea about what engineers do and the skills they need: 95%
- I am more likely to consider studying or working in engineering now: 67%
- I’d like to do something like this again: 95%

Student quotes

- Can we do it again? It really helped me understand the world of engineering and coding much better. Thanks!
- An amazing day. I would like to have a go at home and see how good I could become.

“A great experience and I learned a lot! I would definitely do it again! Thank you :-)”
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 Year 7 students 99%
- The interest of 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 99%
- I would recommend the IET Faraday programme to other teachers 99%

Teacher quotes

- A fantastic day which students thoroughly enjoyed. They loved having the freedom to explore and experiment with top support nearby when required. This event has encouraged the students to behave as professionals, to consider their actions and to spend time planning, rather than just jumping straight in.
- A great day which incorporated lots of skills into a fun challenge. Would definitely be interested in more events for the future.
- A great day. Well planned and delivered. All resources provided and they were excellent quality.
- A thoroughly enjoyable day where all our pupils were engaged throughout. They will take this experience back to schools and that will boost interest amongst the year group. Thank you :-)
**Date (2016)** | **Host school**
---|---
20th January | Garth Hill College
29th January | Bishop Perowne C of E College
8th February | Maplewell Hall School
25th February | Wood Field Middle Academy
29th April | Rickmansworth School
15th June | Stowupland High School
16th June | Kingshill School
24th June | Glenrothes High School
27th June | Shoeburyness High School
29th June | Kesgrave High School

**No. of events:** 10  
**No. of students:** 344 (20 special needs students)  
**No. of schools:** 15 (including 1 special needs school)

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**Student feedback**

**Age:** 11 (31%), 12 (62%), 13 (6%), Not specified (1%).  
**Gender:** Male (55%), Female (45%).

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

- I enjoyed the Faraday Challenge Day **96%**
- I learned new things **99%**
- I now understand more about what engineering is **96%**
- I have a better idea about what engineers do and the skills they need **94%**
- I am more likely to consider studying or working in engineering now **70%**
- I’d like to do something like this again **92%**

**Student quotes**

- I found this super fun and interesting. It helped me learn how to invent and I hope to do this again.
- I really enjoyed today and didn’t know engineering involved coding.
- This was a very interesting day and the engineers who came were very kind.
- I enjoyed today and think it is a good way of telling young people about engineering.

"I like the representative called Keira. She was really helpful, as were the people from Bosch."
A fantastic day had by all. Great ideas and brilliant to see coding being used. Thanks for a great day :-)
### Date (2016) | Host school
--- | ---
10th March | Sarah Bonnell School
14th March | Chase High School
15th March | Maltings Academy
17th March | Greig City Academy
21st March | Townley Grammar School
23rd March | Chobham Academy
12th April | Ricards Lodge
13th April | The Campion School
14th April | Havering College
19th April | St. Marylebone
20th April | The Petchey Academy
21st April | St. Thomas the Apostle College
22nd April | Oaks Park High School
26th April | Carshalton Girls’ High
27th April | Christs School & Sixth Form College
3rd May | Willowfield Humanities College

### Date (2016) | Host school
--- | ---
4th May | Frederick Bremer School
4th May | Beal High School
9th May | Stepney Green School
18th May | Riddlesdown Collegiate
19th May | Northwood School
27th May | Clapton Girls Academy
27th May | Rutlish School
6th June | St. Marks West Essex School
7th June | Enfield County School
9th June | Marjory Kinnon Special School
10th June | St. Mark's Catholic School
20th June | Langley Park School for Boys
30th June | The Coopers Company & Coborn School

**No. of events:** 29 (+ 1 celebration event)

**No. of students:** 888

**No. of schools:** 56 (including 1 special needs school)
Student feedback

Age: 11 (29%), 12 (70%), 13 (1%).
Gender: Male (47%), Female (53%).

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

- I enjoyed the Faraday Challenge Day: 97%
- I learned new things: 98%
- I now understand more about what engineering is: 95%
- I have a better idea about what engineers do and the skills they need: 95%
- I am more likely to consider studying or working in engineering now: 65%
- I’d like to do something like this again: 93%

Student quotes

- A nice, fun, educational experience.
- Although it was very challenging, we as a team came over it.
- Engineering seems more fun now to me. I had so much fun.
- I enjoyed this challenge, picked up information and I am keen on knowing more about engineering in the future.
- I find it amazing that people are doing this - it gives children a taste of engineering at a young age!
- I got to miss RS and History.
- I liked how technology can do so many things.
- I liked how we had to work as a team and it also made me learn new things. It also makes me want to do it again because it shows me how fun engineering can be.
- I liked how we used real life situations while designing it.
- I liked how we worked in teams but everyone could do something like if you can’t code you can be the accountant.
- I have enjoyed working with friends who have become closer. I also learnt more than I expected. I am proud of what we accomplished.
- I think that I am more likely to consider engineering as a career.

I found this a once in a lifetime opportunity and I am thankful I did it.
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 Year 7 students: 100%
- The interest of 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: 70%
- I would be interested in taking part next year: 99%
- I would recommend the IET Faraday programme to other teachers: 100%

Teacher quotes

- A full on day of inspiring events. Pupils worked independently on an enquiry based project! They amazed me! Well done on organising another fantastic event!
- Already recommended others. Phil was brilliant, very engaging and different to what they’re used to. Thank you, excellent day.
- Amazing STEM day. Pupils thoroughly enjoyed the day. Keira was very methodical in her delivery and was very helpful to put pupils nerves at rest. Thank you.
- An excellent day. Would like to offer it in school to our whole Yr 7. Is there a ‘next stage’ in this programme?
- I didn’t know what to expect but the day far exceeded my expectations - the host was knowledgeable, the STEM ambassadors helpful and I feel my students had the opportunity to exercise multiple disciplines as well as get a preview of the micro:bit devices.
- It was a challenging task that encouraged the students to work collaboratively and extend their thought process. Phil was great at explaining and supporting.
- It was great to see the amount of student activity/thinking.
- It was an interactive day and challenged and stretched all pupils and exposed them to new emerging technologies.

I just wanted to let you know that the event was an outstanding success. The girls enjoyed the day and all made progress in learning how to use the BBC micro:bits. If this event is running next year I would like to sign the school up for it again.

I love these Faraday days, they should be mandatory for all schools!
The winning teams from each of the Jack Petchey Foundation-supported events were invited to attend an afternoon event on 18th July at IET London: Savoy Place. This was a celebration of the achievements of all the teams and an opportunity for students to showcase their products and share ideas. The afternoon began with the students presenting their products at our Code Crew exhibition. Judging then took place with all attending students, Jack Petchey Foundation representatives and the IET Faraday team all involved in the decision. The students then listened to a talk on ‘Coding: Past, Present & Future’ with speakers from the IET, Code Kingdoms and Microsoft, before the awards ceremony. During the ceremony, teams were awarded for their success in 5 different categories as well as being awarded overall prizes for 1st, 2nd and 3rd place.

Winning school teams

1st place: Stewards Academy
2nd place: Enfield County School
3rd place: The Coopers Company & Coborn School

Creativity: The Ursuline Academy
Innovation: Townley Grammar School
Most promising future software engineers: Rutlish School
Product design: Park High School
Team spirit: Chobham Academy
Student feedback

Age: 11 (26%), 12 (72%), Not specified (2%).

Gender: Male (30%), Female (68%), Not specified (2%).

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

- I enjoyed the Faraday Challenge Day 98%
- I learned new things 100%
- I now understand more about what engineering is 98%
- I have a better idea about what engineers do and the skills they need 93%
- I am more likely to consider studying or working in engineering now 54%
- I’d like to do something like this again 98%

Student quotes

- I really enjoyed today. I feel a lot closer to everyone on my team. It was an amazing challenge day.
- I found it really interesting to learn more about engineering. I would do it again in a heartbeat!
- I really enjoyed this challenge and have a much clearer and more positive idea of programming. It was great fun and I would definitely do it again!
- This was a really good day, much better than school, and really fun. I liked pitching the products and the prizes are awesome so is Kiera! I would definitely do this again! :-)

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<thead>
<tr>
<th>Date (2016)</th>
<th>Host school</th>
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<tbody>
<tr>
<td>16th March</td>
<td>Rutherford Appleton Laboratory, Harwell</td>
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<tr>
<td>22nd June</td>
<td>Daresbury Laboratory, Warrington</td>
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No. of events: 2
No. of students: 60
No. of schools: 10
### Teacher feedback

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

<table>
<thead>
<tr>
<th>Statement</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>The level of complexity was suitable for a National STEM challenge aimed at Year 7 students</td>
<td>100%</td>
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<tr>
<td>The interest of students was retained throughout the day</td>
<td>100%</td>
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<tr>
<td>The students learnt new concepts and expanded their knowledge base</td>
<td>100%</td>
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<tr>
<td>The registration process was straightforward with enough time to plan for the event</td>
<td>70%</td>
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<tr>
<td>I would be interested in taking part next year</td>
<td>99%</td>
</tr>
<tr>
<td>I would recommend the IET Faraday programme to other teachers.</td>
<td>100%</td>
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### Teacher quotes

- Good day!
- A fantastic day. Thank you for running it.
- Good challenge for students to self-learn. Maybe a bit more training on a couple of coding experiences?
- Was very good - Perhaps a little bit less talk time at the beginning but appreciate that can be difficult.

"Very well organised. Good level of communication with students - both jolly but blunt when needed."
**UK Electronic Skills Foundation**

**Student feedback**

Age: 10 (2%), 11 (36%), 12 (60%), 13 (2%).

**Gender:** Male (48%), Female (52%).

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

- I enjoyed the Faraday Challenge Day: 99%
- I learned new things: 99%
- I now understand more about what engineering is: 97%
- I have a better idea about what engineers do and the skills they need: 98%
- I am more likely to consider studying or working in engineering now: 72%
- I’d like to do something like this again: 99%

**Student quotes**

- Before this I wanted to be an aerospace engineer or a robotics engineer. This has boosted my confidence thank you.
- I enjoyed working in a group with other people and challenging myself to complete it.

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<thead>
<tr>
<th>Date (2016)</th>
<th>Host school</th>
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<tbody>
<tr>
<td>1st February</td>
<td>Thomas Alleynes High School</td>
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<tr>
<td>2nd February</td>
<td>Allestree Woodlands School</td>
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<tr>
<td>26th February</td>
<td>Lacon Childe School</td>
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<tr>
<td>1st March</td>
<td>University of Surrey</td>
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<td>18th March</td>
<td>University of Bristol</td>
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<tr>
<td>22nd March</td>
<td>King Edward VI High School</td>
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<tr>
<td>23rd March</td>
<td>Fallibroome Academy</td>
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<td>14th April</td>
<td>University of Cardiff</td>
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<td>11th May</td>
<td>University of Manchester</td>
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<td>15th June</td>
<td>University of Nottingham</td>
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No. of events: 10
No. of students: 330
No. of schools: 35
**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 Year 7 students: 100%
- The interest of 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: 70%
- I would be interested in taking part next year: 99%
- I would recommend the IET Faraday programme to other teachers: 100%

**Teacher quotes**

- A really well organised event that presented stimulating and engaging issues for the pupils.
- A thoroughly enjoyable day where all our pupils were engaged throughout. They will take this experience back to schools and that will boost interest amongst the year group. Thank you :-)  
- A very enjoyable day. The students fully enjoyed the day and found the challenge to be fun and interesting. The students were stretched and it was lovely to see the final presentations.
- An excellent day for both pupils and teachers alike! Thank you Becky for your motivational input - fantastic.
- Excellent day and introduction to the huge impacts that BBC micro:bits can have in our everyday lives.
- Fantastic event. Students really enjoyed themselves and looking forward to using BBC micro:bits in the near future.
- Fantastic stretching challenge with interesting episodes of fun, thought and innovation! Thanks for the opportunity - please let me come again! Loved that there was a teacher team :-)  
- It was great to see the kids so engaged. I was initially concerned the task was too complicated but the pupils relished the challenge and made me proud.
- Fantastic day! (Good opportunity for CPD too!) Good structure, timings appropriate. Good level of challenge.

**We hosted one of the IET Faraday Challenge Days at Nottingham last week and I wanted to say thank you for the support from the UKESF that allowed us to do this. I’ve not been involved in one of the challenge days myself before and was impressed. The kids were really engaged and had a good time trying to develop devices for helping people. I got a chance to have a play with a BBC micro:bit as well - they’re neat pieces of kit and the programming environment is good.**
Thank you for inspiring our future coders and software engineers