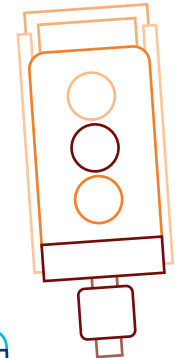
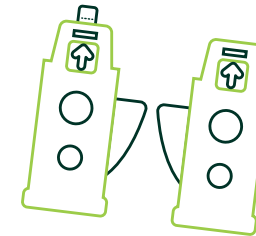


IET Faraday Challenge Days

2020-2021 Review



Explore the
IET Faraday Challenge
at theiet.org/faraday



IET Faraday Challenge Days 2020-2021 Review



Due to the Covid-19 pandemic and further schools closures this academic year we have had to adapt the Faraday Challenge Days this season and be flexible to the changing circumstances. Despite this we are proud to have delivered 60 teacher-led Faraday Challenge Days this season, with 61 schools and 1,856 students involved.

Our supporters and sponsors this year included Airbus, Keith Thrower OBE FREng FIET, Motorola Solutions Foundation, NATS, Network Rail, Rapid Electronics, Reece Foundation, The Science & Technology Facilities Council and Tesco.

The theme for the 2020-2021 season was in association with Network Rail. Teams were tasked to design a prototype that would assist the work of Network Rail in helping them to sustainably manage the increasing numbers of passengers using their network and minimise their impact on the environment. They had to take into account key considerations such as energy, sustainability and capacity for growth. The prototype had to include an electrical circuit.

Given the circumstances the 2020-2021 season of Faraday Challenge Days were adapted to teacher-led Challenge Days which allowed teachers to run a Faraday Challenge Day in school themselves with the support of a Faraday Challenge Leader. Schools were provided with all the resources needed to run the day and had up to two weeks to deliver the challenge so could either run it as a single day event or fit it around specific lesson times.

Prior to the start of the challenge teachers were able to have an introduction meeting with their Challenge Leader. During the challenge students had the option of having a video consult with the Challenge Leader and after designing and building their prototypes, teams could either video or virtually present their ideas to the Challenge Leader for marking.

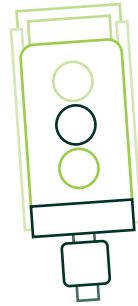
Students were scored throughout the day on their planning and research; development and functionality of the product; use of budget; product engineering; the final presentation, and their teamwork and attitude throughout. Members of each winning team won a gift voucher for themselves, a trophy for their school, and had their score added to the national league table. At the end of the season, the top five teams took part in the season's National Final.





National Final

The National Final was run as a virtual event on 13 July 2021 with the top five teams from the season having to develop their idea from their original challenge day and include at least two processes, one of which must be electrical. The other process could be mechanical or another electrical one.

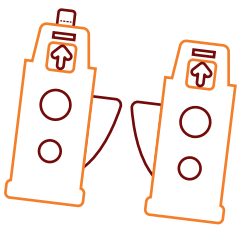


The five national finalists were Ampleforth College from York, King Edward VI Camp Hill School for Girls from Birmingham, Glossopdale School from Derbyshire, Royal Liberty School, Romford, and The Gilberd School from Colchester.

The final was judged by David Lakin, Head of Education at the IET, Keira Sewell, IET Faraday Challenge Leader, Patsy Brady, OLE Asset Engineer at Network Rail and Syed Shah, a Year in Industry student at Network Rail. Teams were judged on their product design and virtual presentation.

After a close competition with impressive virtual presentations this season's winning team was Royal Liberty School, Romford. The winning team designed a prototype pressure pad and buzzer system to minimise overcrowding on platforms.

It was an inspiring event for everyone involved and we are sure all the students have very bright futures ahead of them!



Alongside the Challenge Days this season we also had another Virtual Faraday Challenge. This was available for anyone from 7 to 15 years, with the option for young people to take part at home, in school, individually or as a group/family. This gave many young people who had missed out on taking part this season the opportunity to still get involved as well as many more.



Quotes from professionals

David Lakin

IET Head of Education



"We were delighted to have Network Rail as this year's theme partner to set a challenge which gave students the opportunity to work like Network Rail engineers tackling real-life problems and helping to provide Network Rail users with a better experience. Despite the most challenging academic year due to the pandemic, I was very pleased to see how many students were involved this season, and a big thank you must go out to all the teachers who, despite these difficult times, still engaged with us so their students could have this opportunity.

There is huge demand for new engineers and technicians and I'm confident that this challenge has helped to change young people's perceptions of engineering and inspire the next generation of engineers and technicians. Our IET Faraday Challenge Days, with theme partners, such as Network Rail, give students an insight into the life of a real engineer, the variety a career in engineering can offer and just how exciting and creative engineering really is."

Amit Kotecha

Senior Campaigns Manager, Network Rail



"The rail sector needs tens of thousands more rail professionals over the coming years to keep the railway moving. The Faraday Challenge is a fantastic programme for Network Rail to have the opportunity to work with young people from across the country, giving them some insight into the exciting and innovative projects we deliver.

We have a saying 'You can't be what you can't see', which is why role model interaction is so important, especially during the pandemic. This challenge enables young people to interact with our STEM ambassadors, learn about how to create solutions to some of our challenges through the activity, and to find out more about the vast array of STEM career opportunities on offer making it an industry and career choice they aspire to work in."

Keira Sewell

IET Challenge Leader



"To say the 2020-2021 academic year was a challenge for schools is perhaps the greatest understatement ever but, yet again, staff and students in schools around the UK rose to the Faraday Challenge. Our planning here at IET for the 2020-2021 season with our partner, Network Rail, began back in January 2019 before we knew the impact Covid-19 would wreak on all our lives.

Having ended the 2019-2020 season abruptly in March 2020 due to the first lockdown I think we all understood that this was not a situation which would disappear quickly. As a result, we planned our first ever teacher-led Faraday Challenge Days. We provided all the paperwork and resources to schools, filmed instructional videos and met online with each teacher to guide them through the delivery of the day. On most Challenge Days, a Challenge Leader logged on for 45 minutes during the build time to provide an opportunity for students to ask questions and get advice.

Initially the plan was to run teacher-led Faraday Challenge Days until Christmas and then go back into schools to run them as usual, but this was not to be. A second wave of the virus meant we were unable to go back into schools. We thought schools would have enough on their hands trying to catch up with everything, however, we were delighted when many of them said they would run a teacher-led Challenge Day. Over the season we have run 61 of these events and held an online final and, throughout, we have been in awe of the hard work of both staff and students.

The Challenge this year focused on supporting Network Rail in managing the increasing passenger numbers in their stations. Students came up with many interesting ideas to limit numbers allowed into stations and onto platforms, to avoid people falling off platforms, to keep young children occupied whilst waiting for trains and to increase the numbers of people who can get onto trains quickly. Yet again we were impressed by their empathy with people with disabilities who may need additional support to use the rail network safely. Students designed ramps, specific routes for those in wheelchairs, travelators and guided routes for those with impaired vision.

Students were also keen to support Network Rail's ambitions to minimise their impact on the environment and many of their prototypes incorporated alternative power sources. Students also talked about the types of sustainable materials they would choose if building this in real life.

Yet again our Challenge Leaders learned a great deal from the students. By now, we know not to say 'can't' to our young engineers but even we were amazed by some of the things they managed to do. We are very grateful to them all for giving us ideas for next season's Challenge Days!

Finally, we bow to the teachers, they are amazing. Even given the very challenging year they have had they still go above and beyond to make sure their students get the very best experiences and opportunities. A massive thank you to them all and we hope to be back working with them in their schools next season."

“ Student quotes

"I really enjoyed today. I liked working in a team and it helped me step out of my comfort zone. I always wanted to know more about engineering and after today I'm hoping that this will become my career."

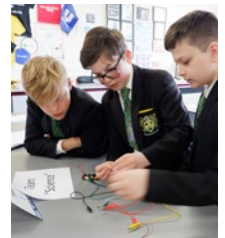
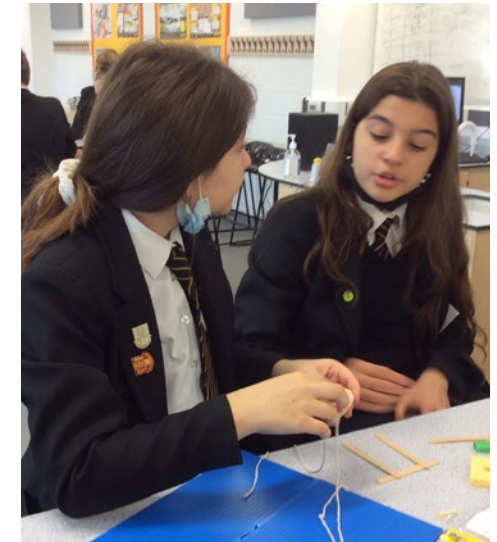
13-year-old girl

"I really enjoyed this opportunity, as it widened my understanding of engineering. I have been introduced to the importance of what may seem like small, insignificant inventions, and how it benefits and aids our society. I am very glad I was chosen for this challenge, as I have now explored different skills vital for an engineer, which I might need in the future. I built on my teamwork and leadership skills and understood the value of engineering as a whole."

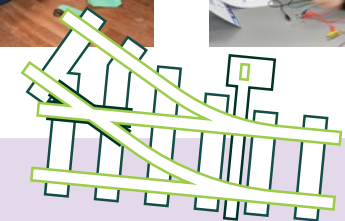
13-year-old girl

"It was a great experience and was nice to meet new people I wouldn't generally meet in a different experience. It was fun to learn about engineering and think of ideas of how to help and change people's daily lives."

13-year-old girl

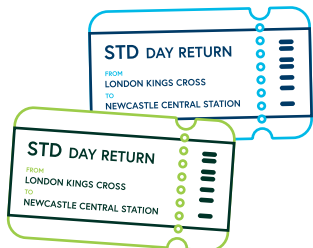


“ Student quotes



"I enjoyed this day as a whole because it allowed me to explore what being an engineer would typically be like and gave me a chance to try it myself. As a group we were able to overcome all of the challenges we faced through lots and lots of trial and error. Our prototype was a good team project for us all as well."

12-year-old girl





Headline statistics from the full season

No. of teacher-led events: **60**

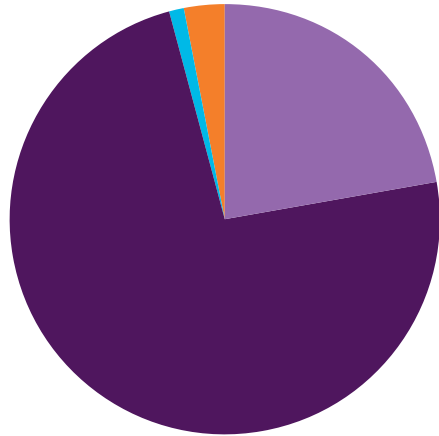
No. of students: **1,856**

No. of schools: **61**

Engaged with **8** schools defined as hard to reach (high percentage of free school meals, rural schools and social mobility indicators).

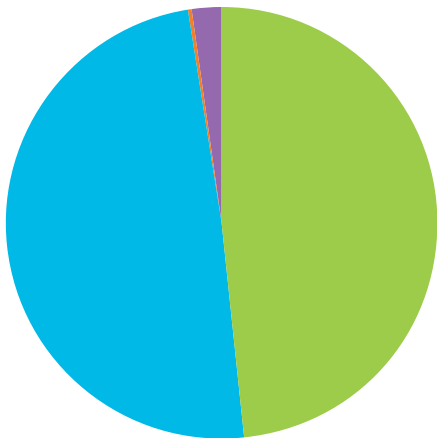
Age

- 12 years
22.5% (322 students)
- 13 years
73.4% (1,053 students)
- 14 years
1.2% (17 students)
- Not specified
2.9% (42 students)



Gender

- Male
48.6% (697 students)
- Female
48.9% (702 students)
- Other
0.4% (5 students)
- Not specified
2.1% (30 students)



Student feedback

The following stats represent the % of students who were in agreement with these statements (information gathered from 1,434 students):

- I enjoyed the Faraday Challenge **96%**
- I learnt new things **93%**
- I now understand more about what engineering is **93%**
- 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 **32%**
- Following this event I am now considering studying or working in engineering **52%**
- I'd like to do something like this again **91%**

There was a **20% increase** in students who after taking part in a Faraday Challenge Day would now consider studying or working in engineering.





Student quotes

"Thank you for giving me this opportunity as it helped me find and explore my interests and abilities for future careers."

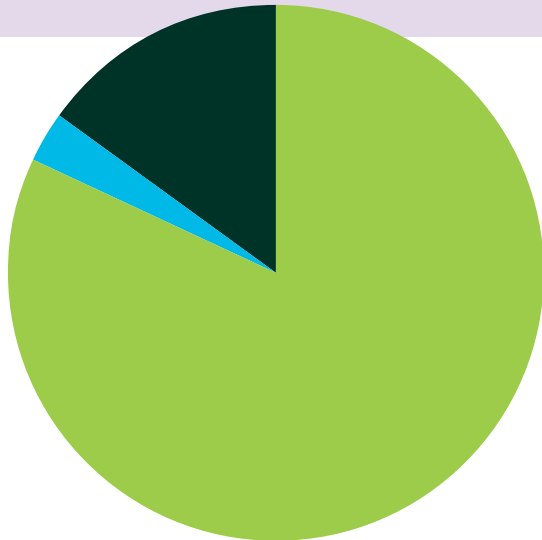
13-year-old girl

"Today was a learning curve. Learning about the railway was fun and using my imagination to create something to help people feels empowering."

13-year-old girl

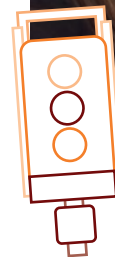
"It was really fun, and I got to do lots of work with my friends and see what it would be like to be an engineer! The teachers there and the expert were really helpful and helped with your problems in circuits etc, but they also explained how it worked and why certain parts worked and functioned which was good because it helped us learn about more. I'd love to do something like this again and it is something I'd definitely consider doing as a career!!"

13-year-old girl



Student feedback

- Positive
82% (1,171 students)
- Negative
3% (44 students)
- Both
15% (219 students)



“ Student quotes

"I learnt new things and loved to communicate with new people. The teachers were very helpful, and I liked how they set up the shop, it was very organised and there was a limit to how many people could go to the cutting station for safety. I hope next time we do something more to do with technology because I find it inspiring and so cool how you can control things in real life with a touch of a screen. Another point that I really liked about today was how it was really challenging, I love trying to challenge myself and today really put me and my group to the test. We aimed to do the servo motor and have an automatic gate using an LDR. We tried many times and failed, and our circuit would keep falling apart. However, instead of arguing we worked as a team to decide what we could improve on and eventually succeeded in having an automatic gate to prevent hazards and help with safety. Overall, I had an amazing experience, loved learning about engineering and would love to do something like this again."

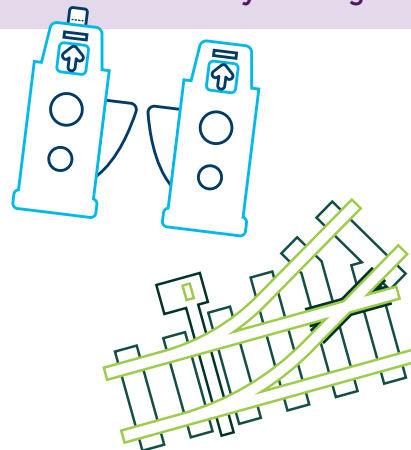
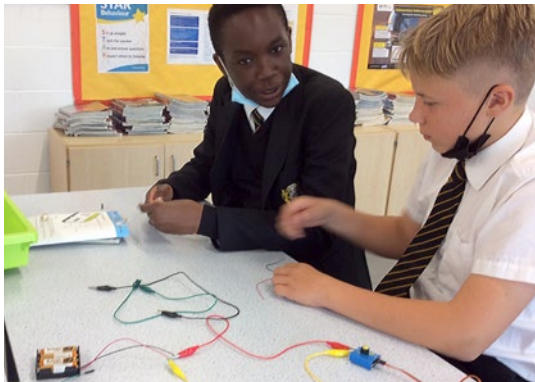
13-year-old girl

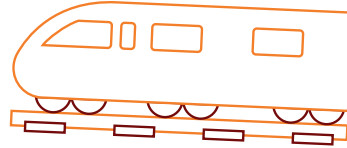


STD DAY RETURN
FROM
LONDON KINGS CROSS
TO
NEWCASTLE CENTRAL STATION



STD DAY RETURN
FROM
LONDON KINGS CROSS
TO
NEWCASTLE CENTRAL STATION





Teacher feedback

The following stats represent the % of teachers who were in agreement with these statements (information gathered from 74 teachers):

- The level of complexity was suitable for a National STEM challenge aimed at students aged 12-13 years **93%**
- 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 **99%**
- I would recommend the IET Faraday Programme to other teachers **96%**

Special thanks

Faraday Challenge Days really do inspire students and raise the profile of STEM overall.

The IET Faraday Challenge has this year reached more young people thanks to the generosity of engineering, technology and science companies and charities who have funded individual events or contributed towards the core IET events and online teaching resources.

A huge thank you to you all.

The next generation of engineers will have better skills thanks to their IET Faraday experiences and thanks to you.

AIRBUS



**Keith Thrower
OBE FREng FIET**

NATS



REECE FOUNDATION

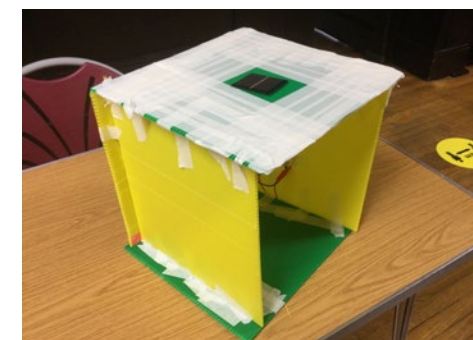


TESCO

2020-2021 Faraday Challenge Days

This season's teacher-led Faraday Challenge Days could be delivered as a one-day event or over a two-week period to fit in with specific lesson times.

Host school	Location	Date
St Mark's West Essex Catholic School	Harlow	23 November 2020
Brighton Aldridge Community Academy	Brighton	26 November 2020
Queen Anne's School	Reading	10 December 2020
Ampleforth College	York	25 March 2021
The Mount School	York	13 April 2021
University College School	Hampstead	20 April 2021
Mosslands School	Wirral	21 April 2021
Christ the King College	Isle of Wight	22 April 2021
Brentwood School	Brentwood	23 April 2021
Royal Liberty School	Romford	26 April 2021
Sarah Bonnell School	Stratford	27 April 2021
Wells Cathedral School	Somerset	28 April 2021
Futures Institute Banbury	Oxfordshire	28 April 2021
Test Valley School	Hampshire	29 April 2021
Twynham School	Dorset	30 April 2021
King Edward VI Camp Hill School for Girls	Birmingham	04 May 2021
Royal Grammar School	High Wycombe	05 May 2021
Maidstone Grammar School	Maidstone	10 May 2021
Eastbrook School	Dagenham	11 May 2021
Farnham Heath End School	Farnham	12 May 2021
The Wellington Academy	Wiltshire	13 May 2021
Glossopdale School	Derbyshire	14 May 2021





Host school	Location	Date
Berkhamsted Boys School	Berkhamsted	18 May 2021
Trinity CE High School	Manchester	19 May 2021
Arnewood School	Hampshire	20 May 2021
Trafalgar School	Downton	25 May 2021
Thomas Becket Catholic School	Northampton	26 May 2021
Mount Kelly School	Tavistock	26 May 2021
Winifred Holtby Academy	Hull	27 May 2021
Halewood School	Liverpool	07 June 2021
Headlands School	Bridlington	08 June 2021
The Norwood School	London	08 June 2021
Swanhurst School	Birmingham	09 June 2021
St Osmund's Middle School	Dorchester	09 June 2021
Mearns Academy	Launceston	10 June 2021
Fulneck School	Pudsey	10 June 2021
Uckfield Academy	Uckfield	11 June 2021
Skegness Grammar School	Skegness	15 June 2021
Thomas Alleyne Academy	Stevenage	15 June 2021
Caroline Chisholm School	Northampton	15 June 2021
Orleans Park School	Twickenham	16 June 2021

Host school	Location	Date
Mayfield School	Dagenham	16 June 2021
The Castle School	Taunton	17 June 2021
New Rickstones Academy	Witham	17 June 2021
Somerhill School	Tonbridge	17 June 2021
Wreake Valley Academy	Leicester	18 June 2021
The Gilbert School	Colchester	18 June 2021
Larbert High School	Falkirk	21 June 2021
Harris C of E Academy	Rugby	21 June 2021
Clacton County High School	Clacton	22 June 2021
Penwortham Girls School	Preston	22 June 2021
Esher High School	Esher	23 June 2021
Wallington High School for Girls	London	23 June 2021
Kingswood School	Bath	24 June 2021
Wellington School	Altrincham	25 June 2021
Ringwood School	Ringwood	28 June 2021
Portchester Community School	Fareham	28 June 2021
Hornsea School	Hornsea	29 June 2021
Ellesmere College	Shropshire	30 June 2021
Chigwell School	London	30 June 2021



“ “ Teacher quotes

"This was a fantastic opportunity for the pupils, especially in these challenging times at school - where they are not allowed practical work."

"Good day. Timings and level of difficulty was just right. Students learnt a lot of non-subject knowledge and life skills."

"Excellent support and resources for supporting schools in taking part in the IET Faraday Challenge and very well adapted to use during lockdown. Would highly recommend and take part again in the future!"

"I've been so impressed with how well everything was organised, so easy as a teacher. Thanks so much!"



“ “ Student quotes

"I really enjoyed the challenge and learnt loads. Now I am inspired to continue studying and looking at more STEM subjects."

13-year-old girl

"It was good to experience problem solving for real world problems."

13-year-old boy

"I enjoyed the team working together to make something that could help or improve a mode of transport that has been used by so many. I enjoyed the working with circuits because I learnt something new and how to do certain things."

13-year-old girl

"I really enjoyed my day and felt that this was a great way of getting people into engineering. I feel as though more students should be given a chance to try it out and this should be done more often. Engineering in a great way of producing the skills of teamwork and confidence in talking to new people and also trying out new things."

13-year-old girl



“ “ Teacher quotes

"Another fantastic challenge that students really enjoyed. Really enjoyed the opportunity to run it in school so that more pupils within our year 8 cohort had the chance to take part. Looking forward to hopefully doing it again next year."

"Great fun! Students enjoyed it throughout. 600% increase in engineers today..."

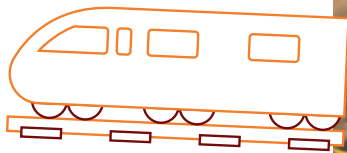
"Really interesting yet accessible brief, excellent resources for the day, and beforehand to support the teacher. Couldn't have done this ourselves. Thanks for making me do it - good! :)"



“ “ Student quotes

"The Faraday Challenge was very fun, although I already knew a lot about engineering it still gave me a better grasp of what it is like working in the engineering department in the real world and how prototypes are made. Doing practicals made it much easier to understand the task that needed to be completed. I am now considering doing an apprenticeship when I am closer to college."

13-year-old girl



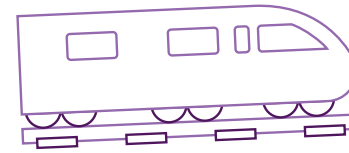


Quotes from Network Rail judges

"Your idea clearly meets the brief to minimise Network Rail's environmental impact. Our world is everyone's responsibility; ideas like yours are vital to our future."

"This idea is very innovative and well thought out. Gives a clear explanation of how it will help manage waste at the station and how it will impact the environment."

"Brilliant idea and one that meets the design brief seamlessly. As well as also being realistic and innovative, as the concept is simple it can be very easily implemented in our stations as a healthy alternative to our customer base."



Quotes from Network Rail judges

"I think this is a fantastic solution. It solves the problem set out in the initial slide, that the general public want to make a difference but don't understand the significance of their carbon impact and also how to offset it."

"Often in Network Rail, we have to take a 'whole system' approach to finding solutions or building new infrastructure. I like in your proposal that you have not only considered the concept of a sustainable vending machine where waste products are eradicated, but also other ideas of how we could re-use the waste in other ways around the station or even to sell the compost to invest in the operation of the vending machine."



Virtual Faraday Challenge

Given the changing circumstances this academic year we extended the Faraday Challenge Day programme to include a Virtual Faraday Challenge to give young people more ways to get involved in the programme. The was open for anyone between 7 and 15 years, with the option for young people to take part at home, in school, individually or as a group or family.

This season's Virtual Faraday Challenge tasked young people to see if they could assist the work of Network Rail in helping them to sustainably manage the increasing numbers of passengers using their network and minimise their impact on the environment and work in the way engineers do in designing a new product. The brief for the challenge is given by video from our Faraday Challenge Day Challenge Leaders and young people had to demonstrate that they had the engineering skills required to think of a solution and produce a design of their idea. If they also wanted to build a model of their idea they could.

Entries were submitted as a PowerPoint presentation and judged on how the design met the criteria in the design brief; explaining how the product worked and was constructed, appropriate use of electronic components and how the presentation was communicated.

The best entries received a prize and featured on our website.

No. of entries: **34**

No. of participants: **60**



Our offices

London, UK

T +44 (0)20 7344 8460

E faradaycentre@ietvenues.co.uk

Stevenage, UK

T +44 (0)1438 313311

E postmaster@theiet.org

Beijing, China

T +86 10 6566 4687

E china@theiet.org

W theiet.org.cn

Hong Kong

T +852 2521 2140

E adminap@theiet.org

Bangalore, India

T +91 80 4089 2222

E india@theiet.in

W theiet.in

New Jersey, USA

T +1 (732) 321 5575

E ietusa@theiet.org

@TheIET      

theiet.org

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