



**Royal Academy  
of Engineering**

**Ingenious**



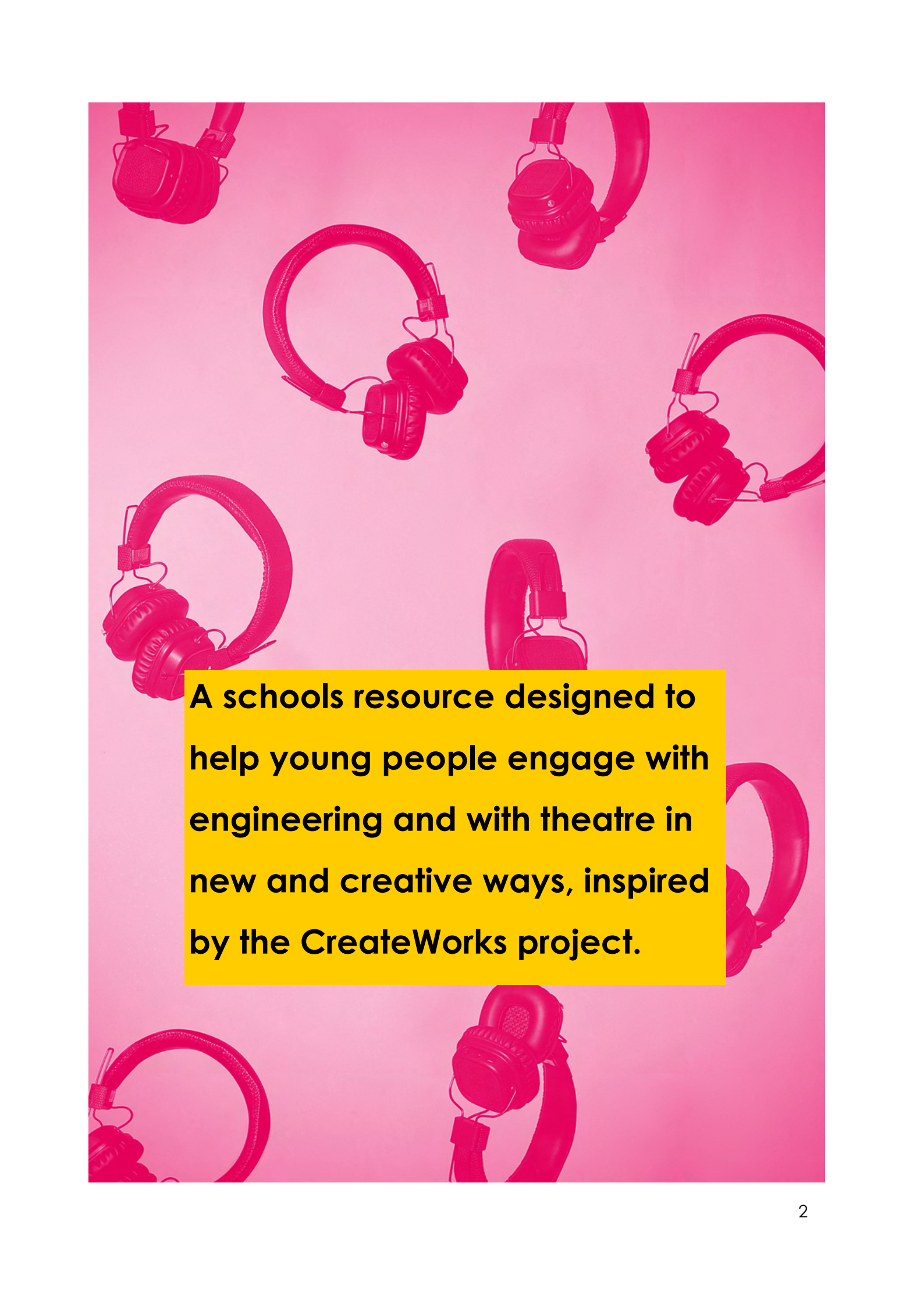
THE UNIVERSITY *of* EDINBURGH  
**School of Engineering**



**Engineers inspired by theatre;  
Theatre inspired by engineers.**

Audio Dramas:

Schools Resource Pack



**A schools resource designed to help young people engage with engineering and with theatre in new and creative ways, inspired by the CreateWorks project.**

# Contents:



	<b>PAGE</b>
<b>How to use this resource -</b>	
What is the CreateWorks project?	4
Curriculum for Excellence	5
Accessing the audio dramas	6
Credits	7
<b>The audio dramas -</b>	
Summary of audio dramas & themes	8-9
Conscience Call	10-11
Future Tense	12-13
Red Tape	14-15
Observer Effect	16-17
Remote Access	18-19
<b>Exploring the texts - questions</b>	<b>20</b>
<b>Activities to engage with the texts</b>	<b>21-22</b>
<b>Further resources -</b>	
About the core team	23-24
About the University of Edinburgh's School of Engineering	25
About the Royal Academy of Engineering	26
Reflections from the team	27-32
Websites	33-34
<b>Keep in touch</b>	<b>35-36</b>

# How to use this resource



## What is the CreateWorks project?

Engineering and theatre might feel like radically different ways of figuring out our world and our place in it, but behind every complex idea is a gripping human story waiting to be told. The CreateWorks collection of audio dramas offers the chance to hear powerful new stories that explore how engineering is changing the world around us.

From November 2020 to June 2021, Braw Fox Theatre's dynamic creative team Amy McKenzie and Jo Rush worked alongside playwright Dave Fagnoli and engineers from the University of Edinburgh's School of Engineering to explore the ways in which theatre can make scientific research more accessible and engaging to the public.

The result of that experimental process is this series of 14 short audio dramas written by engineers from diverse fields, connecting their specialist research to the lives of those that it directly impacts. Covering everything from cutting-edge breakthroughs to climate change, from red tape to rogue robots, ice storms and intrepid journeys into the unknown, these stories give us a snapshot of a changing world, where every new discovery has the potential to benefit, bewilder, endanger, or inspire mankind.

This project has been generously supported by funding from the Royal Academy of Engineering's Ingenious Award, which supports creative public engagement with engineering projects while providing engineers with skills and opportunities to share their stories, passion and expertise with the public.


Braw Fox Theatre specialises in developing and producing new writing and they seek to tell exciting stories inspired by and reflecting the human condition, producing new work by playwrights with something bold and urgent to say about the world.

# Curriculum for Excellence



This resource pack is designed to offer teachers stimulating questions, activities and additional resources that will enable students (age 12+) to engage meaningfully with our CreateWorks collection of 14 audio dramas. These short audio dramas have been written by professional engineers from the University of Edinburgh's School of Engineering and explore the communication of engineering research and ideas through drama.

This resource pack offers an interdisciplinary approach to the Expressive Arts, Sciences and Technologies elements of the Curriculum for Excellence and presents students with opportunities for positive experiences and outcomes in Literacy across learning.



You can use this resource pack either:

- To supplement your students' learning about areas of the Sciences and Technologies curriculums by listening to the audio dramas that present ideas relevant to the subject areas your students are studying.
- Or for a more in-depth and interdisciplinary approach you can use the Questions and Activities provided from page 20 onwards to explore how the Expressive Arts have been used as a tool to communicate concepts and research from the Sciences and Technologies.

A breakdown of the topics and themes covered by each audio drama is provided on page 8.

# Accessing the Audio Dramas

---



**The complete collection of audio dramas can be found at:**

[www.CreateWorks.eng.ed.ac.uk/audio-dramas](http://www.CreateWorks.eng.ed.ac.uk/audio-dramas)

The 14 audio dramas have been organised into five themes that link a collection of two or three audio dramas together.

**CONSCIENCE CALL**

**FUTURE TENSE**

**RED TAPE**

**OBSERVER EFFECT**

**REMOTE ACCESS**

Simply select a theme from the website menu then press play to listen to any of the audio dramas.

Each audio drama is no more than 7 minutes in length.

Some plays come with content warnings or strong language warnings, so please use your discretion in choosing which are appropriate for your students to listen to.

You can access the PDF of this resource and the scripts to all the audio dramas here:

<https://creativeworks.eng.ed.ac.uk/schools-resources>

# Credits

---

All the audio dramas were created as a collaboration between Braw Fox Theatre, the University of Edinburgh's School of Engineering, and our participant engineers, with support from the Royal Academy of Engineering's Ingenious Award.

For the CreateWorks project Braw Fox Theatre also worked with writer-in-residence Dave Fagnoli and sound designer Calum Paterson.

The actors in the CreateWorks audio dramas were:



**L-R Top:** Nicole Cooper, Kim Allan, Jaden Baker

**L-R Middle:** Sarah Miele, Adam Buksh, Joanne Randle

**L-R Bottom:** George Drennan, Ashley Smith, James Rottger

# Summary of audio drama collections & themes

## CONSCIENCE CALL

### *Following the Guidelines by Dr Camilla Thomson*

**Themes:** renewable energy, wind farms, environmental impact, climate change, carbon release, ethics

### *Pathways by Urwah Arif*

**Themes:** career choices, medical applications of engineering, ethics

## FUTURE TENSE

### *Too Much Tech? by Ruby Marshall*

**Themes:** robotics, biomimicry, technology inspired by nature, worries about technology, public concerns, future tech

### *A Jocund Company by Arun Pannir Selvam*

**Themes:** medical applications of engineering, teamwork, cancer, medical image processing (MRI, CAT scans), science fiction, future worlds

### *Life on the Meadows by Lesley Gibson*

**Themes:** future worlds, informal settlements, fire, safety, risk, vulnerable communities, displaced peoples





## RED TAPE

### **The Fury of Friday Evenings by Vasilis Koutsomarkos**

**Themes:** fire safety, risk assessment, methodology, housing design, bureaucracy

### **Launchpad by Selva Manikandan Athi Narayanan**

**Themes:** biotechnologies, new technologies, corporate applications of tech, innovation, enterprise, business

### **The Bouligand Structure by Chidume Nwambu**

**Themes:** technology inspired by nature, material sciences, material resilience, innovation, new ideas

## OBSERVER EFFECT

### **Adrift by Dr Encarni Medina-Lopez**

**Themes:** satellite imagery, data capture, data modelling, new ideas, environment, coastal imaging, machine learning, field trips

### **Salt of the Earth by Dimitri Mignard**

**Themes:** sustainable development, water access, desalination, condensation, global research, field trips

### **In The Lab by Dr Daniel Orejon**

**Themes:** surfaces, micro-scale, surface coatings, waterproofing, hydrophobic properties, resilience, materials, pollutants, innovation, new ideas

## REMOTE ACCESS

### **The Journey by Catherine Megregian**

**Themes:** ice, dangers of ice, extreme weather, Antarctica, limitations of existing technology, icephobic coatings, remote environments, field work

### **Into the Jungle in 3D by Kostas Bantounos**

**Themes:** 3D imaging, lasers, robotics, jungle, research, remote environments, field work

### **Risk and Vulnerability by Tom Reynolds**

**Themes:** cyclones, traditional materials, Madagascar, structures, humanitarian aid, ethics, journalism, remote environments, field work

# CONSCIENCE CALL

What happens when cutting-edge research runs into resistance from the people it was meant to help? This collection of audio dramas explores intriguing ethical dilemmas.

**Key themes:** renewable energy, wind farms, environmental impact, climate change, carbon release, ethics, career choices, medical applications of engineering

## ***Following the Guidelines by Dr Camilla Thomson***

Tackling thorny issues around the public perception of research, this audio drama sees environmental consultant Marjory conflicted between principles and practicality when she discovers that a new wind farm is set to release more carbon than it saves.

Dr Camilla Thomson is a Chancellor's Fellow in Energy. Her primary research interest is in better understanding the environmental impacts of changes to energy systems. Her work to date has focused on wind and marine power, and she is currently working with ClimateXchange to develop a detailed solar power dataset for use in Scottish Government energy models.

**Themes:** renewable energy, wind farms, environmental impact, climate change, carbon release, ethics



## Pathways by Urwah Arif

A man with severe clinical depression is offered hope through a revolutionary new treatment. But when he learns of an unexpected personal connection, he's forced to confront his life choices.

Urwah Arif is studying for her PhD at the Institute for Bioengineering. She wants school students to become more familiar with the wide variety of roles within the engineering profession, so that they can understand their own abilities and find the best career for them.

**Content warning:** discussion of depression and suicide

**Themes:** career choices, medical applications of engineering, ethics



# FUTURE TENSE

In these audio dramas we're looking to an uncertain future with stories exploring the challenges of a rapidly-changing world. As a privileged few benefit from new discoveries, what happens to those who won't, or can't, adapt?

**Key themes:** robotics, biomimicry, technology inspired by nature, worries about technology, public concerns, medical applications of engineering, teamwork, cancer, medical image processing (MRI, CAT scans), science fiction, future worlds, future tech, informal settlements, fire, safety, risk, vulnerable communities, displaced peoples

## **Too Much Tech? by Ruby Marshall**

As the world changes around them, a retired couple do what they've always done – bicker, tease, and comfort one another. But caught between new technologies, online extremists, and out-of-control robot lawnmowers, the benefits still feel remote.

Ruby Marshall is studying for her PhD at the Institute for Integrated Micro and Nano Systems. She is exploring how soft robotics and biomimicry can be used to enhance technology and help people through medicine, wearable technology, and even social robotics.

**Themes:** robotics, biomimicry, technology inspired by nature, worries about technology, public concerns, future tech



## ***A Jocund Company by Arun Pannir Selvam***

Putting a heightened, sci-fi spin on a story of teamwork and technical issues this audio drama takes place on a remote planet, where a skilled radiographer and a sassy engineer find themselves kidnapped by rebel fighters...

Arun Pannir Selvam is studying for his PhD at the Institute for Digital Communications. His research area focuses on medical image processing in cancer diagnosis, which aspires to become an integral part of clinical diagnosis and could vastly improve and personalise the available treatment options for patients.



**Themes:** medical applications of engineering, teamwork, cancer, medical image processing (MRI, CAT scans), science fiction, future worlds

## ***Life on the Meadows by Lesley Gibson***

Trapped in a shanty town in a post-disaster future, a former academic struggles to hold her community together. But when a fire breaks out, she must put her knowledge to the test, and her life on the line.

Dr Lesley Gibson has more than 16 years' professional experience in geographic information systems and remote sensing. She was a lecturer at Glasgow Caledonian University and has just completed a Postdoctoral Research Associate position at the University of Edinburgh focusing on fire safety for international development.



**Content warning:** distressing scenes (fire, building collapse, death)

**Themes:** future worlds, informal settlements, fire, safety, risk, vulnerable communities, displaced peoples

# RED TAPE

---

In this collection we face down the forces of bureaucracy, hypocrisy, scepticism, and self-interest with three stories that shine a spotlight on the dedicated scientists struggling to bring their innovations to the public.

**Key themes:** fire safety, risk assessment, methodology, housing design, bureaucracy, biotechnologies, new technologies, corporate applications of tech, innovation, enterprise, business, technology inspired by nature, material sciences, material resilience, new ideas

---

## ***The Fury of Friday Evenings* by Vasilis Koutsomarkos**

Set in a packed pub this is an offbeat comedy with a poetic twist. After a tough week, a group of engineers drink, de-stress, and vent about the red tape that keeps them from improving lives.

Vasilis Koutsomarkos is currently studying for his PhD at the Centre for Fire Safety Engineering at the University of Edinburgh's Institute for Infrastructure and Environment. His PhD project is the development of a Fire Robustness Index for the Built Environment.



**Content warning:** explicit language

**Themes:** fire safety, risk assessment, methodology, housing design, bureaucracy

---

## **Launchpad by Dr Selva Manikandan Athi Narayanan**

The story of a brilliant team of scientists who stand poised to help humanity with a radical new technology. But first they have to overcome the vested interests of the very corporations that could launch their eco-innovation.



Dr Selva Manikandan Athi Narayanan is a research associate at the Institute for Bioengineering researching bacterial biofilms – a thin surface layer formed by bacteria, which are often considered undesirable because of their stubborn adherence to the surface, but could, however, be beneficially used to produce valuable biobased products.

**Themes:** biotechnologies, new technologies, corporate applications of tech, innovation, enterprise, business

## **The Bouligand Structure by Chidume Nwambu**

Following a series of accidents and injuries at their company, an engineering team tests a potentially much more damage-resistant safety helmet based on a revolutionary new design inspired by nature.

Chidume Nwambu is currently studying for his PhD at the Institute for Materials and Processes. His research focuses on a bioinspired material called 'Bouligand Structured Composite'. A Bouligand structure is a rotated and twisted (helicoidal) structure like plywood, which has a high damage resistance. They can be found in naturally designed materials such as mantis shrimp, beetles and crabs.



**Themes:** technology inspired by nature, material sciences, material resilience, innovation, new ideas

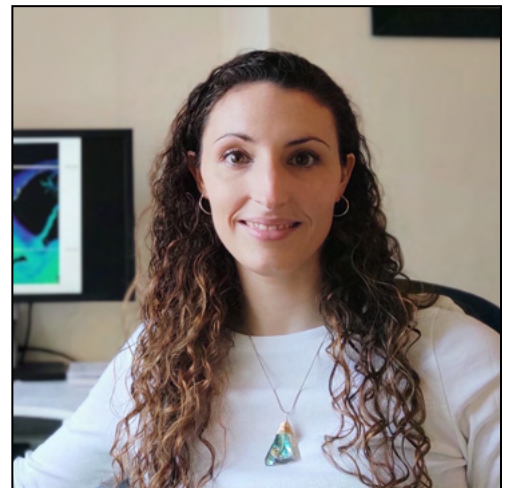
# OBSERVER EFFECT

These audio dramas explore unexpected perspectives, with stories about imaginative innovations and practical solutions to age-old problems. Can considering a new point of view change an individual, a community, or a whole industry?

**Key themes:** satellite imagery, data capture, data modelling, environment, coastal imaging, machine learning, sustainable development, water access, desalination, condensation, global research, field trips, surfaces, micro-scale, surface coatings, waterproofing, hydrophobic properties, resilience, materials, pollutants, innovation, new ideas

## ***Adrift* by Dr Encarni Medina-Lopez**

On a remote Scottish beach, a scientist tries to salvage equipment damaged in a storm. As she dwells on personal and professional struggles, she's interrupted by a phone call from her unsympathetic boss – forcing a long-overdue confrontation.



Dr Encarni Medina-Lopez is a Chancellor's Fellow in Data Driven Innovation, Space and Satellite at the Institute for Infrastructure and Environment. Her current research focuses on the use of remote sensing to tackle issues affecting water, energy and the environment, especially in coastal regions, using multispectral satellite imagery, in situ data, and machine learning.

**Themes:** satellite imagery, data capture, data modelling, new ideas, environment, coastal imaging, machine learning, field trips



## ***Salt of the Earth* by Dimitri Mignard**

Set during a field trial of a new irrigation technology this audio drama sees a researcher and a local villager swapping knowledge and planning for a future where new advancements have made traditional lifestyles more secure.

Dr Dimitri Mignard is a senior lecturer in the Institute for Energy Systems. His research focuses on the conversion and storage of renewable energies. He leads the University's Sustainable Development Research Group which aims to develop approaches, techniques, and technologies that are adapted and effective for improving the lives and livelihoods of communities in low-income countries through targeted research that addresses issues of access to food, water, and energy.



**Themes:** sustainable development, water access, desalination, condensation, global research, field trips



## ***In The Lab* by Dr Daniel Orejon**

A charming slice of high-energy absurdism that imagines a conversation between two experiments – rivals under neighbouring microscopes – bickering through the wee small hours in a University of Edinburgh lab.

Dr Daniel Orejon is a Lecturer in Chemical Engineering at the Institute for Multiscale Thermofluids. His research focuses on the interactions between liquids and solid surfaces which are ubiquitous in nature and relevant to everyday life, industrial, biological, medical and pharmaceutical applications, including heat transfer, liquid films, evaporation, condensation and wettability.

**Themes:** surfaces, micro-scale, surface coatings, waterproofing, hydrophobic properties, resilience, materials, pollutants, innovation, new ideas

# REMOTE ACCESS

These audio dramas set out on expeditions to inaccessible environments, following intrepid characters through snow, storms, and trackless jungle, where the right equipment might just save your life.

**Key themes:** ice, dangers of ice, extreme weather, Antarctica, limitations of existing technology, icephobic coatings, 3D imaging, lasers, robotics, jungle, cyclones, traditional materials, Madagascar, structures, humanitarian aid, ethics, journalism, research, remote environments, field work

## *The Journey* by Catherine Megregian

Skilfully balancing two fast-paced, interwoven stories, this audio drama follows a couple rushing to an airport through icy conditions, while elsewhere a pair of scientists contend with the dangers of a trip to Antarctica.

Catherine Megregian is currently studying for her PhD at the Institute for Materials and Processes. Her research is investigating the performance of a variety of icephobic coatings. She is interested in how functional coatings are integral to our lives but their prevalence is unrecognised by most people and how the ability to impart properties such as corrosion-resistance, hydrophobicity, or self-healing on an object can give us unprecedented control over the world around us.



**Content warning:** explicit language

**Themes:** ice, dangers of ice, extreme weather, Antarctica, limitations of existing technology, icephobic coatings, remote environments, field work

## ***Into the Jungle in 3D* by Kostas Bantounos**

An enthusiastic researcher and a sceptical professor disagree on the use of a new 3D-imaging technology. But when they're thrown together on a derailed surveying expedition, the technology will unexpectedly be put to the test.

Kostas Bantounos is currently studying for his PhD at the Institute for Integrated Micro and Nano Systems. His research focuses on depth (3D) imaging, which is often misunderstood but is becoming more and more prevalent in people's lives through its use in devices such as iPads, gaming, Virtual or Augmented Reality applications, automotive driver-assistance systems and (soon) in driverless vehicles.



**Themes:** 3D imaging, lasers, robotics, jungle, research, remote environments, field work

## ***Risk and Vulnerability* by Tom Reynolds**

As a cyclone batters a Madagascan village, a disinterested journalist reports on the story back in the UK. Contrasting face value statistics with the real human experiences behind them, this is a story of ingenuity, endurance, and community spirit.

Tom is Chancellor's Fellow in Civil Engineering at the Institute for Infrastructure and Environment. He does research on structural engineering using unusual materials, particularly plant-based materials like wood and bamboo. He is part of a team studying cyclones in Madagascar, including engineers, climate scientists and experts in adaptation, from the UK, Kenya and Madagascar, without whom it wouldn't have been possible to write this drama.



**Content warning:** distressing scenes (natural disaster)

**Themes:** cyclones, traditional materials, Madagascar, structures, humanitarian aid, ethics, journalism, remote environments, field work

# EXPLORING THE TEXTS

The following questions will help you to explore the audio dramas in greater depth.

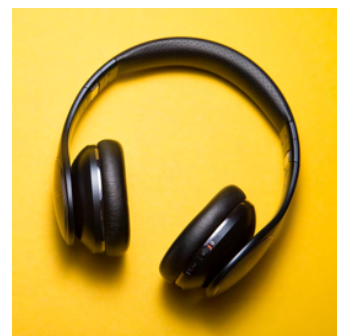
You may want to focus on one audio drama that has the most relevance to topics that you are covering with your students or you could choose a few audio dramas and compare how the different dramas engage with their topics.

**ANALYSIS:** What is this audio drama telling us?

- FACTS – e.g. “biomimicry is a form of robotics inspired by nature”
- PEOPLE – who are the characters being used to tell the story? What do we know about them? What are they like?
- OPINIONS/FEELINGS – what do the characters believe or feel strongly about? What do we know about why they feel or believe this?
- ACTIONS/CONSEQUENCES – what do the characters do as a result of their opinions/feelings? What happens because of their opinions/feelings?
- CONFLICT – what conflicts occur in the story? This could be conflict between two characters, a character’s internal conflict with themselves, or a conflict between a character and an obstacle (e.g. a machine is not working and they must fix it)
- RESOLUTION – how is the conflict resolved in the story? Is it resolved happily or unhappily?

**EVALUATION:** How is the story telling us these things through use of:

- DIALOGUE – what is said
- ACTION – what is done
- TENSION – what *might* happen



**EFFECT ON AUDIENCE:**

- ⇒ What is our response to the story as a listener? How does all of this make us feel?
- ⇒ Did we care about what happened, and if so, why?
- ⇒ Can we see the real-world impact of the subject of this story? Who could benefit and who could be harmed?
- ⇒ How did presenting the ideas in this audio drama through story help you to connect to it in a different way than hearing it as a factual presentation?

# ACTIVITIES TO ENGAGE WITH THE TEXTS

The following activities offer opportunities to use written and spoken work or role-play and improvised performance to further explore themes and questions brought up by the audio dramas and also to explore how drama and story can be used to communicate scientific or technological information.

**WRITTEN: 'INSPIRED BY'** – choosing one of the audio dramas, write a creative response to part of the story. This could be:

- a news article about an event that takes place in the story
- a diary entry or blog post written by one of the characters (think about the difference between what would be written for private and public platforms)
- a series of tweets responding to events in the story as they take place

**WRITTEN/SPOKEN: 'BEST AND WORST'** – reflecting on what is the core message or information in one of the audio dramas, imagine a best-case scenario and a worst-case scenario for a world where that information or message is either adopted or ignored. This could involve imagining an alternate ending for the audio drama itself or could take place in the future of the audio drama world.

- e.g. WORST – because people are afraid of robotics becoming too life-like they reject all technology and potential life-saving advances are lost
- e.g. BEST – people see the benefits of nature-inspired robotics and incorporate them into their lives in ways that offer major improvements to their quality of life

**SPOKEN: 'ON TRIAL'** – choose two characters from one of the audio dramas who are in conflict with each other because they have different beliefs or opinions.

- Imagine that they are putting their opposing arguments to a jury and must win support for their idea.
- Take 10-15 minutes to prepare a 1 minute opening statement, a 2 minute main argument, and a 1 minute closing statement.
- Present both sets of statements to the jury who will then vote on who is right.
- The jury must vote on who presented the best argument, not on what they personally believe is right.

This activity could be done individually, or in teams of 3 or more.

The audio dramas best suited to inspire this activity are: *Following the Guidelines*, *Too Much Tech?*, *Launchpad*, *Into the Jungle in 3D*.

**SPOKEN/PERFORMED: 'WORLD CHANGING'** – the core statement that inspired our audio drama writers was “My research could change the world because...”

In pairs, work through the following questions and ideas to create an improvised scene between two characters.

- Choose a scientific or technological discovery that either doesn't yet exist or isn't being widely used, but that you believe could change the world.
- How could it change the world?
- Who would it change the world for? This will be Character A.
- Who might oppose this change? This will be Character B. (Opposition could look like: refusing to use it, being excluded from using it, wanting to abuse or exploit it)
- Now you have two characters in conflict with each other. Character B is going to create an obstacle or challenge for Character A.
- How will the story end? Happily or unhappily?
- REFLECT: would someone watching your scene care about and understand your world-changing discovery?

## FURTHER RESOURCES:

### About the core team



AMY MCKENZIE is a freelance theatre maker, director, arts administrator and dramaturg. In all these roles she specialises in supporting, developing and producing new writing and working closely with writers. She currently works for Playwrights' Studio, Scotland and has also worked at the Traverse Theatre and with theatre companies such as Catherine Wheels, Lung Ha, and Grid Iron.

JO RUSH works primarily as a theatre director making plays around Scotland and also as a dramaturg, which is a sort of 'drama midwife' helping writers to create their work. She has worked on productions with the Lyceum Theatre, Edinburgh, National Theatre of Scotland, Dundee Rep and the Traverse Theatre.



DAVE FARGNOLI is a playwright and theatre critic, originally from Edinburgh but now based in London. As a critic, you can find his reviews in print weekly in *The Stage*, and online periodically at *Exeunt Magazine*. As a playwright, he is drawn to telling stories about internal struggle, about characters in search of identity, justice, or compassion.



DR. DAVID RUSH is a senior lecturer in structural engineering within the Institute for Infrastructure and Environment at the University of Edinburgh. The research he conducts is designed to support safe and resilient built environments, to reduce environmental and economic costs of construction, and to promote engineering in the everyday lives of society.



# About the University of Edinburgh's School of Engineering

The University of Edinburgh's School of Engineering has a proud heritage of producing ground-breaking thinkers, inventors, and leaders. They address diverse complex challenges across the entire field of engineering, at the micro- and macro/global scales. At the microscopic scale, their research supports the design and deployment of novel nanotechnology and devices for biological monitoring and medical diagnosis; at the macro/global scale, it optimises the security and sustainability of the built environment and develops engineering solutions to climate change issues.

The writers in the CreateWorks Project come from across all the School of Engineering's research institutes and range from PhD students to Post-Doctoral Research Assistants, Fellows and Lecturers.

Engineering has been taught at the University of Edinburgh in one form or another since 1673. Just some of our engineers who have left their imprint on the world, include; Robert Stevenson, designer of lighthouses; Dorothy Buchanan, first female member of the Institution of Civil Engineers; Sir Duncan Michael, designer of the Sydney Opera House wings; and Stephen Salter, inventor of the Salter Duck wave power device.

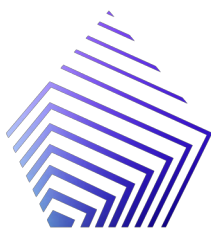


THE UNIVERSITY *of* EDINBURGH  
School of Engineering

# About the Royal Academy of Engineering

The Royal Academy of Engineering harnesses the power of engineering to build a sustainable society and an inclusive economy that works for everyone. In collaboration with their Fellows and partners, they are growing talent and developing skills for the future, driving innovation and building global partnerships, and influencing policy and engaging the public. Together they are working to tackle the greatest challenges of our age.

The Ingenious programme offers grants of up to £30,000 to support creative public engagement with engineering projects while providing engineers with skills and opportunities to share their stories, passion and expertise with the public.



**Royal Academy  
of Engineering**

**Ingenious**

# FURTHER RESOURCES:

## Reflections from the team

### CreateWorks: the hypothesis

#### Blog post by Jo Rush, director, about the idea behind the project

What have theatre and engineering got to do with each other? It's hard to see any obvious connection on the surface and I certainly didn't spot it myself at first.

However, both engineering and theatre ask questions about our world. Engineers figure out how things work, finding practical solutions and creating innovations that make the most of scientific discoveries. In theatre we try to figure *ourselves* out and understand our place in the world.

And this is what brought us to our concept for this project – if engineering acts as a vehicle through which **knowledge** and **applications** are generated and theatre is a vehicle for **communication**, then by bringing these two disciplines together we can create **understanding**.

But what does that mean practically? Well, back in 2012 a chance conversation between myself and researchers from the School of Engineering caused us to stumble upon an interesting problem. Academics had completed exciting and important specialist research, but they were struggling to make this research heard outside of the usual channels of conferences, journals, and already-informed audiences of fellow academics. A throwaway comment about how I “should make a play about it” led me to ask a simple question: “what impact does this research have on an average member of the public?” I then began to use my background as a theatre-maker to create ideas for how a theatre production could explain and embody this research to make a public audience (without an engineering background) really care about its impact.

This led to the creation and performance of ‘*Design by Disaster*’ by Dave Fagnoli – a play that questions our changing awareness of fire safety design, society's desire for answers from engineers only when things go wrong, and an engineer's responsibility to make their voice heard. The play was performed in 2018.

After the successful process of creating this work directly inspired by research, the School of Engineering and Braw Fox Theatre began shaping the outline for the project that is now CreateWorks. We looked at what theatre and engineering have to offer one another and how this could improve communication between engineers and the public.

Our hypothesis was this:

- Through engaging in a creative writing process, engineers would be able to:
  - ⇒ express their complex research to wider audiences by humanising its context
  - ⇒ learn more about their research and what impact it may have on people and society
  - ⇒ inspire new research thinking and encourage a new cohort of students to follow engineering careers
- By training engineers in theatrical skills, they would be better able to communicate their knowledge and expertise to wider, more diverse audiences.
- And, through connecting the disciplines of theatre and engineering we would instigate creative partnerships that develop new drama-led methods of disseminating research in the future.

As a result of these processes we hope that:

- The public would connect positively to engineering research by being engaged through story and in ways that spark their imagination and connect on a personal level
- Engineering research could begin to provide a vital source of exciting material for theatre-makers that want to be future-focused
- Links would be forged between the engineering and theatre communities that will create the potential for further research-inspired collaborations that take engineering research to new audiences

It's been so much fun exploring these new ways to use our skills as theatre makers and opening up the techniques and benefits of theatre making with our participant engineers.

**“Communication works for those who work at it.” John Powell**

---

**Blog post by Amy McKenzie, director, reflecting on the CreateWorks Skills Workshops on VOICE, PHYSICALITY and DIRECTING YOURSELF**

The thinking behind the CreateWorks Skills Workshops was simple. Trained theatre professionals leading workshops to offer concepts and skills to engineers to improve their communication. However, there are many ways to improve communication and we all develop, grow, and process in completely different ways. We also all know that there is no perfect way to communicate with every person, and in every scenario, and defining what makes a great communicator isn't always easy. How do you distil and understand what makes a great communicator? And is communication a form of art or a science?

There may be no perfect way to communicate, but we can all recognise bad communication. Be that someone giving a presentation with their eyes glued to their notes, stuck to the spot, speaking in a monotone voice. Or someone who has a lot of passion, but that passion gets lost behind a nervous excitement or energy, or maybe a simple lack of preparation. Or someone who seems to do all the right things but still fails to communicate what they really want or need, and so can't inspire others in the way they intended. With all that in mind, we set out to create what we referred to as a “tapas of techniques” that the engineers could try, get a feel for, and then decide what would be useful for them to use as part of their work.

---

The first workshop focused on the voice, led by professional actor and voice coach Joseph Brown. Joseph has worked both as a performer and as a vocal coach for those in the performance industry, children with motor-based speech difficulties, and adults who want to improve their voice in a professional context. Joseph explained theories and led demonstrations on using the muscles of the body to support the voice in an effective and safe way, controlling the voice under pressure, articulation, and how to use the voice to engage an audience.

The second workshop concentrated on physicality, led by professional actor and acting tutor Kirsty Eila McIntyre, who has worked in both classical scripted theatre and physical theatre. She led the participants in techniques of how to breathe and ground yourself physically to control nerves, how to maintain open and confident body language, how to engage audiences with focus and confidence, and how to be physically present.

---

The third and final workshop as part of the series was on directing yourself, which I led with support from my colleague and long-time collaborator, Jo Rush. This third workshop completed the trio of ideas related to what you need for great communication; the voice, the body, and the mind. As a theatre director, you need to lead the artistic vision and to lead the team to actualise your vision for a show. To do this you need a creative idea, but you must also be able to communicate that idea, not just in concept but by guiding the team through the actions that are needed to achieve it. Through the workshop we broke this down into useable skills for our participants with theories and exercises about how to prepare yourself for communicating, observe your audience, be in the moment, use active listening, and give critical feedback.

---

We don't always take the time to prepare ourselves to be good communicators with whatever audience we find ourselves in front of or take time to reflect afterwards about how it went. Most of the time we're just glad it's over. Talking about communicating can feel a bit awkward and maybe on one level we might feel a bit embarrassed that we aren't better at something that seems to come naturally to others. Here's the big secret; there are very few people that it truly comes naturally to, it takes work, it takes practice, and it takes time.

---

So, is communication a form of art or a science? Well, I've come to the conclusion, that maybe effective communication is art plus science. Understanding the way communication works and how we react to it, by definition, is a science, and the expression of that learned knowledge is an art. We hope that the techniques we have shared as theatre professionals will truly enhance how the engineers that we worked with make themselves heard.

### **Blog post by Dave Fargnoli, playwright, about the process used to teach writing for performance**

Everyone can tell a story. Most of us can recognise without any conscious effort the difference between a statement, like:

*"I nearly missed the bus"*

Or an anecdote:

*"...Come round the corner and the bus is idling at the stop. I go running for it – it pulls away at the last second – gah! – and I shake my fist at the driver in the rear-view mirror. Which is when he sees I'm there, stops a wee bit ahead of me, and opens up the doors.*

*And I get on. Very awkwardly.*

*'Single up town please.'*"



When we tell a story, we're crafting a sequence of statements into a narrative, communicating information – real or imaginary – to our listener, or our reader. That's true whether you're writing a play or a research paper, a best-man's speech or a eulogy. The only difference is the style – and maybe the number of jokes you want to include.

When Jo and Amy from Braw Fox Theatre invited me to join CreateWorks as Writer-in-Residence, I got excited. Interdisciplinary work opens up new perspectives and allows you to consider your own methods from unexpected angles. Guiding our expert engineers through the process of crafting their own audio dramas – for some of them the first literary writing they've attempted since school – felt like a great opportunity to nurture a creative response to cutting-edge scientific discoveries. To reach new audiences, and even to remind myself of the foundational skills that make the writing process run smoother.

So, I got excited. And I wrote dozens of pages of notes and rehearsed them, out loud, in front of a mirror, which is the only way to tell if a performance text really works. I laid out, as I understood them, the key points I always bear in mind when I'm working on a writing project:

*What am I trying to say here?*

*What am I **actually** saying here?*


And most importantly:

*What's my audience going to feel or understand or think about because of this?*



The thing that separates performance text from everyday conversation is intention. Everything that passes through a play is crafted to communicate an idea to the audience. It is a story, not a statement. Working closely together, Jo, Amy and I defined a clear, concise method for the project's participants to follow, step by step.

It was an intense programme packed into four, dense sessions. We went methodically but swiftly from the absolute basics – what makes a story? What makes a story interesting? – through details of character, setting, and sensation. We discussed stakes and pacing and genre, and watched, delighted as each participant took these building blocks and built their very own, very different, very diverse plays. The results blew me away. Our participants were so generous with their time, so open to the process, so free with their creativity.



And so, we have stories about climate change and corporate influence, stories of rogue robots, rebellions, and Friday nights down the pub. We zoom in to the microscopic scale and zoom out to take in vistas of some of the world's remotest landscapes. There's grim futures and there's optimism, and there's a fierce determination to be heard, to find solutions, to make the world work better. In that instinct, a playwright and an engineer are not so far apart.

I'm proud of what our cohort of participants have achieved, and I'm excited for them to share their stories – and the research behind them – in a new way and with a new audience.



# FURTHER RESOURCES:

## Websites



### The University of Edinburgh

[www.ed.ac.uk](http://www.ed.ac.uk)

- For more on how the University works with Edinburgh schools see:  
[www.ed.ac.uk/local/university-city/schools](http://www.ed.ac.uk/local/university-city/schools)

### School of Engineering

[www.eng.ed.ac.uk](http://www.eng.ed.ac.uk)

### The Royal Academy of Engineering

[www.raeng.org.uk](http://www.raeng.org.uk)

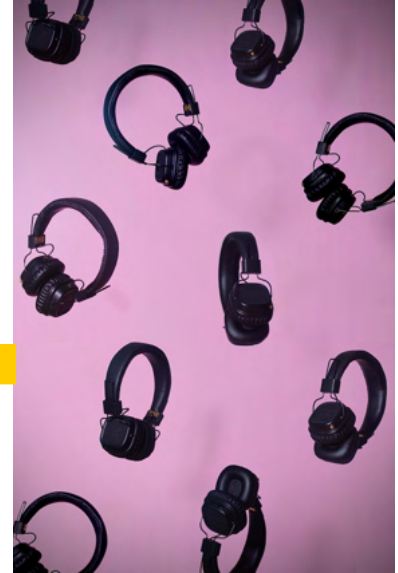
- Their STEM Learning Resources can be found here:  
[www.raeng.org.uk/education/schools/teaching-and-learning-resources](http://www.raeng.org.uk/education/schools/teaching-and-learning-resources)
- This is Engineering website:  
<https://www.thisisengineering.org.uk/>

This website provides resources to show the variety of engineering roles that are possible through the Royal Academy of Engineering's This Is Engineering campaign to bring engineering to life for young people.

## FURTHER RESOURCES:

### Websites continued

---



#### Edinburgh Science Festival

[www.sciencefestival.co.uk](http://www.sciencefestival.co.uk)

- Their teacher support and learning resources can be found here:  
[www.sciencefestival.co.uk/teacher-support-and-resources](http://www.sciencefestival.co.uk/teacher-support-and-resources)

#### Playwrights' Studio, Scotland

[www.playwrightsstudio.co.uk/programmes/online-learning/whats-the-big-idea-with-oliver-emanuel.aspx](http://www.playwrightsstudio.co.uk/programmes/online-learning/whats-the-big-idea-with-oliver-emanuel.aspx)

- This site offers a great online resource providing videos on the basics of playwriting.
- 

#### Traverse Theatre, Edinburgh

[www.traverse.co.uk/get-involved/schools/class-act](http://www.traverse.co.uk/get-involved/schools/class-act)

- Here you can find more information about the theatre's education project, 'Class Act', which challenges senior pupils from across Edinburgh to become artists and writers, creating brand new creative work to be premiered on the Traverse Theatre stage in performances with professional actors and creatives.

# KEEP IN TOUCH

---

You can contact us at [BrawFoxTheatre@gmail.com](mailto:BrawFoxTheatre@gmail.com)

Or visit our project website at [www.CreateWorks.eng.ed.ac.uk](http://www.CreateWorks.eng.ed.ac.uk)

The three main project collaborators can be found on Twitter at:

[@BrawFox](https://twitter.com/BrawFox) – theatre company

[@SchoolOfEng\\_UoE](https://twitter.com/SchoolOfEng_UoE) – School of Engineering, University of Edinburgh

[@RAEngNews](https://twitter.com/RAEngNews) – Royal Academy of Engineering

---



Credits for images used in this resource:

[C D-X](#), [Jon Tyson](#), [Ilias Chebbi](#), [Henry Be](#), [rupixen.com](#), [dusan jovic](#), [insung yoon](#), [Ross Sneddon](#), [Laura Chouette](#); all on [Unsplash](#)

# FEEDBACK SURVEY FOR STUDENTS:

Please ask the group of students who participated in the activities provided by this resource pack the following questions and record the number of students who respond Yes/No/Not Sure.

	Yes	No	Not sure
I enjoyed the activity			
I enjoyed the audio dramas that I listened to			
I learnt something new about engineering			
I gained a deeper understanding of what engineers do			
I have a better understanding of how engineering improves our lives			
It inspired me to find out more about engineering			
I would recommend the CreateWorks audio dramas and activities to other people			
<b>Age range of students who participated</b>			
<b>Postcode/s for your school catchment area</b>			

**You can post this survey back to us at:**

Dr. David Rush, 3.26 William Rankine Building, School of Engineering,  
Thomas Bayes Road, King's Buildings EH9 3JL

**Or alternatively, you can complete this survey online at:**

<https://edinburgh.onlinesurveys.ac.uk/createworks-schools-resource-activity-feedback>