Space in Schools: Careering Into Space

Career Focus

My job in 3 words
Interesting
Challenging
Opportunities

Amber Fitzpatrick (She/Her)
Graduate Engineer
Rolls Royce

Find our more about Amber's job at Rolls Royce here or spacecareers.uk for information on jobs, internships and degrees.

I am a graduate engineer and I move around different departments in Rolls Royce so that I can learn about engineering power systems. I investigate creative and innovative ways the country can generate and deliver power.

Q. What skills are vital for your job?

A. Clear communication is really important in technical situations to get your point across and to avoid confusion. Having a willingness to learn has helped me the most in my job.

Q. What does a typical day in your job look like?

A. Since I move around departments a lot, every day is different! I usually have a lot of experimental work that tests the safety of the systems we use which is really important to power sys-

Q. Who do you work with?

A. I work with a diverse range of senior engineers who have been in the business for 30+ years. I also work with managers who have a lot of responsibility.

Q. How does your job link to everyday life?

A. Part of the job I do impacts on how the electricity you use in your homes and schools is produced and delivered to you.

Q. What role do imagination and curiosity play in your job?

A. Curiosity is critical to my job. I come into departments and question everything they do, to help find the best ways of working and come up with new solutions.

Q. What advice would you give to someone interested in working in the space industry?

A. Give it a go! There are so many different jobs available that you don't need to narrow down

Q. What inspired you to do what you do?

A. My masters degree in Physics and Space Science really helped me to figure out what I like and what I don't. I would recommend doing what makes you happy and feel fulfilled.

Fantastic Fact: Amber enjoys playing frisbee and her house is like a jungle as she has a lot of house plants!

Activity: Investigate different ways of generating power. **Link.** Which ones could be used in space?

Space in Schools: Careering Into Space

Career Focus

My job in 3 words

Interactive

Creative

Learning

Catherine Greene (She/Her)

Head of User Centred Design

Satellite Applications Catapult

Find our more about Catherine's job and uses for satellites at sa.catapult.org.uk/projects/

I help people get information that will support them in solving a problem and make a better decision. I work with scientists and engineers, developing new ideas for how space technology could be used to benefit people on Earth.

Q. What skills are vital for your job?

A. Good communication skills and empathy. Putting yourself in the shoes of others and understand their point of view is important and allows you to make connections between things.

Q. Who do you work with?

A. I work in a team of designers and we work with other teams in our organization including data scientists, engineers and project managers. I also speak to the people who use our products (the end user) such as fishermen, farmers, paramedics and local councils. I really enjoy meeting people with different skills and backgrounds to me.

Q. What role do imagination and curiosity play in your job?

A. A really important role. Creativity helps people imagine the future they want to create. The technologies we use can be hard to understand, imagining how they could work and what effect they could have on a person, place or ecosystem is helpful.

Q. How does your job link to everyday life?

A. We create new products and services that we hope will improve lives. For example, showing a local council where pollution is running into rivers can help them stop it happening.

Q. What advice would you give to someone interested in working in the space industry?

A. There are so many different skills needed in the space sector, so do what you are good at.

Q. What inspired you to do what you do?

A. I was always good at art and design at school so I decided to go to art school and study textile design which led into product design. I discovered that inspiration for new products was most likely to be found by speaking to the people who would use them.

Fantastic Fact: Catherine grew up on a farm in Ireland and often helped deliver baby lambs.

Activity: Watch this video on how satellites track plastic **Link.** What other uses can you think of for satellites?

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Career Focus

My job in 3 words

Exciting

Collaborative

Challenging

Mirko Viviano (He/His)

Electrical Systems Engineer

Airbus Space and Defence

Find our more about Mirko's job at https://www.airbus.com/en

I help build satellites that go into space and allow us to do things like watch TV and use the internet. My job is to design and build the electrical parts of these satellites and to test it and make sure it works perfectly before it goes to space. I even write the instructions on how to use the satellite.

Q. What skills are vital for your job?

A. Problem solving and critical thinking are essential. Good communication is really important too so I can ask for help, discuss problems and explain to others what I have done.

Q. What does a typical day in your job look like?

A. It usually starts with a coffee, answering emails and making my to do list. Some days I write documentation, other days I spend all day in the lab working with electronics. Brainstorming meetings can last all day to decide the best way to design or fix something.

Q. Who do you work with?

A. I always work in a team, Space missions are highly collaborative and the key to success. I work with other engineers to exchange ideas with, with project managers to make sure I meet deadlines, and technicians who can help build the satellites.

Q. What advice would you give to someone interested in working in the space industry?

A. The best advice I can give is to stay curious, keep learning, and ask questions to understand how things work.

Q. What role do imagination and curiosity play in your job?

A. Curiosity is the main driver in the space industry. We wonder what is in space and how we can communicate or live in space. Imagination shapes the way I design and test satellites.

Q. What inspired you to do what you do?

A. When I was younger I wanted to become as Astrophysicist. Understanding why we are here and where we come from are the questions I am fascinated by. As a space engineer I get to contribute to answering them.

Fantastic Fact: I helped develop moon landing technology for when we return to the Moon.

Activity: See all the satellites in space here. Investigate a few satellites, what do they look like? What is their mission?

Space in Schools: Careering Into Space

Career Focus

My job in 3 words

Challenging

Interesting

Varied

Neeta Karia (She/Her)

Early Careers & Skills Development Coach

BAE Systems

Find our more about the variety of roles Neeta supports at www.baesystems/com/en/careers

I support the people on our graduate programmes. I make sure they succeed by coaching them and by delivering fun sessions around learning.

Q. What skills are vital for your job?

A. I have to be confident to stand up in front of people and deliver sessions. It is also important that I am a good active listener so people will come to me if they need help.

Q. What does a typical day in your job look like?

A. Delivering in person sessions means an early start to set up and then the day is spent working with our graduates. For coaching, I usually work remotely and this involves a number of 1-2-1 calls with graduates.

Q. Who do you work with?

A. I work alongside other skills coaches in my team but we also work with a lot with the smaller teams in the business. For example, the business groups for Air, Submarines and Naval ships.

Q. How does your job link to everyday life?

A. My job is paramount to everyday life. I help people become the best they can be by helping them develop emotional intelligence, people skills and build relationships which are all vital to collaborative working and success.

Q. What role do imagination and curiosity play in your job?

A. I use my imagination to bring things to life in the sessions I deliver. I do this using stories, or my own experiences. If I think the graduates aren't understanding what I am teaching then I have to use my imagination to find a new way of explaining things.

Q. What inspired you to do what you do?

A. I love working with people and enjoy sharing knowledge and ideas. I love the light-bulb moments when someone understands what you mean and how they can apply it in the workplace.

Fantastic Fact: Neeta has a law degree and was self-employed before she began working for BAE Systems.

Activity: The activities here will help pupils improve their communication and teamwork.

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Career Focus

My job in 3 words
Rewarding
Exciting
Patient

NAME Peter Shanahan (He/His)
Environmental Specialist
Civil Aviation Authority (CAA)

Find our more about careers at the CAA at https://stem.caa.co.uk/

As an environmental specialist, I look after environmental protection matters if a company wants to launch a space rocket from the UK. My job is to make sure it is done safely and without hurting the environment or wildlife.

Q. What skills are vital for your job?

A. Being good at communicating is very important. I work with different people in my space team, and also with people outside the Civil Aviation Authority, including government officials, rocket builder and environmental experts. They all have different skills and knowledge so I have to make sure all the information is understood correctly.

Q. Who do you work with?

A. I work with many different people to get a company into space. I am part of licence application teams, which includes women and men, with specialities in engineering, safety, computer security, law specialists, I work alongside environmental experts to help me look after the environment around launch sites.

Q. What does a typical day in your job look like?

A. I work from home in Lancaster in northwest England in a hybrid role, with the main office near London. I answer many emails and have meetings on environmental topics to ensure a safe launch. I enjoy working with others, especially the safety engineers who enjoy a laugh.

Q. What inspired you to do what you do?

A. I used to work as an aircraft mechanic but left that to pursue a career in environmental management. This is role is a chance to combine my interests.

Q. What advice would you give to someone interested in working in the space industry?

A. Find what interests you, give it a try and see where opportunities may take you.

Q. How does your job link to everyday life?

A. The satellites I help to launch are used in TV, weather forecasting and much more!

Fantastic Fact: Peter also uses his knowledge about the environment in his volunteer role for Mountain Rescue

Activity: Can you launch your own stomp rocket? **Link**

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Career Focus

My job in 3 words
Exciting
Creative
Fun

Silvia Dalla (She/Her)
Professor of Solar Physics
University of Central Lancashire

Find our more about space weather here Space Weather - Met Office

I study the physics of the Solar wind, the wind of particles that blows from the Sun. I analyse measurements from spacecrafts to help understand it and predict when the solar energetic particles will hit Earth. This is what we call space weather, the effect of the Sun's activity on Earth. I also teach physics and astrophysics to students at University.

Q. What skills are vital for your job?

A. Problem solving and logical thinking are really important when I analyse the data from the Sun. Computer programming is also really helpful in this analysis and a great skill to have.

Q. What role do imagination and curiosity play in your job?

A. They play a very important role because in my job, I ask scientific questions and then come up with a plan to research and answer them. My curiosity helps me to identify new topics to research and new questions that need to be answered.

Q. Who do you work with?

A. I work closely with colleagues both on the teaching and the research parts of my job. When doing research I collaborate with scientists all over the world who are also trying to understand space weather, including people at NASA.

Q. How does your job link to everyday life?

A. Space weather affects satellites and astronauts in space: to protect them my research helps develop and improve the forecasts. My work with students at the University also prepares them for their future careers.

Q. What advice would you give to someone interested in working in the space industry?

A. Keep learning, especially maths and physics. Follow your curiosity and ask questions.

Q. What inspired you to do what you do?

A. I enjoyed studying physics at school and I liked the idea of being involved in new scientific discoveries.

Fantastic Fact: Gas ejected from the Sun interacts with Earth's magnetic field and produces the Aurora.

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Career Focus

My job in 3 words

Creative

Inspiring

Teamwork

Dr Steven Mark Beard (He/His)

Software Engineer

UK Astronomy Technology Centre

Find our more about Steven's job at https://www.ukatc.stfc.ac.uk/

I program the computers that astronomers use to control the instruments on their telescopes and I create the software needed to look at the data. Recently I've worked on the Mid-Infrared Instrument on the James Webb Space Telescope to look at stars that are forming and distant galaxies at the edge of the universe.

Q. What skills are vital for your job?

A. Curiosity and innovation, because the answer to a problem might not be the obvious one. Good at problem solving, because sometimes the computer doesn't do what it should do .

Q. What does a typical day in your job look like?

A. It usually begins with a team meeting, we talk about what the instrument we are building needs to do, how to design it, or if we've already done that, plan how to test if the instrument works. Then we spend the day working on the design or in the lab testing the instrument.

Q. Who do you work with?

A. I work in a team of managers, scientists and engineers. This means I don't have to be good at everything. We work together to build something none of us could have done on our own.

Q. How does your job link to everyday life?

A. Everything from cars and mobile phones to washing machines rely on software to control them, this software is created by people like me.

Q. What advice would you give to someone interested in working in the space industry?

A. If something doesn't work, keep trying and learn from your mistakes.

Q. What inspired you to do what you do?

A. I have always been curious and wanted to know how things work, and I liked playing with my Meccano set ats a child. The Apollo moon landings inspired me and now I help build the instruments that contribute to new discoveries about the universe.

Fantastic Fact: The Mid-Infrared Instrument (or MIRI) detects light from objects invisible to our eyes. The instrument is a bit like wearing night vision goggles and detects the heat from the stars and galaxies. MIRI can see through clouds of gas and dust to reveal cosmic secrets.

Activity: Can you fold a piece of paper like the James Webb Space Telescope? **Link.**

Space in Schools: Careering Into Space

Power Systems Engineer

Amber Fitzpatrick

Graduate Program

Rolls Royce

What is my job?

As a recent graduate from university I am still learning about power systems. I investigate creative and innovative ways space crafts can generate and deliver power. This also impacts how we produce the electricity you use in your homes and schools.

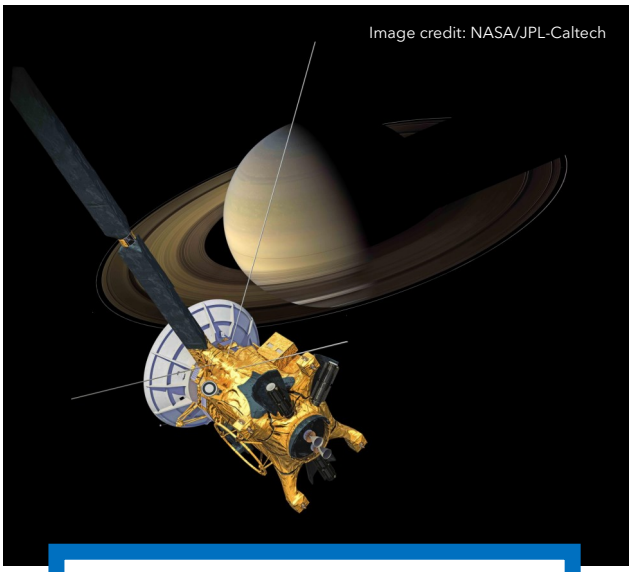
Graduate Programs

When students complete their university studies they graduate with a degree. Many companies **recruit** graduates and teach them the specific knowledge they need.

Power Systems

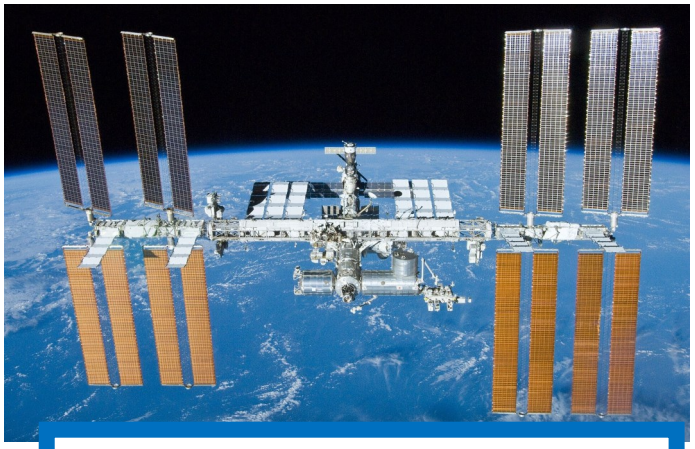
A power system is the process of generating, storing and distributing electricity to where it is needed. Electricity can be produced in different ways using coal, oil, gas, nuclear or renewable resources.

Image credit: NASA/JPL-Caltech



This is the Cassini **satellite** sent to investigate Saturn in our Solar System in 1997. It is too far away from the Sun to use solar power so uses nuclear energy.

Image credit: Crew of STS-132 on space shuttle Atlantis



Astronauts live and work on the International Space Station so need to create the power they need. They use the solar panels to harness energy from the Sun and then it is stored in batteries.

Vocabulary

Recruit: To persuade someone to join a company.

Satellite: An object in orbit around another body. The Moon is a satellite of Earth but we also have man-made satellites orbiting Earth.

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Challenges

Recall: Why does the Cassini satellite not use solar power?

Think: How many different uses for satellites can you name?

Activity: Investigate different ways of generating power. **Link.**
Which ones could be used in space?

Research: What is a geostationary satellite and how does it orbit Earth? What are these types of satellites used for?

Investigate: The International Space Station (ISS) is 109m long and 73m wide, can you mark this out on your school field or in the hall? How do you think it got into space?

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User Centred Design

Catherine Greene (She/Her)

Head of User Centred Design

Satellite Applications Catapult

What is my job?

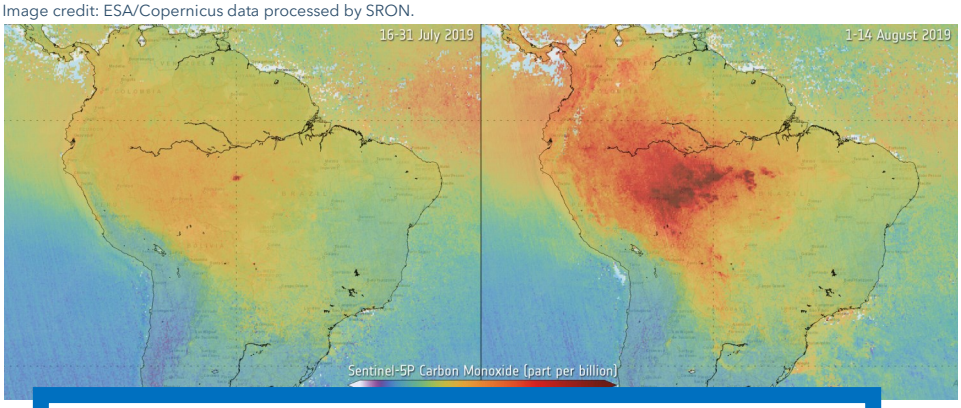
I help people get information that will support them in solving a problem and make a better decision. I work with scientists and engineers, developing new ideas for how space technology could be used to benefit people on Earth.

User Centred Design

In user centred design, a company works closely with their customer to design the technology that will solve the customers problems. This design process it often **iterative**.

This is Landsat 9, an Earth observation satellite, meaning it looks at Earth not the sky. It monitors things like **deforestation**, water quality and crop conditions. Monitoring the health of the Earth can help make the right decision, for example farmers deciding when to plant crops.

Image credit: ESA/Copernicus data processed by SRON.



These images were taken with the European Space Agencies Copernicus Sentinel-5P satellite. The left image shows the Amazon rainforest in July 2019 and the right image is one month later following forest fires. The red shows the increase in toxic gases from the fires which can be a risk to humans. This information can be used to evacuate people close to the gas.

Catherine worked with local councils to find where pollution is running into rivers. This helps the council stop it .

Vocabulary

Deforestation: This is the removal or destruction of a forest of trees from land that is then used in other ways.

Iterative: This means doing something again and again, usually to improve it.

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Challenges

Recall: What is an Earth observation satellite?

Think: What problems on Earth do you think these satellites can help prevent?

Activity: Watch this video on how satellites track plastic **Link.** Can you think of ways we can reduce plastic use?

Research: Can you find out how many Earth observation satellites are in space right now?

Investigate: Landsat 9 takes 99 minutes to complete one orbit around Earth and completes 14 orbits in a day. How many orbits will it complete over its 5-year lifetime?

Space in Schools: Careering Into Space

Electrical Systems Engineer

Mirko Viviano

Airbus Space and Defence

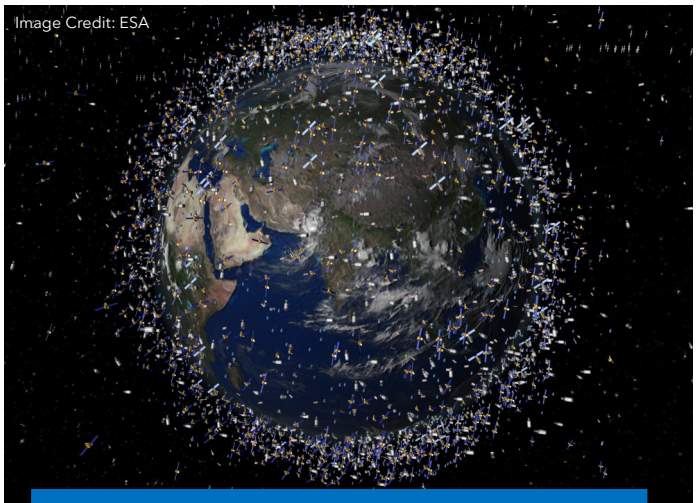
What is my job?

I help build satellites that go into space so we can watch TV and use the internet. My job is to design and build the electrical parts of these satellites and test it to make sure it works perfectly before it goes to space.

Communication Satellites

These satellites are used for television, telephone signal, radio and internet. For this information to get from one place on Earth to another there needs to be a path it can follow. These satellites create the **channel**, between a transmitter and receiver.

This is an artists impression of two Hotbird telecommunications satellites developed by Airbus and the European Space Agency. This satellite broadcasts television to many countries.



With many satellites orbiting Earth, it is important they don't crash into each other. The **orbit** of each satellite is calculated very carefully and is chosen to avoid other satellites. But we also need to think carefully about how many satellites we are launching.

Far side of the Moon

Astronauts on the far side of the Moon need to use a relay satellite to communicate with ground control on Earth. A signal from the Moon takes about 2.5 seconds to reach Earth.

Vocabulary

Channel: The path between two objects.

Orbit: A pathway of one body around another. Orbits can be circular or elliptical.

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Challenges

Recall: How long does it take for a communications signal to travel from the Moon to Earth?

Think: Why is it important to think carefully about launching a satellite?

Activity: See all the satellites in space here. Investigate a few satellites, what do they look like? What is their mission?

Research: What was the first satellite in orbit around Earth?

Investigate: Why do astronauts on the far side of the Moon need a relay satellite?

Imagine your school is the Earth, can you send a signal from one side of the school to the other? How can satellites be used to help?

Space in Schools: Careering Into Space

Environmental Specialist

Peter Shanahan

Civil Aviation Authority

What is my job?

My job as an environmental specialist is to make sure that nothing is harmed when companies launch a satellite into space. This involves liaising with many different people with many different skills and knowledge.

Image Credit: SaxaVord UK

This is the design image for the SaxaVord spaceport in the Shetland Islands that was given permission to launch rockets from 2024.

Civil Aviation Authority

The Civil Aviation Authority (CAA) is responsible for ensuring the safety, security and fairness in the UK **aviation** industry. It oversees airlines, airports, drones and the environment as well as space flights.

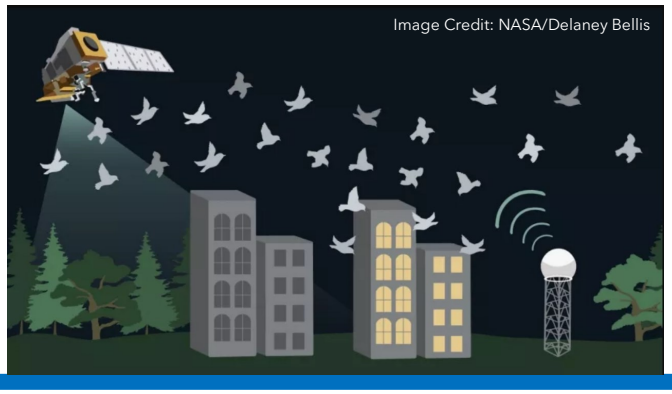

Image Credit: NASA/Delaney Bellis

Bird detection radar tracks the flight paths of birds so aircraft can avoid the flock and minimise the risk to the aircraft and any passengers. This is a cartoon of the NASA-NOAA Suomi NPP Satellite that tracks migrating birds

Environmental Factors

The environmental factors in launching a satellite include many different things. For example, the noise of the rocket, the wildlife surrounding the launch site and in the air. You also have to think about the safety of the people on the ground as the rocket takes off.

Vocabulary

Liaising: When someone acts as a link between a number of people or groups. This is done through speaking or emailing to make sure everyone understands.

Aviation: Anything linked to designing, building or flying aircraft of any type. For example, this could be planes, drones or rockets.

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Challenges

Recall: What does the Civil Aviation Authority regulate?

Think: How many environmental factors can you think of when we launch a rocket into space?

Activity: Can you launch your own stomp rocket? **Link**

Research: Where do we currently launch rockets from in the UK?

Investigate: How do the Civil Aviation Authority ensure the safety of wildlife around launch sites?

Space in Schools: Careering Into Space

Solar Physicist

Professor Silvia Dalla

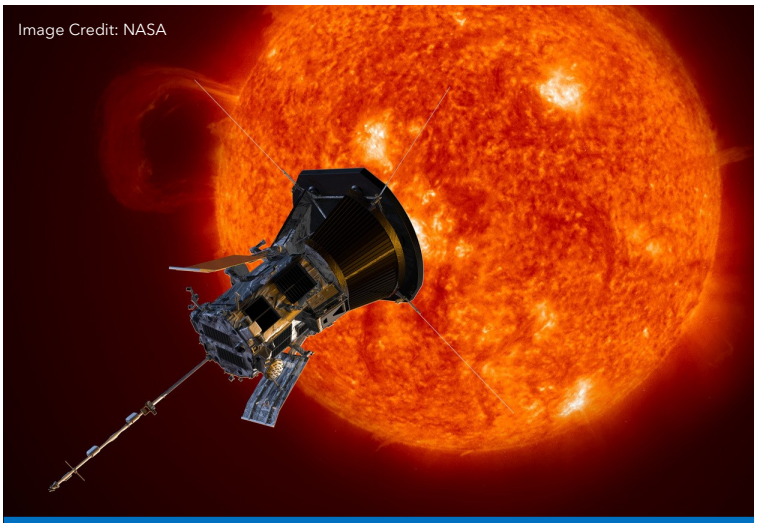
University of Central Lancashire

What is my job?

I study the physics of the Solar wind, energetic particles that blow from the Sun. I analyse measurements from spacecrafts that monitor the Sun to help understand and predict it.

Space Weather

Space weather is the effect of the Sun's activity on Earth. This could be through solar flares or coronal mass ejections from the Sun. This is important as the particles that are ejected from the Sun can damage satellites such as communication satellites but also harm astronauts in space.



This is an artists impression of NASA's Parker Solar Probe in orbit around the Sun. The probe is getting closer to the Sun's surface than anything ever has. It is flying into the **corona** to study how the solar wind forms.

This image of the aurora taken from the International Space Station. The aurora, often called the Northern lights, is the effect of material from the Sun interacting with the magnetic field and around the Earth. The different colours you see here are the different layers of the Earth's atmosphere and the different elements such as oxygen and nitrogen.

Silvia **collaborates** with other universities on a project that tries to forecast the risk of solar energetic particles that come from the Sun. This can help pilots avoid flying their planes into these particles as they hit Earth, protecting everyone on the plane from the radiation.

Vocabulary

Collaborate: Working jointly on an activity or project

Corona: The outermost layer of the Sun's atmosphere.

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Challenges

Recall: What is the space weather?

Think: Why do we see different colours in the northern lights?

Activity: Make your own Sun view and look for sunspots: Link.

Research: How many different satellites missions can you find that look at the Sun?

Investigate: The Sun has an 11-year cycle. When the Sun is the most active, we call this "solar maximum" and when the Sun is the least active we call this "solar minimum". Can you find out how the number of sunspots changes over 11 years?

Space in Schools: Careering Into Space

Software Engineer

Dr Steven Mark Beard

UK Astronomy Technology Centre

What is my job?

I write the software for the computers that astronomers use to control the instruments on their telescopes. I've worked on programming the Mid-Infrared Instrument on the James Webb Space Telescope to look at stars that are forming and distant galaxies at the edge of the universe.

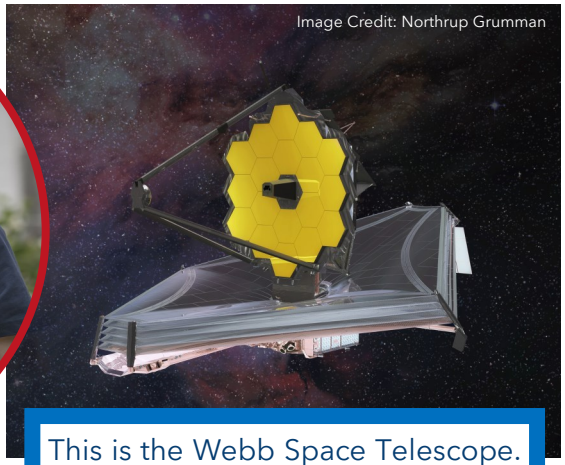


Image Credit: Northrup Grumman

This is the Webb Space Telescope. It has a **diameter** of 6.5 meters. It couldn't fit in a space rocket as one single mirror so it is made up of 18 hexagonal mirrors and it unfolded like a flower in space!

Software

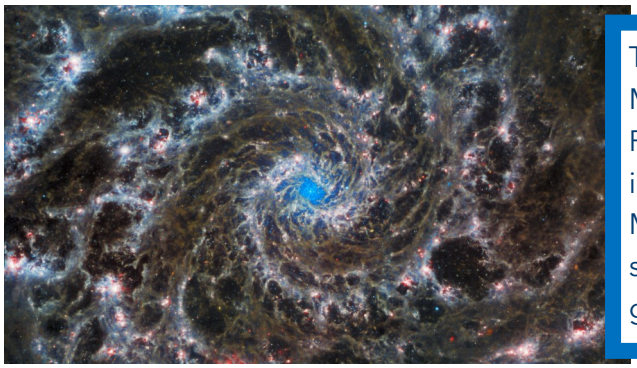
Software is the code (or instructions) that control the computers. This includes mobile phones, washing machines, cars and many other devices you use everyday.


Image credit: NASA/JPL-Caltech/RAL

This is MIRI the "Mid-InfraRed Instrument". Infrared light is much redder than the light our eyes can see. When we look at images taken with MIRI it is like wearing night vision goggles!

Software Engineer

Software engineers write (or program) the code for the computers that controls the telescopes and instruments. It sends the images back to Earth so astronomers can **analyse** the data.



This image shows galaxy M74, also known as "The Phantom Galaxy" . The image is taken with the MIRI instrument and shows the dust in the galaxy.

Image credit: ESA/Webb, NASA & CSA, J. Lee and the PHANGS-JWST Team.

Vocabulary

Diameter: The distance right across the middle of a circle.

Analyse: To examine in detail to answer a question.

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Challenges

Recall: What does MIRI stand for?

Think: How many objects or items can you list that use computer software?

Activity: Can you fold a piece of paper like the James Webb Space Telescope? **Link.**

Research: Who was James Webb and why is the telescope named after him?

Investigate: Can you mark out a circle of 6.5m in the playground? This is how large the diameter of the telescope is! Do you think all of your classmates could stand in the circle?