

It Takes a Spark!

grok STEM Conference

academy

Friday, 16 June 2023 | Queensland

Theme: Creating sustainable and STEAM powered futures

The conference is to highlight the knowledge, skills and thinking that would empower and enable students to create a sustainable and STEAM powered future. This could include how collaboration, critical and creative thinking, problem solving, emotional and social intelligence can be enhanced by participation in non-traditional STEM and cross-curricula learning.

Teacher PD workshops from leading STEM experts

- >> First Steps to designing a well-planned STEAM program
- >> Using AI tools - the good, the bad and the ugly
- >> Teach by Design
- >> Getting started with the Micromelon Rover and Python
- >> Going the Distance – All of STEAM in 40 minutes
- >> Practice, Failure and Learning - what I wish I was taught
- >> Arduino in AgTech

Hands-on sessions for students and teachers, examples...

- >> Creating Holograms
- >> Corals are Cool and Crucial
- >> Waves of Destruction
- >> Perceive or deceive? Is your brain telling you the truth?
- >> Detecting the Unseen: Dark Matter
- >> Mission to Mars
- >> Is my organisation really Cybersecure?
- >> An Introduction to Indigenous Astronomy
- >> STEAM EXPO activities
 - >> Study Gold Coast
 - >> Zenva Schools
 - >> This IS Rocket Science!!!!
 - >> Tangalooma EcoMarines
 - >> Virtual Field Trips to Earth & Beyond
 - >> Balance & Gravity - Living in balance with the planet
 - >> The Weird & Wonderful World of Wounds
 - >> Mothamaticians

Problem Solver sessions: design challenges taking students and teachers through the design process including...

- >> Choosing and using functional foods – a STEM project
- >> Wacky Windmills
- >> Sustainable Space Exploration
- >> Tomb Raider
- >> Future Transport Solutions
- >> Design like a Boss!
- >> Prototyping & Testing with Lego – Kangaroo Point Green Bridge

Continue for complete list...

Outstanding Keynote Speakers



DR SONIA SHAH

**Heart Foundation Future Leader Fellow
University of Queensland & Superstar of STEM**

Sonia uses her knowledge and skills in biology, statistics and computing, to analyse genetic data on hundreds of thousands of individuals to better understand how the human body works and what goes wrong in disease, so we can come up with new ways to prevent and treat heart disease. We now live in a world where it is possible to analyse someone's DNA collected from a bit of spit early in life, and determine if they are more likely to develop heart disease later in life, giving us more time to make the right changes that will help prevent disease in the future. Sonia's curiosity and significant contributions to science have been acknowledged by awards such as the 2020 Women in Technology (WiT) Rising Star Science award and 2022 Queensland Young Tall Poppy Award.



ANNELIES MOENS

**Managing Director Privcore Pty Ltd
Superstar of STEM**

Annelies is a widely recognised global data privacy expert. She was selected as a Superstar of STEM for 2021-2022 and is also a mentor for the Australian Government's Boosting Female Founders initiative. She also holds an MBA in general international management (distinction), a First Class Honours Law degree, and Arts (majoring in computer science) and Science degrees with emphasis on artificial intelligence from The University of Queensland. Annelies' vision is to make privacy core business – a discipline integral to business and government. Today, much of the value of an organisation lies in how well it manages the data it holds. Through Privcore, Annelies and her team conducts privacy impact assessments, privacy health checks, data breach prevention, response and regulatory engagement and builds privacy programs for clients so they can increase trust and confidence in their organisation.

INFO & REGISTRATION: spark-educonferences.com.au/queensland-2023

Contact

Rachel Manneke-Jones

Registrations & Bookings

Spark STEM Conferences

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Host School



Platinum Sponsor



9.40AM to 10.20AM - ROTATION ONE (40min parallel session)

Workshops to choose from - Use excel sheet 1

Teacher Mini Masterclass: Practical Professional Development

Arduino in AgTech



Keely Berther, IntegratedSTEM

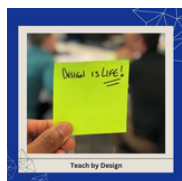
AgTech development and adoption is key to the profitability and responsiveness of Queensland's agriculture supply chain. To keep pace in the changing climate, social, and economic environment, transformational approaches are needed for the agriculture sector to continue to meet the world's needs. This workshop will showcase how students can use Arduino to automate or gather data from systems to inform decisions that lead to better farming practices that enhance yield and reduce production costs. These projects will demonstrate how AgTech can be effectively incorporated into the Grade 4 – 12 classrooms by teachers of any level of technology skills. Teachers will be shown how to engage students in real-world problems by sharing practical strategies and resources that IntegratedSTEM has developed teaching AgTech-focused education to thousands of students across Australia.

Recommended to BYO Laptop or Mobile

School / teacher stages: Beginning, Next Step & Extending

Suitable for Primary & Secondary Teachers

Teach by Design



Daniel McGowan, Inspired Education Australia

Design thinking is fundamentally a process for solving problems by coming to a deep understanding of the situation, identifying what the key aspects you want to solve, and then going through an iterative hands-on process to create a solution that works and meets specific needs. In this mini-masterclass teachers will learn how to incorporate design thinking into their classrooms resulting in developing critical and creative thinking skills and making students' future ready. The workshop will walk through a practical application of future-casting and applying design thinking as a skill set in your STEM classrooms. Teachers will be able to download handouts to support them after the session.

School / teacher stages: Beginning, Next Step & Extending

Suitable for Primary & Secondary Teachers

Going the Distance – All of STEAM in 40 minutes



Mark Lockett, The Southport School

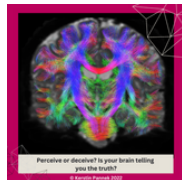
One of the biggest challenges teachers experience is how to embed the skills, knowledge and thinking inherent in STEAM easily into their classes. This hands-on workshop will put teachers in a student's position and demonstrate how every subject in STEAM can be taught in one hands-on lesson. Teachers will learn how to draw out maths in robotics activities, how they could embed the scientific method, and how to design assessment. Handouts will be available to takeaway. The challenge you face: Daredevil Dan is preparing for a stunt that will be held on a pre-set length track. As Daredevil Dan's stunt coordinator, your challenge is to program a robot car to drive as close as possible to Dan, without knocking Dan over. This is a dead reckoning challenge. You are not allowed to use any sensors to detect Dan.

School / teacher stages: Beginning & Next Step

Suitable for Primary & Secondary Teachers

DigiDesign Mini-workshops - Teacher and/or Student

Perceive or deceive? Is your brain telling you the truth?



Dana Bradford and Julie Trinder, CSIRO

Our brains are incredibly smart – they can process huge amounts of information. But do they always get it right? In this workshop you will have some challenges set for your brain to see how you go. You will also receive some tips for maintaining a healthy brain and enhancing your learning and memory. Can your brain be outsmarted?

Suitable for Year 7 to 10 students and/or teacher

Man or Machine: How does Artificial Intelligence work?



Grok Academy

Is ChatGPT actually sentient? How can Scribble Diffusion turn your sketch into a realistic photo?

Join us as we lift the lid on how Artificial Intelligence works and decide for yourself what opportunities there are for how we use it in the future and where there is still room for growth.

Suitable for Year 5 to 8 students and/or teacher

Is my organisation really Cybersecure?



Finn Foulds-Cook, Volkis

Cybersecurity is the practice of protecting an organisation from attacks – online and off-line. These attacks are usually aimed at accessing, changing, or destroying sensitive information; extorting money from users; or interrupting normal business processes. In this thought provoking workshop Finn Foulds-Cook, a security expert from Volkis, will challenge you to explore security in a whole new way. Attendees will have the opportunity to use their out-of-the box thinking to try and bypass security protections that an organisation has put in place. Along the way you will discover how important creativity, problem-solving and STEM thinking is to the world of cyber-security.

Suitable for Year 7 to 10 students and/or teacher

Detecting the Unseen: Dark Matter



Jackie Bondell, ARC Centre of Excellence for Dark Matter Particle Physics

Dark Matter is the mysterious material that makes up a quarter of our Universe but has not yet been directly detected by scientists. Australia is at the forefront of Dark Matter research. The Southern Hemisphere's first Dark Matter direct detection lab was built in regional Victoria and began operating in 2021! The science of dark matter involves everything from the largest structures in the Universe to the smallest known particles that make up the atom. In this session, students and teachers will participate in activities that bring the cutting edge science of Dark Matter Particle Physics to the classroom. They will use 3D printed objects to understand how scientists investigate the unseen and lasers to investigate how we map Dark Matter in our Universe. Teachers will receive lesson plans to bring these activities back to their classrooms. **Suitable for Year 7 to 10 students and/or teacher**

Design Thinking SuperSprint



Sid Verma, BrainSTEM

Design Thinking is an approach to creative problem-solving that aims to bring together what is desirable from a human point of view, with what is technologically feasible and economically viable.

In this session you will tackle a design challenge and go through the problem solving process rapidly to come up with a viable solution.

Suitable for Year 7 to 10 students and/or teacher

Corals are Cool and Crucial



Diana Kleine, CoralWatch, The University of Queensland

Coral reefs are under relentless stress from myriad global and local issues, including climate change, declining water quality, overfishing, pollution and unsustainable coastal development. In this session you will discover the importance of The Great Barrier Reef and local reefs, the lifecycle of corals and gain understanding how living things in the ocean depend on each other to survive. You'll learn how you can become a citizen scientist, collect data on coral bleaching and will have the opportunity to practice coral monitoring, collecting, and analysing virtual data using virtual tools. You will also learn about sustainable actions achievable in everyday life and how community action is required to protect reefs for the future. **Suitable for Year 4 to 6 students and/or teacher**

Waves of Destruction



Faculty of Engineering, Architecture and IT; The University of Queensland

Coastal environments constantly adapt to change as a result of tides, waves, floods, storms and cyclones, and changes in sea level. Climate change impacts will compound and extend the vulnerability of Queensland's low-lying coastal areas to coastal hazards. Sound coastal planning and management is vital to help protect and conserve the coast's important cultural, ecological and natural values. In this workshop you will explore the importance of coastal protection by using a mobile wave tank to simulate interacting with coral reefs and beaches. Working in groups, you'll discover the damage waves can have on our coastline and work out the best solutions to minimise this impact. **Suitable for Year 7 to 10 students and/or teacher**

Trash Travel



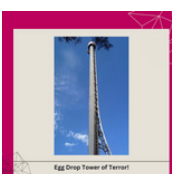
Dini Kanagaratnam, Tangalooma EcoMarines and Bree Cremen, City of Gold Coast Council

Waterway pollution is a huge contributor to loss of marine life and healthy ecosystems, but do we really know what the rubbish in our waterways is comprised of, or where it came from?

You will put their scientific discovery skills to the test, examining rubbish particles from various waterways to try and determine what they once were and consider what we can do to clean our waterways and prevent further pollution.

Suitable for Year 4 to 6 students and/or teacher

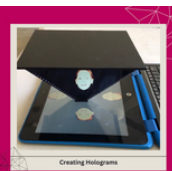
Egg Drop Tower of Terror!



Gabrielle Austerberry, Global Education Innovations

Impact protection is a critical design condition when designing an object such as a car, a helmet, a child seat, etc. The aim is to ensure the safety of the users and to avoid injuries. A good scientist or engineer can use their experience and technical abilities to overcome such challenges and come up with ingenious ideas to design and build safety mechanisms. In this session you will be challenged to use the materials provided to create a tower that is at LEAST 25 cm high and has a launching platform sticking out beyond the dais/ platform. You will then drop a raw egg (in a plastic bag) into a nest (furnished by you) and whoever has the highest drop without breaking the egg, wins. This is a great activity that teachers can run with their students of any age to learn about engineering, as well as impact and projectile science and can be adapted to any depth in those areas of science. **Suitable for Year 4 to 10 students and/or teacher**

Creating Holograms



Students from St Aidan's Anglican Girls College

Students will demonstrate how to use PowerPoint and a square pyramid to create a hologram that will appear in the pyramid. The students will demonstrate how to video against a black background, insert the video into a PowerPoint slide, and position and sync the video to reflect into the pyramid. This type of presentation can be used across the curriculum to enhance and engage an audience! Teachers will receive a handout on how they can do this with their classes.

Suitable for Year 4 to 10 students and/or teacher

STEAM Expo: hands-on activity area - Student and / or Teacher (selected as one workshop)

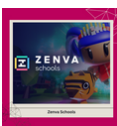


Melting Metal Mementos

Mark Baker, Assumption College Warwick

When we think of something being a metal we often think of copper, gold, silver, iron and steel. These metals are known to be quite strong, have high melting points and are used in a variety of construction, technology and jewellery. However not all metals have high melting points and can be quite beautiful in a crystalline form. In this STEAM expo, attendees will see non-toxic bismuth metal melt and then make their own bismuth rainbow crystals to grow on an earring. Science in action!

Suitable for Year 8 to 10



Zenva Schools

Zenva

Zenva Schools is an education platform that helps schools to teach coding and game creation. We provide engaging, curriculum-aligned lessons that support the Digital Technologies subject. Our project-based content can be used in grades 3 to 12, and teaches real-world skills through the creation of games, apps, and websites. It allows teachers to easily support every student, catering to different experience levels, learning speeds, and preferred learning styles. Come along and discover how you can get everything you need to successfully teach digital technologies.

Suitable for Year 4 to 10



Robot Arm Control Systems

Ryan Marple, Cyborg Dynamics

A robotic arm is a type of mechanical arm, usually programmable, with similar functions to a human arm. They are used in factories to automate execution of repetitive tasks, such as applying paint to equipment or parts; in warehouses to pick, select, or sort goods from distribution conveyors to fulfill consumer orders; and even in a farm field to pick and place ripe fruits onto storage trays. Cyborg Dynamics works on control systems for robotics. In this expo activity you will be able to enter in an angle for the robotic arm to travel to and adjust the control values to see how the arm behaves. This is a real-world example of how mathematics and engineering can make a difference.

Suitable for Year 7 to 10



Virtual Field Trips to Earth and Beyond

Faculty of Science, Queensland University of Technology

In this expo activity you will experience how planetary surface exploration is conducted. Two immersive experiences will be provided - one on earth and the other on Mars. You will get to interact with the virtual Perseverance rover and Ingenuity drone and get to know their role on Mars 2020 mission. In another virtual simulation, you will become field geologists; immersing yourself in nature and doing some cool geoscience including taking measurements of folds.

Suitable for Year 8 to 10



This IS Rocket Science!!!!

It's Rocket Science Adventures

Who invented the Rocket? It was the ancient Chinese... Using fair testing principles, attendees will explore rocket design and learn how the centre of mass plays a pivotal role in why rockets fly straight. We achieve this with the use of small wind tunnel test rockets followed by launching the refined design to really get the STEM excitement going.

Suitable for Year 4 to 10



Hands on Robotics with Micromelon

Micromelon Robotics

Robots are widely used in manufacturing, mining, earth and space exploration, surgery, and much more! You will be challenged to program your own robot using simple coding tools to move around a maze without running into any walls. Come along and test out your skills, no prior experience necessary.

Suitable for Year 7 to 10



Balance & Gravity - Living in balance with the planet

Big Bang Education

Attendees will be invited to learn about balance and the concept of centre of gravity by creating balancing toys with recyclable junk/materials. Big Bang Education will highlight the importance of living in balance with the planet, and a great way to do that is to reuse and recycle material into toys.

Suitable for Year 4 to 6



Mothamaticians

Bayer Crop Science

Successful agriculture depends on growers knowing not only the plant's life cycle, but the life cycle of the weed, disease and insect pests common to their crop. Knowing the life cycle of a pest allows growers to control it at the most vulnerable point in the cycle, or possibly avoid it all together. In this Expo activity, you will be introduced to insect life-cycle and use of video microscopy to understand the importance of insect life cycles on our food chain.

Suitable for Year 4 to 7



Tangalooma Ecomarines

Tangalooma EcoMarines and City of Gold Coast Council

The Tangalooma EcoMarines works to improve the water quality of waterways and adjacent environs throughout southeast Queensland to enhance marine and terrestrial environments. Our mission is to inspire a community of environmental heroes with our vision for a healthy environment for local marine and wildlife through collaborative community action. Come along and find out about their partnership with the City of Gold Coast and have the opportunity to win fun prizes while recycling!

Suitable for Year 4 to 10

STEAM Expo: hands-on activity area - Student and / or Teacher continued...



Grok Academy @ the STEAM Expo

Grok Academy

How do we secure information on the internet?

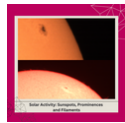
What information is safe to share online?

How do computer programs work?

Discover the answers to these questions and more by participating in a range of short unplugged activities running across the day:

- Cybersecurity Cards: sort through cards about various personal information and determine if it is safe to share online or not
- Cryptography: use different cyphers to encrypt and decrypt messages to understand the importance of encryption
- Decision Trees: classify animals using a decision tree
- Algorithmic Treasure Hunt: complete the activities to find the prize!

Suitable for Year 4 to 10



Solar Activity: Sunspots, Prominences and Filaments

Stephen Broderick, St Ursula's College Toowoomba

Sunspots are phenomena on the Sun's photosphere that appear as temporary spots that are darker than the surrounding areas. A solar prominence (also known as a filament when viewed against the solar disk) is a large, bright feature extending outward from the Sun's surface. A prominence forms over timescales of about a day, and stable prominences may persist in the corona for several months, looping hundreds of thousands of miles into space. In this hands-on Expo activity two telescopes will be set up for viewing sunspots, prominences and filaments. You will have the opportunity to observe the sun and estimate the Sunspot number based on your observation of the Sun.

Suitable for Year 4 to 10



The Weird & Wonderful World of Wounds

Assoc. Professor Jessica Stokes-Parish, Bond University

How are health professionals trained to look after and talk to potential patients when they present themselves at a medical facility? In this exciting Expo activity Dr Jessica Stokes-Parish will show you using special effects makeup (moulage) as a teaching tool! You will be able to use the moulage to create wounds and bruises and find out the link to health science and leave with some scary new skills!

Suitable for Year 4 to 8



Hawker Brownlow Education

Igniting STEM Learning

Leading education publications, professional learning resources and more will be available for teachers and schools.



Fly through the Past, Present and Future!

Cross River Rail Delivery Authority

Through the magic of VR, travel in time from 1819 to the future, moving through Cross River Rail's future stations and station precincts, developing a sense of just how significantly Cross River Rail will assist Brisbane with its ongoing development as a world class city. Explore how digital tools are used for project planning, collaboration and management and how design ideas and solutions can be communicated to audiences.

Suitable for Year 4 to 10



Engineering, Design and Computing

Faculty of Engineering, Architecture and IT; The University of Queensland

Come along and get a taste of engineering, design and computing. Meet the team from UQ Racing – a student-led group who design and build race cars. Meet Australia's #1 student aerospace team, UQ Space, and view rockets which have been designed and built by them. Put your design and construction skills to the test, using only gummy bears and skewers, to design and build the tallest and most structurally sound gummy bear tower. While you're here why not check out some of the latest technology in robotics and mechatronics.

Suitable for Year 8 to 10



Starry Nights Preserved: A Showcase of Astronomy's Past Through Glass Plates

Queensland University of Technology

"Starry Nights Preserved" is a showcase that celebrates astronomy's history through the display of replica glass plates. These plates offer a glimpse into the past, revealing the beauty and mystery of the night sky captured by astronomers of yesteryear. Come and marvel at these treasured artifacts of our cosmic heritage.

Suitable for Year 4 to 10



Drone Experience

Pakronics and The Southport School students

Drones are used for a wide range of activities including; search and rescue, surveillance, traffic monitoring, firefighting, photography and videography as well being used increasingly by organisations such as energy companies, agriculture and mines to inspect their assets. Drones are also great in STEAM education in learning about programming, design, robotics, and more. In this STEAM Expo activity you will have an opportunity to not only fly a drone but program one for an autonomous activity.

Suitable for Year 4 to 10



Southern Cross University - Transforming Tomorrow

Southern Cross University

Southern Cross University will be showcasing one of Australia's most ambitious vehicle prototypes – a long-range converted vintage Volkswagen Kombi that is now 100% electric and designed to drive between our east coast locations.

The conversion of the University's iconic promotional vehicle was a collaborative effort between the University, the NSW State Government, our students, Energy Lab, and lead contractor EV Machina. Come and find out about how SCU can forward your career!

Suitable for Year 7 to 10



Study Gold Coast and Gold Coast Student Hub

Study Gold Coast

The Gold Coast has over 200 education and training institutions including 4 world class universities, QLD's largest training provider of vocational education, some of Australia's finest secondary schools, and English language colleges. Study Gold Coast provides support and extensive employability resources for students throughout the Gold Coast. Visit the Gold Coast Student Hub to find out about our resources, get some giveaways, and participate in a range of activities including VR career exploration, games and more!

Suitable for Year 7 to 10

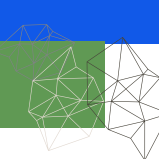
11.00AM to 12.20PM

PROBLEM SOLVERS DESIGN CHALLENGE + TEACHER ALTERNATE SESSION

Workshops to choose - use excel sheet 2

Problem Solvers Design Challenge - Student and Teacher

Each session has a different real life design or STEAM challenge to solve aimed at Year 4 to 10 students. You will be posed with a real life design challenge and lead through the design process to ideate and present possible solutions.



Design like a Boss!

Grok Academy

Design Thinking gives you the tools to solve any problem with creativity and confidence!

This session is a practical introduction to Design Thinking, a set of techniques and processes for solving problems which you will get to apply to a real-world problem. It introduces key design thinking concepts, including ideation, failing fast, prototyping and iteration, as well as the skills and dispositions you need to be a great design thinker, such as empathy, open-mindedness, and resilience to failure.

Suitable for Year 4 to 10 students and teachers



Crash Course in Micro:Bit

Grok Academy

Micro:bits are a great introduction to physical computing. This problem solver session introduces you to the BBC micro:bit and how to program it. You will learn about inputs and outputs and use basic programming skills to solve a variety of different challenges such as making a dice game!

Suitable for Year 4 to 6 students and teachers



Wacky Windmills

Vanessa Bermingham, Queensland Academy for Science Mathematics and Technology

Windmills are structures that convert wind power into rotational energy by means of vanes called sails or blades, specifically to mill grain (gristmills). The term is often extended to windpumps, wind turbines, and other applications.

In this design challenge you will design and build a small windmill that lifts a load. Along the way you will learn about sustainable energy production and how much power we can harness from wind. The group that lifts the most will win a prize!

Suitable for Year 4 to 7 students and teachers

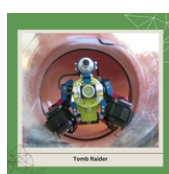


Automatic product counting for belt conveyors

Vinh Bui, Southern Cross University

Belt conveyors are used in automated distribution systems, such as postal sorting offices and airport baggage handling systems, as well as warehousing, manufacturing and production facilities. Products are conveyed directly on the belt so both regular and irregular shaped objects, large or small, light and heavy, can be transported successfully. It is a labor-saving system that allows large volumes to move rapidly through a process, allowing companies to ship or receive higher volumes with smaller storage space and with labor expense.

In this real-world problem you will be designing and implementing an automatic product counting solution for a belt conveyor. This is a challenge that will require you to bring together your understanding of engineering, coding and problem solving. Handouts will be available for teachers. **Suitable for Year 7 to 10 students and teachers**



Tomb Raider

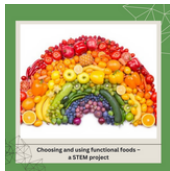
Mark Lockett, The Southport School

What if robots could help us find hidden treasure like Lara Croft or Indiana Jones?

In this workshop we will design and build robots to crawl through pipes, climb columns and swing across vines to find the secret 'Spark' Gems.

The workshop can also be linked to the 'real world' when applied to Robot Drainage Pipe Cleaners, Elevators, and automated cable cars.

Suitable for Year 6 to 10 students and teachers



Choosing and using functional foods – a STEM project

Professor Lindsay Brown, Griffith University

A recent global report highlighted that more than four in 10 children drink sugary drinks daily and one in three do not eat fruit each day. The researchers warn the standard of diets around the world was “diabolical”, and that problems such as obesity, anaemia and micronutrient deficiency were being neglected. What can schools do about this? Functional foods provide nutrition and can also prevent or reverse long-term health problems such as those listed above. Functional foods include vegetables such as beetroot, purple carrots, silver beet and celery, and fruit such as citrus, tropical fruits and even algae. How can we grow them at home? How can we incorporate them in meals? How can we measure their benefits? How can we encourage families to choose functional foods?

Suitable for Year 7 to 10 students and teachers



Toying around with Simple Circuits

St Ursula's College Toowoomba

Modern toys often incorporate items such as electric motors, radio transmitters and receivers, and electronic voice systems. Due to the complex nature of the toy design and manufacturing industry, toy engineering often relies upon persons with diverse engineering backgrounds that lend themselves to work in multidisciplinary teams.

In this workshop you will be using a range of recycled items to design and create entertaining toys that incorporate electrical circuits.

Suitable for Year 4 to 6 students and teachers



Creating a sustainable powered future

Darren Fellowes, The Southport School – Preparatory Campus

The use of energy is considered sustainable if it meets the needs of the present without compromising the needs of future generations. In this design workshop, you will be creating generators and movable objects using renewable energy sources. You will have the opportunity to create, manipulate, experiment and problem solve with others as you build generators, windmills, water powered vehicles and air and water powered systems.

Suitable for Year 4 to 7 students and teachers



Beating the Bee Bug

Nicolette Wheaton, The Glennie School

Over 70% of plant species on earth require pollination by a variety of species like bees, birds, butterflies and flies. This matters because such pollinators (animals and insects that cause plants to make fruit or seeds) are critical both for the reproduction of wild plants and for agricultural food production. There is one particular parasite that threatens to decimate bee populations. Innovation and creativity in design is required physically and theoretically, to reduce the risk of this parasite causing irreversible damage to Australian agricultural and horticultural sectors. In this problem solver session you will be taken through the design process to create potential solutions to the Varroa mite threat out of simple, accessible materials. Teachers will receive handouts so they can run this with their students.

Suitable for Year 7 to 10 students and teachers



Sustainable Space Exploration

Cran Middlecoat and Petar Nikolic, It's Rocket Science Adventures

Until relatively recently space exploration has been extraordinarily environmentally harmful. From the vast usage of fossil fuels producing greenhouse gases to space junk left in space and single use expendable rockets and other components. In this engineering, sustainability and recycling challenge, attendees will discover the methods of space transport from the past and present, explore the environmental impact of space junk and why sustainable space exploration using renewable energy will be essential for shaping the future communities and habitats. Can you come up with some great ways to make space exploration sustainable?

Suitable for Year 4 to 10 students and teachers



Future Transport Solutions

Shelley DeRuyter and Veronica Farina, William Ross State High School

To meet the reduction in greenhouse gas emissions many countries are exploring how to reduce the environmental footprint and increase safety in our transportation systems. In this problem solver you will work in small groups to review contemporary data around emissions related to the household passenger car to identify possible areas of improvement. Based on your findings you will be required to design and prototype a solution idea using materials supplied. Finally you will test and evaluate your prototype.

Suitable for Year 5 to 8 students and teachers



Prototyping & Testing with Lego – Kangaroo Point Green Bridge

Natalie Rodrigues, e2Young Engineers

Bridges play multiple roles in cities. As functional infrastructure, they can facilitate transport for thousands of people every day. They can be architectural marvels, cultural icons, and tourist attractions. While they are physical connectors, making movement possible between different geographical areas, they can also serve as social connectors, facilitating commerce and interaction between people. Brisbane City Council is building the Kangaroo Point Green Bridge to link Kangaroo Point to the CBD. Using this new bridge as a reference, this workshop will help teachers and students understand the importance of testing & prototyping in any engineering project – especially bridge building. Teachers will learn how they can reproduce this fun, hands-on Lego engineering experiment back in their own classroom.

Suitable for Year 4 to 8 students and teachers



What Does Learning Sound Like? Optimising acoustics for educational environments

Matthew Ottley - Marshall Day Acoustics and Fiona Young - Hayball Architects

When we walk into a classroom it is rare that we think about how the acoustics affect our ability to learn - unless of course the acoustics are awful! Yet the design of the physical spaces and their acoustics can make a profound difference to creating a more collaborative and creative learning environment. In this problem solver session, you will view your learning environments through sound. Working together with an architect and an acoustic consultant, you will consider the impact of acoustics on the types of learning and settings that create an engaging learning environment. This hands-on session will merge maths and design in the exploration of reverberation and sound absorption as you work together to improve your learning environments.

Suitable for Year 7 to 10 students and teachers

Teacher Alternate Session

11.00am Using AI tools - the good, the bad and the ugly



Grok Academy

AI tools are increasingly making themselves known in education. Grammarly, Co-pilot, GPT3 are now being used by students. What are the implications for academic integrity and assessment design? How can teachers be equipped to navigate this fast changing landscape? Join us as we demonstrate how AI tools can be used effectively in teaching and learning and discuss the potential pitfalls and how to avoid them.

School / teacher stages: Beginning, Next Step & Extending

Suitable for Primary & Secondary Teachers

11.40am Teacher Networking and STEM Pathways session



Facilitated by Dr Adrian Bertolini

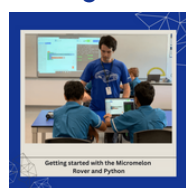
Discuss how the variety of STEM organisations including businesses and universities can support you in delivering and inspiring STEM in your school. Connect with other teachers and presenters to share ideas, possibilities and practices.

School / teacher stages: Beginning, Next Step & Extending

Suitable for Primary & Secondary Teachers

Teacher Mini Masterclass: Practical Professional Development

Getting started with the Micromelon Rover and Python



Tim Hadwen, Micromelon Robotics

In this hands-on workshop, using the Micromelon Code Editor and Micromelon Rover, we will guide you through a series of engaging and real-world activities and challenges that you can immediately incorporate into your robotics lessons or after school club, some without even using robots. You'll be able to code along without a robot using the Micromelon Robot Simulator, Blockly and/or Python to program a robot of your own.

School / teacher stages: Beginning & Next Step
Suitable for Secondary Teachers

Practice, Failure and Learning - what I wish I was taught



Cran Middlecoat, It's Rocket Science Adventures

As an airline pilot I've seen some really good training and assessment techniques, I've also seen some really bad training and assessment techniques. Practice most certainly does NOT make perfect; in fact, such a notion can be extremely detrimental to your students. Practice needs to be encouraged, however, the goal of what practice is meant to achieve, requires redefining. Let's unpack practice. Failure is NOT the opposite of success. Like practice, failure needs to be redefined. Failure continues to be stigmatized as bad, something to be avoided. How can failure possibly be good? How on earth is a student meant to embrace failure? Should I be encouraging failure? These questions and more will be answered. Every airliner has a suite of manuals with thousands of pages of information, all of which is necessary to safely operate the aircraft. How do pilots keep it all in their heads? Applicable to both teachers and students, these techniques will also be revealed. Allow me to share my experiences, showing you how you can implement the skills of my cockpit, in your classroom.

School / teacher stages: Beginning, Next Step & Extending
Suitable for Primary & Secondary Teachers

First Steps to designing a well-planned STEAM program



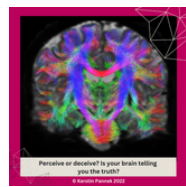
Dr Adrian Bertolini - Intuyu Consulting / Spark STEM Conferences

Schools often begin enacting STEM by introducing STEM clubs or activities at lunchtime or after school, having STEM specialist subjects and maker spaces, or even participating in STEM competitions. These approaches are all great ways to begin laying the groundwork for a sustainable STEM program. The challenge for many schools will be moving STEM from these groundwork laying activities to an authentic STEM program that delivers the desired outcomes. In this session Adrian will outline the thinking and planning that primary and secondary schools will need to do if they are going to design a whole school STEM program that delivers. This includes discussing creating a design brief for a STEM program, mindset and capabilities planning, learning ladders which assist with budgeting and resourcing, and curriculum mapping approaches. Templates for planning will be provided.

School / teacher stages: Beginning, Next Step & Extending
Suitable for Primary Teachers

DigiDesign Mini-workshops - Teacher and/or Student

Perceive or deceive? Is your brain telling you the truth?



Dana Bradford and Julie Trinder, CSIRO

Our brains are incredibly smart – they can process huge amounts of information. But do they always get it right? In this workshop you will have some challenges set for your brain to see how you go. You will also receive some tips for maintaining a healthy brain and enhancing your learning and memory. Can your brain be outsmarted?

Suitable for Year 7 to 10 students and/or teacher

LEGO Algorithmics



Grok Academy

An algorithm is a procedure or a list of step by step instructions that can be used to solve a problem or deliver a particular outcome. When creating STEM solutions it is vital that you are able to accurately communicate your ideas and the actions you want to be taken by others. In this workshop you will be introduced to the ideas of problem decomposition and accurate documentation. You will have the opportunity to build a small LEGO 'thing' and then attempt to document how another person would build the same 'thing'.

Suitable for Year 4 to 6 students and/or teacher

Web3.0 – will it transform learning?

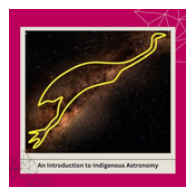


Babu Pillai, Southern Cross University

While web 1.0 refers to the original informational web, and web 2.0 refers to the social web, the term web 3.0 refers to the evolving intelligent web. The underlying concept is that as artificial intelligence (AI) improves and our devices become smarter, they will increasingly be able to read, collate and integrate information, enabling them to give intelligent responses to our questions, and to customise information and notifications to our needs. It will all run on blockchain technology. In this workshop, you will not only get a concise overview of web 3.0 technology and its various applications but have the chance to explore the challenges, opportunities and generate ideas how the web 3.0 technology could be used to enhance and transform the traditional educational environment.

Suitable for Year 7 to 10 students and/or teacher

An Introduction to Indigenous Astronomy



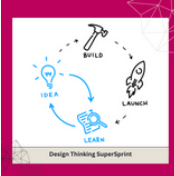
Faculty of Science, Queensland University of Technology

"Indigenous astronomy" is the first astronomy – the astronomy that existed long before the Babylonians, Greeks, the Renaissance, and the Enlightenment.

In this session you will discover how Aboriginal and Torres Strait Islander peoples use observations of the night sky to inform decisions about some everyday activities, e.g. food gathering and ceremonies. The session will involve several hands-on activities

Suitable for Year 4 to 7 students and/or teacher

Design Thinking SuperSprint



Sid Verma, BrainSTEM

Design Thinking is an approach to creative problem-solving that aims to bring together what is desirable from a human point of view, with what is technologically feasible and economically viable.

In this session you will tackle a design challenge and go through the problem solving process rapidly to come up with a viable solution.

Suitable for Year 7 to 10 students and/or teacher

Corals are Cool and Crucial



Diana Kleine, CoralWatch, The University of Queensland

Coral reefs are under relentless stress from myriad global and local issues, including climate change, declining water quality, overfishing, pollution and unsustainable coastal development. In this session you will discover the importance of The Great Barrier Reef and local reefs, the lifecycle of corals and gain understanding how living things in the ocean depend on each other to survive. You'll learn how you can become a citizen scientist, collect data on coral bleaching and will have the opportunity to practice coral monitoring, collecting, and analysing virtual data using virtual tools. You will also learn about sustainable actions achievable in everyday life and how community action is required to protect reefs for the future. **Suitable for Year 4 to 6 students and/or teacher**

Waves of Destruction



Faculty of Engineering, Architecture and IT; The University of Queensland

Coastal environments constantly adapt to change as a result of tides, waves, floods, storms and cyclones, and changes in sea level. Climate change impacts will compound and extend the vulnerability of Queensland's low-lying coastal areas to coastal hazards. Sound coastal planning and management is vital to help protect and conserve the coast's important cultural, ecological and natural values. In this workshop you will explore the importance of coastal protection by using a mobile wave tank to simulate interacting with coral reefs and beaches. Working in groups, you'll discover the damage waves can have on our coastline and work out the best solutions to minimise this impact. **Suitable for Year 7 to 10 students and/or teacher**

Trash Travel



Dini Kanagaratnam, Tangalooma EcoMarines and Bree Cremen, City of Gold Coast Council

Waterway pollution is a huge contributor to loss of marine life and healthy ecosystems, but do we really know what the rubbish in our waterways is comprised of, or where it came from?

You will put their scientific discovery skills to the test, examining rubbish particles from various waterways to try and determine what they once were and consider what we can do to clean our waterways and prevent further pollution.

Suitable for Year 4 to 6 students and/or teacher

Mission to Mars



Stephen Broderick, St Ursula's College Toowoomba

The idea of sending humans to Mars has been the subject of aerospace engineering and scientific studies since the late 1940s as part of the broader exploration of Mars. Much like the Apollo missions were the spark for a generation of scientists, mathematicians and engineers in the 1960's, the Mars missions will ignite a new generation of STEM thinkers and doers. This hands-on workshop will have you working in groups to design a paper rocket, rotocopter and a logo for your mission. It will have you engage in the type of STEM thinking mission designers go through when planning missions. Groups achieve points for accuracy with their rocket, greatest height and distance reached by their rocket, slowest descent time for their rotocopter and points for their logo design. The group with the highest cumulative score from the three activities will win. Teachers will receive a handout to support them in running a similar mission in their own classes. **Suitable for Year 7 to 10 students and/or teacher**

Lego Lifting Challenge



Natalie Rodrigues, e² Young Engineers

Engineering is the use of scientific principles to design and build machines, structures, and other items, including bridges, roads, vehicles, spacecraft, ships, and much more. It is in essence applied science dealing with making something work in real world conditions.

In this workshop, you'll be challenged to see whose engineering and design thinking reigns supreme. Best of all, everything will be done using Lego (and some strings). Are you up for the challenge?

Suitable for Year 4 to 7 students and/or teacher

STEAM Expo: hands-on activity area - Student and / or Teacher (selected as one workshop)



Blast Off to the Virtual Universe!

Jackie Bondell, OzGrav
(ARC Centre of Excellence for Gravitational Wave Discovery)

In the Universe, massive objects warp the fabric of space-time and colliding black holes create waves that spread out over millions of light years in space! In this session, students will explore the planets of our solar system, the varieties of stars in our universe, and beyond to exotic objects such as black holes! Using virtual reality exploration, students will observe and learn about: differences and similarities among planets, why stars have different sizes and colours, how stars change over time, how stars affect the motion of objects in space, and how scientists observe dark objects like black holes.

Suitable for Year 4 to 10



The Weird & Wonderful World of Wounds

Assoc. Professor Jessica Stokes-Parish, Bond University

How are health professionals trained to look after and talk to potential patients when they present themselves at a medical facility? In this exciting Expo activity Dr Jessica Stokes-Parish will show you using special effects makeup (moulage) as a teaching tool! You will be able to use the moulage to create wounds and bruises and find out the link to health science and leave with some scary new skills!

Suitable for Year 4 to 8



Engineering, Design and Computing

Faculty of Engineering, Architecture and IT; The University of Queensland

Come along and get a taste of engineering, design and computing. Meet the team from UQ Racing – a student-led group who design and build race cars. Meet Australia's #1 student aerospace team, UQ Space, and view rockets which have been designed and built by them. Put your design and construction skills to the test, using only gummy bears and skewers, to design and build the tallest and most structurally sound gummy bear tower. While you're here why not check out some of the latest technology in robotics and mechatronics.

Suitable for Year 8 to 10



Hawker Brownlow Education

Igniting STEM Learning

Leading education publications, professional learning resources and more will be available for teachers and schools.



Grok Academy @ the STEAM Expo

Grok Academy

How do we secure information on the internet?

What information is safe to share online?

How do computer programs work?

Discover the answers to these questions and more by participating in a range of short unplugged activities running across the day:

- Cybersecurity Cards: sort through cards about various personal information and determine if it is safe to share online or not
- Cryptography: use different cyphers to encrypt and decrypt messages to understand the importance of encryption
- Decision Trees: classify animals using a decision tree
- Algorithmic Treasure Hunt: complete the activities to find the prize!

Suitable for Year 4 to 10

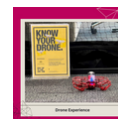


Explore Electronics!

Keely Berther, Integrated STEM Pty Ltd

Drones are used for a wide range of activities including; search and rescue, surveillance, traffic monitoring, firefighting, photography and videography as well being used increasingly by organisations such as energy companies, agriculture and mines to inspect their assets. Drones are also great in STEAM education in learning about programming, design, robotics, and more. In this STEAM Expo activity you will have an opportunity to not only fly a drone but program one for an autonomous activity.

Suitable for Year 4 to 10



Drone Experience

Pakronics and The Southport School students

Drones are used for a wide range of activities including; search and rescue, surveillance, traffic monitoring, firefighting, photography and videography as well being used increasingly by organisations such as energy companies, agriculture and mines to inspect their assets. Drones are also great in STEAM education in learning about programming, design, robotics, and more.

In this STEAM Expo activity you will have an opportunity to not only fly a drone but program one for an autonomous activity.

Suitable for Year 4 to 10

STEAM Expo: hands-on activity area - Student and / or Teacher continued...



Study Gold Coast and Gold Coast Student Hub

The Gold Coast has over 200 education and training institutions including 4 world class universities, QLD's largest training provider of vocational education, some of Australia's finest secondary schools, and English language colleges. Study Gold Coast provides support and extensive employability resources for students throughout the Gold Coast. Visit the Gold Coast Student Hub to find out about our resources, get some giveaways, and participate in a range of activities including VR career exploration, games and more!

Suitable for Year 7 to 10



This IS Rocket Science!!!!

It's Rocket Science Adventures

Who invented the Rocket? It was the ancient Chinese... Using fair testing principles, attendees will explore rocket design and learn how the centre of mass plays a pivotal role in why rockets fly straight. We achieve this with the use of small wind tunnel test rockets followed by launching the refined design to really get the STEM excitement going.

Suitable for Year 4 to 10



Hands on Robotics with Micromelon

Micromelon Robotics

Robots are widely used in manufacturing, mining, earth and space exploration, surgery, and much more! You will be challenged to program your own robot using simple coding tools to move around a maze without running into any walls. Come along and test out your skills, no prior experience necessary.

Suitable for Year 7 to 10



Southern Cross University - Transforming Tomorrow

Southern Cross University

Southern Cross University will be showcasing one of Australia's most ambitious vehicle prototypes - a long-range converted vintage Volkswagen Kombi that is now 100% electric and designed to drive between our east coast locations.

The conversion of the University's iconic promotional vehicle was a collaborative effort between the University, the NSW State Government, our students, Energy Lab, and lead contractor EV Machina. Come and find out about how SCU can forward your career! **Suitable for Year 7 to 10**



Tangalooma Ecomarines

Tangalooma EcoMarines and City of Gold Coast Council

The Tangalooma EcoMarines works to improve the water quality of waterways and adjacent environments throughout southeast Queensland to enhance marine and terrestrial environments. Our mission is to inspire a community of environmental heroes with our vision for a healthy environment for local marine and wildlife through collaborative community action. Come along and find out about their partnership with the City of Gold Coast and have the opportunity to win fun prizes while recycling!

Suitable for Year 4 to 10

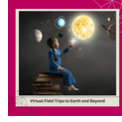


Balance & Gravity - Living in balance with the planet

Big Bang Education

Attendees will be invited to learn about balance and the concept of centre of gravity by creating balancing toys with recyclable junk/materials. Big Bang Education will highlight the importance of living in balance with the planet, and a great way to do that is to reuse and recycle material into toys.

Suitable for Year 4 to 6

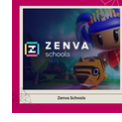


Virtual Field Trips to Earth and Beyond

Faculty of Science, Queensland University of Technology

In this expo activity you will experience how planetary surface exploration is conducted. Two immersive experiences will be provided - one on earth and the other on Mars. You will get to interact with the virtual Perseverance rover and Ingenuity drone and get to know their role on Mars 2020 mission. In another virtual simulation, you will become field geologists; immersing yourself in nature and doing some cool geoscience including taking measurements of folds.

Suitable for Year 8 to 10



Zenva Schools

Zenva

Zenva Schools is an education platform that helps schools to teach coding and game creation. We provide engaging, curriculum-aligned lessons that support the Digital Technologies subject. Our project-based content can be used in grades 3 to 12, and teaches real-world skills through the creation of games, apps, and websites. It allows teachers to easily support every student, catering to different experience levels, learning speeds, and preferred learning styles. Come along and discover how you can get everything you need to successfully teach digital technologies.

Suitable for Year 4 to 10

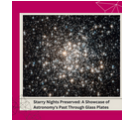


Mothamaticians

Bayer Crop Science

Successful agriculture depends on growers knowing not only the plant's life cycle, but the life cycle of the weed, disease and insect pests common to their crop. Knowing the life cycle of a pest allows growers to control it at the most vulnerable point in the cycle, or possibly avoid it all together. In this Expo activity, you will be introduced to insect life cycle and use of video microscopy to understand the importance of insect life cycles on our food chain.

Suitable for Year 4 to 7



Starry Nights Preserved: A Showcase of Astronomy's Past Through Glass Plates

Queensland University of Technology

"Starry Nights Preserved" is a showcase that celebrates astronomy's history through the display of replica glass plates. These plates offer a glimpse into the past, revealing the beauty and mystery of the night sky captured by astronomers of yesteryear. Come and marvel at these treasured artifacts of our cosmic heritage.

Suitable for Year 4 to 10



Fly through the Past, Present and Future!

Cross River Rail Delivery Authority

Through the magic of VR, travel in time from 1819 to the future, moving through Cross River Rail's future stations and station precincts, developing a sense of just how significantly Cross River Rail will assist Brisbane with its ongoing development as a world class city. Explore how digital tools are used for project planning, collaboration and management and how design ideas and solutions can be communicated to audiences.

Suitable for Year 4 to 10

Flow of the day....

*Listed program is subject to change

- 8.15am Sign-in, coffee and networking
- 8.45am Master of Ceremonies - Welcome, set up for the day and housekeeping
- 9.00am **KEYNOTE SPEAKER - DR SONIA SHAH**
Learn how Sonia's curiosity and use of her knowledge and skills in biology, statistics and computing has led her to make a difference to our future health
- 9.40am **ROTATION ONE - 40 min parallel sessions**
>> Teacher Mini-Master Classes
>> Student and/or Teacher DigiDesign Mini-workshops and STEAM Expo
- 10.25am **MORNING TEA**
- 11.00am **PROBLEM SOLVERS DESIGN CHALLENGE**
>> 80 min session - parallel sessions for Year 4 to 10 students and teachers
- 11.00am **TEACHER ALTERNATE SESSIONS**
>> **40 min Grok Academy's Using AI tools - the good, the bad and the ugly**
Find out about how AI tools can be used effectively in teaching and learning and discover the amazingly wide variety of free PD and resources available to all teachers throughout Australia that support the effective delivery of the Technologies curriculum.
- 11.40am **>> 40 min Teacher Networking and STEAM Pathways session**
Opportunity to discuss how the variety of STEM organisations including businesses and universities can support you in delivering and inspiring STEM in your school.
Opportunity to connect with other teachers and presenters to share ideas, possibilities and practices
- 12.25pm **LUNCH**
- 1.00pm **KEYNOTE SPEAKER - ANNELIES MOENS**
Learn how Annelies applies STEM to business and data privacy ... a very topical area!
- 1.40pm **ROTATION TWO - 40 min parallel sessions**
>> Teacher Mini-Master Classes
>> Student and/or Teacher DigiDesign Mini-workshops and STEAM Expo
- 2.30pm **FEEDBACK AND CONFERENCE COMPLETION**
>> Awarding of prizes to attendees e.g., Micro:Bits, sponsor gift vouchers etc
>> Completion of feedback form
- 2.45pm **CLOSE OF THE CONFERENCE**

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Conference Coordinator



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