

# It Takes a Spark!

## grok academy STEM Conference

Early bird  
registration  
closes 9th Aug  
**BOOK NOW or  
HOLD PLACES**

Friday, 1 September 2023 | TASMANIA

### Theme: STEM - everywhere, everyone, everyday

The 2023 conference theme is to highlight how STEM is at the heart of innovation and learning in every discipline and is used (mostly unconsciously) by everyone everyday. This is not about the acronym but about the thinking, mindsets and skills that STEM engenders.

#### Teacher PD workshops from leading STEM experts, teachers and students on topics as diverse as

- >> First Steps to designing a well-planned STEM program
- >> Teaching Smarter, Not Harder: An AI Workshop with ChatGPT
- >> Computers in the real world - building sensors to monitor our environment
- >> Computational thinking through Coding
- >> Development of STEAM authenticity through Project Based Learning
- >> Using AI tools - the good, the bad and the ugly
- >> Teacher Networking and STEM Pathways session

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

- >> Robot Recovery Mission
- >> Detecting the Unseen: Dark Matter
- >> Machine Learning Applications
- >> Supporting the survival of species through sensors
- >> Curious Kids can Code!
- >> LEGO Algorithmics
- >> Man or Machine: How does Artificial Intelligence work?
- >> Contemporary compounding: Innovation in medication delivery
- >> Introduction to F1 in Schools
- >> STEM EXPO activities
  - >> Tasmanian minerals, electric cars and solar panels
  - >> Kids in Space
  - >> Fun with Cubelets
  - >> Exploring the Internet of Things
  - >> Blast Off to the Virtual Universe!
  - >> Greenpower Tasmania

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

- >> A Space Designed For All Of Us: Accessible Learning For Every Body
- >> Creating Autonomous Vehicles using Lego Spike Prime
- >> Catchment sustainability challenge
- >> The heat is on: Design to thrive in a hotter 2050
- >> Designing a real-world drone solution
- >> Designing and Racing Land Yachts!
- >> Marshmallows to Mars
- >> Regenerative Systems Design

...read on for full programme

#### Outstanding Keynote Speakers



##### MARS BUTTFIELD-ADDISON

**Computer Scientist  
Superstar of STEM**

Mars Buttfield-Addison uses technology for good. She is a Computer Scientist, specialising in machine learning and supercomputing. In this role, she has worked to solve problems spanning public health to aerospace, all with computers. And she's passionate about empowering others to do the same. Mars has Bachelor and Honours degrees in Information and Communication Technology, and is working towards her PhD in Computer Engineering at the University of Tasmania. On the side, she's an avid freelancer for all things technology and STEM outreach—writing books, apps and teaching materials; organising, speaking and volunteering at events; tutoring privately, through her university and for the local Indigenous centre; working for companies towards ethical use of technology and artificial intelligence; contributing to free-to-use software used by scientists around the world; and involving herself in every effort to inform the public about the benefits and dangers of advanced technologies.



##### DR LILA LANDOWSKI

**Neuroscientist, Science Communicator  
Superstar of STEM**

Dr Lila Landowski is a multi-award winning neuroscientist and lecturer at the University of Tasmania, a Director of the Australian Society for Medical Research, a Director of Epilepsy Tasmania as well as a regular guest expert science communicator for the ABC. As a thought leader in STEM and STEM advocacy, her honorary titles include being a "Superstar of STEM," a Patron of Science, a Public Education ambassador for the Department of Education, and one of the Chief Scientist of Australia's "Science Superheroes". Lila has a strong personal focus on community health and wellbeing, making the wonderful world of science more accessible to the community through talks and the media. The TEDx speaker has received accolades including the Premier's Young Achiever of the Year, an Australian Institute of Policy and Science Young Tall Poppy award winner, was a Tasmanian finalist for Young Australian of the Year, and was recently named as one of Australia's top 20 Scientists in the Herald Sun

**INFO & REGISTRATION: [spark-educonferences.com.au/tasmania-2023](https://spark-educonferences.com.au/tasmania-2023)**

#### Contact

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#### Host School



Guilford  
Young  
College

#### Conference Coordinator



Intuyu  
Consulting

Empowering  
21st Century  
Learning

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

## Teacher Mini Masterclass: Practical Professional Development

### Computational thinking through Coding



#### Kaye North, Code Club Australia

Code Club is a nationwide network of volunteer-led coding clubs with a mission to #getkidscoding! We are a charity with the aim of giving every child the tools and skills to power their own future. We bring Code Clubs to kids all over regional and remote Australia and provide free online teaching resources. In this workshop teachers will explore how to develop students in computational thinking through coding, creating projects that share indigenous culture, address the Sustainability Goals and teach kids about what makes Australia unique! Computational thinking is now part of the Maths curriculum from grade 3 and this workshop will make a big difference to your practice and pedagogy. We will share with you a wide range of free resources, aligned to the Australian Curriculum that can be adapted and utilised across your school.

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

### Development of STEAM authenticity through Project Based Learning



#### Michelle Bradley, Launceston Church Grammar School

This workshop will focus on using the development of authentic STEAM problem-solving skills through project-based learning. The open-ended nature of PBL challenges allows students to use their creativity to develop design thinking and problem solving skills. The skills developed are vital for 21st Century learners to be effective in an ever-changing world.

This is a hands-on workshop. After being given a run-down of tasks you will be involved in a mini-version of a project-based learning / problem-solving STEAM challenge. Participants will come away with a framework (and resources), and examples of how to approach questioning in order to come up with an authentic approach to STEM learning. Specifically, you will learn how to:

- Approach questioning to allow for a wide range of responses, and encourage deeper STEAM learning
- The fundamentals of effective project based learning and how to apply those fundamentals
- Develop Design Thinking skills
- Encourage teamwork, participation and student voice.

**School / teacher stages: Beginning, Next Step & Extending**  
**Suitable for Secondary Teachers - BYO Laptop**

### 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. How can teachers use it to make learning more meaningful and support their students to navigate this space? 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 - BYO Laptop**

## DigiDesign Mini-workshops - Teacher and/or Student

### Introduction to F1 in Schools - Primary

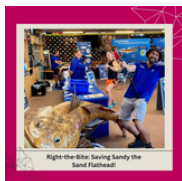


#### Murat Djakic, Re-Engineering Australia Foundation

The F1 in Schools STEM Challenge provides an exciting and engaging experience for students through the captivating appeal of Formula 1. Through the challenge, teams use Computer Aided Design (CAD) to design, analyse, manufacture, test and race model F1 cars manufactured from a block of balsa wood. The cars race on a 25m track powered by CO2 canisters and reach speeds of up to 80km/h. In this workshop you will get the opportunity to go through the design process to make a cardboard F1 car and race it on the 25m track. Are you a budding F1 engineer?

**Suitable for Year 4 to 6 students and/or teacher**

### Right-the-Bite: Saving Sandy the Sand Flathead!



#### Department of Natural Resources & Environment – Fisheries Tasmania

Sand flathead are Tasmanian's favourite fish to catch – they're caught by virtually every fisher, everywhere, every day! Populations have reached critically low levels and we need to solve this problem fast!

Using the materials provided, and a big dash of design thinking, you will be putting your creative mind to the test, to design, develop and test innovative fishing lures and rig designs to attract other more sustainable fish species, and ease the squeeze on Sandy! A great real-world application of STEM.

**Suitable for Year 7 to 9 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**

### Contemporary compounding: Innovation in medication delivery



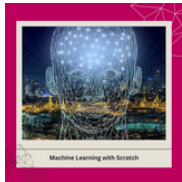
#### University of Tasmania, School of Pharmacy and Pharmacology

Compounding is often regarded as the process of combining, mixing, or altering ingredients to create a medication tailored to the needs of an individual patient. This mini-workshop will focus on the individualisation of medications through compounding.

You, as a junior compounding pharmacist, will be assisting the presenters to create lip balms (a formulation used to deliver targeted therapy). Once complete, the presenters will guide you through the appropriate quality control processes and labelling of the product.

**Suitable for Year 7 to 10 students and/or teacher**

## Machine Learning with Scratch - Primary



### Dr Bob Elliot, Tasmanian Dept of Education Gifted Online

Machine learning already has many applications you are familiar with; YouTube recommendations, SIRI, face recognition, and license plate readers. It can do some jobs better than lawyers or doctors, write books that sell on Amazon, and even write music. Machine learning is a very important topic with big impacts on our society.

In this workshop you will learn how to use one important application of machine learning... classifying objects in photos. You will start with Google Teachable Machine to learn the basics of creating Machine Learning models and how to use them to classify/identify objects. Then you will use Scratch 3.0 GUI (machinelearningforkids.co.uk) to learn how to write code that can use machine learning. If we have time you'll learn how to use machine learning to control a servo on a BBC Micro:bit using block code.

**Suitable for Year 4 to 6 students and/or teacher**

## Plants and Humans - Same or Different?



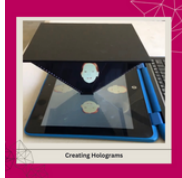
### ARC Centre of Excellence for Plant Success

Plants are living organisms that are everywhere and vital to life on earth. They include grasses, trees, flowers, bushes, ferns, mosses, and more. However, have you ever noticed that plants have some similarities to humans?

In this hands-on plant science workshop you will begin by exploring the ways humans and plants are similar or different. You'll get to see inside a plant at a microscopic level to understand how water stress and drought, seen with climate change, effects plants and eventually us! To finish off we'll make a TikTok style video to give plants a voice!

**Suitable for Year 5 to 8 students and/or teacher**

## Robot Recovery Mission



### TasNetworks STEAM Program

Robots are being used in an increasing range of situations from agriculture, surgery, production, rescuing people and even exploring other worlds!

In this workshop your mission will involve working as a team to successfully deliver materials to a remote site in Tasmania, whilst avoiding the obstacles of fallen trees. Your tools include Lego to build your trailer and a robot to transport the materials to site, much like that of TasNetworks crews.

**Suitable for Year 4 to 6 students and/or teacher**

## What's a Knot and what's not?



### Doug Grubert Education

Ever considered that knots may be the greatest technology in history? Evidence suggests they date back 300,000 years – which was way before wheels were invented around 6500 years ago. Knots were an essential precursor, or component, of many inventions since.

In this workshop you will get to understand the importance of knots, how they relate to mathematics, science and materials technology, and you will even get the chance to tie some knots then utilise destructive testing to determine what a knot is and what's not!

**Suitable for Year 4 to 6 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**

## Machine Learning Applications



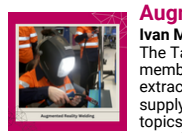
### Students from Cressy District High School

While artificial intelligence encompasses the idea of a machine that can mimic human intelligence, machine learning does not. Machine learning aims to teach a machine how to perform a specific task and provide accurate results by identifying patterns.

In this workshop students from Cressy District High will demonstrate how to use pseudocode and Python to create a simple application incorporating machine learning and natural language processing to assist humans in performing a real-world task.

**Suitable for Year 8 to 10 students and/or teacher**

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



### Augmented Reality Welding

**Ivan Markota, Tasmanian Minerals, Manufacturing and Energy Council**  
The Tasmanian Minerals, Manufacturing and Energy Council (TMEC) is a membership-based organisation that represents the state's mining exploration, extraction and processing businesses, advanced manufacturers, and associated supply chains. TMEC's core role is to coordinate representative committees across topics such as energy, land management, occupation health and safety, advanced manufacturing and emergency response. In this STEM Expo activity attendees will use Virtual Reality and Augmented Reality technology to experience all the real elements of welding in a workshop environment (welding torches, welding helmet, workpieces, etc.). Come and experience the latest in realistic VR/AR training experiences! **Suitable for Year 8 to 10**



### Fun with Cubelets

**Steve Reiher, RobotMan**

Cubelets are great fun for the novice and expert, alike. Each Cubelet either senses, thinks or acts confirming the basic robotic principles of input, processing, and output. In this fun, hands-on activity you will be using these magnetic modular robotic blocks to experiment with and create robots either from challenge cards or your own imagination. **Suitable for Year 4 to 10**



### Australian STEM Video Game Challenge

**Australian Council for Educational Research**

The Australian STEM Video Game Challenge (STEM VGC) is a free national video game development competition for students in Years 4 to 12. It is a fun challenge that aims to engage more students in STEM and enable them to develop real world skills required to succeed in work and life. This workshop will showcase the 2022 winning entries and demonstrate how schools can participate in the Challenge in 2024. **Suitable for Year 4 to 10**



### Drone Experience

**Pakronics**

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**



### Kids in Space

**Sacred Heart Catholic School Geeveston**

The Andy Thomas Space Foundation in partnership with the Australian Space Agency created the Kids in Space national program to engage schools across each state and territory in a space themed, technology-based, design thinking project. The students from Sacred Heart Geeveston will showcase the challenge they face, their learning and their solution. Come along and learn about the Kids in space program, how the students used 3D printing in their project and even 3D print some of the parts they used in their solution! **Suitable for Year 4 to 6**



### Tasmanian minerals, electric cars and solar panels

**Sebastien Meffre, University of Tasmania**

You'd normally think that rocks and earth science wouldn't be much fun – that's because you haven't met Sebastien! In this fabulous Expo activity, you'll learn about Tasmania's complex geology and investigate the relationship between the geology and mineral deposits. You'll have the chance to try and work out which minerals from Tasmania are used for making various items used for transport, infrastructure and consumer items. You also discover how the properties of minerals can help with mineral identification but also investigate how these properties are related to their end use in society. **Suitable for Year 8 to 10**



### Exploring the Internet of Things

**Troy Merritt, Bitlink**

Computers are all around us in places we mostly don't realise. They are in our street lights, weather stations, gardens and even pet feeders. The Internet of Things (IoT) connects them all together and automates simple jobs as well as gathers data to help us make decisions. In this hands-on expo activity Bitlink will demonstrate our Internet of Things kits and 20 curriculum linked lessons and resources that have been created to support them. Students can explore and experiment with a range of sensors and coding examples, and teachers can find out about some of the projects and get tips on how to get started with design and digital technologies. **Suitable for Year 4 to 8**

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



### Guilford Young College STEM

#### Guilford Young College

STEM prepares you to be flexible and adaptable in a world of constant change. It teaches you to think critically and creatively about problems and be innovative with your possible solutions. Many of the jobs you will be applying for in the future are still being invented! Come along to the GYC expo table to discover the wide range of STEM options that GYC offers from chemistry, maths, and biology, to robotics, game design and computer science. Participate in some cool hands-on Science activities and get your questions answered about the courses GYC offers.

**Suitable for Year 8 to 10**

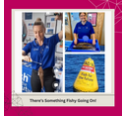


### Sensor Technology in Agriculture

#### Hagley Farm School Agricultural Learning Centre

Everyday Australian's all over the country consume agricultural products grown in Tasmania. Increasing the uptake of technology is a key driver for improving productivity in food and fibre production. This Expo activity will demonstrate how an on farm digital sensor system can improve agricultural outcomes and productivity. You will use iPads to access real time data and solve various agricultural scenarios.

**Suitable for Year 5 to 10**



### There's Something Fishy Going On!

#### Department of Natural Resources & Environment – Fisheries Tasmania

Whether you're interested in science, engineering or just enjoy fishing, everyone plays a part in caring for Tassie's oceans. In this fun and exciting Expo you will have the chance to participate in a range of hands-on STEM activities where you will explore the science behind fishing, test your precision and speed when measuring your catch, create innovative artificial fish habitats and learn how to best care for your catch to improve fish survival. **Suitable for Year 4 to 10**



### Inspiring STEM learning through Agriculture

#### Tasmanian Institute of Agriculture, College of Sciences and Engineering, UTAS

Agriculture is a pathway that embraces STEM to meet the needs of growing populations, whilst also developing sustainable approaches. From soil science to plant breeding, food safety to cutting-edge precision engineering, agriculture provides real-world examples of STEM in action and help students to learn in an inspiring and engaging environment.

Come along and discover the variety of engaging approaches to bring agriculture into your STEM learning. This expo display will showcase hands-on activities, provide examples of case-studies for developing real-world learners, career opportunities & resources for pathway visioning, plus fantastic experiences for students outside of the classroom and connect with our Tasmanian agriculture industry. **Suitable for Year 7 to 10**



### Bobbing Around

#### Maritime Museum of Tasmania

The Maritime Museum of Tasmania is dedicated to showcasing Tasmania's maritime heritage story: Indigenous watercraft, European exploration and navigation, convict transportation, whaling, colonial and global trade, migration, naval history, ship-building, model ships and shipwrecks. In this Expo activity you will have the opportunity to discover STEM in maritime action via buoyancy and balance in a plimsoll line activity, how block and tackle usage in loading and unloading ships demonstrates the physics of pulleys, and maybe even how sailboats can tack into the wind. **Suitable for Year 4 to 6**



### Engineers Make Things Happen

#### Engineers Australia Tasmania

Engineers are scientists, inventors, designers, builders and great thinkers. They tend to be naturally curious and critical thinkers which leads them to build a myriad of skill sets throughout their study and careers. Their interests are extremely varied but typically include creativity, social, cultural and economic awareness, biology, chemistry, physics and other areas of science as well as teamwork. Join us at our Expo stand to participate in a range of hands-on activity kits covering multiple engineering disciplines including electrical, structural and mechanical engineering. This will allow you to gain an understanding of the broad scope of engineering as a potential career path.

**Suitable for Year 6 to 8**



### Grok Academy @ the STEM 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**



### Greenpower Tasmania

#### Daniel Edwards, Greenpower Tasmania

Greenpower Tasmania challenges young people to design and build an electric car to race at Greenpower events. In this action packed STEM Expo you will experience a number of exciting hands-on activities including;

- **Virtual reality simulator** – compete against others to see who can set the fastest lap time around Goodwood, the home of Greenpower's International Final
- **Greenpower F24 pitstop challenge** – which team can set the fastest time changing a full set of wheels on a Greenpower F24?
- **Minecraft Education** – explore informative and interactive Greenpower worlds created by members of Montello Primary's Greenpower racing teams. These feature connections to many aspects of Greenpower, including designing, building and racing an electric vehicle, different roles and responsibilities within teams, renewable energy and Tasmania's carbon-negative status

**Suitable for Year 4 to 10**

## 11.00AM to 12.20PM PROBLEM SOLVERS DESIGN CHALLENGE (80 min parallel session) 11.00AM to 12.20PM ALTERNATE TEACHER ONLY PD SESSION

### Problem Solvers Design Challenge - Student and Teacher

Each session has a different real life design or STEM 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.



### Doing it Scared

#### Doug Grubert, Paul Pritchard & John Middendorf, Doug Gruber Education

Paul Pritchard was a world-class rock climber with an international reputation for difficult and bold ascents. In 1998, on a visit to Tasmania, he suffered a catastrophic head injury in a climbing accident that left him fighting for his life. Paul spent a year in hospital and was left hemiplegic. He has spent the last 25 years overcoming a variety of day-to-day challenges: some obvious, others not so obvious. In this Problem Solver Challenge you will put yourself in Paul's shoes to help you identify challenges that confront people with disabilities every day. You will go through the design process to brainstorm some solutions to the challenges that people with disabilities face.

**Suitable for Year 4 to 7 students and teachers**

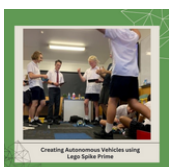


### Regenerative Systems Design

#### School of Architecture and Design, University of Tasmania

Ancient tribes and civilizations, such as the Aboriginal Australians, knew something we seem to have forgotten. They worked in synchronization with nature's cycles of seasons and the biodiverse ecological systems we exist in. When designing solutions to problems we need to account for the impact on all the systems involved. In this problem solver workshop you will learn about regenerative systems design while defining and exploring real world systems. With this understanding you will use creative problem solving skills to build design interventions using Lego.

**Suitable for Year 5 to 8 students and teachers**



### Creating Autonomous Vehicles using Lego Spike Prime

#### Steve Reiher, RobotMan

An Autonomous Vehicle is a vehicle that can use artificial intelligence (AI) to move the car from one point to another without human intervention. The AI gathers data from a range of sensors so it can respond rapidly to the ever changing driving conditions. In this problem solver challenge attendees will attempt to build and program a simple autonomous vehicle that will travel quickly from one point, around an L-shaped course, and back again. Their vehicle will use colour and force sensors to navigate the course.

**Suitable for Year 7 to 10 students and teachers**



### The Trouble with Transfer (and Tribbles)

#### Hydro Tasmania

Moving water from point A to point B is not always easy. In this problem solver session you will be presented with a 3D model of a landscape. Given the topography and any information provided, will you build a tunnel? Perhaps a canal? Are there other things to consider when moving water such as threatened or sensitive species (tribbles)? Attendees will work in small groups to come up with a solution and be given time at the end to pitch your idea.

**Suitable for Year 8 to 10 students and teachers**



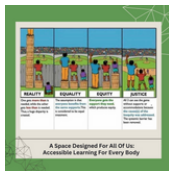
### Marshmallows to Mars

#### St Patrick's College Launceston

When we normally think of marshmallows we often think of those soft, squishy things we eat in hot chocolate and around campfires. However, have you ever wanted to rapidly deploy marshmallows over a great distance?

In this workshop you will be using a variety of methods to do just that. From catapults to vacuum launchers come and figure out the best way to take the humble marshmallow to velocities previously unheard of!

**Suitable for Year 7 to 10 students and teachers**

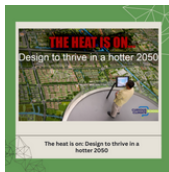


## A Space Designed For All Of Us: Accessible Learning For Every Body

**Mount Carmel College**

Learning spaces are mostly designed to support the learning of each young person equally. However 'equality' means providing the same to all despite each and every learner being different. Educational equity means recognizing that we do not all start from the same place and must acknowledge and make adjustments to imbalances. Yet even this is not enough as it doesn't address the systemic barriers learners can experience. In this problem solver, you will use systems thinking and work together to design and model a 2025-era Learning Space that has been optimised to solve the problem of access for anyone who is differently abled or disadvantaged. The aim will be to move beyond educational equity to educational justice – something that will be beneficial to every body.

**Suitable for Year 4 to 6 students and teachers**

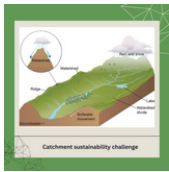


## The heat is on: Design to thrive in a hotter 2050

**Curious Climate Schools and School of Geography, Planning and Spatial Sciences, UTAS**

The questions that students ask experts in Curious Climate Schools show that many young people are experiencing uncertainty and anxiety about what the future holds, and some equate this with imminent doom. In this interactive game-like workshop, you will find out what life could be like in a hotter world. Teams will be designing solutions to help their community adapt to higher temperatures, sea level rise and other climate impacts. In exploring possible futures, the workshop will also highlight how important it is to take action now to avoid big temperature changes.

**Suitable for Year 7 to 10 students and teachers**



## Catchment sustainability challenge

**Tasmanian Institute of Agriculture, College of Sciences and Engineering, UTAS**

Catchments provide people, stock and flora and fauna with drinking water. They provide people with water for domestic and industrial use, including irrigation, and they cater for recreation and tourism. In the catchment challenge, players compete in teams to manage land use in a river catchment. Each team has access to limited resources in the form of land, water and money, which they can use to change land use in the catchment under different climate scenarios. The team that improves the overall sustainability of the catchment, that is, the environmental, economic and social outcomes, wins the game. Through the game, players will learn about the different values of water in a catchment and the challenges of improving sustainability.

**Suitable for Year 7 to 10 students and teachers**



## The Opportunity Recognition Game

**BitLink**

Entrepreneurship is about seeing problems in the world and recognising them as potential opportunities. To be an entrepreneur, you need to be able to identify a problem that a real potential customer has, figure out a solution to their problem and figure out how to build a business around that solution. Timing is also important. A great idea today might not be a great idea in ten years' time and might not have been a great idea ten years ago. To build a successful business, we need to ride the wave of current consumer, social and technology trends. In this workshop, you will learn about how to come up with ideas for new startup businesses by taking customer problems and growing technology trends, and using them to come up with innovative new business ideas.

**Suitable for Year 6 to 10 students and teachers**

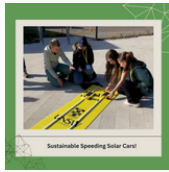


## Designing and Racing Land Yachts!

**Rose Anderson, Dept for Education, Children & Young People; and Bronwen Baume-Tarrant, Sacred Heart College**

Land yachts are innovative vehicles that harness wind power to propel themselves across the ground, showcasing the intersection of engineering, physics, and renewable energy. In this exciting hands-on design challenge, you will have the opportunity to design and construct a land yacht from a range of available materials. Once your land yachts are complete, it's time to race! We will gather all our vehicles and have a thrilling race to see whose design is the fastest. Of course, this workshop is not just about racing. We will also be discussing the potential of renewable energy and how it can help us create a more sustainable future as well as exploring the principles of engineering and physics. Teachers are encouraged to join in the fun and learn how they can run this back in their schools!

**Suitable for Year 4 to 6 students and teachers**



## Sustainable Speeding Solar Cars!

**Hydro Tasmania**

Solar Car Challenges are a great way to understand, in practical terms, how solar panels operate, the influence of angles and alignment of the solar panel to voltage output, the relationships between all the physical elements needed to produce an effective mechanical output, and how to construct a working solar-powered and race-ready car. In this problem solver session you will go through a fast prototyping process to design a fast solar car. You will be able to choose from different sizes of body and wheels for your cars and, through testing them, enter your final designs into a car race on a track.

**Suitable for Year 7 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**



## Making an Impact to what matters

**Illuminate Education Australia**

Design thinking is about problem finding more than problem solving, and problem framing is a crucial part of the discovery process. In this interactive workshop, you will be exploring and use the skills of brainstorming, problem framing and initial ideation to come up with possible solutions to community challenges that you want to make a difference to. Along the way you will discover how you can apply these skills in other contexts.

**Suitable for Year 4 to 6 students and teachers**

Alternate Teacher Only PD Session - select as one session



## 11.00am Teacher Networking

Opportunity to connect with other teachers and presenters to share ideas, possibilities and practices

## 11.40am STEM Pathways session

Opportunity to meet with the sponsors in the STEM EXPO area to discuss (without students) how they can support you in delivering and inspiring STEM in your school.

**Facilitated by Dr Adrian Bertolini - Conference Coordinator**

**Suitable for Primary & Secondary Teachers**

## Teacher Mini Masterclass: Practical Professional Development

### Computers in the real world - building sensors to monitor our environment

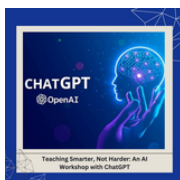


#### Bitlink

There's a special kind of magic that students feel when they code a computer to interact with the real world. James and Troy from Bitlink will talk about real world examples you can use in your classroom and show you how to build a sensor device with a BBC Micro:bit.

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

### Teaching Smarter, Not Harder: An AI Workshop with ChatGPT



#### Kaleb Clark, Queechy High School

ChatGPT, a powerful language model, provides instant feedback for students. While AI should not replace a teacher's lessons, it can serve as a practice tool for teachers to use in the classroom and a way to switch it up and provide something new for students. This workshop is designed to help teachers learn how to effectively use ChatGPT to teach their students about AI. Through this workshop, educators will gain a foundational understanding of AI and its impact on society, as well as practical experience using ChatGPT as a teaching tool.

**School / teacher stages: Extending**  
**Suitable for Secondary Teachers - BYO Laptop or Device**

### First Steps to designing a well-planned STEM 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, and curriculum mapping approaches. Templates for planning will be provided.

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

## DigiDesign Mini-workshops - Teacher and/or Student

### Curious Kids can Code!



#### Kaye North, Code Club Australia

Coders regularly solve problems and create solutions and so can you! Do you want to design a more sustainable way to plant crops? Share cultural stories that teach us about the stars? Tell others about the biggest produce exports of Tasmania? In this workshop you will have the opportunity to use Code Club project design briefs to create a coding project using Scratch. These ideas can be used in classrooms or in your school's coding club! Learn how you can code and create!

**Suitable for Year 4 to 6 students and/or teacher**

### Contemporary compounding: Innovation in medication delivery



#### University of Tasmania, School of Pharmacy and Pharmacology

Compounding is often regarded as the process of combining, mixing, or altering ingredients to create a medication tailored to the needs of an individual patient. This mini-workshop will focus on the individualisation of medications through compounding. You, as a junior compounding pharmacist, will be assisting the presenters to create lip balms (a formulation used to deliver targeted therapy). Once complete, the presenters will guide you through the appropriate quality control processes and labelling of the product.

**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**

### Right-the-Bite: Saving Sandy the Sand Flathead!



#### Department of Natural Resources & Environment – Fisheries Tasmania

Sand flathead are Tasmanian's favourite fish to catch – they're caught by virtually every fisher, everywhere, every day! Populations have reached critically low levels and we need to solve this problem fast! Using the materials provided, and a big dash of design thinking, you will be putting your creative mind to the test, to design, develop and test innovative fishing lures and rig designs to attract other more sustainable fish species, and ease the squeeze on Sandy! A great real-world application of STEM.

**Suitable for Year 7 to 9 students and/or teacher**

### Supporting the survival of species through sensors



#### Julia Murrie & Madison Raimondo, Rosebery District School

Tasmania is one of the highest roadkill states in Australia. Current data shows that 75% of the animals killed are mammals and less than 10% each are birds and reptiles. Rosebery District School has been exploring how we can reduce this impact within Tasmania by coding robots to autonomously modify their own trajectory during navigation in order to avoid collisions. In this workshop you will learn the important aspects of obstacle avoidance and have the opportunity to code a robot to detect movement and react in an obstacle course.

**Suitable for Year 4 to 7 students and/or teacher**

## Sky Country – Aboriginal Astronomy



### Catholic Education Tasmania

How can the sky affect life on Earth and vice versa?

Aboriginal and Torres Strait Islander peoples have been observing and responding to the skies for millennia.

In this workshop you will investigate the phenomenon that is retrograde using a digital planetarium. Students will come to understand the names of the planets, their movement across the sky and the concepts of ecliptic, zodiac, and retrograde motion and discuss how this scientific knowledge was developed by Aboriginal and Torres Strait Islander people long ago.

**Suitable for Year 4 to 7 students and/or teacher**

## Introduction to F1 in Schools - Secondary



### Murat Djacic, Re-Engineering Australia Foundation

The F1 in Schools STEM Challenge provides an exciting and engaging experience for students through the captivating appeal of Formula 1. Through the challenge, teams use Computer Aided Design (CAD) to design, analyse, manufacture, test and race model F1 cars manufactured from a block of balsa wood. The cars race on a 25m track powered by CO2 canisters and reach speeds of up to 80km/h.

In this workshop you will get the opportunity to go through the design process to make a cardboard F1 car and race it on the 25m track. Are you a budding F1 engineer?

**Suitable for Year 7 to 9 students and/or teacher**

## Plants and Humans - Same or Different?



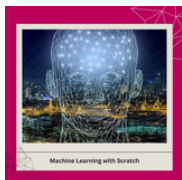
### ARC Centre of Excellence for Plant Success

Plants are living organisms that are everywhere and vital to life on earth. They include grasses, trees, flowers, bushes, ferns, mosses, and more. However, have you ever noticed that plants have some similarities to humans?

In this hands-on plant science workshop you will begin by exploring the ways humans and plants are similar or different. You'll get to see inside a plant at a microscopic level to understand how water stress and drought, seen with climate change, effects plants and eventually us! To finish off we'll make a TikTok style video to give plants a voice!

**Suitable for Year 5 to 8 students and/or teacher**

## Machine Learning with Scratch - Secondary



### Dr Bob Elliot, Tasmanian Dept of Education Gifted Online

Machine learning already has many applications you are familiar with; YouTube recommendations, SIRI, face recognition, and license plate readers. It can do some jobs better than lawyers or doctors, write books that sell on Amazon, and even write music. Machine learning is a very important topic with big impacts on our society.

In this workshop you will learn how to use one important application of machine learning... classifying objects in photos. You will start with Google Teachable Machine to learn the basics of creating Machine Learning models and how to use them to classify/identify objects. Then you will use Scratch 3.0 GUI (machinelearningforkids.co.uk) to learn how to write code that can use machine learning. If we have time you'll learn how to use machine learning to control a servo on a BBC Micro:bit using block code.

**Suitable for Year 7 to 8 students and/or teacher**

## Robot Recovery Mission



### TasNetworks STEAM Program

Robots are being used in an increasing range of situations from agriculture, surgery, production, rescuing people and even exploring other worlds!

In this workshop your mission will involve working as a team to successfully deliver materials to a remote site in Tasmania, whilst avoiding the obstacles of fallen trees. Your tools include Lego to build your trailer and a robot to transport the materials to site, much like that of TasNetworks crews.

**Suitable for Year 4 to 6 students and/or teacher**

## STEM 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 students, 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**



### Augmented Reality Welding

Ivan Markota, Tasmanian Minerals, Manufacturing and Energy Council  
The Tasmanian Minerals, Manufacturing and Energy Council (TMEC) is a membership-based organisation that represents the state's mining exploration, extraction and processing businesses, advanced manufacturers, and associated supply chains. TMEC's core role is to coordinate representative committees across topics such as energy, land management, occupation health and safety, advanced manufacturing and emergency response. In this STEM Expo activity attendees will use Virtual Reality and Augmented Reality technology to experience all the real elements of welding in a workshop environment (welding torches, welding helmet, workpieces, etc.). Come and experience the latest in realistic VR/AR training experiences! **Suitable for Year 8 to 10**



### Fun with Cubelets

Steve Reiher, RobotMan

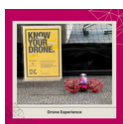
Cubelets are great fun for the novice and expert, alike. Each Cubelet either senses, thinks or acts confirming the basic robotic principles of input, processing, and output. In this fun, hands-on activity you will be using these magnetic modular robotic blocks to experiment with and create robots either from challenge cards or your own imagination. **Suitable for Year 4 to 10**



### Australian STEM Video Game Challenge

Australian Council for Educational Research

The Australian STEM Video Game Challenge (STEM VGC) is a free national video game development competition for students in Years 4 to 12. It is a fun challenge that aims to engage more students in STEM and enable them to develop real world skills required to succeed in work and life. This workshop will showcase the 2022 winning entries and demonstrate how schools can participate in the Challenge in 2024. **Suitable for Year 4 to 10**



### Drone Experience

Pakronics

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**



### Tasmanian minerals, electric cars and solar panels

Sebastien Meffre, University of Tasmania

You'd normally think that rocks and earth science wouldn't be much fun – that's because you haven't met Sebastien! In this fabulous Expo activity, you'll learn about Tasmania's complex geology and investigate the relationship between the geology and mineral deposits. You'll have the chance to try and work out which minerals from Tasmania are used for making various items used for transport, infrastructure and consumer items. You also discover how the properties of minerals can help with mineral identification but also investigate how these properties are related to their end use in society. **Suitable for Year 8 to 10**



### Exploring the Internet of Things

Troy Merritt, Bitlink

Computers are all around us in places we mostly don't realise. They are in our street lights, weather stations, gardens and even pet feeders. The Internet of Things (IoT) connects them all together and automates simple jobs as well as gathers data to help us make decisions. In this hands-on expo activity Bitlink will demonstrate our Internet of Things kits and 20 curriculum linked lessons and resources that have been created to support them. Students can explore and experiment with a range of sensors and coding examples, and teachers can find out about some of the projects and get tips on how to get started with design and digital technologies. **Suitable for Year 4 to 8**



### Engineers Make Things Happen

Engineers Australia Tasmania

Engineers are scientists, inventors, designers, builders and great thinkers. They tend to be naturally curious and critical thinkers which leads them to build a myriad of skill sets throughout their study and careers. Their interests are extremely varied but typically include creativity, social, cultural and economic awareness, biology, chemistry, physics and other areas of science as well as teamwork. Join us at our Expo stand to participate in a range of hands-on activity kits covering multiple engineering disciplines including electrical, structural and mechanical engineering. This will allow you to gain an understanding of the broad scope of engineering as a potential career path. **Suitable for Year 6 to 8**



### Grok Academy @ the STEM 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**

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



### Guilford Young College STEM

#### Guilford Young College

STEM prepares you to be flexible and adaptable in a world of constant change. It teaches you to think critically and creatively about problems and be innovative with your possible solutions. Many of the jobs you will be applying for in the future are still being invented! Come along to the GYC expo table to discover the wide range of STEM options that GYC offers from chemistry, maths, and biology, to robotics, game design and computer science. Participate in some cool hands-on Science activities and get your questions answered about the courses GYC offers.

**Suitable for Year 8 to 10**

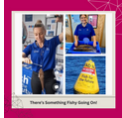


### Sensor Technology in Agriculture

#### Hagley Farm School Agricultural Learning Centre

Everyday Australian's all over the country consume agricultural products grown in Tasmania. Increasing the uptake of technology is a key driver for improving productivity in food and fibre production. This Expo activity will demonstrate how an on farm digital sensor system can improve agricultural outcomes and productivity. You will use iPads to access real time data and solve various agricultural scenarios.

**Suitable for Year 5 to 10**



### There's Something Fishy Going On!

#### Department of Natural Resources & Environment – Fisheries Tasmania

Whether you're interested in science, engineering or just enjoy fishing, everyone plays a part in caring for Tassie's oceans. In this fun and exciting Expo you will have the chance to participate in a range of hands-on STEM activities where you will explore the science behind fishing, test your precision and speed when measuring your catch, create innovative artificial fish habitats and learn how to best care for your catch to improve fish survival. **Suitable for Year 4 to 10**



### Bobbing Around

#### Maritime Museum of Tasmania

The Maritime Museum of Tasmania is dedicated to showcasing Tasmania's maritime heritage story: Indigenous watercraft, European exploration and navigation, convict transportation, whaling, colonial and global trade, migration, naval history, ship-building, model ships and shipwrecks. In this Expo activity you will have the opportunity to discover STEM in maritime action via buoyancy and balance in a plimsoll line activity, how block and tackle usage in loading and unloading ships demonstrates the physics of pulleys, and maybe even how sailboats can tack into the wind. **Suitable for Year 4 to 6**



### Greenpower Tasmania

#### Daniel Edwards, Greenpower Tasmania

Greenpower Tasmania challenges young people to design and build an electric car to race at Greenpower events. In this action packed STEM Expo you will experience a number of exciting hands-on activities including;

- [Virtual reality simulator](#) – compete against others to see who can set the fastest lap time around Goodwood, the home of Greenpower's International Final
- [Greenpower F24 pitstop challenge](#) – which team can set the fastest time changing a full set of wheels on a Greenpower F24?
- [Minecraft Education](#) – explore informative and interactive Greenpower worlds created by members of Montello Primary's Greenpower racing teams. These feature connections to many aspects of Greenpower, including designing, building and racing an electric vehicle, different roles and responsibilities within teams, renewable energy and Tasmania's carbon-negative status

**Suitable for Year 4 to 10**



### Inspiring STEM learning through Agriculture

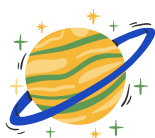
#### Tasmanian Institute of Agriculture, College of Sciences and Engineering, UTas

Agriculture is a pathway that embraces STEM to meet the needs of growing populations, whilst also developing sustainable approaches. From soil science to plant breeding, food safety to cutting-edge precision engineering, agriculture provides real-world examples of STEM in action and help students to learn in an inspiring and engaging environment.

Come along and discover the variety of engaging approaches to bring agriculture into your STEM learning. This expo display will showcase hands-on activities, provide examples of case-studies for developing real-world learners, career opportunities & resources for pathway visioning, plus fantastic experiences for students outside of the classroom and connect with our Tasmanian agriculture industry. **Suitable for Year 7 to 10**

## Flow of the day....

- 8.15am Sign-in, coffee and networking \*Listed program is subject to change
- 8.45am Master of Ceremonies - Welcome, set up for the day and housekeeping
- 9.00am **KEYNOTE SPEAKER - MARS BUTTFIELD-ADDISON**  
Mars Buttfield-Addison uses technology for good. She is a Computer Scientist, specialising in machine learning and supercomputing. In this role, she has worked to solve problems spanning public health to aerospace, all with computers. And she's passionate about empowering others to do the same.
- 9.40am **ROTATION ONE - 40 min parallel sessions**  
>> Teacher Mini-Master Classes  
>> Student and/or Teacher DigiDesign Mini-workshops and STEM Expo
- 10.25am **MORNING TEA** - An opportunity to network with other teachers and students, and explore EXPO
- 11.00am **PROBLEM SOLVERS DESIGN CHALLENGE**  
>> 80 min session - parallel sessions aimed at Year 4 to 10 students and teachers. This session is an opportunity for universities, industry, schools or community organizations' to pose real life design challenges and lead students through the design process to ideate and present possible solutions.
- ALTERNATE TEACHER ONLY PD SESSIONS**
- 11.00am >> 40 min Teacher Networking session: Opportunity to connect with other teachers and presenters to share ideas, possibilities and practices
- 11.40am >> 40 min STEM Pathways session: Opportunity to meet with the sponsors in the STEM EXPO area to discuss (without students) how they can support you in delivering and inspiring STEM in your school.
- 12.25pm **LUNCH** - An opportunity to network with other teachers and students, and explore EXPO
- 1.00pm **KEYNOTE SPEAKER - DR LILA LANDOWSKI**  
Dr Lila Landowski is a multi-award winning neuroscientist and lecturer at the University of Tasmania, a Director of the Australian Society for Medical Research, a Director of Epilepsy Tasmania as well as a regular guest expert science communicator for the ABC.
- 1.40pm **ROTATION TWO - 40 min parallel sessions**  
>> Teacher Mini-Master Classes  
>> Student and/or Teacher DigiDesign Mini-workshops and STEM Expo
- 2.30pm **FEEDBACK AND CONFERENCE COMPLETION**  
>> Awarding of prizes to attendees  
>> Completion of feedback form
- 2.45pm **CLOSE OF THE CONFERENCE**





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