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# STANSW *young* Scientist Awards



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## Presentation Ceremony

McKinnon Building  
University of Wollongong  
Main Campus

2nd November, 2016

Hosted and  
Sponsored by:



UNIVERSITY  
OF WOLLONGONG  
AUSTRALIA



## PROGRAM

### Master of Ceremonies

Stuart Garth, STANSW Young Scientist Awards Coordinator

### Welcome Address

Associate Professor James Wallman, University of Wollongong

### Multimedia Presentation of the ISEF 2016 trip to Phoenix

### Presentation of STANSW Scientific Investigations Awards

### Presentation of IIATE Models and Innovation Awards

### Presentation of MANSW Working Mathematically Awards

### Message from BOSTES Inspector, Science

Kerry Sheehan

### Presentation of STANSW Most Promising Awards

### Announcement of BHP Billiton Science and Engineering Awards' Teacher Finalist Representative from NSW

Maree Woods, President, Science Teachers' Association of NSW

### Keynote Address

Dylan Parker, Paper Pilots

### Presentation of Sponsored Awards Part I

### Message from a Sponsor

Peter Bowditch, Australian Skeptics

### Presentation of Sponsored Awards Part II

### Announcement of Rowe Scientific's School Grant Awards

### Message from our Principal Sponsor, Sebel Furniture

Gary Macarthur (Outgoing CEO) & Trevor Vyner (Incoming CEO)

### Announcement of Grand Awards

Associate Professor Kerry Hitos, ISEF Panel Judge and Young Scientist Scientific Review Committee's Biomedical Scientist

### Closing address

Maree Woods, President, Science Teachers' Association of NSW



## MESSAGE FROM THE PRESIDENT



As President of the Science Teachers' Association of NSW, I would like to congratulate all the students receiving an award tonight. I would also like to welcome my technology and mathematics counterparts who will be sharing the stage with me tonight presenting awards on behalf of their own professional teacher associations. Newly appointed president of the Institute of Industrial Arts and Technology Education, Grant Byrne and IIATE's immediate past-president, Ruth Thompson will both be presenting the IIATE Models and Innovation Awards, while John Meng, President of the Mathematical Association of NSW, will be presenting the new MANSW Working Mathematically Awards.

We are thrilled that the three professional teacher bodies, representing STEM education in NSW, are collaborating together for the first time under the umbrella of the Young Scientist Awards. Our three disciplines are dependent on each other as you can't produce a top-level scientific investigation without a rigorous mathematical analysis of the data obtained and some form of real-world application of the results found.

Less than 12 months ago the Australian Government launched a major campaign to encourage more women and girls to study STEM at school and university. In the five years prior to this announcement, only 45% of all Young Scientist prize-winners were females. Well the tide has changed – this year a staggering 66% of all prizes have been won by girls. We now have a 2 to 1 ratio of girls to boys so something is definitely happening.

Maree Woods

President, Science Teachers' Association of New South Wales



## STANSW Young Scientist Awards Committee

Stuart Garth (*Coordinator*)

Brian Barter

Catherine Beehag

Anjali Chandrasekar-Rao

James Cleaver

Lauren DiMarco

Ian Fairhurst

Firth Garth

Ann Hanna

Edwina Hine

Michele Mawer

Philippa Miller

Elizabeth O'Connor

The STANSW Young Scientist Committee is a group of dedicated volunteers who meet monthly to plan Young Scientist activities and develop fresh strategies for supporting NSW teachers; fostering innovation, creativity and a love of Science and Technology.

## ISEF Judging Panel

Dagmar Arthur McCloughan (*Chair*)

Vatche Ansourian

Associate Professor Kerry Hitos

The ISEF Panel is an independent judging panel, made up of leading educators and a biomedical scientist. They review the top 10-12 projects against the ISEF and Young Scientist rules and select the STANSW Young Scientist of the Year and the finalists for the Intel International Science and Engineering Fair.

## MESSAGE FROM THE COORDINATOR



It is hard to imagine that only a year ago, we were holding this Ceremony in this same room, with 21 fewer student finalists than are present tonight and with only 82 prizes, compared to the 133 prizes that will be presented this year. The names of our six selected ISEF students were in envelopes, however, with no sponsorship money to send them to the US, these envelopes were left unopened. The night concluded with a request for sponsorship and in response an executive member of Sebel Furniture, who happened to be in the audience, came forward and expressed his desire to support us. The flow-on effect from this courageous decision has been truly amazing!

With Sebel becoming our Principal Sponsor, we now had an ISEF team and with subsequent funding from Intel Foundation, Broadcom Foundation and the Department of Industry, Innovation and Science this team was able to expand to our maximum quota of six ISEF finalists, one Broadcom delegate and two chaperones – our biggest team ever. Our students who went to Phoenix did us proud with their tremendous results (see p.6) and they were great ambassadors for Australia, in every facet.

Tonight we will be sharing a brief glimpse of the myriad of unforgettable experiences the ISEF team encountered while in Phoenix and our special multimedia presentation, soon to be uploaded to our website, will both inspire and motivate NSW students for years to come. On behalf of the STANSW Young Scientist Committee, I would like you to sit back and enjoy this celebration of STEM and be encouraged by the level of innovative devices and investigations produced by NSW students this year.

Stuart Garth

STANSW Young Scientist Awards Coordinator





Thursday, 19 May 2016

## STANSW Young Scientists excel at International Fair

The winner of the STANSW Young Scientist of the Year Award and three of her Young Scientist team-mates won Grand Awards at the Intel International Science and Engineering Fair (ISEF), in Phoenix, Arizona. STANSW is the Science Teachers' Association of NSW.



Photo: Stuart Garth



Jade Moxey (left), who recently presented her investigation *'The Spread of Seeds through Cattle'* to a Science Advisory Group at BOSTES, was one of four students who won a Grand Award at the largest school science fair in the world. Jade, a Year 11 student at Sapphire Coast Anglican School, reports "from the opening ceremony, to the mixer event, to the Grand Awards, each and every second was uniquely special and will be cherished forever!"

The other NSW students who received Grand Awards were Macinley Butson (Illawarra Grammar School), Aniruddh Chennapragada (James Ruse Agricultural High School) and Nga Nguyen (Sydney Girls High School). James Poyitt (Redeemer Baptist School) also won a four-year scholarship, worth \$48,000 USD to the University of Arizona.

BOSTES Science Inspector, Kerry Sheehan, praised their achievement. "It is wonderful to see our talented and innovative young students being celebrated like this. I hope this international endorsement of their work will give other budding NSW scientists confidence to pursue their passion."

With only 26% of the 1767 students from 77 countries winning a Grand Award, the coordinator of the STANSW Young Scientist Awards, Stuart Garth, described the six-strong team's performance as a "tremendous and significant boost for STEM education in NSW".

With the respective professional teachers' associations for Mathematics (MANSW) and Technology (IIATE), joining forces with Science (STANSW) in the promotion of the new Working Mathematically, Working Technologically and Working Scientifically categories of the 2016 Young Scientist Awards, the future of STEM education in NSW is looking bright.

Further information about the STANSW Young Scientist Awards scheme can be found on their [website](#) or contact their [email](#) address.

**For more information, contact:**

Kerry Sheehan

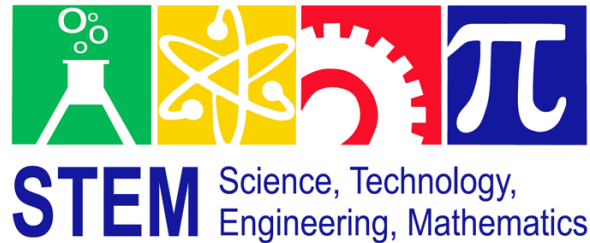
Inspector, Science

[kerry.sheehan@bostes.nsw.edu.au](mailto:kerry.sheehan@bostes.nsw.edu.au)



## STEM Professional Teacher Associations collaborate to promote inquiry learning

In an unprecedented move, the respective professional teacher associations that represent STEM education in NSW collaborated together this year with the common purpose of inspiring inquiry-based learning in Science, Technology, Engineering Studies and Mathematics classes across NSW.



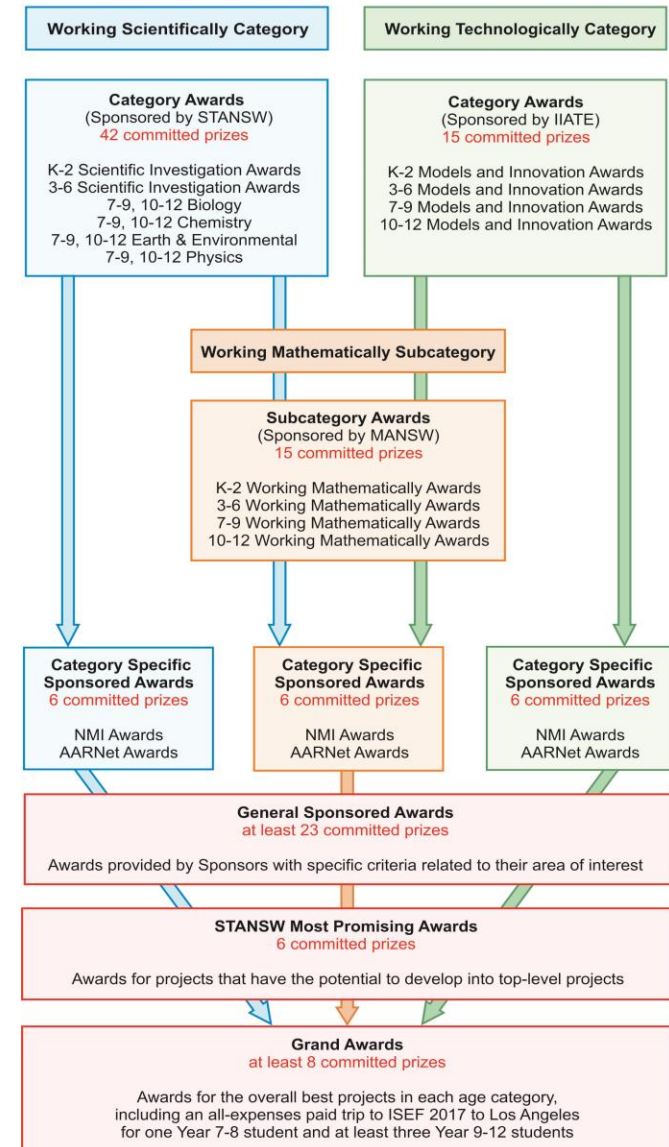
In the **Science Teachers' Association of New South Wales "STANSW Scientific Investigation Awards"**, projects were assessed on the level of **Working Scientifically** outcomes achieved.

In the **Institute of Industrial Arts Technology Education's "IATE Models and Innovation Awards"**, projects were assessed on the level of the **Working Technologically** outcomes that had been achieved.



In the **Mathematical Association of NSW's "MANSW Working Mathematically Awards"**, projects were assessed on the extent that the investigation or innovation incorporated the components of **Working Mathematically**.

### STANSW Young Scientist Awards





## Presentations Part 1: Category Awards

### STANSW Scientific Investigations K-2

#### **Equal 1<sup>st</sup>: Nathan Burns, Redeemer Baptist School, *Look What I Found!***

Nathan investigated the animals that inhabit the rock pools and rock platform of Dolphin Point. He conducted a survey to find out which sea creatures live in these rock pools and learned about their particular features and habits through his observation and research.

#### **Equal 1<sup>st</sup>: Keira Chandler, Oatley West Public School, *Washing Hands with Soap***

Keira wanted to find out if soap makes a difference to cleanliness when washing your hands and if it does, which soap works the best. Her investigation showed that the 'no soap' test samples produced more mould than any of the samples using different types of soap. Hand-made soap proved to be the most effective of the range of soaps used in her investigation.

#### **Equal 1<sup>st</sup>: Olivia Cleaver, Grose View Public School, *Chocolate Coated Strawberries***

Olivia wanted to find out the optimal temperature for making the shiniest and crunchiest chocolate coating for strawberries. Fair testing showed that dipping the strawberries into chocolate heated to a lower temperature was the most successful way to create a harder and shinier chocolate coating.

#### **Equal 1<sup>st</sup>: Paige Delaney, St John Bosco Catholic Primary School, *How Fast a Plant Grows Under Different Coloured Lights***

Paige investigated the rate of plant growth under different coloured lights. Using sunflower seeds and blue, red, green and white light in her testing, the plants under the red light were found to be the fastest growing.



#### **Equal 1<sup>st</sup>: Elyse Jones, Redeemer Baptist School, *Flower, Flower in the vase, which one of you drinks water fast? - An investigation of which flower drinks the most water***

Elyse investigated which type of plant drinks the most water. Research found that xylem vessels carry water through a plant. Roses, gerberas and tulips were fair tested with roses ending up drinking the most water. Elyse intends to find out if flower size and a plant's capacity to store water will affect her findings.

#### **Equal 1<sup>st</sup>: Jarod Macarthur, Homeschool, *Lego Sort-o-matic: Man versus Machine*.**

Jarod wanted to find a quick way of sorting his Lego pieces and so created the Sort-o-matic, a robot that could sort the bricks by colour and size. The results of testing both the machine and people for time taken and accuracy showed the Sort-o-matic to be the more accurate sorter but at the expense of time.

### STANSW Scientific Investigations 3-6

#### **Equal 1<sup>st</sup>: Monique Andersson, Hannah Bendror & Amelia O'Shanassy, Gib Gate, *Straws that Stay***

The purpose of this particular experiment was to determine how long paper/cardboard and plastic straws take to decompose inside compost and mulch. The paper straws lost much more weight than the plastic straws and it was concluded that using paper straws was far better for our environment.

#### **Equal 1<sup>st</sup>: Indy Brock, Alix Long & Tara Seymour, Mona Vale Public School, *At what age does anxiety regarding appearance affect primary school children the most?***

The aim of this investigation was to find out whether certain age groups within primary school are anxious about the way they look to others. The test results showed children in Year 2 and 3 are the most anxious about their appearance. The researchers believe this is when children are first taught about body image.



## STANSW Scientific Investigations 3-6

### **Equal 1<sup>st</sup>: Evangeline Burns & Isabella Burns, Redeemer Baptist School, *We See Sea Shells by the Seashore***

Evangeline and Isabella wanted to find out the location on rock platforms where limpets live. Do they live in the wet or the dry areas of the rock platform? Results showed that there were more limpets in the wet areas than the dry areas and the limpets in the dry areas were generally larger. Their observations matched other research which found that larger limpets prefer drier areas as they retain water better than smaller limpets and waves in the wet zone are more prone to wash the larger limpets off the rocks.

### **Equal 1<sup>st</sup>: Gregory Burns, Redeemer Baptist School, *Battling with Bacteria: Exploring the pH that kills bacteria***

This study is unique in that there was no answer to the testable question, however, it is the analysis of why it didn't work which makes this investigation successful. Gregory aimed to investigate what level of pH killed bacteria. After completing an exhaustive regime of subcultures with and without pH buffers, he found that the low pH agar plates did not kill as much bacteria as higher pH samples. This didn't make sense and good deductive work showed that it was the buffer solution used to vary pH which killed off the bacteria. Hence, Gregory felt a better title for his investigation should be 'Battling with the Buffers'.

### **Equal 1<sup>st</sup>: Yani Dearness, Castle Cove Public School, *The flight of the butterfly***

Yani wanted to find the angle of a butterfly's wing which generates the most lift for gliding. She did this by cutting out paper in the shape of a butterfly wing and placing the wing in an outstretched (gliding) position on a craft-stick stand. She put the wings on the stand in front of a fan and by tilting the stand she could see which angle generated most lift. She hypothesised that 30° would be the best angle, however, she found 20° was the optimum angle.



## STANSW Scientific Investigations 3-6

### **Equal 1<sup>st</sup>: Damien Delovski & Josh Hayes, St Brigid's Catholic Primary School, *Is Volcanic Soil More Fertile Than Non Volcanic Soil?***

The aim of this investigation was to test if volcanic soil was more fertile than non-volcanic soil. Damien and Josh investigated the volcanic soil at Saddleback Mountain, Jamberoo and the soil at Robertson (the land of extinct volcanoes). The fertility of these soils was compared to two non-volcanic soil areas, Mt. Keira Lookout and Gwynneville Woodland, where volcanoes have never existed. Their results showed that volcanic soil was more fertile than non-volcanic soil.

### **Equal 1<sup>st</sup>: Cameron Frost, Redeemer Baptist School, *That's Not My Voice! - An Investigation into voice recognition***

Cameron's investigation aimed to see if people could recognize their own voice in contrast with familiar voices. The results showed that 86% of the people tested were able to recognise their own voice. It was also found that males were better at recognising their own voice than females. He suggested that this could be because male voices are lower than female voices so they have fewer high frequencies filtered out by the bones in their head.

### **Equal 1<sup>st</sup>: Claudia Hadwen, Balgowlah Heights Public School, *Is school travel harming our future?***

Claudia aimed to calculate the amount of pollution/greenhouse gases that are produced each day in getting her Year 5 classmates to school and how much pollution could be saved in getting them to school by using environmentally friendly transport. She surveyed approximately 75% of the Year 5 students of the school. Claudia found that in total they produced approximately 25.8 kilograms of carbon dioxide by travelling to school a day. She calculated that if students were to travel by environmentally friendly transport that this could be reduced by approximately 69.5%.





## STANSW Scientific Investigations 3-6

### **Equal 1<sup>st</sup>: Claire Kitching, Abbotsleigh Junior School, *What effect, if any, does protein powder have on the weight patterns of second stage meal worms?***

This study investigated whether food quality affected the growth rate of insects, specifically mealworms. From her initial research, Claire found that 1-2 teaspoons of Protein Powder had a positive impact on the growth patterns of mealworms. Protein powder quickens the growth time for mealworms, but only at certain dosages.

### **Equal 1<sup>st</sup>: Evan LaFontaine, Glenhaven Public School, *Study into the Biodegradability of Soaps***

Evan aimed to find out if antibacterial soaps/liquid hand washes degrade and lose their antibacterial activity when exposed to outdoor environments. Results showed that antibacterial soaps do not degrade over time and are therefore extremely harmful to the environment.

### **Equal 1<sup>st</sup>: Savannah Linde, Bridget Schereck & Ella Veleba, Gib Gate, *Murdering Microbeads***

Savannah, Bridget and Ella investigated which facial scrubs have the most microbeads in them and whether these microbeads are made from plastic polypropylene. True Essentials facial scrub had the most microbeads when counted but these fragments were in fact crushed walnut shells and are therefore not harmful to our oceans like plastic microbeads. It was concluded that of the products tested this was the scrub to be recommended.

### **Gus Opie, Castle Cove Public School, *Degradable v/s Biodegradable - What's the difference?***

The aim of this investigation was to find out if biodegradable plastic bags break down faster than degradable plastic bags. Gus' results showed that biodegradable plastic bags did break down faster than degradable plastic bags.



## Biology 7-9

### **1st: Ash Hodgkinson, Shore School, *The Impact of Gender Bias on Change Blindness***

'Change blindness' is a term coined in 1997 to describe the failure of test subjects to notice significant changes to photographs when those changes occurred during a brief visual disruption. Ash investigated the impact of gender on the ability of a subject to detect large and obvious changes to the visual environment in a video and found that overall, females detected fewer changes than males. Males were found to be better at detecting more obvious changes while females were better at detecting more subtle changes.

### **2nd: Jack Ford, St Aloysius College, *How temperature affects the germination rate of seeds and plant growth***

Jack investigated the germination rates of two plant species (Jutrzenka Radish and Noir Gros Radish) in different temperatures to determine how these different climatic conditions would impact on the phenology of seedling emergence and plant growth. Jack found that germination rate was highest at room temperature but that growth was optimal in a colder temperature range, reflective of the colder climates of the seeds' countries of origin.

### **3rd: Emily Smith, Sapphire Coast Anglican College, *Parental Influence on the Healthiness of Children's Food Preferences***

The rate of childhood obesity is rapidly growing, not only in Australia but the rest of the Western world as well. Emily conducted surveys of 25 families to investigate the possibility of correlation between parents' food preferences and those of their children. Little correlation was found between food choices made by children and their parents, suggesting that nutritional information disseminated by the media as part of health campaigns may be better targeted at the children themselves, rather than their parents.





## Biology 10-12

### 1st: Mary-Anne Poyitt, Redeemer Baptist School, *Up the Creek*

Mary-Anne conducted plant and soil surveys in a Sydney sandstone gully forest vegetation community in the Lake Parramatta Reserve in relation to a creek, in order to determine which plant species should be utilised for regeneration in a neighbouring riparian corridor. Transect and quadrat techniques, as well as soil samples, were used to arrive at the conclusion that the distribution of plants did not depend on distance from the creek but rather on elevation above it.

### 2nd: Jordan Voll & Jonas Zimmerman, Homeschool - Danthonia, *Hive Thrive*

Supplements and stimulants are frequently used by beekeepers to boost their bees' honey production during times of low output. These commonly involve time-consuming and tedious processes to prepare and apply. Jordan and Jonas developed an effective and convenient protein supplement, 'Hive Thrive' to fill deficiencies in natural protein sources for bees. Follow-up testing found that the supplement stimulated brood growth and increased hive population.

### 3rd: Eleanor Lawton-Wade, PLC Sydney, *In hot water*

Climate change is an evolving force on the world's environments with long-term effects unknown. In some freshwater environments, temperatures have risen by as much as 3-4 degrees over the past 50 years. Eleanor investigated the effects of rising water temperatures on various abiotic factors, and on populations of zooplankton, phytoplankton and algae. She found that increasing water temperatures decreased populations of zooplankton and phytoplankton, whilst causing an increase in the percentage population of algae.



## Chemistry 7-9

### 1st: Angelina Arora, Sydney Girls High School, *Which Bioplastic will win the RACE?*

Angelina's project aimed to produce different types of biodegradable plastics using corn starch, tapioca starch and potato starch and different amounts of glycerine. She then compared the maximum weight each can hold, folding endurance, flexibility, clarity and the time it takes to start decomposition. All the bioplastics Angelina produced were found to be biodegradable, but she found the corn starch bioplastic exhibited the most desirable mechanical properties.

### 2nd: Chelsy Teng, James Ruse Agricultural High School, *Plastic, Permanent Ink and PVA: How does polyvinyl acetate affect the adhesiveness of permanent ink to plastics?*

Chelsy investigated whether the addition of polyvinyl acetate (PVA) to inks contained in permanent markers improved the inks adhesiveness to plastic surfaces of different porosities. Chelsy found the addition of PVA did improve the permanency of the ink on plastic surfaces - although it was also found that the mixture of 'ink:PVA' of 60:40 was the optimum and that the permanency of the ink mixture decreased once the PVA concentration exceeds 40%.

### 3rd: Meg Lonie, Loreto Kirribilli, *Tension Breaker*

Meg investigated the effect on temperature on the surface tension of liquids. Through a simple but scientifically vigorous investigation she showed how as temperature increased surface tension decreased and that the surface tension of water was greater than that of olive oil.



## Chemistry 10-12

### **1st: Aniruddh Chennapragada, James Ruse Agricultural High School, *Nanomaterials for the Future: Simple Synthesis of Graphene Quantum Dots***

Graphene quantum dots (GQDs) are single carbon layer thick luminescent nano-materials. Via thermal decomposition of citric acid Aniruddh synthesised GQDs. He also investigated effect of pH on spectral properties of his nanoparticles, finding a pH of 7 being an optimum. His project also highlighted some potential applications for his synthesised nanoparticles.

### **2nd: Rhiannon Kumar, PLC Sydney, *Eucalyptus Vs Ethanol: Fuel for Thought***

Much media attention is given to the research in the search for alternates to fossil fuels. Rhiannon has investigated the potential for eucalyptus oil as an alternate fuel or as a fuel component, by comparing the heating values of eucalyptus oil, ethanol and a 50/50 blend of eucalyptus oil and ethanol. She found the 50/50 blend of eucalyptus oil and ethanol was the best prospective biofuel.

### **3rd: Sabena Bhadri, PLC Sydney, *The sweet job of yeast***

Sabena's investigation centred on the metabolism of different sugars (and sugar substitutes) using yeast. Through fermentation she showed caloric sugars eg glucose and sucrose, had similar metabolic properties. Interestingly Sabena also found that so called "non-caloric" Splenda and Equal sweeteners, though in theory unable to be metabolised by yeast, could indeed be fermented to form sucrose, from which they are structurally modified so that they can undergo further fermentation to alcohol. Only "Stevia" was proven to be metabolised very poorly by yeast, supporting its non-caloric description.



## Earth & Environmental Science 7-9

### **1st: Lily Yang, Meriden School, *Using food waste to remediate soil***

Oil pollution on land and in particular in soils is an important environmental problem but is often poorly managed. Contaminated soils are sometimes just dumped in landfill with little attempt to recover the soils. Lily investigated the use of common food wastes such as coffee grounds, banana peels and eggshells as bio-remediators. She found that all three materials were capable of remediating contaminated soil with eggshells being the most effective.

### **2nd: Caitlin Sendt, Macarthur Anglican School, *Is Global Warming the Solution for Global Warming?***

The challenge posed by global warming requires farmers to intensify farming techniques to provide food security in the world. Caitlin investigated whether we could get help from our invertebrate friends by incorporating earthworms into soil. She found that the radish plants grown in soil with worms grew faster than those grown without worms. Her research also hinted at a potential use of worms to protect plants from pests and disease.

### **3rd: Warisul Razzak, James Ruse Agricultural High School, *Effects of Different Fertilisers on Bean Plants***

Fertiliser—to use or not to use? Warisul investigated the effect of organic and inorganic fertilisers on the growth of dwarf bean plants. Surprisingly his results showed that the plants without any fertiliser had the strongest growth and that inorganic fertiliser resulted in better growth than organic fertiliser. The use of fertiliser has many environmental impacts and these results may question its universal use on plants.



## Earth & Environmental Science 10-12

### **1st: Jade Moxey, Sapphire Coast Anglican College, *Grazing Sheep on Deadly Fireweed: A "BaaaaD" Situation?***

Sheep are widely used by farmers to control the noxious weed *Senecio madagascariensis* or fireweed. Jade investigated whether this could potentially be making a baaaaad situation worse if fireweed seeds were capable of germinating after passing through the sheep's digestive tract, and if there was a potential for health impacts for sheep and humans from the toxic alkaloids in fireweed. Jade found that fireweed seeds did indeed survive being digested by sheep although sheep themselves were not affected by ingesting the fireweed.

### **2nd: Darryl Domer & Carlos Meier, Homeschool - Danthonia, *Evaluating the Effects of Grazing Management***

Cell grazing is a land management technique proposed as a viable solution to the challenge of climate change and sustainability in farming. Darryl and Carlos compared cell grazed and conventionally farmed paddocks and found that cell grazing provided significant economical and ecological benefits including increases in water use efficiency, pasture productivity and plant biodiversity. Their results also showed that cell grazing could provide a potential solution to global food security when applied to a larger scale.

### **3rd: Eliza Otton, PLC Sydney, *Mulch to Mouth***

Eliza investigated the effectiveness of natural loose mulching materials and fibre-based matting in preventing loss of soil moisture compared to traditional tilling of soil. Eliza found that all forms of mulch reduced soil moisture loss significantly and that tilling helped retain soil moisture more than non-tilling. This is an important issue in farming in arid and semi-arid areas of the world and links into conservation farming, which is promoted by the Food and Agriculture Organization of the United Nations (FAO) in these countries.



## Physics 7-9

### **1st: Ada Luong, Sydney Girls High School, *Cooling coffee - The relationship between different brands of disposable cups and heat loss***

Do you like your takeaway coffee piping hot? Ada tested takeaway coffee cups from various outlets in order to determine which one was most effective in keeping the coffee hot. She found that the double-walled cardboard cups used by the coffee outlets were not as effective in maintaining the temperature of the coffee as a plain Styrofoam cup. She also noted that the diameter of the cup was an important factor.

### **2nd: Liam Graham, Shore School, *How Temperature affects the processing speed of a computer chip***

Computers play a large part in our lives, and we always appreciate them more when they run quickly and efficiently. Liam conducted an experiment to look at the effect of temperature on the processing speed of a CPU. He used two Raspberry Pi boards for the investigation, with a temperature range of 5-80°C. He found that performance, indicated by clocking speed, dropped quite quickly after 50°C, emphasising the importance of maintaining computer temperature.

### **3rd: Eliza Martin, PLC Sydney, *An Investigation Into The Effect Of Slack Fill In Chip Packets***

Ever noticed how much air is in a chip packet? Eliza set out to investigate whether the presence of air really does help reduce chip breakage, as claimed by the manufacturers. She filled bags with chips and varying volumes of air and then dropped a mass on each. By counting how many fragments resulted she was able to establish that that air does help cushion the chips. So, if you don't like your chips whole then be grateful for all the air in the package!





## Physics 10-12

### **1st: Macinley Butson, The Illawarra Grammar School, *Innovation in Contralateral Breast Shielding Design for Radiotherapy Cancer Treatment***

When women receive radiotherapy for breast cancer the other breast also receives a significant dose of radiation, which can potentially induce a new cancerous tumour. Macinley designed a shield, from small overlapping scales of copper, that could be draped over the other breast. She found that her shield reduced the radiation dosage by 60%, to well within accepted safe levels. This invention has amazing potential to improve the outcomes for cancer sufferers!

### **2nd: Sherie Pan, PLC Sydney, *From Waste to Paper - an investigation into the suitability of crop residues as materials for paper***

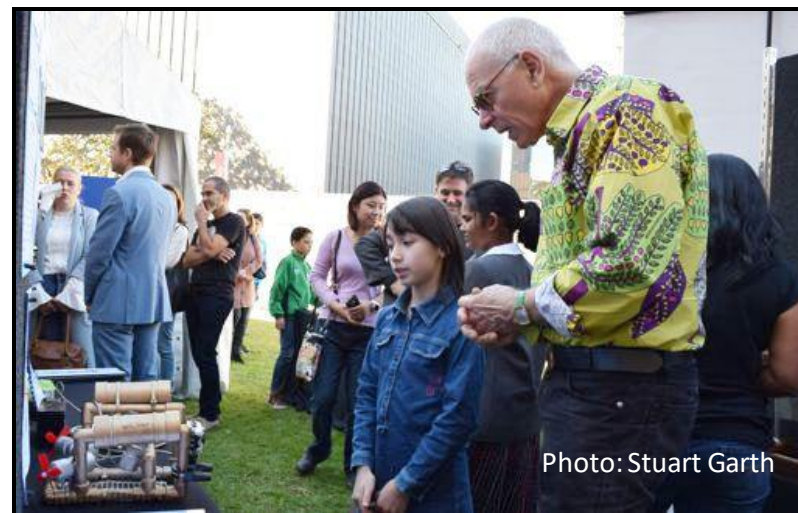
Sherie identified that paper is an important product in our society and the great quantities needed use up large amounts of resources. Meanwhile, disposal of crop wastes causes environmental issues as well. She decided to see whether both these problems could be solved by using crop residues to make paper, and conducted experiments to test the performance of the resulting sheets.

### **3rd: Lauren McGrath-Wild, PLC Sydney, *Noise cancellation Tiles***

Concerned about the effect of urbanisation and the associated noise levels on quality of life, Lauren made and tested sample tiles with different characteristics. Her experiments showed that use of larger glass beads, a thicker honeycomb and greater compaction increased the level of noise reduction. She also determined that the tiles were more effective at absorbing higher frequencies.



## IIATE Models and Innovations Exhibition



*Held at the University of Sydney Open Day, Saturday 27<sup>th</sup> August 2016*





## IIATE Models and Innovations K-2

### **Equal 1<sup>st</sup>: Seraphim Haryjanto, St John Bosco Catholic Primary School, *Solar Panel***

Seraphim made a solar-powered model house, complete with working switches allowing power to be diverted between a cooling fan or TV set. She concluded that solar panels help the world to be more sustainable.

### **Equal 1<sup>st</sup>: Jarod Macarthur, Homeschool - Menai, *Lego Sort-o-matic: Man versus Machine***

Jarod successfully built a machine that can sort Lego by colour and size. He has committed to keep on trying to find ways to make it faster so it can take over his least favourite job - having to sort through and organise all his Lego pieces.

## IIATE Models and Innovations 3-6

### **Equal 1<sup>st</sup>: William Byron, Balgowlah Heights Public School, *Bed fall preventing alarm***

William has developed a bed fall prevention alarm. Inspired by posters in a hospital ward he researched the problem of children falling from high places. The invention includes an infra-red sensor, a relay and a buzzer assembled on a pole with Velcro. It is easy to use and he hopes in the future it can be used to save lives.

### **Equal 1<sup>st</sup>: Angus Haddow, Callum Haddow & Thomas Reid, Knox Grammar Preparatory School, *Community Techsperts - A Student created 'Life Skills' Education Solution***

Angus, Callum and Thomas formed a group called the Community Techsperts. They wrote a survey for their school community and selected one of the major issues raised, which that of was road safety. They have designed a robotics and software based educational package to help teach younger students road safety at their own school and at a neighbouring school, St Lucy's All Abilities School.



## IIATE Models and Innovations 3-6

### **Equal 1<sup>st</sup>: Kira Macarthur, Homeschool - Menai, *uROVer - Underwater ROV***

Kira saw a documentary on scientists using Underwater ROVs to explore the Titanic. She decided she wanted to build a project that was not only functional, but would have potential uses in different fields and areas of marine biology. She has built an ROV that can explore and take photographs underwater.

### **Equal 1<sup>st</sup>: Ellis Merrett, Tawhid Rahman & Thomas Reid, Knox Grammar Preparatory School, *'Exercise Tech' an improved fitness tracking suit***

Ellis, Tawhid and Thomas chose to focus on the current trend of wearable fitness trackers. They first conducted research to prove a device which only measures the step count of one wrist is inaccurate. Next they designed and built a working model of an improved 'fitness tracking suit' which uses an Arduino bean in each wrist and ankle seam as accelerometers to track the movement of all four limbs.

### **Equal 1<sup>st</sup>: Lucas Negro, Glenhaven Public School, *Extra Storage***

Lucas has explored the problem of Australia's ageing population and rising cost of housing which is resulting in smaller houses with limited storage. He has invented an elevated roof storage system which makes use of available space in the roof void anywhere in a house where there is roof space above.

### **Equal 1<sup>st</sup>: Ryleigh Stead, MET School Wagga Wagga, *Bird Scarer***

Ryleigh's device can be used to scare birds from outdoor entertaining areas, clean washing and pools. Her bird scarer has been successful in keeping unwanted birds away from the family veranda and also proved useful in keeping the birds away from the undercover lunch area at school. The bird scarer involves a water-powered tilt mechanism dropping a beam onto a drum to intermittently create a loud sound. This means birds are not harmed in any way.



## IIATE Models and Innovations 7-9

### **1st: Sabiquel Hoque, James Ruse Agricultural High School, *Automated Sprinkler System***

Sabiquel found that the school automated sprinkler system was inaccurate and inefficient, being only timer-based meant it was not able to recognise when the ground was sufficiently wet. Originally his project was made to work along with the school-based system to determine when the soil is wet and turn it off when this happens. If it rains the soil becomes wet and thus it also doubles up as a rain detector. He has further refined his project then to make it independent of the school system.

### **2nd: Georgia Batson, Meriden School, *BinGo - A self-driving bin carrier***

Georgia has created an automated robotic bin-carrying system. She explored various programming options to explore how to best use a variety of sensors to get the robot to navigate to the end of a driveway. To improve efficiency she programmed the project so the robot would check each side as it was moving, and then turn towards the side with the most space.

### **3rd: Georgia Hughes, Kariong Mountains High School, *Recycled Water Solar Powered Water Purification System***

Georgia's aim was to create an easier, cheaper way for third world countries to access clean water. She found that the biggest killer in developing countries is pollution, this includes polluted water. Her design features a single tank, filter system, tap and boiling system. Rainwater is filtered through the filter and collects in the tank. When ready to be used, the tap is turned and water is released in the boiling system below. The model is then placed in the sun and requires 4 hours in sunshine for sufficient boiling time to purify the water.



## IIATE Models and Innovations 10-12

### **1st: Macinley Butson, The Illawarra Grammar School, *Innovation in Contralateral Breast Shielding Design for Radiotherapy Cancer Treatment***

Macinley's aim was to develop a type of radiation shield to protect the contralateral breast during radiotherapy cancer treatment. Her project involved designing, inventing and testing an innovative way to use a new Scale Maille Armour Shield to protect the contralateral breast during treatment. It has allowed radiation levels to be reduced to those acceptable by the International Radiation Therapy Oncology Group (RTOG) regulations. This produces a significant improvement over current conventional techniques.

### **2nd: Maddison King, Meriden School, *Clever GIRL (Global Intelligent Rip Detector)***

Maddison's project focus was to design a warning buoy that harnesses potential rip current energy in the ocean to provide a power source for warning lights advising swimmers not to swim there. The renewable rip energy will not need to be stored in a battery, as the energy is only needed to power the light when the rip is actually underneath the product. She has then explored various possibilities for anchoring the buoy to keep it in place in the rip.

### **3rd: Oliver Nicholls, Barker College, *Dog tennis ball launcher for people with physical limitations***

Oliver has designed a dog tennis ball launching machine for people with physical limitations – with a difference. Normally a tennis ball is dropped into the tube and it is fired at a predictable trajectory making the dog lose interest quickly. Oliver's dog tennis ball launcher randomises the direction at which the ball travels which keeps a dog interested for longer and results in improved fitness levels for the dog.





## MANSW Working Mathematically K-2

**Equal 1<sup>st</sup>:** Elyse Jones, Redeemer Baptist School, *Flower, Flower in the vase, which one of you drinks water fast? - An investigation of which flower drinks the most water*

Elyse gathered, organised and displayed meaningful and extensive data in her investigation. Temperature and water volumes were efficiently measured and the data collected informed her thinking and analysis in drawing valid conclusions about the water absorption of cut flowers.

**Equal 1<sup>st</sup>:** Travis Kennard, Oatley West Public School, *Using Maths to find the hardest level on Rayman Legends*

Using tally marks and line graphs Travis effectively displayed the collected data and informed his thinking within the investigation. Travis was able to make valid conclusions based on a thorough analysis of the useful and concise data collected about levels of difficulty of Rayman Legends.

**Equal 1<sup>st</sup>:** Emerald Staniforth, St John Bosco Catholic Primary School, *Paper Towels*

Emerald used mathematical language, lists, tables and symbols in her investigation of paper towel absorption. A digital food scale was found to be more accurate than a jug in measuring the volume of water absorbed. Her tabulated results and analysis of her collected data supported her hypothesis.

## MANSW Working Mathematically 3-6

**Equal 1<sup>st</sup>:** Gregory Burns, Redeemer Baptist School, *Battling with Bacteria: Exploring the pH that kills bacteria*

Gregory gathered, organised and displayed meaningful and extensive data in his investigation. Appropriate scale and mathematical conventions were adopted and concise data collection enabled Gregory to make a thorough analysis for the drawing of conclusions about bacteria growth at different pH levels.



## MANSW Working Mathematically 3-6

**Equal 1<sup>st</sup>:** Issy Dunstan, Castle Cove Public School, *Rising Yeast*

Issy used mathematical language, symbols, lists, tables and line graphs to present information in her investigation. Measurements and calculations were performed efficiently and the collected data thoroughly analysed by Issy to make valid conclusions about the effect of sugar type on the rate of rising yeast.

**Equal 1<sup>st</sup>:** Cameron Frost, Redeemer Baptist School, *That's Not My Voice! - An Investigation into voice recognition*

Cameron posed insightful questions to underpin his collection of data about voice recognition. Tables, lists and column graphs appropriately presented the data to inform Cameron's thinking about his investigation and to analyse and draw conclusions about the percentage of individuals able to recognise their own voice in contrast with others.

**Equal 1<sup>st</sup>:** Kira Macarthur, Homeschool - Menai, *uROVer - Underwater ROV*

Kira investigated which propeller type was most efficient in driving an underwater rover through water at the highest speed. Testing of 2, 3 and 4 blade propellers was displayed appropriately in lists, tables and graphs and relationships described. Mathematical operations and measurements were performed fluently and efficiently and Kira thoroughly analysed data to make valid conclusions that supported her hypothesis.

**Equal 1<sup>st</sup>:** Ellis Merrett, Tawhid Rahman & Thomas Reid, Knox Grammar Preparatory School, *Exercise Tech - Investigating Connections in Increasing Obesity Rates and the Current Solution of Fitness Tracking Devices*

Ellis, Tawhid and Thomas gathered, organised and displayed meaningful data using lists, tables and graphs in their investigation of exercise technology. The relevant mathematical language was used appropriately and operations and calculations performed efficiently. A valid conclusion was based on analysis of the data collected for tracking device accuracy.



**Equal 1<sup>st</sup>: Arwyn Stone, Abbotsleigh Junior School, *Spelling- How much do we know?***

Arwyn investigated the progress rate in spelling skills development. Extensive and meaningful data was collected and appropriately displayed in tables, graphs and a spreadsheet. Mathematical language was used and numerical operations performed fluently and efficiently. Arwyn made valid conclusions based on thorough analysis of the data collected.

### **MANSW Working Mathematically 7-9**

**1st: Zane Assen, Aquinas Catholic College Menai, *The best shot angle to beat the goalkeeper***

How can mathematics help you win at soccer? Zane set out to use mathematics and physics to explore the relationship between the distance to goal and the necessary launch angle. He made great use of trigonometric ratios and speed calculations in his analysis of experiment, finding that it is essential to launch at successively higher angles as you move away from the goal, if you hope to score.

**2nd: Emily Smith, Sapphire Coast Anglican College, *Parental Influence on the Healthiness of Children's Food Preferences***

Which would you choose – a blueberry muffin or oatmeal? Emily wanted to see whether there was a link between the food choices of parents and those of their children. Through use of scatter and box plots, Emily established that these choices were linked to age, rather than family relationships.

**3rd: Nathan Huff, Aquinas Catholic College Menai, *Improving the water binding capacity of soil***

The water capacity of soil is an important parameter for any gardener. Nathan compared the relative effectiveness of products in retaining water through by calculating appropriate concentrations of the products, and careful analysis of his results and their consistency.



### **MANSW Working Mathematically 10-12**

**1st: Macinley Butson, The Illawarra Grammar School, *Innovation in Contralateral Breast Shielding Design for Radiotherapy Cancer Treatment***

Macinley developed the BREAST SHIELD to protect the contralateral breast during radiation therapy in breast cancer patients. She evaluated the properties of different materials to assess the radiation shielding abilities of different metals and calculated percentage depth doses, attenuation of radiation from shielding and uncertainties in measurements to confirm that the BREAST SHIELD reduced radiation doses to the contralateral breast to acceptable levels as recommended by the International Radiation Therapy Oncology Group.

**2nd: Mary-Anne Poyitt, Redeemer Baptist School, *Up the Creek***

Mary-Anne conducted plant and soil surveys in the Lake Parramatta Reserve to study the distribution of the species present. She calculated percentage compositions of soil samples and used a clinometer to calculate the angles to the tops of trees and slopes, before applying trigonometry to calculate their heights. Working mathematically, Mary-Anne arrived at her conclusion that the distribution of plants was dependent on elevation.

**3rd: Eleanor Lawton-Wade, PLC Sydney, *In hot water***

Investigating the effects of increased freshwater temperature on a number of abiotic factors, as well as on populations of phytoplankton, zooplankton and algae, Eleanor collected numerous measurements and conducted a rigorous statistical analysis of the data in order to ascertain the statistical significance of her results. She thus assessed the validity of her results and their significance for the impact of climate change on the biodiversity of freshwater environments.



## NSW Nominee: Anjali Chandrasekar-Rao 2017 BHP Billiton Science and Engineering Teacher Award



*Anjali Chandrasekar-Rao using Skype to share her experience of Bush Blitz in the Kimberley with one of her two classes*

The BHP Billiton Science Teacher Awards recognise outstanding contributions made by classroom teachers to science education especially in the area of open ended investigations. Our 2017 NSW nominee is Anjali Chandrasekar-Rao, a Year 2-6 Science and Technology teacher at Castle Cove Public School, since 2009. In her early career, Anjali was a research ecologist having obtained two research-based Masters degrees before she turned to teaching Senior Biology at a New Zealand secondary school.

Anjali is a staunch advocate for the Inquiry Model, embedding investigative activities into all units of work from Stage 1 to 3 at her school. She co-ordinates the Young Scientist program in her school, having 10 winners in the last 3 years with one student being featured this year in the Sydney Morning Herald. She is an active Young Scientist committee member and in 2014 she was selected by ASTA as one of five teachers in Australia to take part in Bush Blitz.



## Presentations Part 2: Most Promising Awards

### STANSW Most Promising Awards K-6

*Awarded to highly commended students who show particular promise and are encouraged to pursue further development*

#### Equal 1st: Rosie Cartwright & Elli Rugg, Santa Sabina Del Monte, *Seeing Red*

Rosie was intrigued with some red lens swimming goggles she purchased at Katoomba pool, for she felt so different wearing them and her performance improved. With Elli they tested 10 swimmers with four shades of swimming goggles and 9 out of 10 swam fastest with the red goggles. Subsequent research has found many elite swimmers always wear red goggles. Rosie and Elli are now staunch advocates for red lenses for sportsmen and sportswomen.

#### Equal 1st: Liam Weber, Mount Ousley Public School, *The Burning Question*

Liam tested the flammability of 10 different fabrics to find the safest fabric. He looked at how long it took to ignite when exposed to a naked flame and then he examined how long it burnt before the flame died down. He found the safest fabrics to be leather and wool as they consistently took the longest amount of time to catch alight and the flame didn't get very far before dying out.

### STANSW Most Promising Awards 7-12

#### Equal 1st: John Bivell, Fort Street High School, *Mangrove Munificence*

Due to pollution in the Parramatta River, John wanted to establish the restorative powers of mangroves on filtering the water and helping to rebuild the local ecosystem. Using a well-designed experiment, John established that the mangroves had a minimal impact on the turbidity of the water.





## STANSW Most Promising Awards 7-12

**Equal 1st: Kelvin Du, Newington College, *Do warm air dryers in public bathrooms need regular disinfection?***

Warm air dryers (WADs) are fitted in many bathrooms in public areas. Kelvin investigated the prevalence of microbes on hands and in the WADs after use. He identified a shift of microbes from poorly washed hands to the environment during WAD usage and an increase in microbes on hands after washing with antibacterial soap if a WAD was used for drying. These results suggest a need for regular disinfections of WADs in bathrooms.

**Equal 1st: Jessica Nikolovski, St George Girls High School, *More is More***

Acne is a skin condition affecting millions of people globally and having mental, physical and emotional impacts but there is currently a lack of conclusive evidence on the efficacy of over-the-counter treatment options. Jessica investigated the effects of four different ingredients at a range of concentrations in treating and preventing acne growth. Of these, it was found that 100% tea tree oil was most effective in the treatment and prevention of acne.

**Equal 1st: Liam Viney, Inaburra School, *It's Raining, It's Pouring***

Having noted that pools frequently turn green after heavy rainfall, Liam set out to investigate whether the cause could be linked to the pH of rain affecting the pool's chlorine and its ability to kill algae, or whether the cause was a dilution of the chlorine in the pool by the rain water. Using a number of tests, Liam arrived at the conclusion that the inability of pool water to kill algae after heavy rainfall was most likely due to the dilution of the pool chlorine by the rain water.



Tuesday, 30 Aug 2016

## Full STEM ahead for NSW students

Hundreds of students across NSW have been taking part in STEM events, including one where a new Australian record was set, organised by the Science Teachers' Association of New South Wales (STANSW).

Over 600 students recently took part in the state finals of the 2016 NSW All Schools Paper Plane Challenge, held in conjunction with the University of Sydney Open Day.



Photo: David Poyitt



Performances reached amazing heights with a new Australian Distance Record for a school student set by Nick Holland, a Year 3 student from Balgowlah Heights Public School.

Competing indoors under the watchful eye of Dylan Parker, whose World Championship exploits inspired the hit Australian movie "Paper Planes", Nick launched a plane that soared into the back wall of the stadium over 35m away.



Photo: Stuart Garth

*Nick Holland, Year 3 Balgowlah Heights Public School, new Australian record holder for distance*

STANSW Young Scientist Coordinator, Stuart Garth, described the Paper Plane Challenge, which is now into its second year, as "an exhilarating STEM event that's now a permanent fixture in the NSW school calendar".



## KEYNOTE SPEAKER



*Dylan Parker  
Paper Pilots*

In 2009 Dylan Parker and his friend James Norton represented Australia at the Paper Plane World Championship in Austria. Dylan came 3<sup>rd</sup> in the distance event and their exploits inspired the hit Australian movie *Paper Planes*. Together they founded Paper Pilots and they run paper plane workshops in schools and community centres all round Australia.

After the Young Scientist team founded the NSW Paper Plane Challenge in 2015, Dylan took over the coordinating role of this event in 2016 and together with Young Scientist and CleverPatch ran a most successful NSW All Schools Paper Plane Challenge at the University of Sydney Open Day.



## Presentations Part 3: Sponsored Awards



### Young Marine Scientist Award

*For primary school entries that explores the marine world*

**Equal 1st: Evangeline Burns & Isabella Burns, Redeemer Baptist School, *We See Sea Shells by the Seashore***

Evangeline and Isabella used their summer holidays to study limpets on the rocky shores in Ulladulla. They discovered that while there were more limpets in the wet areas of the shore than in the dry areas, the limpets in the dry area were much larger. Their explanation is that larger limpets are better able to survive drying out while smaller limpets were more able to survive wave action in the wet area.

**Equal 1st: Nathan Burns, Redeemer Baptist School, *Look What I Found!***

Which child doesn't enjoy exploring the rocky shores on a beach on their summer holidays? Nathan used this enjoyable holiday activity to conduct a scientific survey of the organisms that were found on the rocky shores in Ulladulla. He found an amazing variety of organisms – both invertebrate and vertebrate. Nathan was inspired to use his results to create a very useful field guide for other beach goers to use when they visit our rocky shores!



## NMI Measurement Award



Australian Government  
Department of Industry,  
Innovation and Science

**National  
Measurement  
Institute**

*Awarded to entries in the category of Scientific Investigations that demonstrate an excellent understanding of measurement*

**1st: Aniruddh Chennapragada, James Ruse Agricultural High School, *Nanomaterials for the Future: Simple Synthesis of Graphene Quantum Dots***

Quantum dots are tiny particles with very large potential. Aniruddh made them by heating solid citric acid, however, he then had to prove it. By gaining access to advanced spectrophotometers he was able to measure UV, visible and infrared spectra of the solutions he created and show that quantum dots had indeed been successfully synthesised.

**Equal 2nd: Rebekah Kang, PLC Sydney, *Slick and Clean - An investigation into how magnetite can be used with organic sorbents in oil spill clean-up***

Oil spills are a serious problem, and sometimes the actions taken to clean up cause problems of their own. Rebekah carefully measured the amount of oil that could be absorbed by hair, feathers or straw, finding that feathers were consistently more effective. She went on to show that the use of magnetite and strong magnets could make the clean-up process even more efficient.

**Equal 2nd: Jade Moxey, Sapphire Coast Anglican College, *Grazing Sheep on Deadly Fireweed: A "BaaaaD" Situation?***

Jade partnered with a number of animal and chemical specialists to determine the impact of the toxic fireweed on sheep. Through measurements of her own, including pasture surveys, manure collection and germination tests, and careful analysis of complex tests by professionals she was able to come to valid conclusions about the dangers of this weed.





## NMI Measurement Award

*Awarded to entries in the category of Models and Innovations that demonstrate an excellent understanding of measurement*

**1st: Macinley Butson, The Illawarra Grammar School, *Innovation in Contralateral Breast Shielding Design for Radiotherapy Cancer Treatment***

Macinley invented a shield to protect the other breast of women receiving radiotherapy. She took numerous measurements to determine the quantity and nature of the radiation, using actual medical equipment under supervision. Further experimentation showed that copper would be the best material, so she made the shield and measured its effectiveness.

**2nd: Kira Macarthur, Homeschool - Menai, *uROVer - Underwater ROV***

Kira wanted to determine the best number of blades for the propeller of the underwater rover that she built. She measured the time taken to travel 3 metres and hence the speed, for propellers with 2, 3 and 4 blades. Statistical analysis showed that 4 blades resulted in significantly more speed than 2 or 3 blades, although most of the improvement was between 2 and 3 blades.

*Awarded to entries in the category of Working Mathematically that demonstrate an excellent understanding of measurement*

**1st: Eleanor Lawton-Wade, PLC Sydney, *In hot water***

Concerned about the possible effects of global warming, Eleanor conducted an experiment to test the effects of temperature increases on a number of variables in an aquatic ecosystem. She used probes to measure changes in dissolved oxygen and carbon dioxide levels, as well as examining the water microscopically to identify and count microbes.



**2nd: Roha Rasheed, Salamah College, *The Effects of Micronutrients on Lead Toxicity***

Lead contamination can occur as the result of various industrial processes. Roha set out to test whether the presence of micronutrients could remediate soil contaminated with lead. She took numerous careful, replicated measurements and assessed the reliability and statistical significance of her data.

## ACPSEM Medical Physics Award

*Awarded to the student who demonstrates good scientific analysis in the field of Physics*



**1st: Lauren McGrath-Wild, PLC Sydney, *Noise cancellation Tiles***

Lauren's project investigated how altering the materials in noise cancelling panels affects their ability to dissipate sound. She used the results to conclude which combination of materials would be most effective in noise cancellation. Her project showed that the thicker the honeycomb - the larger the glass beads, and the greater the compaction - the higher the Noise Reduction Coefficient of the noise cancelling tile.

## ASBMB Award



*Awarded for excellence in Biochemistry and Molecular Biology*

**1st: Lakmali Edirisinghe, Gosford High School, *The Effect of Heat on Enzyme Activity***

Lakmali investigated the effect of heat on papain (the enzyme found in papaya), and the enzyme's effect on the setting of gelatine found in jelly. Contrary to other studies, Lakmali found the enzyme operated optimally between 80-90°C.



2016 STANSW Young Scientist Awards Presentation Ceremony



## RACI Chemistry Encouragement Award

Royal Australian Chemical Institute



*For primary and secondary students demonstrating ability, skill and promise for Chemistry*

### **1st: Primary - Evan La Fontaine, Glenhaven Public School, *Study into the Biodegradability of Soaps***

Evan tested whether antibacterial soaps are biodegradable. He aged the soaps over 90 days, and found they were just as “antibacterial” after 90 days, and thus they are not biodegradable. He therefore concludes these soaps pose a significant hazard to the environment.

### **1st: Secondary - Angelina Arora, Sydney Girls High School, *Which Bioplastic will win the RACE?***

Angelina’s project aimed to produce different types of biodegradable plastics. She then compared the maximum weight each can hold, folding endurance, flexibility, clarity and the time it takes to start decomposition. All the bioplastics Angelina produced were found to be biodegradable, but she found the corn starch bioplastic exhibited the most desirable mechanical properties.

### **Highly Commended: Secondary - Rhiannon Kumar, PLC Sydney, *Eucalyptus Vs Ethanol: Fuel for Thought***

Rhiannon has investigated the potential for eucalyptus oil as an alternate fuel or as a fuel component, by comparing the heating values of eucalyptus oil, ethanol and a 50/50 blend of eucalyptus oil and ethanol. She found the 50/50 blend of eucalyptus oil and ethanol was the best prospective biofuel.



Presentation Ceremony - Proudly Sponsored by



## AARNet Communications Award

*For best use of electronic communications in Scientific Investigations*

### **Equal 1<sup>st</sup>: Primary - Calum Kennedy, Balgowlah Heights Public School, *Our Ultrasound Environment***

Calum investigated the impact ultrasound had on his dogs, as well as surveying the level of man-made and natural ultrasound in his neighbourhood. He used a “bat detector” to convert ultrasound into audible sound. He established that his dogs did not respond to ultrasound from overhead aeroplanes as he surmised.

### **Equal 1<sup>st</sup>: Primary - Ellis Merrett, Tawhid Rahman & Thomas Reid, Knox Grammar Preparatory School, *Exercise Tech - Investigating Connections in Increasing Obesity Rates and the Current Solution of Fitness Tracking Devices***

Wearable devices are becoming more and more common. Ellis, Tawhid and Thomas compared the effectiveness of devices by seeing if counting different number of steps is dependent on if the wearer is using them on their dominant arm or not. They established that the count was higher on the dominant hand.

### **Equal 1<sup>st</sup>: Secondary - Sophie Ma, PLC Sydney, *The Effect of Different Music Tempos on the Heart Rate and Blood Pressure of Adolescent Musicians and Non-Musicians***

Sophie investigated the effect music tempo had on the heart rate and blood pressure of musicians and non-musicians. She found that both heart rate and blood pressure increased when listening to fast tempo music.

### **Equal 1<sup>st</sup>: Secondary - Lauren McGrath-Wild, PLC Sydney, *Noise cancellation Tiles***

The issue of urban sound, and noise pollution encouraged Lauren to investigate the effectiveness of noise cancelling tiles, she established that the size of the glass beads, and the size of the air gaps in honeycomb noise cancelling tiles had a direct impact on their effectiveness.



*For best use of electronic communications in Models and Innovations*

**Equal 1st: Primary - William Byron, Balgowlah Heights Public School, *Bed fall preventing alarm***

By using an infrared sensor coupled with a piezo buzzer, William built an alarm system that could be used to stop small children falling from high places. William built the system after his brother was taken to hospital. He used the system to detect when his brother was standing in bed after he returned from hospital.

**Equal 1st: Primary - Seraphim Haryjanto, St John Bosco Catholic Primary School, *Solar Panel***

With an interest in Solar and renewable energy, Seraphim made a solar powered model house. To mimic household use she incorporated both a fan and a TV. She established that by using the solar energy and careful use of components at the right time, solar energy can assist in making a sustainable house.

**Equal 1st: Secondary - Georgia Batson, Meriden School, *BinGo - A self-driving bin carrier***

Georgia built a prototype robot to carry a bin around. The motivation of her project was to assist her grandparents with carrying their rubbish to the curb. Georgia used a computer to pre-programme the instructions to the robot so it would successfully carry the load. She identified further enhancements that her robot could utilize in the future.

**Equal 1st: Secondary - Kate Carey, Meriden School, *Electromagnetic security window***

Kate invented a security screen that is held in place by electromagnets. This design means that a screen will act as a security deterrent, however, it will still enable people in the house to egress safely in the event of an emergency. The use of an illuminated switch also means that the invention is easy to use in the dark.



*For best use of electronic communications in Working Mathematically*

**Equal 1st: Primary - Paige Delaney: St John Bosco Catholic Primary School, *How Fast a Plant Grows Under Different Coloured Lights***

Paige used different coloured lights whilst investigating plant growth. By measuring and recording when the plants germinated she was able to establish that plants growing under red light germinated the fastest, whilst plants under green light didn't germinate at all.

**Equal 1st: Primary - Ethan Humphrey, Carlingford Public School, *Are bananas radioactive?***

Radiation is around us all the time. By doing a statistical analysis, and having a well-designed experiment Ethan showed that bananas and granite both emit radiation. His research indicated that both the bananas and granite are unlikely to be harmful, however uranium-glazed plates might be.

**Equal 1st: Secondary - Melisa Denizli, Redeemer Baptist School, *A Seat For You***

Melisa took sound recordings and built a decibel contour map of her school classroom. She managed to establish the best seats for hearing impaired students to be able to hear the teacher clearly. Melisa used a decibel meter and mathematical analysis with precision in a well-designed experiment.

**Equal 1st: Secondary - Aletheia Yosaviera, Redeemer Baptist School, *Improving Bimanual Coordination through the development of a computer game***

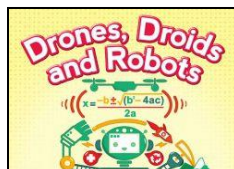
Aletheia developed a computer game, requiring the use of two mice, to allow her to determine whether students could improve brain performance by playing a computer game that mandated bimanual coordination. Her experiment showed that you can increase your bimanual coordination and by inference brain performance using the computer game that she developed.



## AIP Most Outstanding Physics Award



national science week 2016



*For the students who best represent the 2016 National Science Week theme, "Drones, Droids and Robots"*

### 1st: Georgia Batson, Meriden School, *BinGo - A self-driving bin carrier*

Every week people have to do a chore no one likes - drag their rubbish bin out to the street. What if a robot could do it for you? Georgia set out to build and program a robot prototype that could do just that. Her small robot can take a small bin from the house out to the street. Scaled up, this has the potential to help those who have difficulty completing this task, or who just don't want to!

### 2nd: Sam Watson, Armidale High School, *Comparison of the lifting ability of an Artificial Exoskeleton (mechanical arm) verses an Unaided Arm*

Exoskeletons have long been a feature of science fiction. So, now that versions are available commercially, Sam decided to test the performance of an exoskeleton arm in the real world. He found that the exoskeleton multiplied the time that a weight could be supported, and was particularly effective for smaller weights.

### 3rd: Kira Macarthur, Homeschool - Menai, *uROVer - Underwater ROV*

With an interest in underwater exploration for archaeology and marine biology, Kira built an underwater rover. Once she had the rover working and exploring a swimming pool, she tested the effect of different number of propeller blades. She found that the four-blade propeller allowed the rover to travel at the fastest speed.



## STEP Environmental Award

*Awarded for the best environmental entries*



### 1st: Jade Moxey, Sapphire Coast Anglican College, *Grazing Sheep on Deadly Fireweed: A "BaaaaD" Situation?*

*Senecio madagascariensis* or fireweed is classified as a Weed of National Significance and has very significant economic and productive impacts on grazing pasture. Sheep, unlike cattle, readily consume fireweed and farmers often use sheep to control it. Jade investigated whether sheep could be acting as dispersal agents if fireweed seeds were capable of surviving their digestive tracts. Her research showed that was in fact true - a finding that has significance for weed management guidelines for coastal pastures in South-Eastern Australia where fireweed is well established.

### Highly Commended: Darryl Domer & Carlos Meier, Homeschool - Danthonia, *Evaluating the Effects of Grazing Management*

Cell grazing is promoted as an alternative to conventional farming of pastures. It is claimed to increase the biological productivity of our pastures while maintaining a healthy ecosystem. Darryl and Carlos used long term farming records as well as original data to compare the methods in terms of water use efficiency, pasture productivity and biodiversity. Their results show that cell grazing does indeed provide significant ecological and economic benefits and could be an important and sustainable solution for farmers facing the challenges of adapting to climate change and greater global food security.





## Sebel Testing and Evaluation Award

*Based on the high level of quality control that Sebel displays in the design and manufacture of their products, they are looking for students who display the same meticulous and rigorous testing of their results or final products*

### 1st: Olivia Beck, PLC Sydney, *Growing Plants under LED Lights for Space Travel*

Growing plants effectively under artificial light would be essential for long term space travel. Olivia set out to test combinations of LEDs as a light source for Dwarf Marigolds. Taking observations every day for two weeks, she tested 10 different combinations of LEDs, each with a sample of 6 plants, to determine the best light source for the plants.

### 2nd: Macinley Butson, The Illawarra Grammar School, *Innovation in Contralateral Breast Shielding Design for Radiotherapy Cancer Treatment*

Macinley created a shield of overlapping copper scales to reduce the dosage to the untreated breast during radiotherapy. Initial detailed measurements guided her design and she tested the dosage with and without the shield six times each. When these tests suggested an issue with the design of the edge, she made adjustments and tested the new design just as thoroughly.

### 3rd: Arwyn Stone, Abbotsleigh Junior School, *Spelling- How much do we know?*

Could you spell 'submersible'? This was the most difficult word in the spelling test Arwyn designed to ascertain how spelling improves across years. She administered it to the 450 students in Years 1-6 in her school, and took a sample of 240 across the years to analyse in greater detail. This allowed her to identify particular words that were difficult for each year group.



## IIAS Commercialisation and Entrepreneur Award

*For three discoveries and inventions with the greatest potential to meet some urgent needs in economy, industry and society*

### 1st: Lina Cho, PLC Sydney, *Trash or Treasure? The use of rice husk ash as an agricultural fertiliser*

Despite being the most plentiful agricultural by-product in the world, rice husk is still largely considered a waste product by rice farmers, and is disposed of and deposited at high costs. Lina investigated the use of rice husk to meet the growing demand for a safe, organic and cheap fertiliser to produce environmentally-friendly food without harmful chemical fertilisers.

### Equal 2nd: Maddison King, Meriden School, *Clever GIRL (Global Intelligent Rip Detector)*

Because 'GIRLS' are cleverer than buoys. Having worked as a lifeguard since the age of 14 and realising the need for such a product, Maddison developed the 'Clever GIRL' a device that harnesses rip energy in the ocean, producing a warning light to alert swimmers of the presence of a rip underneath. It also indicates rip intensity with the brighter the light, the stronger the rip.

### Equal 2nd: Jordan Voll & Jonas Zimmerman, Homeschool - Danthonia, *Hive Thrive*

Having identified the difficulties beekeepers have in preparing then applying currently available protein supplements to optimise the output of beehives, Jordan and Jonas developed 'Hive Thrive', an innovative protein supplement that specifically meets deficiencies in bees' protein intake. Their investigations have shown stimulated brood growth and increased hive population as a result.



## IIAS Science and Triathlon Prize

*For three investigations that utilise knowledge and skills from a minimum of two scientific fields, and increase understanding across the boundary between them*

**1st: Rebekah Kang, PLC Sydney, *Slick and Clean - An investigation into how magnetite can be used with organic sorbents in oil spill clean-up***

Rebekah investigated the efficiency of using magnetite to clean up oil spills. She combined her knowledge of petroleum chemistry and the physics of magnetism to show that there was a linear relationship between the efficiency of oil extraction and the amount of magnetite in the oil.

**2nd: Jade Moxey, Sapphire Coast Anglican College, *Grazing Sheep on Deadly Fireweed: A "BaaaaD" Situation?***

Jade's investigation into the relationship between sheep and the noxious fireweed required an in depth understanding of the distribution and biology of fireweed, as well as its effect on the biology of the sheep. She used classic botanical research procedures to study the germination of seeds collected from sheep manure and conducted extensive biochemical analyses on the blood, liver and muscle tissue of selected sheep.

**3rd: Eleanor Lawton-Wade, PLC Sydney, *In hot water***

Eleanor examined the effect of rising temperatures on the water chemistry and plankton and algae populations in fresh water mesocosms. Her study found that phytoplankton and zooplankton levels decreased at higher temperatures while algae populations increased. She also found that dissolved oxygen levels increased and above water carbon dioxide levels decreased, but there was no change in pH.



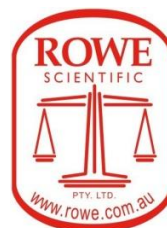
## Western Sydney University Science Award

*Greater Western Sydney entry that demonstrates particular scientific accomplishment*

**1st: Firas El-Hawat, Al Amanah College, *The effectiveness of different greenhouse materials on the growth of wheat grass***

Greenhouses are used around the world to enhance plant growth, and to allow cultivation of plants in otherwise unsuitable areas. Firas decided to explore the effectiveness of different materials as the covering of the glasshouse. He tested polycarbonate, acrylic, vinyl and fibreglass sheets against a control with no covering and found that polycarbonate resulted in both the greatest height and mass of wheatgrass. This could be explained by the greater light diffusion properties of polycarbonate as well as its high heat resistance.

### ***Latest Sponsor to join Young Scientist***

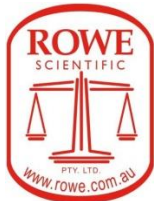


**Rowe Scientific Pty Ltd is a proudly 100% Australian Owned Company that has been servicing scientific laboratories since 1987.**

**They are sponsoring Young Scientist to the value of \$10,000 yearly for 2016 – 2020, of which \$5,000 goes directly to Young Scientist 7-12 prizes and \$3,000 goes directly to regional school students through a series of grants.**



## Rowe Scientific Equipment Prize



*Awarded to the best three secondary students who best utilise scientific equipment in designing their solution to a scientific or technological problem*

### 1st: Jennifer Xu, PLC Sydney, *Probiotics or Nobiotics?*

Can the probiotics touted for gut health make it through the hostile environment of the stomach? Jennifer tested the tolerance of the common probiotic *Lactobacillus acidophilus* by simulating the conditions in the stomach and small intestine and incubating the mixture on agar in an anaerobic environment. Her results showed that most of the bacterial cells survived.

### 2nd: Hingis Li, PLC Sydney, *Fertiliser and its effect on lake water*

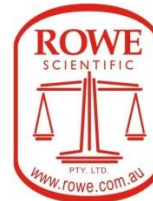
Overgrowth of algae due to excess nutrients in waterways is a real problem associated with industrial farming. Hingis explored the effect of varying concentrations of fertiliser on the properties of water, including pH, light transmission and dissolved oxygen, making effective use of a variety of probes and meters in the process.

### 3rd: William Harris, Wollondilly Anglican College, *Accuracy of dataloggers and probes in Streamwatch*

The Streamwatch program involves schools and other groups contributing to regular monitoring of our waterways. William investigated whether the monitoring process could be improved with greater use of dataloggers. He found that there was some variation between the two methods, and so further tests would be needed to determine which was most accurate.



## Rowe Scientific School Grants



*The major objective of Rowe Scientific's sponsorship is to directly reward hard-working science students. They are also keen for the Young Scientist Awards to attract greater engagement from schools, teachers and students from rural or remote locations.*

*In response, for 2016 we are awarding 3 school grants of \$1,000 to be distributed amongst a few hard-working science students from each school. To be eligible the school must come from a rural or remote location and have two or more entries from Year 7-12 students in the 2016 STANSW Young Scientist Awards.*

### Grant Winner No. 1: Eden Marine High School

### Grant Winner No. 2: Walcha Central School

### Grant Winner No. 3: MET School Wagga Wagga

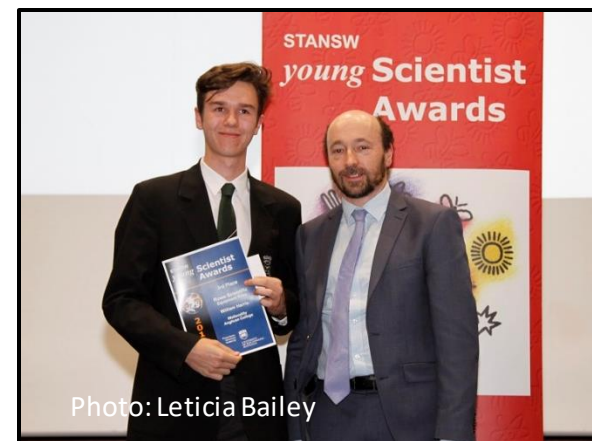


Photo: Leticia Bailey

*Rowe Scientific NSW State Manager, John Dwyer presenting William Harris with his award*



## Presentations Part 4: Grand Awards



### Budding Young Scientist

*Sponsored by the School of Education, Australian Catholic University, the Budding Young Scientist is presented to the best overall K-2 project*



Photo: Leticia Bailey

**Elyse Jones, Redeemer Baptist School, *Flower, Flower in the vase, which one of you drinks water fast? - An investigation of which flower drinks the most water***

Elyse investigated which type of plant drinks the most water. Research found that xylem vessels carry water through a plant. Roses, gerberas and tulips were fair tested with roses ending up drinking the most water. Elyse intends to find out if flower size and a plant's capacity to store water will affect her findings.



### Primary Young Scientist

*Sponsored by the School of Education, Australian Catholic University, the Primary Young Scientist is presented to the best overall 3-6 project*



**Gregory Burns, Redeemer Baptist School, *Battling with Bacteria: Exploring the pH that kills bacteria***

This study is unique in that there was no answer to the testable question, however, it is the analysis of why it didn't work which makes this investigation successful. Gregory aimed to investigate what level of pH killed bacteria. After completing an exhaustive regime of subcultures with and without pH buffers, he found that the low pH agar plates did not kill as much bacteria as higher pH samples. This didn't make sense and good deductive work showed that it was the buffer solution used to vary pH which killed off the bacteria. Hence, Gregory felt a better title for his investigation should be 'Battling with the Buffers'.

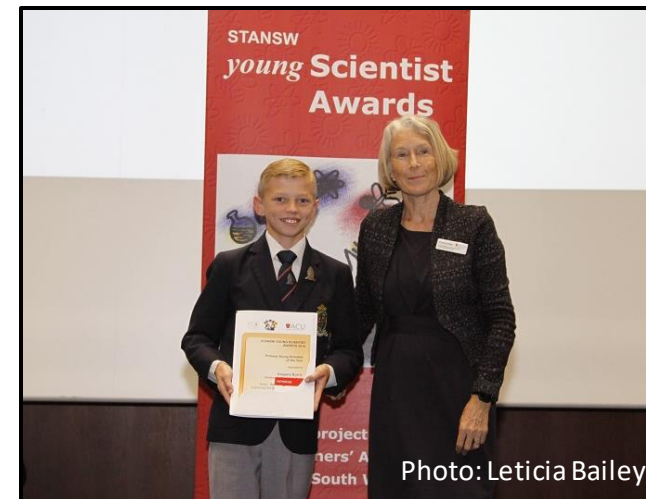


Photo: Leticia Bailey





2016 STANSW Young Scientist Awards Presentation Ceremony



## 2017 Broadcom MASTERS International Delegate



*One student with a top entry from Years 7-8 will travel to Los Angeles, USA, to the Broadcom MASTERS International in May 2017. The selected student must be a prize-winner, a good communicator and fit the age requirements*



Photo: Leticia Bailey

### **Eliza Martin, PLC Sydney, *An Investigation Into The Effect Of Slack Fill In Chip Packets***

Ever noticed how much air is in a chip packet? Eliza set out to investigate whether the presence of air really does help reduce chip breakage, as claimed by the manufacturers. She filled bags with chips and varying volumes of air and then dropped a mass on each. By counting how many fragments resulted she was able to establish that that air does help cushion the chips. So, if you don't like your chips whole then be grateful for all the air in the package!



Presentation Ceremony - Proudly Sponsored by



## 2017 Broadcom MASTERS International Honorary Mention

*One student with a top entry from Years 7-8 will be selected as a reserve for the Broadcom MASTERS International delegate.*

### **Meg Lonie, Loreto Kirribilli, *Tension Breaker***

Meg investigated the effect on temperature on the surface tension of liquids. Through a simple but scientifically vigorous investigation she showed how as temperature increased surface tension decreased and that the surface tension of water was greater than that of olive oil.



Photo: Leticia Bailey

*ISEF Panel Judge, Associate Professor Kerry Hitos, announcing the ISEF Finalists and the 2016 Sebel Young Scientist of the Year*



## 2016 Sebel Young Scientist of the Year Award

*\$2000 award to the student who submits the most outstanding project overall*



Photo: Leticia Bailey

### **Macinley Butson, The Illawarra Grammar School, *Innovation in Contralateral Breast Shielding Design for Radiotherapy Cancer Treatment***

Macinley's aim was to develop a type of radiation shield to protect the contralateral breast during radiotherapy cancer treatment. Her project involved designing, inventing and testing an innovative way to use a new Scale Maille Armour Shield to protect the contralateral breast during treatment. It has allowed radiation levels to be reduced to those acceptable by the International Radiation Therapy Oncology Group (RTOG) regulations. This produces a significant improvement over current conventional techniques.



## 2017 Intel ISEF Prize

*At least four students from Years 9-12 will travel to Los Angeles, USA, to represent Australia at the Intel International Science and Engineering Fair (ISEF) in May 2017*



Photo: Leticia Bailey

1. **Macinley Butson, The Illawarra Grammar School, *Innovation in Contralateral Breast Shielding Design for Radiotherapy Cancer Treatment***
2. **Maddison King, Meriden School, *Clever GIRL (Global Intelligent Rip Detector)***
3. **Jade Moxey, Sapphire Coast Anglican College, *Grazing Sheep on Deadly Fireweed: A "BaaaaD" Situation?***
4. **Mary-Anne Poyitt, Redeemer Baptist School, *Up the Creek***



Photo: Jonathan Bailey

## WHAT'S NEW IN 2017!

### Confirmed Initiatives

- Entry portal for 2017 is now open. All students may now submit an innovative device or a scientific investigation via our online registration system. To be eligible for a prize in the 2017 Young Scientist Awards, experimentation or construction must have started after 1<sup>st</sup> September 2016. A project is to be registered in the school year that the student is currently enrolled, e.g. a student currently in Year 6 will register their project as Year 6 if submitted online on or before 31 December 2016 and as Year 7 if submitted online on or after 1<sup>st</sup> January 2017.
- The four-level judging rubrics will be replaced with a five-level structure in 2017. Winners will most likely be selected from projects that have attained a Level 5 and possibly a Level 4.
- The Australian Institute of Physics (AIP) sponsored award for “Drones, Droids and Robots” will continue in 2017.

### Ideas on the Drawing Board

- The selection process for the 2017 Rowe Scientific Regional School Grants to be held in Term 1 2017. NSW Regional Schools will be given the opportunity to complete an Expression of Interest detailing how \$500 will be distributed to their high-performing Year 7-12 Science students. Six schools will be selected to receive this \$500 grant.
- Young Scientist resource material to be collated and made readily available for schools implementing the new HSC Mathematics and Science courses (especially Investigating Science) in 2018.