

Chairman's Award - Team 3132

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2016 - Team 3132

Team Number

3132

Team Name, Corporate/University Sponsors

Macquarie University / BAE Systems / Google / NASA / Rockwell Automation / Ford / Boeing / Salesforce / AndyMark / Aarnet / United Airlines / Optus / Blackbird Ventures / Newscorp Ltd / National Instruments / Hilti / Smile Like Drake Foundation / CSIRO / Anritsu / T-Shirt Printing Australia / CSC / Telstra Foundation & Greater Sydney Area High Schools & Global Student Network

Briefly describe the impact of the *FIRST* program on team participants with special emphasis on the 2015/2016 year and the preceding two to five years

Since our start, TDU has been a family for the bullied & school outcasts. We've grown our family from Australia to Alaska & Wisconsin. Challenging each other to set high goals, celebrate success & grow from failure, TDUsers have transformed into community leaders. The once timid Kassie & shy Rui are team role models, leading our technical subteams. The greatest measure of our impact is our alumni who are 5x more likely to get a scholarship & 95% are involved in FIRST while pursuing STEM careers.

Describe the impact of the *FIRST* program on your community with special emphasis on the 2015/2016 year and the preceding two to five years

We are transforming the Asia Pacific through the FIRST family of programs. Reaching over 200,000,000 people via media, we've grown FIRST in Australia from 30 to 500 teams through programs targeted for rural, refugee, Indigenous, female and low income groups. We donate tens of thousands of dollars to charities from Oxfam to Relay for Life. Through events like the Asia Pacific Invitational and Aus Regional, we are creating a FIRST culture in APAC that celebrates diversity and inclusion.

Team's innovative or creative method to spread the *FIRST* message

Our innovation is to use ALL of FIRST to reach the STEM underrepresented. We demo'd FRC at the 2015 World Robotics Conference in China, founded 2 microbanks for team startup & sustainability, trained retirees to teach their grandkids electronics, & ran holiday FIRST camps to grow FIRST Progressions. TDU delivered FRC/FTC/FLL seminars in China with the Chinese FLL/FTC partner. Macquarie University (MQ) created a cinema ad with us and we had our FLL coaches train FLL students to deliver FLL Jr.

Describe examples of how your team members act as role models and inspire other *FIRST* team members to emulate

TDU students serve as role models in their schools & beyond; Jasmine is a class lead & Steph is a peer advisor. This year, we have volunteered >4 working man years: mentoring FIRST teams, running events globally, volunteering for charities, and tutoring afterschool. 3132 women help girls through our FIRST Ladies networking events held at every major event that we host or go to. TDU alumni have impressed MQ leading to a FIRST direct entry path & a new platinum FIRST scholarship provider.

Describe the team's initiatives to help start or form other FRC teams

Removing barriers among teams, our "Mentors without Borders" (MWB) program has travelled more than 300,000 km in 2 years to help start teams on 4 continents. We ran 2 "Robots in the Outback" (RITO) roadtrips to go to 11 rural towns, starting & funding entire FRC teams & FIRST progressions with Google, Ford, & others. TDU Microbank has loaned \$500K to date including India. We donated parts to the first team in Ecuador and helped start the first teams in China, the Dominican Republic & Poland.

Describe the team's initiatives to help start or form other *FIRST* teams (including Jr.FLL, FLL, & FTC)

TDU-made materials helped secure low-income STEM government funding, starting dozens of new FLL/FTC/FRC teams. We convinced NI to import & absorb 75% of the cost to start the Australia FTC program and then started 30 teams with Bechtel-funded FTC "Season in a Day" bootcamp with a Google grant to develop teacher workshops. FTC has grown to 50+ teams & FLL to 400+. RITO has created complete FIRST Progressions in a 2-day intensive session in 11 rural towns. We took FLL Jr nationwide this year.

Describe the team's initiatives on assisting other *FIRST* teams (including Jr.FLL, FLL, FTC, & FRC) with progressing

through the *FIRST* program

TDU spearheaded an FLL-to-FTC progression initiative to bridge the 2 programs resulting in new FTC teams. Since we run all of our state/national FLL Jr/FLL/FTC events, we spend time with successful teams' mentors to help them move to the next program as their students age. FRC Teams 5584 & 6024 (first FRC team in India) are 2 examples, both starting from FLL, getting TDU mentor & student training and FRC funding support. We trained FLL students to mentor FLL Jr teams.

Describe how your team works with other *FIRST* teams to serve as mentors to younger or less experienced *FIRST* teams (includes Jr.FLL, FLL, FTC, & FRC teams)

We mobilized teams from Mexico, USA, Aus, China, and UK to mentor FTC/FRC teams in China at the World Robotics Conference and actively assist FLL/FTC/FRC teams with mentoring and sustainability on 4 continents. Our *FIRST* Step videos capture best practices with teams 111, 126, 365 and 2614 and we hold biweekly web-help sessions with 4613. Through MWB, we've partnered with over a dozen FLL/FTC/FRC teams to mentor teams globally. We trained other FRC team mentors as FLL Jr. Workshop providers.

Describe your Corporate/University Sponsors

We recognise 23 organisations as sponsors. Macquarie University (MQ) is our major sponsor, an Aus "top-ten" university. MQ provides us with financial, mentor, and lab resources. BAE Systems, a defense contractor, is one of our team's founding partners providing financial and in-kind sponsorship. Our major corporate partners include Google, Ford, Boeing, National Instruments, Rockwell Automation, & AndyMark. We also work with governments, small businesses, foundations, and entrepreneurs.

Describe the strength of your partnership with your sponsors with special emphasis on the 2015/2016 year and the preceding two to five years

We don't have sponsors; we have partners asking us to support their STEM outreach while they support ours. TDU robots were centerstage in Ford's Aus Fuels Innovation campaign. We're partnering with Salesforce to grow FRC in India. NSW gov't had us create STEM heros videos and they screened RITO towns. We have transformed MQ whose engineering dept has grown 20x and MQ sends us overseas to spread *FIRST*. The Vice Chancellor brought us to his rural hometown to start a *FIRST* Progression.

Describe how your team would explain what *FIRST* is to someone who has never heard of it

FIRST is the STEM program that every parent, teacher and principal wishes they could have done as kids. It gives "Everyone, Everywhere" the opportunity to access science and technology by opening doors that students might have never thought possible. Working together, students and professionals create an environment where everyone can do something amazing, empowering students to become world leaders in all fields. *FIRST* enables today's students to become tomorrow's Nobel Laureates.

Briefly describe other matters of interest to the *FIRST* judges, if any

The Fisherman's Institute is our sustainability project; our 2nd microbank fund makes loans for teams to buy FLL/FTC kits to hold holiday RoboCamps. The proceeds fund the team, repay the loan and create FLL/FTC teams to act as FRC student/mentor "feeders". Our Robocamp "playbook" is being used by more than a dozen teams globally and raises \$90K for us annually. A >\$1M grant to start *FIRST* teacher training makerspaces in China resulted from our many trips there with the FLL/FTC China partner.

Team Captain/Student Representative that has double-checked this submission.

Jaye Heimlich

Essay

FRC Team 3132, "Thunder Down Under" (TDU) at Macquarie University (MQ), Sydney Australia (Aus), started in 2010 simply as a dad's promise to a daughter, has transformed a country's passion for STEM, now reaching nearly 5% of Aus schools. We brought FRC to a girl in Alaska, to a small Polish town, and to FTC champs in India; used STEM to reconnect a prodigal son to his hometown; saved swimmers' lives with robotics. TDU has spanned the globe connecting "Everyone, Everywhere" to STEM. In inspiring ourselves, we have helped others globally. We are creating and implementing the blueprint to change the face of STEM in Aus, the Asia Pacific (AP) and the world.

As a group of highly committed students & mentors, we inspire ourselves to set and achieve STEM goals in spite of any barrier. Our community-based team reaches over 50 high schools. More than 50% of TDU is comprised of women and 75% are 1st generation Aussie. Alumni are 5x more likely to receive a scholarship, perform a letter grade higher, and 95% go on to attend our top universities. Some intern at global innovators such as Google, Dolby & Siemens. Our international media has reached over 200,000,000 people on 7 continents, from millions on global TV to 65,000 at Aus's biggest rock festival. TDU runs 15 official *FIRST* events each year, including FLLJr/FLL/FTC Regionals &

Nationals.

Aus FIRST was in decline with a meager 20 FLL teams when we started as the 1st FRC team. Using formal business tools, we doubled FLL and started the next 5 FRC teams in 2 years by creating a pre-regional off-season event, Duel Down Under (DDU) (to save teams USA travel), and the Microbank (0% loans for registration). The result is TDU starting nearly 40 FRC teams & the Aus FRC Regional. The Microbank has loaned \$500K with 100% repayment in the last 4 years. We support all our teams with quick-shipping, onshore AndyMark parts and biweekly, nationwide web help-calls (with Team 4613), modeled on our FIRST Step training videos.

All Aus FRC teams have had mentors trained directly by TDU or former TDU mentors. From this, we created Mentors Without Borders (MWB) to break down team barriers and open up TDU's team operations to Every mentor, Everywhere. MWB now includes other FRC & FTC teams globally; mentors mentoring mentors, old and new teams alike.

The FIRST Progression means student progression: FLLJr, FLL, and FTC "feeder" teams. We partnered with National Instruments to start FTC in Aus and with Bechtel to create "season in a day", starting 30 new teams. TDU piloted FLLJr last season and is now launching its release nationwide. Our holiday Robocamps (FLL/FTC as daycare) has become a \$90K/yr fundraiser for us, seeded dozens of new FIRST teams in 3 years, and created a stream of TDUsers. "The Australia Model"--a DDU-like event, MWB training, Microbank funding, and healthy FIRST progression--has taken a dying Aus FLL program and made it an exploding Progression.

The towns of the Outback pose a unique STEM challenge which we have raised with and gained support from our Mayor, and state and federal Members of Parliament. We identified team creation and sustainability as barriers to tackle. First, we created Robots In The Outback (RITO): 2-day FLLJr/FLL/FRC intensives in rural towns staffed by TDU, Aus, and USA MWB mentors. We worked with the NSW Premier's office to get towns to apply via a 2-page business plan for a community-FIRST network grant. A 2-town pilot in 2015 led to \$400K of funding from Google, Ford, MQ, Rockwell, and AndyMark: RITO created 11 FRC and 60 FLL teams in 2015/2016. Second, from the saying "Give a man a fish, he'll eat for a day. Teach a man to fish, he'll eat for a lifetime.", TDU started The Fisherman's Institute (TFI) to share Robocamps with a 2nd Microbank fund to let teams purchase FLLJr/FLL kits for Robocamps. The town's FLLJr/FLL/FRC is then totally financially sustainable and staffed as students/parents progress FLLJr-FRC. TFI is now being piloted in regions across the US and Aus.

Everyone, Everywhere starts at home, but doesn't end there. We started the AP Invitational (API), an FLLJr/FLL/FTC/FRC event annually drawing 1000s from dozens of countries. Endless global inspiration stories have resulted--audiences signing "cheers" for an Egyptian all-girls deaf FLL team and a Chinese reform school FTC team returning home as heroes. Team "R-Factor" from India left API 2013 as the FLL Champions and returned in 2015 to win the FTC Inspire award. A TDU trip to India and our 1st overseas Microbank loan...and now R-Factor is competing with us at the 2016 Sydney Regional, completing the FIRST progression.

API so impressed FIRST China that they asked us to help them organise an FRC/FTC exhibition at the 2015 World Robotics Conference in Beijing, in partnership with China Academy of Science & Technology. TDU alerted its partner network, mobilizing teams from Mexico, UK, Canada, Aus, and USA. While in China, we all met with FIRST CEO Don Bossi, demo'd FRC to the Vice Premier, and started 6 new FRC teams. Afterwards TDU trained 300+ teachers on FIRST in one of China's poorer provinces leading to a \$1.5M donation for us to start a FIRST-based teacher-training makerspace.

Essay - page 2

A vibrant Aus FIRST resulted from a lot of hard-won lessons. Everyone, Everywhere need not "recreate the wheel". We started our 500,000 km globetrotting in 2012, going to the Dominican Republic to help start 4091 DRIFT and leading to a collaboration on a Guide to International FIRST. Since then TDU has started the first teams in China (2012), Japan (2015), and Poland and India (2016). We have mentored the first teams in Taiwan, Ecuador, UAE, and Singapore. MQ partnered with us to send students to Indonesia, Hong Kong, Columbia, Brazil, and China to reach 1000s with FLL/FTC training. Globally transplanting our local effort has validated The Australia Model for us, so we documented and shared it with FIRST HQ, China, and Europe confident that it can be replicated. TDU will continue to travel the world over to help teams implement their own FIRST progressions and STEM successes. And if FRC is still not available to you, join TDU! Our Global Students Network connects Anyone, Anywhere as full TDU members: FTC students from New Zealand and Canada built robots with us in past years and this year FTCers Katie (Team 3595) in Alaska writes software & Rachel (Team 5972) in Wisconsin wrote the business plan.

Sponsors play an essential FRC role providing funding, mentors, and in-kind. TDU graciously recognizes the support from our 23 global and local sponsors. In the past year alone, Boeing, Salesforce, United Airlines, Ford and AndyMark have joined as TDU sponsors. Our relationship with our sponsors has done a "180" where they now ask us to help on their STEM initiatives. Google drafted us to map FIRST into the national digital technologies curriculum to share with the federal government. We built LEGO F1 cars for Ford and ran outreach programs to promote Aus engineering.

Nowhere has TDU had a bigger impact on a sponsor than MQ. The huge growth in Aus FIRST has mirrored MQ's

Engineering enrollment, growing by nearly 20x since TDU started. This past year MQ was inspired to create a planetary research centre based on our Recycle Rush robot. Besides trips around the AP with MQ, locally we help with their outreach to the STEM underrepresented. Through our Google CS4HS program--delivering FLL/FTC teacher training--a teacher attending from Ivanhoe, NSW (pop. 150) met Ivanhoe's favorite son, MQ President Prof. Bruce Dowton who turned around and challenged us to inspire his hometown. A TDU group left build-season for a 1000 km outback trip and taught FLL Jr, FLL & FRC to the town's 27 students, some who had never seen an escalator. This inspired us to create RITO and get it funded to repeat this "lightbulb" moment.

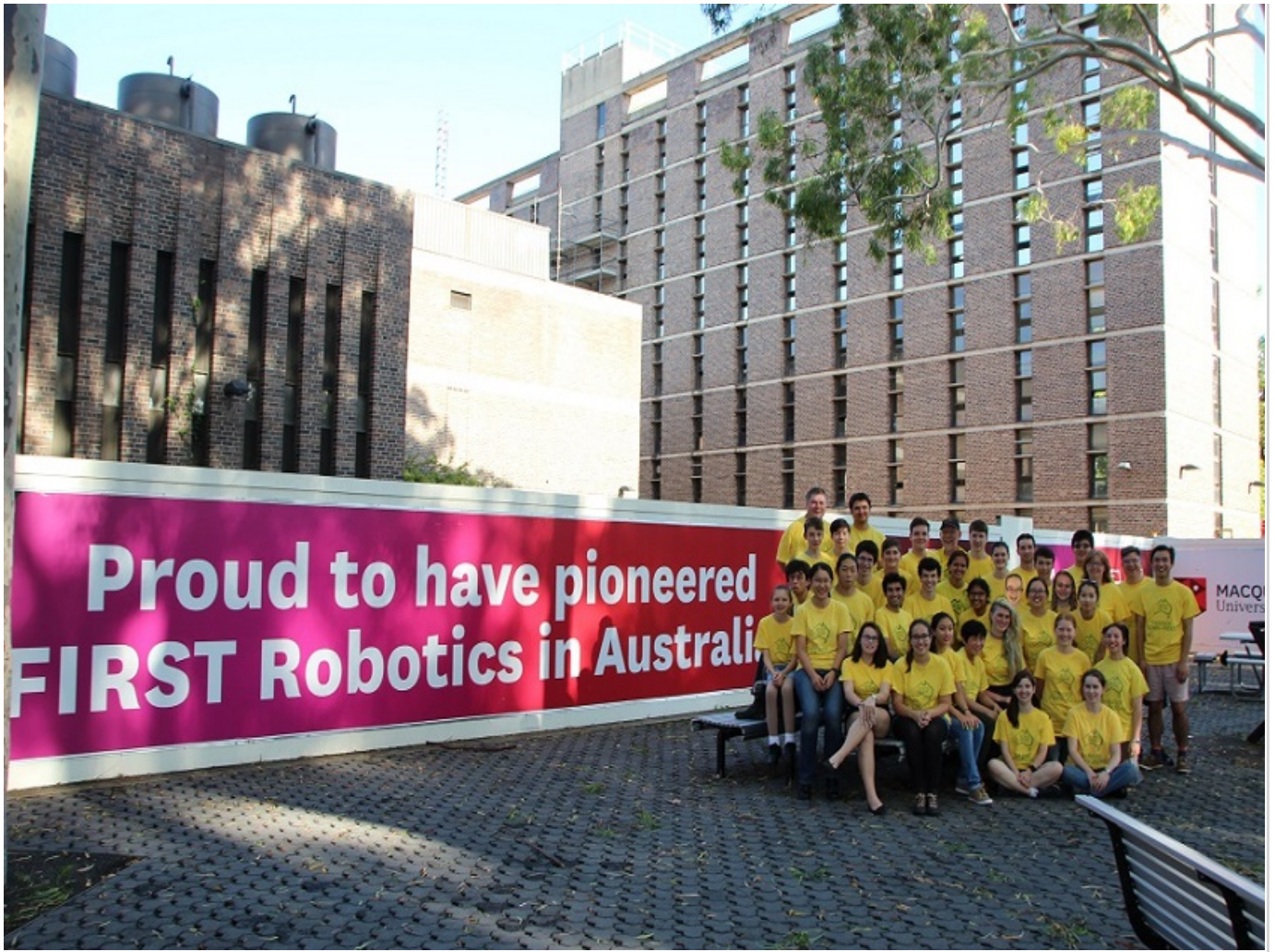
We also work to inspire Every Neighbor, Every Town. Starting in 2010 with a robot from partner Team 2342 and a spot at our state's Science EXPOsed event, our outreach has grown annually to 50 community events and raised \$1000s for charities like the Cancer Council, 40 Hour Famine, Locks of Love, and more. We spent 2 weeks "in residence" with our robots at National Science Week festival. Our 4 years of BBQing at NSW's 2nd largest Xmas event (Rotary Carols) helped fund lifesaving cardio surgery for a little boy, Johnny, who we met at this year's event. More Australians die from drowning than car accidents, so we partnered with water-safety nonprofit Smile Like Drake Foundation (SLDF) to use FIRST to reverse this. We jointly delivered fun, FLL-like challenges to reinforce the kids' SLDF safety training. SLDF is tapping into our robot skills to build an underwater drone-swarm for their upcoming water safety device to assist in finding distressed swimmers.

When we look at Everyone we've met and Everywhere they're from it brings it all full circle, inspiring us to do more. To get TDU to 54% girls. we grew pre-team girls' breakfasts into the FIRST Ladies global network in partnership with FTC/FRC teams. FIRST Ladies encourages girls to get involved and speak out, using mentors and alumni as role models. We have and will sponsor a FIRST Ladies morning tea at all our FRC events. And, our mentors do amazing things outside traveling for FIRST. Jake was shortlisted to go to Mars, Tim set the solar car speed record, & Graham is building the world's largest telescope. And this year 2010 original team members have graduated from university!

We have seen that we can do more together than apart; that by setting the bar higher than we imagined we achieve more than we dreamed. Starting teams on 4 continents, a vibrant FIRST at home; Alaskan, Canadian & NZ TDU membership, national governments & global corporations asking for our help in STEM; trailblazing university pathways for ourselves. We ARE creating and implementing the blueprint to change the face of STEM in Australia, the AP & the world...for Everyone, Everywhere.

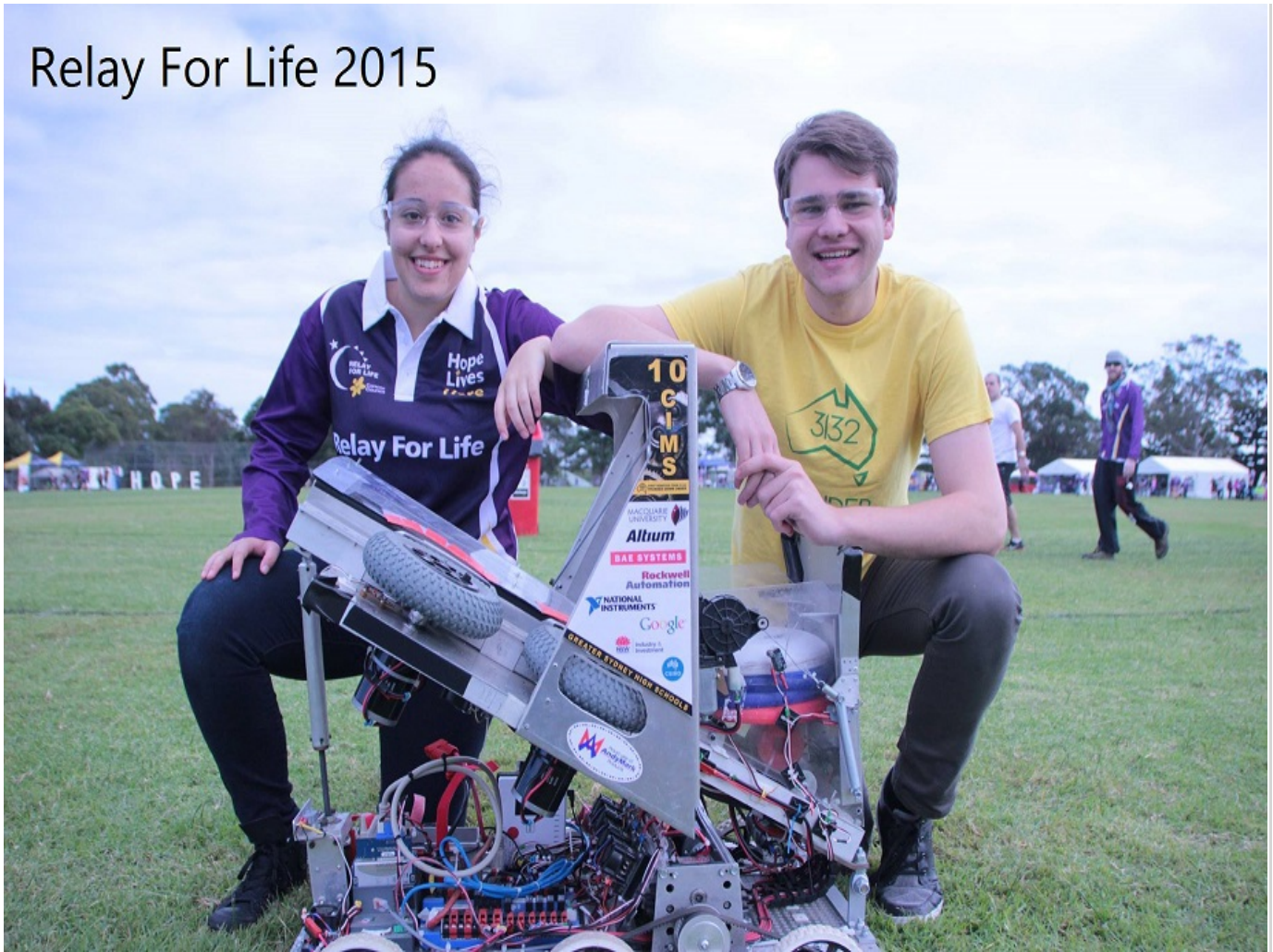
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Picture 1



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Picture 2



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Picture 3

Chinese Media at the World Adolescent Robotics Competition



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Picture 4

Inspiring FLL Jr. In the Outback

