

Chairman's Award - Team 5985

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2020 - Team 5985

Team Number

5985

Team Name, Corporate/University Sponsors

Project Bucephalus Robotics/TAFE NSW/University of Wollongong/Total Aerospace Solutions/IronCAD/CAD International/Go Hire/Blackbird Ventures/ANOVA/Mt St Thomas Public School/Wollongong West Public School&Family/Community

Briefly describe the impact of the *FIRST* program on team participants within the last five years.

Limitations discarded, abilities expanded, and impossible opportunities before you. This is 5985. Yet FIRST is more than FRC, and statistics paint the whole picture. For 5985 students, FIRST is: -A passion, 50% being involved in more than 1 program -A community, 26 students from 12 high schools in 2 countries -A commitment, 73% volunteering at FIRST events -A path, 76% moving to FRC from other FIRST programs -A future, 100% planning for tertiary education and 92% seeking STEM careers

Describe the impact of the *FIRST* program on your community within the last five years.

Powered by FIRST, PB's impact is strongest in the team's "backyard", up to 140km South of Wollongong. Here PB has: - Run STEM classes every day of the school week -Inspired audiences in 376 hrs of STEM displays -Engaged with government, invited to events such as Australia Day and the Comic Gong convention -Donated LEGO for "Backpacks of Love" aiding bushfire-affected kids -Received \$52K in government funding for girl's STEM outreach -Run the "Unlimited" STEM program for people with disabilities

Describe the team's methods for spreading the *FIRST* message in ways that are effective, scalable, sustainable, and creative.

Powerful STEM opportunities come from the PB Teaching Program which: -Operates year-round, normalising STEM and FIRST involvement for 4,780 students -Retains students for up to 5 years -Promotes student use of personal robotics kits, freeing up PB resources for other programs -Run classes in 34 venues for pupils aged 4-109 -Raises funds for PB as 92% of members teach in lieu of team fees -Inspires pupils with exciting STEM games and LEGO-scale FRC - Integrates with the 7583 teaching program

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

Every PB member is a teacher, embodying FIRST over 3,579 hours of robotics classes since 2015. PB members model GP especially by: -The Robot FIRST Aid program, supporting FLL teams at 13 events -Running the FLL Helpdesk and "Jack's Judgments", official support pages for Australian FLL -Collaborative Scouting, globally teaching cooperation and strategy in FRC -Serving on the Compass Alliance 24hr FRC helpdesk -Delivering robotics kits to African nations - Mentoring 3 FRC teams in China

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

The PB Teaching Program prepares both future FRC students and their schools, starting 2 FRC teams! PB builds foundations for teams through: -School visits and public displays -A TAFE partnership supporting STEM students -FIRST Seminars at teacher conferences -Assistance with startup grant applications for rookie teams -FLL involvement as a platform to promote FRC -Offering pathways to FRC for students with disabilities -Leading the South Coast Alliance; 6 FRC teams collaborating to showcase FRC

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

5985 grows FIRST by starting new teams and sustaining existing ones. -The Teaching Program has guided hundreds of students into FLL, starting 47 teams -School visits, kit donations and grant assistance encourage new teams -5 years of FLL/FLL Jr Kickoffs and published material support new teams -"My Maker's Space" started 7 FLL Jr teams for marginalised kids -"FIRST Scouts" integrates FLL into Scouts Australia, engaging 119 youth -Starting 4 FTC teams and supporting outreach of existing teams

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

PB's Teaching Program provides STEM opportunity, introduces FIRST and provides a guide for the journey. -In formal classes at 34 locations, PB has built STEM skills and made it easy to join (or coach) FLL Jr/FLL teams - mentoring 161 since 2015! -PB provides resources, event volunteers and runs tournaments -Students meet FTC and FRC through teachers and displays in class, eventually joining the FRC team that started their FIRST journey -81% of all 5985 members started in a PB robotics class

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)

-PB organises collaboration between hundreds of Australian FLL teams, local and internationals-bound, with forums, lessons and invitations to demonstrate at PB events -FTC teams use PB classes as platforms for outreach and recruitment -PB pools resources with 5 FRC teams in the South Coast Alliance -PB helped 7583 develop a "Junior" STEM program to reach young children -PB leads and works with 8+ international FRC teams to teach scouting and strategy in the Collaborative Scouting Project

Describe your Corporate/University Sponsors

5985 aims to be self-sufficient, reducing financial dependence on sponsors. However, PB pursues sponsorships that grant unique opportunities or fund special outreach projects. Every sponsor is valued and recognised at team events. - Financial: Total Aerospace Solutions, GoHire, Anova, Women in STEM Entrepreneurship Grants -Facilities: TAFE NSW, University of Wollongong, Mt St Thomas PS -Media and Software: IronCAD -Logistics and Fundraising: Project Bucephalus Robotics, Rotary Club of Corrimal

Describe the strength of your partnership with your sponsors within the last five years.

-All sponsors follow PB's progress via a build blog -Total Aerospace Solutions has been an avid supporter of PB's outreach since 2017 -PB has run robotics classes at University of Wollongong since 2015 -PB and IronCAD began an international partnership at the 2017 FIRST Championships. PB-created CAD tutorials are traded for support and software -TAFE NSW is PB's new major partner. Granted an entire TAFE building, PB now brings robotics students and the Wollongong FLL Regional to TAFE until 2022

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

FIRST begins with robotics, but goes so much further! One look at a tournament tells you everything about FIRST: joy, heartbreak, practical learning, frantic problem-solving, epic dancing and intense fun. FIRST combines engineering and science with artistry. It matures the mind, building critical thinking, handling of failure, decision-making, and mental flexibility. FIRST prepares students of all ages for the future and provides a link between the dream and reality of a future career.

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

A 5th-year team that is independent, self-sufficient and open to all, PB: -Has grown female membership from 24% in 2015 to 44% in 2020 -Is proud of their all-girl robotics program engaging 100 girls annually -Treasures their oldest fans - residents of the IRT nursing home -Has a workshop with room to spare. The team runs Scrimmages and shares space with 7583 -Has performed at Australia Day festivities reaching 18,000 people -Is a certified provider in the State Government's Creative Kids program

For FRC teams older than 5 years, briefly describe your team's broader impact from its inception.

PB has fundamentally changed attitudes in Wollongong: FIRST participation has been normalised for 4,780 students, with 126 FLL teams and a local Regional. A vibrant FIRST community enables team collaboration. STEM opportunities abound: Since 2015, PB classes have grown 127% in 21 schools. Pupils include seniors and students with disabilities. PB is part of local civic life, engaging with politicians and participating in the planning and running of Council committees and events.

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

Faith Clark

Essay

Create Opportunity, Transform the Community: this is the vision of 5985, Project Bucephalus (PB). On this path, PB has discovered that sustainable change comes not at a sprint, but at the pace of a marathon. This understanding has led to steady growth of outreach and opportunities, built on those already proven. The result is a vibrant FIRST culture in the City of Wollongong and connections to communities across the world. From pre-schools to nursing homes and beaches to the bush, PB is running a marathon that has only just begun.

PB is forged from its Teaching Program. Every opportunity begins with this tool of transformation, designed to teach robotics to anyone. Since 2015, it has powered outreach, enabled growth, and is renowned in a region stretching 140 km from Wollongong. Every school day a 5985 class is in session, reaching 247+ students in 17 classes requiring 500+ km of travel - each week! In addition, 300+ students join holiday workshops up to 140 km away. New classes start each year. Catering to all ages, skill levels and learning styles, this year-round program merges newcomers and veterans equally - inspiring love for STEM and fostering life skills.

PB extracts every opportunity from the Teaching Program. It roots 5985 in communities and creates self-sufficiency - a FY 2019 gross income of \$151,850 provided 80% of team funds. 92% of team members contribute time as mentors in lieu of fees, making the team accessible to all.

Through the Teaching Program, 4,780 Australian students share the 5985 identity, enabling a long view towards recruitment. STEM-minded students are identified early, introduced to FIRST, and encouraged to join PB. Of all 5985, 81% began their STEM journey in a PB robotics class. 100% continue this process. These stories define 5985:

Luin knows the day that changed his life - when PB visited his Scout meeting and introduced him to FLL. Never looking back, FIRST became a driving force. Graduating in 2019 after 4 years of FLL and 4 FRC seasons with 5985, he is now studying Mechanical Engineering. Luin is, of course, already a 5985 mentor.

Lily discovered FRC when a robot moved into her K-6 school! With the school basement becoming PB HQ, robots regularly crossed her path. Eventually able to join the school FLL team, her enthusiasm earned an invitation to 5985 "when she was older". Her time has come, and Lily is taking PB by storm - active in Drive Team, Tools and Awards.

As elite athletes train, PB creates opportunities. Discovering that after-school classes suited FLL teams, 5985 designed a lesson plan to fit the format. Coach load was reduced and teams flourished. In 2019 alone, PB mentored 20 teams in 8 classes. Success has seen the plan delivered interstate and internationally.

The combination of outreach, opportunity, and impact has put 5985 in the heart of FIRST in Wollongong, creating a FIRST explosion on the South Coast of New South Wales. This momentum reaches across borders - particularly to the Quad Cities (QC) of Iowa and Illinois, USA. In 2019 alone, PB equipment and volunteers supported 18 official FLL Jr, FLL, FTC and FRC events. Far greater is PB's impact on FIRST teams.

FLL is truly a passion of 5985. 73% of PB are FLL alumni, freely sharing knowledge. Since 2015, PB has mentored 143 FLL teams around the world, starting 72. This work is powerful. PB has transformed FLL in Australia, impacting quality and number of teams. In the last 5 years, 77% of the 134 South Coast teams were mentored by 5985. In 2015, 5985 founded the Wollongong FLL Regional - the first event in the state outside Sydney! Working with FIRST Australia, the team trains the Australian Head Referee and delivers the Robot FIRST Aid and National FLL Help Desk programs. PB's annual FLL Kickoff draws teams from 600 km away. In the QC PB grows FIRST in schools and neighbourhoods, running displays, building interest and assisting with grants and mentoring. PB has also helped plan the QC FLL Kickoff since 2017, reaching 98 teams.

5985 supports the youngest FIRST students. A PB FLL Jr team was one of the 35 FLL Jr teams started by 5985, many taking part in the Expo at the Wollongong Regional. In Iowa, PB created the first FLL/FLL Jr Joint Kickoff, involving 42 FLL Jr teams since 2017. PB is truly proud of "My Maker's Space"; a 2019 official FLL Jr season-in-a-day event for 20 marginalised QC youth. Expansion is already underway.

5985 keeps pace with FTC, with 15% of PB members in teams. Wollongong teams visit PB classes for outreach and recruitment. In Iowa, 5985 has mentored 4 FTC teams, starting 4. PB is close to FTC team 8813, assisting in design, videography and writing. PB members also helped plan and assist an Illinois FTC Kick-Off and spoke at an FTC coach conference in Iowa.

Working from the USA and Australia, PB has reached Africa and Asia. In 2016, a team member travelled to Kenya with NXT kits restored by 5985, visiting 8 schools, officially starting FLL in the country. PB sent more kits in 2018 to Tanzania and Ethiopia, and sent LEGO construction kits to Kenya in 2020. In 2017 PB members travelled to China to mentor and compete with 3 rookie FRC teams.

For 5985, FRC is collaboration. The team shares its field and workshop, runs scrimmages and presents at Mentors Without Borders conferences. 2020 saw PB join the Compass Alliance 24hr Call Centre, assisting FRC teams around the world.

The greatest challenge in PB's marathon is creating FRC teams. Since 2015, 5985 has laid foundations for potential teams. Success was elusive, but persistence saw PB start Elonera Embers (7583) in 2019 and Deakin Velocity (8259) in 2020. Both teams had roots in 5985 FLL outreach, validating effort in this area. PB expands this focus on Coopertition and connections through two FRC programs: the South Coast Alliance (SCA) and the Collaborative Scouting Project (CSP).

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The SCA is a collaboration of 5 FRC teams, founded by 5985 with 6035 and 5988 in 2017. With this system, 5985 could help 6035 when it was near collapse - rallying team members and securing funding. 5985 helped 7583 start a teaching program complementing PB's. When 7583 lost their workspace in 2020, PB invited them to share space and work side-by-side.

The CSP is Coopertition in action. Teaching the value of strategy, it creates an alliance that shares scouting, data and analysis - even in opposition! PB created and tested the program in 2017, taking off in 2018. Now a full enterprise, 5985 leads 8+ CSP teams to produce a system for events across the world.

All strides carry an athlete forward. The "Unlimited" program is a giant stride, created for those outside traditional STEM audiences. Regular visits to a nursing home taught PB the power of opportunity and the universal hunger for learning.

Here, the idea for "Unlimited" was born and in 2019 it arrived! Disability Service Providers use PB robotics classes as vocational training for clients with intellectual and physical disabilities. Students at Autism Spectrum schools flourish in PB classes. The team has spoken at disability education conferences and worked with the National Disability Insurance Scheme. "Unlimited" is now trialling classes for students who are deaf or vision-impaired in Australia and the USA.

Another stride began when Scouts Australia updated their badge system in 2019. PB's "FIRST Scouts" initiative expanded, leveraging the new STEM badges. From Troop visits to robots staying at a 4-day camp, PB adopted leadership roles and engaged youth in the new system. With the growing Scout FLL program (including all-girl teams) FIRST Scouts is an option for local youth and a National model.

5985 confronts inequality, creating opportunities such as "Rocketing Girls Into Robotics". Since 2018, this government-funded STEM program has been run by girls, for girls. The initial idea grew into long-term success - and 2 FLL teams in 2019! PB delivers STEM events in remote areas, visits pre-schools and runs classes for exchange students. The team is seen at malls, council chambers, cinemas and community events like the Comic Gong convention and Australia Day festivities.

In PB's marathon, opportunity outweighs financial aid. Mutually-beneficial relationships are the sponsorship goal.

IronCAD gives software and support whilst PB produces tutorials for middle-schools. The University of Wollongong has provided space for the Teaching Program since 2015. Rotary Clubs provide connections and manpower for community events, whilst gaining opportunities to fundraise.

Since the marathon began, schools have been PB's most valuable partners, connecting 5985 to communities. Links began with students attending PB programs. Relationships grew with 21 schools hosting classes since 2015. Eventually 5985 found homes in K-6 schools! First at Wollongong West, then Mt St Thomas (MST), PB traded robotics for workspace.

PB's long-term presence transforms schools, creating robotics hubs in areas with low socioeconomic status and many non-English-speaking and refugee families. 5985 connects robotics to school life and brings FLL mentorship that raises exceptional teams. PB is adopted by the school, and links remain after they leave - notably at MST, where 5985 saved the school from fire in 2019!

This arrangement created a surreal reversal. Potential hosts approach 5985 and major institutions offer partnerships. Meetings with Wollongong TAFE (Technical And Further Education) gained 5985 an entire building in 2020! In return, PB will create an FRC team and use TAFE as a venue for the Teaching Program and Wollongong FLL Regional until 2022. A marathon is about endurance, each step reaching further, built on ones prior. This is the race of 5985. Each step is an opportunity capable of transformation, regardless of age, gender or location. This has put PB at the heart of FIRST in Wollongong. The entire community has learned that STEM is powerful, a message echoed across the globe. Those who hear it join the race.