

## Chairman's Award - Team 5985

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2019 - Team 5985

### Team Number

5985

### Team Name, Corporate/University Sponsors

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

### Briefly describe the impact of the *FIRST* program on team participants with special emphasis on the 2018/2019 year and the preceding two to five years

Limitations discarded, expectations 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, 76% being involved in more than one program -A community, 31 students from 15 high schools in 2 countries -A commitment, volunteering at events for all programs -A path, 69% moving to FRC from other FIRST programs -A future, 100% planning for tertiary education and 91% seeking STEM careers

### Describe the impact of the *FIRST* program on your community with special emphasis on the 2018/2019 year and the preceding two to five years

Through 5985, FIRST is felt around the world. The effect is powerful, especially in the team's "backyard" covering an area 140+ km south of Wollongong. Here, since 2015: -3,578 students have experienced 2,778 hours of STEM -100 FLL teams have been mentored, starting 41 of these -Public demonstrations have run for 241 hours -5 FLL/FLL Jr. tournaments have been hosted and run -FLL has been built into Scouts Australia -STEM has reached new areas like nursing homes and special needs classrooms

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

The 5985 robotics program introduces FIRST and is a powerful force for delivering STEM opportunity, designed to: - Operate year-round, normalise FIRST for 3,578 students, foster FLL teams (106 since 2015), retain students, and include a free all-girls STEM program -Operate classes of 6-45 pupils, aged 4-108 -Raise funds for 5985 as volunteers teach in lieu of team fees -Inspire pupils with exciting STEM games and LEGO-scale versions of FRC events -Expand to new locations, including international

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

As teachers and competitors, 5985 embodies FIRST via practical interaction. 5985 has: -mentored 86% of the 100 FLL teams from Wollongong and 140 km south -embodied FIRST for 3,578 children over 20,000+ student-hours -supported 300+ teams at 7 FLL events with the Robot FIRST Aid program -regularly volunteered in all FIRST programs -used Collaborative Scouting to model coopertition in FRC -mentored 3 FRC teams in China -mentored FLL Jr/FLL/FTC teams in the USA -shared FLL and FRC resources online

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

5985 builds FRC students along with robots. Through the robotics program, a wave of FRC recruits approaches high-school age, starting 1 new FRC team with more to come. Overcoming the barrier of startup funds, 5985 sets foundations for new teams through: -School visits promoting FRC -Constantly recruiting mentors -Seminars at teacher conferences - Feedback from other FRC teams -Assistance with grant applications -Founding the South Coast Alliance; 4 FRC teams collaborating to showcase FRC

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

Through the 5985 robotics program, hundreds of students each year are guided into FLL Jr. and FLL teams. 41 FLL teams have been started in Australia alone. Alongside this program, 5985 has: -Made regular school visits -Created FLL coach materials -Founded FLL/FLL Jr. Regionals in the USA and Australia -Integrated FIRST into the Australian Scout Association -Started 2 FTC teams in the USA -Coached rookie FLL/FTC teams -Donated LEGO to rookie FLL teams - even sending MINDSTORMS kits to Africa!

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

For 3,578 students, 5985 is an introduction to FIRST, a guide, and their ultimate destination. Starting with FLL Jr. and FLL, the 5985 robotics program acts as a vehicle to engage students and aid teams - including running a tournament for both programs. Support continues as students explore FTC by volunteering and participating. Finally, students can join the FRC team that has been part of their FIRST journey from the start. They then become the guides for new students following the same path.

**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)**

With the Project Bucephalus FLL team, 5985 has: -Delivered FLL training internationally -Led collaboration between Australian FLL teams advancing to internationals -Ran FLL Kick-Offs in the U.S. and Australia, inviting local FLL and FLL Jr. teams to demonstrate In collaboration with other FRC teams, 5985 has worked with: -3132 in China to mentor 3 rookie FRC teams -15+ FRC teams to teach strategy via the collaborative scouting project -6035 and 6317 to teach them to run LEGO robotics workshops

**Describe your Corporate/University Sponsors**

5985 works to be self-sustaining, reducing financial dependence on sponsors. However, sponsorship of several varieties has enabled the team to succeed, and every supporter is valued and recognised: -Financial Only: Total Aerospace Solutions, GoHire -Facilities Only: University of Wollongong, Mt St Thomas PS, Wollongong West PS -Media and Software: IronCAD -Logistics and Fundraising: Project Bucephalus Robotics

**Describe the strength of your partnership with your sponsors with special emphasis on the 2018/2019 year and the preceding two to five years**

-5985 has been adopted into Wollongong West (2016-18) and Mt St Thomas (2018-19) K-6 Schools, enriching all in the process. -The University of Wollongong is the oldest 5985 sponsor, continually supporting and providing space for robotics workshops. -A chance meeting with IronCAD at the 2017 FIRST Championships began an international partnership that benefits everyone! -In 2017, Total Aerospace Solutions met FIRST through 5985 - and is now an avid supporter of the team's outreach program.

**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, epic dancing, frantic problem-solving, 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 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**

5985 is a 4th year team that is independent, self-sufficient, and open to all. It is built on the 9-year history of the Project Bucephalus FLL team. 5985 treasures friendships with their oldest fans: the residents of the IRT nursing home. With a goal of 50% female membership, the team has reached 34% in 2019, up from 24% in 2015. The value from hosting 5985 means local schools now bid to provide the team's workspace. 5985 is proud of their all-girl robotics program, engaging 100 girls annually.

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

Nina Lawson

## Essay

Create opportunity, transform the community: This is the guiding vision of FRC Team 5985, Project Bucephalus (PB) from the City of Wollongong. Opportunities created by 5985 go deep - from kindergartens to nursing homes, across backgrounds and cultures around the world. Now woven into the fabric of their city, the team's work has created a vibrant FIRST community and placed them at the forefront of the change in city focus from steelmaking to STEM.

Communities respond to opportunities. This is notable in Wollongong, the birthplace of PB. Once a steelmaking city, focus is changing from steel to STEM - and 5985 is at the forefront of the transformation. Students engage in PB programs regardless of age, gender, location or financial status. STEM aspirations are pursued through FIRST, with 5985 supporting alumni through grade 12 and University, encouraging them to become mentors. There is nothing passive about PB's approach, and it has created an independent, self-sufficient team.

To 5985, the power of opportunity is not measured by attendance, and hunger for learning is universal. Indeed, the most powerful opportunity began in a nursing home! The IRT aged-care facility welcomes team visits, residents as old as 109 eagerly expanding their STEM knowledge. They are as engaged in FIRST as any child and prove engineers never retire! The vision of 5985 guides it to other oft-neglected areas of the community. The team is seen at Scout halls, shopping centres, council chambers and cinemas, as well as annual events such as the Comic Gong convention.

In this manner, PB confronts inequality of access. Visits to the IRT residents are just the beginning. Challenging gender bias, the team offers programs such as "Rocketing Girls into Robotics", a free all-girl STEM class. Similar programs are offered to special needs students, removing barriers to STEM opportunities. Powerful bonds form, some team members engaged as official support for students on the autism spectrum. 5985 welcomes all!

Both an opportunity and a tool of transformation, the PB robotics program is renowned on the South Coast. A 5985 robotics class is in session every day of the school week, reaching 180+ students in 15 classes requiring 500+ km of travel - each week! In addition, 310+ students join holiday workshops 140 km away. Catering to all ages, skill levels and learning styles, this year-round program offers the first taste of STEM to many, yet maintains a return rate of 52%.

The PB robotics program makes 5985 self-sufficient, with a gross income of \$109,903 in FY 2018, providing 81% of team funds. The team extracts every opportunity from the program. It is the community's first point of contact with the team. 90% of team members volunteer as mentors in lieu of team fees. Up to 89% of a class use personal robotics kits, freeing up PB equipment for new classes and creating STEM opportunity at home.

Through the robotics program, 3,578 Australian students share the 5985 identity and are invested in PB's efforts. This allows the team to take a long view towards recruitment. STEM-minded students are identified years in advance, introduced to FIRST, and encouraged to join 5985. 89% of the team began their STEM journey in a PB robotics class. 100% continue this process. These stories define 5985:

Josh breathes robotics. He borrowed a LEGO robotics kit at age 5, discovered PB at age 7, and started FLL at age 8. He has racked up 23 holiday workshops and years of after-school classes. FIRST was an epiphany, and joining 5985 was a long-held dream. Josh achieved this goal in 2019 - his long-time teachers becoming teammates.

Compared to her teammates, Jess came late to FIRST. However, the impact on her future has been tremendous.

Starting with little knowledge of STEM, she now teaches the subject! Inspired, Jess has found her niche and pursues a teaching career. Of course, she is already a 5985 mentor.

Many opportunities in the robotics program are due to innovative scheduling! The after-school class format perfectly suits FLL teams. A PB lesson plan reduces coach-load and sees teams flourish. In 2018 alone, 5985 mentored 15 teams over 15 classes. The lesson plan has been delivered over 2-day workshops for 6+ FLL teams; interstate workshops (1,000+ km); and virtual classes for 5 international teams.

Applied over time, the results are astounding - 5985 is the heart of FIRST in Wollongong. The city's FIRST engagement began with the PB FLL team in 2010. 5985 has since created an FLL explosion on Australia's South Coast - an area stretching 140 km south of Wollongong. Since 2015, PB has mentored 100 FLL teams in this area, starting 41. In the last four years, 86% of South Coast teams were mentored by 5985. These teams excel, regularly advancing to national and international competition. PB is proud of the way it has integrated FLL into the Scout Association of Australia, working to make FIRST a part of Scouts nationwide. Investment in mentorship has returned dividends for 5985. 71% of PB are South Coast FLL alumni.

Applied nationally, 5985 has transformed FLL. In 2015, the team founded the Wollongong FLL Regional, the first and longest-running event outside Sydney in the state. PB FLL Kick-Off events attract attendees from 600 km away. 5985 founded both the National FLL Helpdesk and the "Robot FIRST Aid" support programs, run at all levels of competition. PB also helped bring the inaugural FLL State Championships to Wollongong, supplying volunteers, kits and tables. As a final flourish, 5985 has trained the Australian FLL Head Referee since 2015.

FLL is undeniably a 5985 passion, but other programs aren't forgotten. FTC teams visit 5985 classes for outreach and recruitment. 11% of PB members are on FTC teams, others assist with documentation or as emergency drivers! FLL Jr. is also encouraged, 5985 assists 10 teams and includes them at the Wollongong Regional. PB volunteers across every FIRST program.

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It is in creating FRC opportunities that 5985 met its most challenging goal. For several years, PB worked hard to generate interest amongst schools and community groups in the South Coast. Success was elusive, but 2019 was the breakthrough! The Elonera Embers (7583) were started and mentored by PB. 5985 even helped 7583 develop their own robotics program, complementing the PB program in Wollongong. 7583 was also introduced to programs created by 5985 for existing FRC teams: the South Coast Alliance (SCA) and the Collaborative Scouting Project (CSP).

The SCA was founded by 5985 with 6035 and 5988 in 2017. The SCA collaborate and practice together during build season and support each other in competition. In 2017, 6035 was in danger of collapse. PB notified FIRST Australia, and helped secure a donation to pay the 6035 entry fee. 5985 rallied 6035 students, offered workspace, and gave 5985 membership to those unable to continue in 6035.

The CSP is Coopertition in action! PB lacks the membership to operate a comprehensive scouting program. This can be overcome by teams working together. Using a 5985 application, CSP teams share scouting duties, data, and analysis - even when in opposition! PB tested the program in 2017, taking flight in 2018/19 and is now utilised internationally.

South Coast schools are PB's most valuable partners in transforming the community, and the solution to the recurring challenge of workspace. After 3 temporary locations in 2 seasons, 5985 now has an unusual home - a K-6 school! Links to schools began with students attending PB programs. Relationships grew when schools hosted classes, with 17 schools taking this opportunity since 2015. Going further, 5985 even became part of the schools themselves. First at Wollongong West (WW, 2016-18), and now at Mt. St. Thomas (MST, 2018-19), 5985 traded their robotics program for workspace. The school community adopts 5985, taking pride in "their" robotics team. The value of the opportunities mean that schools now offer PB space when the chance arises.

The long-term presence of 5985 transforms these schools. WW is a low socioeconomic school with 230 students, 45% from non-English speaking families and 20% from refugee backgrounds. PB brought robotics to the school, along with FLL mentorship that saw the WW FLL team rise to regional, state, and national competition. The team brought STEM and FIRST events to the school, creating a community robotics hub. Now at MST, 5985 is repeating this transformation. These schools demonstrate PB's sponsorship goals. For 5985, opportunity is more valuable than financial support, which is shown by concrete relationships with sponsors. The University of Wollongong has provided venues for the 5985 robotics program since 2015. IronCAD provides software and design support. Rotary Clubs provide connections and manpower for community events.

In Australia, PB's impact is immense, but it doesn't stop there! International outreach extends the team's vision. 5985 joined the effort to bring FIRST to African nations. In 2016, a team member traveled to Kenya with NXT kits restored by 5985, visiting 7+ schools, creating opportunity and officially starting FLL in the country. PB repeated the effort in 2018 in Tanzania and Ethiopia. With hope for the future come dreams of change.

Pursuit of opportunity has opened connections to both the USA and China. In the USA, 5985 members mentored 67 FLL Jr., 62 FLL, and 3 FTC teams. Of particular pride is the joint FLL/FLL Jr. kick-off, founded by a 5985 member in 2017/18, reaching 80+ teams. Outreach began in China when PB members traveled to mentor 3 rookie FRC teams, working and competing with them.

Opportunities matter. They begin transformation regardless of age, gender or position. That effect is carried to the community. By this method, 5985 is the heart of the FIRST explosion in Wollongong and the South Coast. The entire community has learned that STEM is powerful. The message is heard and echoed across the globe. Transformation ensues.