

Chairman's Award - Team 5985

Team Number

5985

Team Name, Corporate/University Sponsors

Project Bucephalus Robotics/University of Wollongong/Wollongong West Public School/Argosy Foundation/Moneywise Accounting/Total Aerospace Solutions/CAD International/Dapto Citizens and Bowling Club/Scouts Australia&Neighborhood Group

Briefly describe the impact of the *FIRST* program on team participants with special emphasis on the 2016/2017 year and the preceding two to five years

5985 is an accumulation of FIRST journeys and transformed lives. For team members, STEM was previously an interest, now it is a future. 72% of the team are FLL graduates with average participation of 3 seasons. 5985 is built on this experience, but also draws newcomers. In its 2nd season, 5985 has: -grown by 56%, to 25 students from 12 High Schools (64% rookies). -100% of members volunteer as robotics mentors. -100% of members planning on tertiary education, 84% seeking STEM careers.

Describe the impact of the *FIRST* program on your community with special emphasis on the 2016/2017 year and the preceding two to five years

FIRST arrived in Wollongong with the Project Bucephalus FLL team in 2010. FIRST spread throughout the region and beyond, growing to 27 FLL, 1 FTC, and 2 FRC teams in 2017. 5985 formed in 2015 to cater to the region's FLL alumni. Since then, 5985 has championed FIRST by: -delivering 1,234 hours of STEM teaching to 1,792 students over a range of 183 km -Mentoring 38 FLL teams, starting 17 of them -founding a Regional FLL tournament -reaching new areas, such as nursing homes and Scouts Australia

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

For 2 years, 5985 has focussed on delivering STEM opportunities. 1,792 students engage in a program where inventive tactics produce powerful results: -Play: Original games develop technical skills -Multi-Stream: Novice and Advanced options mean 51% are returning students -Discount: Up to 75% of students in a class use their own robotics kits -Scale: "LEGO size" FRC games prepare students for the real thing -Nursery: Integrate FLL into classes -Unusual: STEM in nursing homes and Scout Groups

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

For any member of a Wollongong FLL team, there is an 85% chance that the person teaching them about FIRST belongs to 5985. The 5985 robotics program puts team members in a position to work with students and create personal connections. This interaction occurs throughout the year, offering continuity of mentorship. Students are genuinely enthusiastic about 5985 results. 5985 members spoke to rookie FRC teams at the 2016 Mentors without Borders conference, sharing experiences of their rookie year.

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

5985 is providing the groundwork to form an FRC team in Nowra (a regional centre 85 km south of Wollongong). The team runs Primary and High school robotics programs at the Nowra Anglican College, and an FRC team is the next step. Similar outreach is happening at other high schools with a 5985 program. 5985 is organising a gathering of southern FRC teams. This will build alliances with these existing teams, and increase their collective ability to showcase FRC to the community.

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

Fuelled by the 5985 robotics program, FIRST in Wollongong is built on FLL teams. New teams are started each season - a total of 17 since 2015. After-school lessons are part of a year-round process that introduces FIRST values, and familiarises FLL participation to parents and students. During the season, classes are reliable havens, where teams can work under the supervision of veterans and other mentors. Coaches are easier to recruit when 5985 offers continual support throughout the season.

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

For hundreds of students, 5985 is an introduction to FIRST; a guide for their journey; and their ultimate destination. 5985 runs a "FIRST ecosystem" in Wollongong. Robotics programs engage children year-round. FLL teams are formed from this group. 5985 supports these teams, and runs the local tournament. At the end of this process, students can join the FRC team that has been part of their FIRST journey since the start. As part of 5985, these recruits continue the process with new FLL 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)

5985 is focused on building a strong Australian FLL program. To this end, 5985: - Consists of 8 FLL teams, each benefitting from mentorship within the FRC team. - Assists Australian FLL teams selected for international competition - Runs the "FLL Experience" workshop, bringing together 6 remote FLL teams to collaborate. 5985 has also started working with FRC teams, running robotics workshops for other teams, and organising a gathering of Southern FRC teams before the end of Build Season.

Describe your Corporate/University Sponsors

Confirmed 5985 sponsors include several categories: Financial: -Argosy Foundation -Moneywise Accounting -Dapto Citizens Bowling Club -Total Aerospace Solutions Facilities: -University of Wollongong -Wollongong West Public School Other: -MetWest Engineering - Metal supplies -Scouts Australia - BBQ/Kitchen tools -CAD International - Software

Describe the strength of your partnership with your sponsors with special emphasis on the 2016/2017 year and the preceding two to five years

For Illawarra children, Project Bucephalus is synonymous with school holiday robotics workshops and the University of Wollongong. Hosted at the University at multiple campuses, 23 of these workshops have catered to 774 students in the past 2 years. West Wollongong Public School is a sponsor being transformed by the partnership with 5985. The school provides workshop space - and in return, 5985 provides a robotics program, covering general STEM lessons with a goal of creating an FLL team in 2017.

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

FIRST brings engineering and science to anyone, and lets creativity become part of STEM. The best way to understand FIRST is to watch a tournament: frantic problem-solving, intense fun, practical learning, heartbreak, dancing, and joy. FIRST matures the mind. Students learn critical thinking, how to handle failure, and make better decisions. FIRST prepares students for careers: it gives a reason to develop practical skills, 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 2nd year team that is independent, self-sufficient, and open to all. It is built on the 7-year history of the Project Bucephalus FLL team that formed in 2010 and still competes today. 5985 treasures relationships with residents of the IRT nursing home, the team's oldest fans.

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

Isaac Clark

Essay

Learning. Sharing. Teaching. 5985 has been guided by this motto since being started by a FIRST LEGO League team in 2015. From these humble roots, the Illawarra community has been profoundly changed. STEM programs have been introduced to multiple schools, and numerous FLL teams populate their own Regional FLL tournament. After-school and school holiday robotics programs extend STEM opportunities to hundreds of students each year. 5985 works at the forefront of this transformation.

To appreciate the story of a changed community, one begins with chapters about its people:

Isaac is an 8-year veteran of the FIRST program and founding member of both Project Bucephalus FLL and 5985. A childlike interest in robots, channelled by FIRST into a passion for STEM, now defines his future. Isaac's enthusiasm has inspired hundreds of students and dozens of FLL teams taught by him in his FIRST career. Some past students have now joined Isaac in 5985.

Tash attended a robotics course run by Isaac for his Australian Scout Medallion and encountered FIRST. She was recruited to 5985 before the workshop was over! A newcomer to the region, Tash valued the welcoming nature and

humour of the team. Now a 2nd-year veteran of 5985, she has taken on a leadership role due to her new skills. Andre is a student of the Project Bucephalus robotics program, having attended 6 years of after-school and school holiday workshops. 5985 watched his abilities and confidence grow, and (to his astonishment) invited Andre into the team before he started high school. As a direct result of 5985, Andre's dream to work in Engineering has blossomed, his new skills and new friends guiding him to a new future.

Resorting to statistics confirms the powerful impact of 5985 on its members. The team consists of 25 members drawn from 11 High Schools; spread over an area reaching 35 km from the team workshop. 75% of these students were involved in a 5985 robotics program before joining the team, 92% of team members are planning on STEM careers, and 75% progressed to 5985 from other FIRST programs.

5985's profound effect on individual team members is replicated on their community. From nursing homes to kindergartens, the team inspires interest in STEM - delivered through demonstration, competition, and teaching. Demonstration is the most effective way to influence an audience, whether as small as a Foster Carer's picnic, or the crowds at the ComicGong comic convention. Since 2015, XXX hours of demonstrations have been delivered by 5985 to groups ranging from Scouts to schools.

However, 5985 has learned that the most rewarding use of time doesn't come with the largest crowd! STEM's greatest impact is felt in the social room of the IRT Nursing home. Continuing the relationship formed during the 2012 FLL "Senior Solutions" season, 5985 makes regular visits to share robots, achievements, and socialise with the IRT residents. The visits are enjoyed by all, especially the "retired" engineers.

Competition has been instrumental in changing the perception of robotics in the Illawarra. In this capacity, 5985 and the Project Bucephalus FLL team are united in purpose and composition, as many students can be found on both teams. The FLL team has inspired Australian teams to higher standards, with 5985 passing on the lessons learned through years of FLL competition. Though only a 2nd-year team, 5985 has started this process itself, presenting at the 2016 Mentors Without Borders conference, connecting with South Coast FRC teams, and offering local students a practical, accessible way to progress in the FIRST program. Team growth of 60% in a season quantifies this inspiration. Competitive success builds enthusiasm for change, but stronger fuel is needed to continue. 5985's founding of the Wollongong Regional FLL tournament is an example. The event is significant - almost 40 FLL teams competed in 2016. The Wollongong Regional is one of the largest NSW events, and the only one hosted outside Sydney. As an annual event with all 5985 members volunteering (or participating), the tournament uniquely serves local and country NSW teams.

5985's widest community outreach is their robotics program. Every day of the school week, in multiple places, 5985 runs a robotics workshop. Each event is a partnership with a separate host group (typically a school), structured to fit the host's needs. These classes are open to all, and not restricted to the local area - team members travel up to 90 km to the classrooms in which they teach. This widespread program requires superior coordination and commitment from team members. Their effort is evident in the outcomes: each week up to 200 students of all ages engage with a hands-on STEM experience.

The robotics program is extended in the school holidays with multi-day workshops drawing students from near and far. Based in the Shoalhaven and Wollongong campuses of the University of Wollongong (85 km apart), each school holiday program sees more than 80 students explore the possibilities of robotics.

The 5985 robotics program is fuelled by the team - literally, as members volunteer in lieu of payment. Team members mature and develop teaching skills as they create lessons, lead classes, and inspire the students. New activities combined with old favourites create an engaging program for students, increasing retention and producing entertaining projects for display. Success is shown in statistics: an average of 51% of any class is returning students. 100% of 5985 team members volunteer 2+ hours a week, a marked increase for everyone, especially the 33% who had never volunteered before.

Taken on its own, the robotics program would be an effective method of transmitting FIRST's mission. When combined with several team innovations, the message is heard throughout the community.

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The after-school class format is an innovation that has produced amazing dividends. After-school classes uniquely suit the creation and support of FLL teams. As such, 5985 has developed a series of "FLL Robotics" lessons designed to train teams with weekly mentorship. FLL students flourish, whilst the load on coaches and schools is reduced. This system works so well that each after-school class produces FLL teams. In 2016 alone, 8 classes produced 10 FLL teams, and Wollongong has developed a reputation for excellence!

5985 has refined the after-school format, allowing classes to run in any space with desks and power points. Lessons are adaptable - combining "FLL Robotics" lessons into a two-day "FLL Experience" workshop allows 5985 to mentor up to 6 FLL teams at a single event. Lessons have even been run virtually for international teams.

Further innovation is seen by 5985 offering discounts to robotics program students supplying their own LEGO MINDSTORMS kits. This has resulted in up to 75% of students in a class using personal kits. Many of these students then work on projects at home, spreading STEM further into the community. 5985 benefits with reduced equipment maintenance.

5985 has also worked to reach past typical audiences. Taking STEM into IRT is discussed above, but the team has also

worked to integrate FIRST into the Scout Association of Australia. 5985 has presented FIRST to Scouting Leaders of all levels in Australia and run activities for the Scouting community. As a result, FLL has become an officially-sanctioned Scout activity in the South Coast and Tablelands Region, with interest spreading further into NSW.

The robotics program serves three purposes: to generate income for the team; to serve as a vehicle for STEM; and a feeder system that trains students as potential 5985 recruits. Many students show such potential they are encouraged to aim for 5985 membership prior to high school. This approach is effective: of 25 current team members, only 7 have experienced a prior FRC build season.

5985 is an independent, sustainable, yet only a second-year FRC team. These combined factors reinforce the exceptional nature of the group. Whilst a strong start is owed to the Project Bucephalus FLL team, 5985 has taken this foundation and reached new heights. As an independent team, the greatest need of 5985 is an operational base. All sponsors are recognised, and whilst the team gains small financial aid from various local groups, the most vital sponsors are those offering facilities.

The ground floor of a K-6 school is an unexpected FRC base, but the partnership between 5985 and Wollongong West Public School is definitely unusual! In a win-win situation, WWPS receives a free robotics program and 5985 gains unused space as a workshop. This relationship is of extraordinary strength and enthusiasm - particularly by WWPS pupils. This arrangement will see the creation of a new FLL team, teacher training, the establishment of a LEGO robotics program, and students ready to take part in the FRC when they start high school.

Space is also offered by the University of Wollongong, granting access to classrooms during session break. Two campuses provide separate venues for the 5985 school holiday robotics program. More children are taught, STEM is spread to new areas, and the UOW showcases itself to future students. This partnership began with the Project Bucephalus FLL team in 2011, and is being continued by 5985. The FRC team has extended the partnership to include manufacturing assistance from an eager UOW workshop.

In a sense, the ultimate sponsor of 5985 is the community. Local support fills the robotics programs, allowing the team to prosper. Willing local schools share 5985 STEM event flyers with their pupils, recognising their value. Enthusiastic local students continue to provide new recruits to FRC. Without this support, the team could not survive. The bonds formed result in 5985 being firmly rooted in the community.

Learning. Sharing. Teaching. 5985 continues to be guided by this way of life as it helps shape the City of Wollongong from a Steel City to a STEM City.