Accepting the Greater Challenge

Team 900, The Zebracorns, has accepted the greater challenge for the past 16 years. We strive to create a network of collaboration within the FIRST community by sharing the cutting-edge technologies that we implement on our robots. Through our active presence and efforts in connecting with other teams, we aim to inspire and empower students across the world to be exceptional innovators and leaders.

The hardest place to start an FRC team is a school where one failed before. Many teams have folded due to various causes ranging from a lack of sustainability to poor community support. As a veteran North Carolina team, we have enabled team growth and sustainability in our state. We've hosted workshops attended by FRC teams in multiple states and presented on a wide range of topics from basic LabVIEW programming to team culture. We've also volunteered at many of the NC off-season events and used opportunities like this to make observations about team inequality.

After spending numerous hours at competitions helping rookie teams like 6502 DARC Side and 6500 GearCats fix mechanisms and code, we wanted to increase the sustainability and success of rookie teams in a more significant manner. Rookie teams tend to be severely underfunded compared to older teams, creating an uneven playing field. To reduce the number of teams that fold in their first years, we created TIGER: Teaching Innovation, Graciousness, and Engineering through Robotics. Through TIGER, we address the issues of team longevity and retention rates. This past summer, we implemented this Summer Accelerator program for rookie teams to become more acquainted with FIRST. We worked with the students and mentors of FRC Teams 6888, 6729, and 6565 to help map their communities for fundraising, build a KOP bot, use tools, and learn more essential skills. Due to our sustained relationship with AndyMark, they discounted their parts and allowed us to give teams an enhanced Kit of Parts. We wanted to go further than giving them a rookie KOP so that they could have access to the materials that they needed to succeed; beyond PWM controllers, we also gave them CAN motor controllers for sensored feedback. Accessibility to these parts and resources were instrumental in TIGER teams' early successes.

Our TIGER curriculum helped these rookie teams get a head start for the season, and one team, Team 6888, even won THOR, an off-season competition, after participating in TIGER.

Within the FRC community, we collaborate with teams across the state and nation. In the past couple months, we have assisted 5 FRC teams by letting them borrow parts and tools, answering questions about team structure, helping debug code, implementing our time-logging system, and more. Our time-logging system—which has been developed since 2014—uses students' barcodes to measure the number of hours that students spend at meetings each week. The NC FIRST Zone in Charlotte and FRC Team 2052, based in Minnesota, also use this system. Further, we collaborated with Kauai Bots, a team in Hawaii, to analyze FIRST Stronghold and see the game from different perspectives. We also have an active online presence, answering questions to help other teams in all aspects of FIRST. Our support@team900.org email address is always open for other teams to ask for help with fundraising, vision, etc.

The Zebra-Storm

The Zebracorns are trailblazers, taking the world by storm. Recently, our team developed a unique Virtual Reality technology to train our drivers and predict game strategies. Last year, we designed programs to simulate a wide variety of robot drive trains using the game development system Unreal Engine 4. After FIRST released 3D models of the field, we implemented the game mechanics to build an immersive environment that simulated FIRST STEAMworks and PowerUp gameplay. We utilized the Oculus Rift to acclimate drivers on the playing field. While demoing our driver simulator at district competitions and World Championships, we showed sponsors, other FIRST teams, and even Frank Merrick our 'ZebraReality.' Our VR technology has the potential to fundamentally change how teams strategize and implement robot designs. Thus, we published a white paper to help other teams implement Virtual Reality and experience a fully immersive robotics experience.

Besides supporting FRC teams, we strive to inspire young students to pursue STEM, knowing they will inevitably advance the technology of the FIRST community. We share our lab with four other FIRST

teams, resulting in a close-knit community where we all encourage and support each other's endeavors. It also provides us with opportunities to mentor and assist younger FIRST Teams. The Robofoxes, Roboknights, Flaming Mechanical Coyotes, and Robutofu Turtle Lords are not simply teams that we donate money to; we take time to guide the next generation of excellence by teaching them the critical thinking and problem-solving skills we use in FRC. The teams we mentor have been extremely successful, as one team even won the Champions Award at their regional event this season.

The Zebracorns are more than just an FRC team. We are an expanding force influencing others to think beyond the bounds of the FRC manual by inspiring them to innovate and analyze. Our reach spans beyond the FIRST community, and our Stripes4All Initiative unites diverse populations around the globe. In the past we have taught elementary schoolers the engineering design process for a Shark Tank Competition, flown to California to assist FIRST teams with vision, and helped Boy Scouts earn a robotics merit badge. Additionally, we spread FIRST by sharing our feats with companies like Nvidia and Stereolabs. From neural networks to object detection, The Zebracorns continue to impress large companies. These invaluable relationships with our influential sponsors have allowed us to make their advanced products more accessible to all FIRST teams. For example, while competing in the World Championships, Nvidia commended our work with vision. Three years later, they are still one of our strongest sponsors, and we are a partner in their new Jetson Champs program, where we evangelize the use of Jetson products. They even flew us to their corporate headquarters in California where we presented during their annual FIRST day. By discounting products like ZED cameras and utilizing advanced vision technologies like neural networks and cascade classifiers for object detectors, we are making cutting-edge technology available to all FIRST teams.

The Zebra-Core

Of course, The Zebracorns would be nothing without its core of 44 ambitious and motivated students from over 19 cities and 13 schools in North Carolina. Because over 50% of our students come from the North Carolina School of Science and Math (NCSSM), a public residential high school for 11th

and 12th grade students in NC, our students naturally come from a diverse range of ethnic and socioeconomic backgrounds. Our students and mentors work together to learn and apply relevant multi-disciplinary skills, fundamental engineering techniques, and new technologies through a creative design process within a culture of personal and team excellence. Since we started tracking it in 2013, 100% of our students have gone to college, employing the skills we equipped them with to succeed.

The diverse origins of our team members mean we must effectively work together to maximize our efficiency. Since the majority of our students come from NCSSM and are only on The Zebracorns for two years, many new members join our team annually. We spend the majority of pre-season training new members to ensure that everyone is an active member of the team. From strategy to virtual reality, and from vision to outreach, The Zebracorns' diverse range of skills help us forge an environment built on more than robots. We also utilize management systems such as Slack, Google Team Drive, and ZenHub to delegate tasks and to ensure we stay connected outside of our lab. Our strong student leadership structure of project managers and sub-team leads manage tasks, contact corporate sponsors, and help answer questions sent to our support@team900.org email address. Our lab is a bustling environment of collaboration, ingenuity, and innovation, and while most of our students leave the Herd seeking new opportunities after cultivating confidence, some of our alumni have even come back to serve as mentors. Our lead mentor was once a student on Team 900.

While we have spent 5400 total hours in our lab this season, The Zebracorns prioritize furthering FIRST by volunteering at events and mentoring/assisting other teams. Since many of our team members have been through FIRST's progression of programs, we understand the impact of reaching out to young students. In the past two years we've mentored 7 FLL, 10 FTC, and 2 FRC teams. In the past five years alone, we have assisted 63 FRC teams! Our efforts range from inviting other teams to our space, to helping them with tool use, to sharing our white papers (which have been downloaded nearly 4000 times on Chief Delphi). Since 2004, we have published 33 instructive documents, including white papers on neural networks, presentations on vision programming, and a guide to pioneering the field of VR within FIRST.

Here on 900, we leverage the diversity of our students by creating a rich team culture that's more than just black and white stripes. Since 2002, our mission has been to empower the FIRST community to accept the greater challenge. Evident in our focus on outreach, technology, and improvement of our community, our team's impact is tangible. With our iconic zebra pants, high energy, and passion for spreading STEM, we aspire to create an incredible culture to inspire and ignite creativity within others in our community- locally and globally.