Unicorns + Stripes = Zebracorns

Team 900—The Zebracorns—is a horse of a different color. We were founded in 2002 at the NC School of Science and Math (NCSSM) as Team Infinity. After expanding to a community team, we earned our stripes of diversity, transforming NCSSM's Unicorn mascot into a Zebracorn. With this open invitation, students and mentors come from public schools and home schools across the Triangle region. About half our students attend NCSSM, a public residential high school in Durham. NCSSM accepts 11th and 12th graders from across NC, cultivating our diversity; in the past three years, we've had Zebracorns from 45 different towns! Having students from throughout NC and from other FIRST teams gives us a diverse perspective, leading to some incredible feats. Our mission is to inspire and empower students across NC to be exceptional innovators and leaders. Our students and mentors collaborate to learn and apply multi-disciplinary skills, fundamental engineering techniques, and cutting-edge technologies through a creative design process within a culture of personal and team excellence.

Ways of the Zebracorns

Zebracorns take pride in student leadership and communication. We've developed a student leadership team which is comprised of project managers (PM) and student leaders for various sub-teams. Our PMs make sure that priorities and deadlines are well voiced during meetings, and our student leaders distribute tasks. We have utilized an industrial project management technology—Trello—to ensure everyone is actively participating and is aware of tasks that are being completed across the team. We distribute weekly emails which cover meeting times, surveys, and our team handbook. We use Slack to facilitate communication. When we can't meet as a group, we host video conferences via GoToMeetings or Google Hangouts to ensure progress continues. In addition, we use Canvas—a learning management system—to encourage learning outside the lab. By applying these real-world technologies, we prepare our students for their futures.

Zebracorns' Community

Though we were founded at NCSSM, this is our first year at an off-campus lab space in Northgate Mall. At our lab, we host Camelot Robotics which is comprised of FLL teams Robofoxes and Robotofu Raptors and FTC team RoboKnights. Zebracorns mentored these teams, teaching them more about strategy, programming, mechanical feedback, and gyroscopic and light sensors. One of these FLL teams—the Robofoxes—won the Champions award, placed fourth at the NC State Championships this year and qualified for the North American Open. The RoboKnights won the Inspire award at their qualifier. Having FLL, FTC, and FRC in one space gives us insight on how FIRST inspires STEM in various ages.

Outside of our lab space, we also reach out to FLL and FTC teams across NC. The ACE Benefactors, Team 16168, were struggling with identifying deformed fish in Animal Allies. Our vision programming team taught them how to detect fish, and the concept of this technology was used in the ACE Benefactors' final project. They later took the Grand Champions award at their regional. We also supported Cougar Bots of Pitt County. With the help of our students, they learned how to program and incorporate a gyroscopic sensor into their robot runs, giving them the advantage they needed to qualify for states. We assisted FTC team 5881 with both parts and knowledge; they won the Inspire award at their qualifier.

Apart from FLL and FTC, we assist and collaborate with FRC teams across the nation. Within the state, we have assisted over five teams in the past year with programming and FIRST basics, including how to set up a team and how to gain sponsors. Last season, we helped rookie team SUM Robotics by letting them borrow parts and helping them debug their code. We also helped f(x)—another rookie FRC team—by inviting them to our lab, helping them with code, and sharing our time-logging system. This system—which we developed in 2014—uses a barcode to measure the number of hours students spend at meetings each week. We actively support teams implementing this system, including the NC FIRST Zone in Charlotte and FRC Team 2052, based in Minnesota. We also collaborated with Kauai Bots—a team in Hawaii—to analyze FIRST Stronghold and see the game from different perspectives. At

competitions, our team helps anyone in need of assistance, most often with debugging software and handing out spare parts. We also have an active online presence, consistently answering questions to help other teams in all aspects of FIRST. Our support@team900.org email address is always open for other teams to contact. Our most requested help is with vision programming.

As a whole, we believe that supporting our fellow FRC teams and all of FIRST can help raise awareness for STEM. By assisting and mentoring all ages through three different FIRST programs, we are bringing everyone together to celebrate all FIRST has to offer: camaraderie, academics, and gracious professionalism. A number of our students have gone through FIRST's progression of programs, and understand that our assistance and volunteering can motivate people to stay in FIRST and pursue STEM careers. As a 15-year-old team, we do our best to help other teams grow into sustainable teams.

Collaborating with our Family

This year, Team 900 ran and hosted the NC FRC workshops at NCSSM, after two years of active participation in these workshops. With a series of talks, 287 people from three states were able to learn more about topics such as FRC vision systems, judging tips, swerve drive, and pneumatics. These talks were given by students and mentors, including some from our own team. Team 900 talked about vision programming, team culture, tool safety, and beta testing for LabVIEW programming. We used these workshops as a platform to create an environment where students and mentors learn from one another. Coordinating the event was a great opportunity to unite many great minds across NC, SC, and VA. We also ran the NC offseason event, THOR, in 2016.

Zebracorns Look Back

Our team has taught and graduated hundreds of high school students. Some alumni have returned as mentors; currently, there are three generations of mentors helping the team, a true testament to the impact of FIRST. One student said that being part of FIRST and the team "taught me many useful skills in communication and teamwork, as well as some technical skills that I feel may be highly valuable in the future, specifically the ins and outs of CAD design and its applications." Since 2013, 100% of our students have gone on to college. These include NCSU, UNC, Caltech, Carnegie-Mellon, Duke, Georgia Tech, Yale, Harvard, and MIT. Many received scholarships including FIRST scholarships to Capitol College and the Park Scholarship to NCSU. Our students have won the Verizon Innovative Learning app challenge for their high school and the NC Women in Technology Aspiration award. We use the soft and hard skills learned on the team to make a positive impact on the community, whether it is starting our own team or running a code camp.

Seeing is Believing

The Zebracorns have been at the cutting edge of vision programming for years. Our enthusiasm to push the limits of FRC vision systems stems from a desire to analyze, innovate, and work outside of the box. We don't stop at using new technologies: we share our work with the community by publishing white papers online that have been downloaded over 1,000 times, hosting workshops, and traveling to CA for Nvidia's FIRST Day. Our impressive work found us a new sponsor and partner in Nvidia; we helped them teach other FIRST teams how to use their donated products from FIRST Choice. Team 900 has also reached out to the next generation of companies, such as Stereolabs and Slamtec, and made their advanced products more accessible to all FRC teams. By using stereoscopic cameras, putting vision targets on human players, and utilizing advanced vision technologies like neural networks and cascade classifiers for object detection, you could say that The Zebracorns have a vision for leading the herd of FRC teams to see the potential in these amazing technologies.

Virtual Zebracorns

Our team is developing a virtual reality technology to train our drivers and predict game strategies. Before kickoff, we designed programs to simulate a wide variety of robot drive trains using the game development system Unreal Engine 4. After 3D models of the field were released, we implemented the game mechanics to build an immersive environment that realistically simulates FIRST STEAMworks

gameplay. We utilize the Oculus Rift to immerse our drivers in this new environment. This may fundamentally change how teams plan and implement robot designs. We intend to publish our work with VR in a white paper before the competition season ends.

Zebracorns Take on the Community

Students use the skills they learn on the team to positively impact their larger communities. We realize that FIRST is more than robots, and we use FIRST as a gateway to reach all kinds of populations. We have a student who started an afterschool program to tutor elementary schoolers, and many more who regularly volunteer at nursing homes and at summer camps. Whatever our students do, they bring enthusiasm for FIRST and passion for serving.

Zebracorns Just Want to Have Fun (and make a difference)

Aside from our love for robotics and our passion for FIRST and our community, Team 900 loves to have a good time. Whether it be jumping into foam pits at SkyZone Trampoline Park or enjoying some good old-fashioned board games, we love to take the time to bond as a team and have some fun. Team 900's mission is simple, we want to spread the word of FIRST and STEM to everyone while also teaching skills and serving our community.

Zebra Pants + Passion + 21st Century Technological Innovations = Team 900