50 s- Trevor: Good morning judges, we are Robo Thunder, team 9915. If I could share a single differentiating characteristic that our team exhibits, it would have to be Student-Led Teamwork. From splitting our team into groups based on subsystems for build, to prioritizing and assigning tasks on Github during weekly “scrum-meetings”, to documenting our goals and reflecting on our goals every meeting, our team is structured and run by students to maximize involvement and efficiency. Our team has especially exemplified Student-Led teamwork this year from our tremendous efforts in over 13 outreach events, ranging from local summer STEM programs for underserved elementary students, to international efforts to expose students to STEm for the first time in China. As I have our other teammates elaborate on Build, Programming, and Outreach, you’ll see how student-led teamwork is the foundation for every aspect of our team.

1-Emma- Our robot design is simple, rugged, and efficient. The mecanum wheels allows easy alignment and a versatile end effector on side of robot so it doesn’t need to turn to pick & place.

The radial arm for placing is simpler & faster than cascaded lift, can stack 6 stones high with a single stage extension.

Matthew/Owen- The end effector rotates to enable placing stones in any orientation. Our robot can reliably deliver Capstone to last Stone placed and it can also pull or push foundation in Teleop and Autonomous. (demo claw and capstone).

30-Sonal/Ethan- Our Software was developed by group of 5 programmers. They used GitHub for collaboration, planning, & source control. In TeleOp, arm driver controls vertical & horizontal motion. We used trigonometry calculations translate motion into angle and extension of arm, while keeping Stone level. (Demo arm)

30-Ashley-We have four autonomous programs from simple park to 2-skystone versions. We used Vuforia to locate the Skystone, guides robot for range & position. We deployed 6 REV 2-meter range sensors & gyro guide the robot in Autonomous (see more below)

30-Kavin- We did more than 13 outreach events to about 100 underserved students and 500 people in the general public. We recruited mentors, outreached in China to rural students, recruited for diversity and inclusion … (need to finish this part)

Sonal/ Nithin-Our team’s sustainability is excellent because as a community team we can take students from many schools. We always had more students in our spring training camp than space available. We raised enough funds for multiple robot parts so every student has a chance to build robots and we can test our prototype quickly.

20 s-Avery-Everyone on team did documentation. We have a hand-written engineering notebook and a printed part 2 for software development, outreach, & business. We also have a application for control award. We would like to hand them to you now. We are ready for your questions.

Vishwa-hands judges Notebook 2 with Control Award application

while Ethan/Nithin hands judges EN

Below is Ashley’s unfinished write up as she had to code. Feel free to heavily edit it to fit in 65 sec talk for two kids:

Relatively large software team

We use GitHub for:

- collaboration between our 5 programmers (and source control)

- scrum methodology

- weekly scrum sessions

- prioritizing tasks

We focus on getting code done early rather than waiting till a short time before competition

We have multiple autonomous paths

Challenges/interesting aspects of code

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We have a software team of 5 programmers. To collaborate, we have weekly scrum sessions and use GitHub for source control and prioritizing tasks. We have multiple autonomous paths for accompanying alliance partners with different abilities. We use Vuforia to recognize skystones and range sensors and odometry to navigate during autonomous.

Some challenges we overcame include when Vuforia would overcompensate for the small angle of the robot in relation to the skystone. We solved this issue using trigonometry to determine the actual adjustment necessary to pick up the skystone. Another challenge was pulling the foundation into the building site. We used an algorithm to adjust the robot’s angle depending on the gyro sensor’s reading so that it would drag the foundation straight. We also use a range sensor to determine when the robot reaches the building site, making it independent of slippage in the wheels. …

Trig Y-values, foundation pulling (range sensor to wall) [Challenges/interesting aspects of code]