

Modularity and Safety

Geby Jaff

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I'm a junior going to DuVal Highschool in Lanham MD, I'm part of the aerospace and aviation program in my school, so tech has always been my strong suit. I've been programming on calculators and robots since I was little but recently got serious at the beginning of highschool. I currently Have experience making simulations, operating systems, and embedded systems while also being an avid competitive programmer. I'm interested in learning more, especially in electrical engineering and computer science.

Shree Ruttala

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I currently go to school at DuVal High School in Lanham, Maryland. I'm a junior and I'm in my school's special Aerospace Engineering Program. This engineering program actually propelled my interest in 3D design because of my second year. In my second year we used Onshape to design things like tools and got to understand the fundamentals of CAD. I became a certified Onshape Professional around June. I've had many research opportunities at the University of Maryland College Park Department of Biology and NASA Jet Propulsion Laboratory. I'm interested in either Biomedical Engineering or Aerospace Engineering.

Abstract:

The FRC robotics competitions can be very demanding of students. Towards the end of each competition we see the team scrambling to complete their robot with each subteam waiting for the other to finish, this type of problem exists at the beginning of a new season as well. When new members join they have a hard time choosing which subteam to go to, whether that be programming, mechanical, or design and how to teach new members without breaking something. To fix issues like this, it's useful to create models and simulations to allow work to be done digitally. With an almost 1 to 1 model of the actual robot, this allows the sub teams to easily identify problems and brainstorm new designs. With said model, we created a simulation which included everything the robot could do but with simulated physics as well as simulated code for the programming team to test as well. The simulation is modular, if you were to add a new motor somewhere to your robot, it could be mimicked with a pre-programmed library all with a simple click and drag. Not only is the simulation world modular but so is the code. It was made to look just like the real robot code used in competitions to provide transparency. From the start of the new season we analyzed that it provided a fun way for new individuals to get interested while also helping our neurologically challenged students to focus. Open sourcing it led to 30+ teams forking the code to use for their respective teams. Simulations like these help to provide a safe and fun space to keep students and enthusiasts engaged.