A Computational Journey

I was sitting up on a ledge with a view just barely over the crowd so I could see our robot’s final seconds. There was a 3 tier pyramid located in the center of the arena, with the audience wrapped around it. Every single one of us had our eyes fixed on my team’s robot, it was lifting itself up to the final tier of the pyramid for maximum points. It reached the top of the pyramid just as the time for the round only had a few seconds left. Suddenly one of the hooks that were used to hold the robot up snapped, and the robot fell over 10 feet and slammed to the ground just as the timeout buzzer rang. My team was short just enough points to lose the final round of a regional tournament. It all ended with a big cheer from the crowd for Hawaii’s alliance, the opposing team.

About a year earlier I was walking through the crowded halls of my high school, filtering out all the clumps of people wanting me to join their club because it’s “Great to get involved” or “Lots of fun!” Each year during registration Meridian High School always put stands up for each club/team at the school, it was a good way to recruit new people. I didn’t want to join the lacrosse team, had already played football for six years, and quite frankly thought all these people were annoying. Especially since this was my junior year and I had already dealt with these people two other times. They were bombarding me with signup requests and all I wanted to do was get to the end of the hallway. On the second floor I looked down one of the hallways and noticed a girl standing next to what appeared to be a robot. This caught my attention, I had never seen anything like this before. A robot standing next to a multitude of sports teams seemed out of the ordinary. After some thought about it I walked up to the girl, and had a small chat with her. “We’re in great need of computer programmers at the moment, since all of current ones are seniors” she noted. “Oh well perfect, I’m pretty interested in programming. I’ve had some experience with it as well” I replied. The friendly girl then encouraged me to sign up for their team. I was a little nervous about committing to a team. At this point in my life I had never been in a club that I had any deep, personal experiences with. But I gave it a shot, and wrote my email down on the neglected signup sheet. In just a few minutes I was out in the parking lot. I had just finished junior year registration and had something to look forward to.

After several months I received my first email from the team. They call themselves the Bullbots, which derives from the mascot at Mountain View High School in Meridian, Idaho. During the first meeting, held at Renaissance High School, I met most of the people that I would spend the next two years with. Also I witnessed a handful of robots the team built, along with the one I saw at registration. The robots were all specialized for different tasks. Some could shoot basketballs or kick soccer balls, while others were built for speed. One robot could even deploy another smaller robot. After the meeting I was suddenly struck with anxiety about my competence and abilities as a programmer. But I soon learned to grow comfortable with my team, and realized that any level of experience is welcome. It’s a place for growth and personal exploration.

This place is the home of what is called a FIRST Robotics Competition (FRC) team. These teams can be found all over the world, a few are located here in Idaho. Every FRC team competes in a global competition each year. This competition changes from year to year. Sometimes it may involve throwing or catching objects for scoring, climbing simple structures, autonomously speeding around a track, etc. Once the FRC teams are given their assignment, this marks the start of “build season”. Every team has exactly six weeks to design, create, and test their robot before competition. Each team is normally broken into sub-teams. The Bullbots were broken up into four groups, each with their own lead. Electrical, mechanical, and programming were the three main sub-teams, with the fourth meant for everything non-robot related (i.e. Marketing, scheduling events, fundraising, etc.) Each sub-team collaborates with each other in order to build a successful robot on time.

My first year was all about getting used to the team, and getting to know one another. I was very shy at this time. I was antisocial, which was probably why it took me so long to find a club that I liked. I also had trouble communicating ideas and/or thoughts. This was a very self-conscious time for me. Thoughts like “What will they think of me and my abilities” and “What if I can’t do it” came into my head. Worrisome and anxious I was. Eventually build season came. The team met after school for about 4 hours on Mondays, Tuesdays, and Thursdays. In addition we met from 8am to 8pm every Saturday. You practically live with your team throughout the 6 weeks of build season. The lead programmer, Derik, was an intelligent, blonde haired geek. Interestingly enough he wasn’t just good at code, but also with poems and literature. Throughout his years he had done much of the robots code himself. Derik’s best friend Taylor was scrawny and humble. He never exactly typed code but he always helped with computer science theories and aided the team along. Derik’s prime objective was to get the robot coded for competition. He struggled in teaching newcomers how to code, what components do what, and how the team works. Many new members were interested in programming. But one by one those members moved to a different sub-team like electrical or mechanical. A lot of the members simply became disinterested since Derik spent little time with them. Eventually I was the only member of the programming team that stuck to it and played the waiting game.

Build season days were intense with discussion, brainstorming, and confusion. What do we do? How do we build it? What parts do we need? Will we have time to prototype this? Why the heck hasn’t X Y and Z been done yet? Those are the types of questions that everybody was asking all the time. The atmosphere can seem exotic for one who isn’t used to it. Drills and saws are screaming away from the mechanical team, electrical is wiring up power and discussing schematics for the robot components, while programming is mashing their keyboards and excessively testing the robot to kill any remaining bugs in the code. On top of that people are tired, hungry, possibly overworked and sometimes just want to go home. Team members start getting impatient, people aren’t doing their jobs, we argue. This is the time where an individual’s personality is tested. At the end of the day, one may be mentally and physically exhausted, and stressed. But if you love what you do, then you still have that itch to come back, to finish the project, to see what you’re really made of.

Eventually we were able to create a robot that shot Frisbees through the air and was able to climb a 3 tier pyramid (The mechanics of the climbing system were honestly quite sketchy). The team felt we all had a fairly good robot this year. According the other team members, the Bullbots had only gone to nationals once before (But not because of robot performance, there are other ways to make it to nationals). Eventually we tested our robot’s climbing mechanism during competition and found out that we were among a small group of teams throughout the nation that could actually climb to the top of the pyramid. I’m unsure of the exact numbers but only some 10-20 teams in the U.S could get to the top, and we turned out to be one of them. This fact fueled us until the very end of the competition, when Hawaii’s alliance scored just enough points to win the final match, sending them to nationals.

We may have lost the final round, but to me this was just the beginning. The only two programmers left besides me were Derik and Taylor, who were graduating seniors. Therefore my second year I was elected as the lead programmer. This not only meant that I would have some training to do later on, but it meant that I had to figure out everything Derik didn’t teach me, plus program the robot solo. Well almost solo, that is. This was the year I met Steve. Steve was a mentor for the team who I hadn’t really talked to until now, since I now had incentives. This year proved most difficult. I didn’t know where to start, felt lost, isolated, and confused. My mentor Steve guided me each step of the way. Showed me workarounds to problems I hadn’t experienced in the past. We faced many of the same problems the first year, except all the weight was on me now. I came to really respect Steve after working with him for hours and hours on end. I never realized how knowledgeable and intelligent he was. I not only had the help of Steve, but the gentle help of Katy as well. Katy is the Bullbot’s head advisor. She knew nothing about programming, but she was able to help with the stress, coordinating schedules, and simply just be there when we needed a little extra push. “Is there anything you need Clay?” Katy would always ask, especially when we had a lunch break and everybody could see that I was still working. Sometimes I barely ate I was so busy. Which I don’t recommend. Steve and I were constantly working on robot bugs, but we were also working on something the team had never done before. “The robot camera can detect the game ball using color” I said aloud as I was presenting our progress on the code. Using an artificial intelligence library developed by Intel, Steve and I were able to get the robot’s camera to detect the game ball. Although we never finished every feature of this product due to time constraints, it worked in more than just theory. It’s achievements like these that make me miss my late night coding session at with the Bullbots. Eventually we “finished” the robot - more like had to stop working on it - and we drove out of state to competition…

There was a 10 by 10 foot area marked for my team and me. This small concrete section was outlined by white tape. Along the tape was a series of tables and toolboxes wrapped around the inside of the marked section. This allowed just enough room to fit a few of my team members in the designated space at one time. Among all of these toolboxes, tables, and team members stood the most valuable piece. Sitting in center, about three feet wide and 4-5 feet tall, stood our teams robot. We were located inside of a stadium in Utah. There were around 40 to 50 other robots inside the stadium, each one of them either located in their designated areas or in the testing area. Because our team had a 10 by 10 foot square for all of our belongings, so did every other robotics team in the stadium. Every team had anywhere from 10-25 members. Now take that number of members per team multiplied by the number of teams, and shove them all into half the size of an ice skating rink and you have what is called the pits.

In the pits every team had one main job; that was to get the robot ready for the next round. Each robotics team was battling in a tournament against one another. About every 20-40 minutes our team would have to take our robot out to the arena to play in a 3v3 round along other teams. Honestly we did not make far in the tournament. Our robot had fundamental mechanical issues that hindered its performance in important aspects of the game. Throughout the competition the mechanical team and I were constantly battling our robot’s issues. Changing gear ratios, editing the loading system’s code, etc. To no avail, the Bullbots robot’s “problems” were never quite solved. But I cannot stress how much I appreciated my team during our time in the pits. Each and every member gave me the upmost respect. Not only was Katy and Steve there to guide me in my decisions, but in the pit the entire team was very trustworthy and helpful. I needed anything, and it was done. Mechanical and Electrical leads were asking what it was that I wanted them to do. Although we didn’t get close to nationals that year, I was more than happy to work with the team I had. Their joy to work with me brought about a bittersweet feeling.

Once back from competition I felt different. I was no longer the shy kid walking among the hallways of my high school. I was better at working and communicating with others. I learned a vast amount of skills from that team. My time with the Bullbots has taught and given me more hands on experience than any classroom could ever give me. I also realized that you can’t make everything perfect and you just need to give it your best shot. If you try to juggle everything at once, you’ll wreck the whole show. Not only did I feel different, but I wanted the programming team to be different as well. I soon began training individuals and helping them as much as I could throughout the summer. I eventually came across the son of a Bullbots alumni who was very interested in programming. Once he joined the team, I gave him every last bit of knowledge I had for as long as I could. I wasn’t going to let all my time there go to waste, otherwise the programming team would have to reinvent the wheel all over again.

Signing up for my high school robotics club was one of the most pivotal moments of my life. If the team would have never decided to recruit people at Meridian High School, or if I would have never signed up, then I would have never met any of the wonderful people on my robotics club. Which in turn would have changed my life dramatically. Simple moments can change our lives. It still astounds me how the people around you in your everyday life can change how you think, feel, and behave as an individual. It wasn’t just me, but the people I worked with that helped me achieve my goals. That is why I still visit them to this day, dropping by whenever I have time to check up on them. Sometime later I was able to reflect on my experiences, and realize how much I cared about the Bullbot’s and its future. Having a passion like that changes who you are, and what you aim to become.

A simple moment can change our lives.

The people we surround ourselves with can also change our lives.

Addition notes: Almost entirely changed the order of the piece, started out with the first year competition, then came back to explain how it is that I got where I was. Added much more detail to the pits to show what it is that FRC teams do there. Tried to make the voice less egotistical, changed how my moment in “the pits” was perceived and portrayed. Added dialog, added people, talked about what I actually did to better the team and how it was different from previous leaders. Went into much greater detail of what the team does, and what an FRC team is.