

The Challenges and Thrills of Starting a Botball Team

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Beginnings

Prologue

I first heard about Botball in sixth grade, from my family's friends, the Maldonados, after it had already started. It sounded interesting, and I had just started learning C++ with my dad, so I joined the Hammond Middle School team in seventh grade, with two of my friends. Neither of them had much of an idea of what they were doing. Jessica became a builder (but didn't do much), and Rachel was voted leader of our sub-team, the Angry Chipmunks and Squirrels. I worked with Kevin, another seventh grader, to program our RCX robot, Chippy. The next year, I wanted to join the team again, but Jessica didn't want to, Rachel couldn't, and none of my other friends would. I decided to join anyway. I soon realized that I was the only girl, and considered dropping out. If I had, then the team wouldn't have done nearly as well as we did. I was the only good programmer, because Kevin moved to Australia, and the other programmers from the previous year moved to high school. The new programmer, a sixth grader named Stephen, couldn't focus well and got bored easily. So I became the indispensable master programmer. Hammond Middle got sixth place in the double elimination rounds that year, and might have had the "best middle school" award if we had done better documentation.

As most of the team, including myself, were going to high school the next year, at the last meeting we discussed plans for the future. I discovered that only two others on my team were going to Reservoir High School with me - John and Daniel. Mr. Rosnik, our middle school technology education teacher, gave us some tips on starting Botball at Reservoir: talk to the principal, advertise the club, and make sure there are at least ten and preferably no more than twenty students on the team. Thus began the idea of the formation of a Botball team at Reservoir High School.

Starting a New Team

I started early in the year, in the middle of October. I found out that I needed a teacher sponsor, so I asked my computer science teacher, Mr. Gearhart. He agreed to be the sponsor and let us meet in his room. Then I had to talk to the assistant principal, Mr. Strothers, about letting us become a club. He agreed, so I held an "informational meeting" in late November. (I did all of this basically by myself, because my dad kept pushing me to keep going.) I advertised with announcements and flyers on bulletin boards around the school. Only seven people attended the informational meeting: Mr. Gearhart, my dad, John, Daniel, myself, Danni (a friend I dragged to the meeting) and Logan (another freshman who never showed up again). My dad, a NASA employee at Goddard Space Flight Center, helped with my middle school team, and mentored

the Reservoir's inaugural Botball team. At that first meeting, we just described what Botball is to those who didn't really know, and showed them some code from the year before. We also registered as a team. Two or three weeks later, I held another meeting, advertising with flyers and announcements again. More people showed up this time – everyone that had been at the informational meeting, except Logan, plus Andy, Chris P., Chris H., and Richard. Then, we decided that Tuesdays and Thursdays worked well for basically everyone (if people only *had* to come once a week), then later found out that Chris H. couldn't come either day, so dropped out. We also talked a bit more about money issues because we needed to raise \$2,300 by the middle of March.

Preparation

To help with the money problem, we applied for a scholarship with Botball, and my dad and I attended a Booster club meeting. (The Boosters is a group at Reservoir that supports the clubs in the school.) We told them about Botball, and how we needed money, and they gave us as much money as they were allowed to give (\$250). They would have given us more if they had known about us earlier in the year, but we were not in their budget. They did seem excited about Botball, though, and told us about a fundraiser at Barnes & Noble bookstore that we could participate in – an in-store book fair. When customers presented a R.H.S. book fair flyer, a percentage of their sales went to the Booster Club. The Boosters divided that money among participating clubs. We borrowed a robot from Hammond Middle School and demonstrated it at Barnes & Noble. We later learned that out of the whole week, the night we participated brought the most money.

Around this time is when the team started meeting regularly, every Tuesday and Thursday from the end of school at 2:15 to 3:30. (After the workshop, we extended the time to 4:00.) We didn't do much, because there wasn't much we *could* do – we didn't have any robot parts. So we started learning HTML, for the website (which turned out to be a waste of time, since we used Freewebs, which doesn't require HTML). Then I had the idea to bring in a Lego "Robotics Discovery" kit I had at home, which couldn't be programmed, but was better than nothing. (The box says "No PC required" as if that's a good thing!) And Mr. Gearhart gave us lessons on C, so those of us who knew it could remember, and those who didn't know it could learn. This was the beginning of the division between builders and programmers. We needed a leader, so the team voted – I was unanimously elected leader, although I didn't really want to be. But I took the challenge anyway, because if I didn't, no one else would.

During a church retreat in January, I told my friend Jeanne about Botball. She said she had heard of the club and wanted to join, but didn't think there would be any girls. Little did she know a girl had started the club! So I invited her to join. This brought the total number of students in the club to eight, which was fewer than what Mr. Rosnik suggested; regardless, it worked out well.

We still needed more money, so Daniel's parents offered to give us \$5 for every ten-pound bag of leaves we raked in their yard. So John and I met Daniel at his house and we spent an afternoon bagging leaves. Daniel's parents gave us \$250. We were still short on money, so I asked everyone to bring \$25 to the next meeting.

Middles

The Fun Begins

The workshop approached; since a new rule stated that only three people from each team were allowed to go, and one of them had to be an adult, we voted. Mr. Gearhart, Richard and I went to the workshop Saturday, and Andy, my dad and I went Sunday. That worked out well because Saturday is the day that you do more building (Richard is a builder) and Sunday you do more programming (Andy's a programmer). So we got our Legos and the challenge and spent the next two meetings telling the rest of the team, brainstorming, and coming up with a schedule. (And Andy used band music to create a song for the robot to sing.) The schedule helped us see what we needed to do.

We started working on the robots, accomplishing more on Thursdays when my dad could be there; he could keep the group focused much better than I could. (I got a bit better at it as time progressed.) Our basic plan was to have one robot go for the smaller points, the Tribbles, and another to go for larger points on the Tower (which was our successful strategy I learned at Hammond Middle School). Franz was the Tribble-fetching robot that Richard and Jeanne built and Andy programmed. Fritz was the tower-attacking robot that John and Daniel built and Chris programmed. Danni did documentation, and I made sure everything got done.

Franz's goal was always to sweep the Tribbles into the starting box (using a dead reckoning program I made the year before), then sort them into their bins, but as time grew short, we didn't worry about the camera and just put one Tribble into the yellow bin, since it was usually a yellow Tribble that Franz picked up. Fritz's goal changed several times. It was always to go for the tower, but the first idea was to pull back the tower to get the colored balls. When we realized that was impractical, we considered driving the robot forward to the tower and, while the robot holds the tower in place, poking the balls up so they fall, hopefully onto our side. Then we came up

Calendar - 2006-03-16 12:13:04 - Last Edited on 2006-04-18 11:45
Week ending March 18: Start documentation, establish plans, establish a strategy and create the board (PVC Party!)
Week ending March 25: Create algorithm, assign robot jobs, determine possible robot appendages, experiment
Week ending April 1: Final robot design decisions, first program, build, March 29 - End of first period for documentation
Week ending April 8: Start robot, code integration
Week ending April 15: Complete robot integration of hardware and software; Note: this is the week of spring break!!
Week ending April 22: Final testing, PANIC!!, April 19 - End of second period for documentation
May 3: End of third period for documentation
May 6: Competition
Edit Entry - Delete Entry -

Figure 1: The documented schedule

```
Interactive C 6.0.14
File Edit Tools Settings Help
New Open Save Close Check Download Run main Stop Simulate
Interaction XBCsnui.c Sweep.ic (not saved) C:\Botball\Botball 2006\Botball 2006 CD\Programs\Franz\Sweep.ic (not saved)
//Franz: The Tribble Fetching Bot
//3/28/06
//Head Programmer: Andy Higgins
//Chief Engineer: Richard Meija
//Builder: Jeanne Clemmer
#include "Claw_Positions.ic"
#include XBCsnui.ic
#include To.ic
//Sweep Goal: Move all Tribbles into the "Home" area
void Sweep()
{
    to(30.5,22.5); //Changed from 30,22.5
    to(25.5,26.5);
    turn(-27); //was -20, too little //was -30. Too much, caused tube to slip out of plow. 10 is too little
    halfdom();
    sleep(0.5);
    turn(27); //This angle changed too.
    to(19.25,27.5);
    to(9.29); //at 8.5, it crashed into the wall and wouldn't move.
    to(4.5,17.5);
    to(15.5,19.5);
    up();
    go(-4.5);
    beep();beep();beep();
}
}
```

Figure 2: Andy's Sweep code which uses my dead reckoning code

with the idea of holding the tower in place with a few wheels connected together. That was the plan we were staying by until we realized that Fritz, who at this point had been rebuilt a couple times, wasn't built right for this particular job (it took a while just to figure out how to get Fritz over the PVC), and we didn't have time to rebuild again. So we went with John's simple idea of just going forward over the PVC and holding the tower in one spot, not worrying about the balls.

Danni made a [supplemental website](#) for the team, which included biographies for everyone and a photo album. It has grown a lot, and has continued to grow, as opposed to previous years.

Running out of Time

With only a week left until the competition, we still had much to accomplish. There was still some documentation to do, we needed to test the robots more, and we wanted team shirts to wear to the competition. We decided to meet every day in the next week. Unfortunately, Mr. Gearhart's father-in-law died, so he couldn't come to the meetings at the beginning of the week, and I couldn't come to the meeting on Monday, so nothing got done. Tuesday, the door was locked, so we couldn't get into the room. Wednesday there were only a few of us there, and we tried testing the robots, but for some reason Franz wasn't working, even though it had worked the last time we tested it. Thursday and Friday we met at my house, working until around 5:00 on Thursday and 10:00 on Friday. Every time we had a successful run, my dad would say, "Test it again." We tested the robots until we were almost positive they would get at least a couple points each time.

My mom purchased light-blue tee shirts for \$2.50 each. Danni drew characters representing each of us: I was an angry alarm clock, Danni was a banana, Andy was a sad strawberry, Chris was an octopus, Jeanne was a pair of jeans, Richard was a puppy, Daniel was a jelly bean and John was a piece of ham. My mom put the characters on the fronts of the shirts, with "Reservoir Botball 2006" on the back. We asked all of our team members to wear their shirts to the competition the next day.

Endings

The Competition

We woke up early and drove to the competition at the University of Maryland. When we arrived, we found our designated space in the pit area and settled in. We anticipated a long day because of our past experience --our region has forty-six teams. So we brought a total of about five power strips, two laptops, two portable DVD players (complete with way more movies than we had time to watch), a Gamecube and two decks of cards, so we never got bored. We took the first opportunity to test on the practice tables, and Franz was acting up -- when we first turned it on it started moving, instead of waiting until we told it to start. This kept happening until finally we took the Gameboy off the XBC and put it back on, which worked for a while. Not only that, but we realized the tube that contains three Tribbles was substantially bigger than the one we had been using. This caused the robot to behave slightly differently, throwing off the whole thing. Because this was such a serious problem, we decided to make some adjustments to fix the problem of the larger tube. When we got back to the pit area, Andy changed some code. We

spent the rest of the practice time testing over and over. We decided to make no more changes after we were satisfied that the problem was resolved.

Seeding round time came, and we scored an average of ten points – fifth place. During the seeding rounds everyone got very hungry. Since the official lunch break wasn't for a long time, we decided to break into two groups. The first group (composed mainly of the hungrier of the team) ate lunch, while the second group stayed behind. Then the second group got lunch while the first group stayed. Because we had eaten our lunches early, we used the official lunchtime to test the robots.

Next were the double elimination rounds. Because we had done so well in the seeding rounds, our first match was a “bye”. As the day progressed, we started a couple movies, played several games, and kept constant watch on the scores, and where we placed. Several times we were very close to losing a match, but never did. One we won five to four, one we won ten to nine, and one we tied, but won the tie-breaker because we had gotten Botguy. Several times we nearly gave the other team the colored balls because Fritz pushed the tower almost too far over the line, but the balls always ended up in the flood zone. One time Fritz actually did push the balls to the other side, but the other team's robot pushed them back, costing their team many points. So we were very lucky. We resisted the temptation to adjust the robots, since they were consistently getting points.

It was late afternoon and we were playing cards, when it was time for our team to go on-deck for the second-to-last time. When we came back after winning yet again, we realized – “we're in second place!” We were too excited to finish our card game, so we finished the round and declared Danni the winner. John said he might have the song “We are the Champions” by Queen on his computer, but we decided it would be obnoxious to play it since we had not yet won.

So then the final match began. The final two teams' robots were probably the most simple of all the robots in the tournament – no fancy arms or sensors or anything (which really demonstrates the philosophy that we learn in Botball – KISS, Keep it Simple Stupid). We won the final match, and, since our win was the second loss for the other team, they were eliminated. Undefeated, we won the double elimination rounds! We ran back to the pit area. John, who had stayed in the pit area to guard our things, was curled up in shock, unbelieving that we had actually won. It turned out he did not have “We are the Champions” on his computer, so we didn't play it.



Figure 3: (from left) John, Richard and Daniel play on the Gamecube with someone from HMS, while Jeanne watches a movie and the rest of us play cards

But Wait, There's More...

Next was the awards ceremony. When they were awarding double-elimination winners, they called third and second place first, and each of those teams got a plaque. Richard said "What?! We get a plaque?!" But when Reservoir was announced, they brought out a trophy! After we sat down, they announced other award winners. Finally they got to the overall winners. I was sure that if we even placed overall, it would be third or possibly second, which is why when they said Reservoir was the overall winner, I was totally surprised. In a field of forty-six teams, with many established robotics clubs, our fledgling group was the undefeated first-place winner in the entire Greater DC Metro region! I couldn't stop smiling until at least five hours later, after I got home. From the University of Maryland we all went to Five Guys, a new burger place, for dinner. (And the name was fitting because our team has five guys... and three girls.)

On the way home, we dropped Danni, Daniel and Jeanne off, each time running up to the door with the two trophies. Jeanne said, "I *love* being a nerd. I *win* at being a nerd!" because she had never won anything else before, and most of her family is athletic.

A week later, we had a party for the team, which ended up being around twice as long as was intended. We played video games, air hockey and Solarquest (sort of like Monopoly, except you buy planets and moons).

The Fun Continues

After we learned we had won first place overall, someone pulled us aside and told us that we should consider going to Nationals and that we would get a travel grant. We hadn't thought of it before, because in middle school we had never won, and had never gone to Nationals. Once the regional competition was over, Botball was over for us. But not this year. Our one failure was in the lack of planning for the team's success. In these past few weeks since the competition, we have been scrambling to raise money, better our robots, plan our trip, and learn about the other teams. My mom especially has been keeping constant watch on airfare prices (we now have our tickets) and the number of teams registered for NCER. We are very grateful for the \$800 travel grant, but it does not go very far towards taking eight team members plus chaperones halfway across the country. (We hope to get more next year for the trip to Hawaii.) Recently we have been selling candy and having bake sales to raise money.

Lessons

When I started the team, the only jobs I anticipated were programmers, builders and website designers. I realize now, as team leader, that there are many other responsibilities that should have been divided among my teammates. These include:

- ❖ Public relations – send club updates to school website, contact local papers of club events
- ❖ Fundraising/Treasurer – Find creative ways to fund our team, keep track of money
- ❖ Secretary – Take notes at each meeting to document progress

My story has several lessons behind it:

- ❖ If you like something enough, stick to it, even if your friends don't – you'll have fun and make new friends who share your interests!
- ❖ Even a new team can get first place.
- ❖ Test, test, test. Oh, wait. Test some more.
- ❖ Keep it Simple, Stupid.

Also remember this: At one of our first meetings, Danni asked me, “Are we even going to make it past the first round?” We did a lot more than that – we're going to Oklahoma! ☺



Figure 4: The team with the robots and trophies. From left - me, Jeanne, Chris (back), Richard, Andy, Danni, John, Daniel; Robots from left - Franz, Fritz