SPECTRUM 3847

BUILD SEASON LOG 2012

June 4th, 2012

Build Log

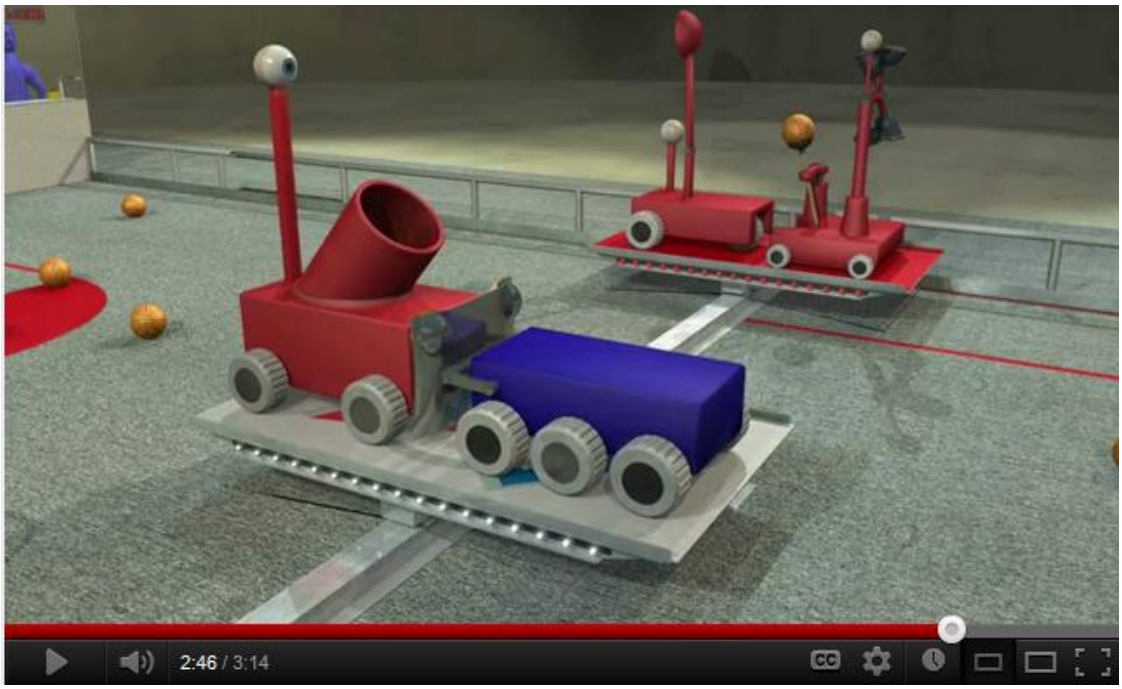
Sunday, December 11, 2011

I will be updating the progress of FIRST Team 3847 Spectrum. There will be an update posted after every meeting.

Kickoff 2012

Saturday, January 7, 2012

The details for the 21st FIRST game, "Rebound Rumble", were released today. It's another bit of an amalgamation from FIRST combining 2001's bridge balancing (Cooperative Balancing) with the 2006 game, Aim High.



2012 Rebound Rumble – Game Animation

I was excited to see bridge balancing; our controls team has been working on projects that fit directly in line with that concept.

We spent most of the day reading and discussing the rules. Every student seemed to have a good grasp of the rules and a good idea of how robots could play it.

Towards the end of the afternoon, we had a few students break off and do the kit of parts inventory, while others started brainstorming to define their ideal robot. The first day or two is the time to generate any ideas that you possibly can – nothing is too outlandish. We had jumping robots suggested as well as an air-air defensive robot, I doubt either of them will be built, but the ideas are good and they generate more ideas.

We did do some detailed discussion about robot features but nothing was set in stone. We talked about how teams will score and how many points they will score. We also covered defensive strategies, along with a few other non-scoring non-defensive strategies. Just like in actual basketball, there may be other stat categories to keep track of besides points scored to make a strong alliance.

Tomorrow, we start deciding on the specific game strategies we will pursue to get us the best results. We will also decide what parts we need to prototype right away and begin designing these prototypes. We will break down into our different sub-groups and discuss timelines for when items need to be accomplished.

Overall, I am very pleased with this game, which is rare. I normally have to think about it for a while before I like a game but this one just seems to make sense. I am not so happy about the fouls but other than that, I think it's going to be fun to build, play, and watch.

- Allen Gregory

"Enthusiasm is one of the most powerful engines of success. When you do a thing, do it with all your might. Put your whole soul into it. Stamp it with your own personality. Be active, be energetic, be enthusiastic and faithful and you will accomplish your object. Nothing great was ever achieved without enthusiasm."
- R.W. Emerson

Build Update Day 2

Sunday, January 8, 2012

The high of kickoff has already worn down and we are starting to get into the gritty details of our design, starting from the chassis and moving up. With this being the rookie season for nearly 3/4 of the team, we are hoping to just be able to build the 1114 Kitbot on Steroids (http://goo.gl/pWEkH) and be done with a drive train in week 1. The FIRST Game Design Committee wasn't very nice; they gave us a barrier that we have to get over. We spent a portion of today doing some CAD work to figure out the geometry of a 6-wheel drive robot climbing the barrier. We were hoping to run some simple tests with last year's chassis but the new classmate (Driver Station laptop) image that is supposed to just work, did everything but. We have been working on it for the past 7+ hours and we still aren't quite finished. We should be able to reimage the cRIO first thing tomorrow and have the old robot running again.

We had a much smaller turnout then I expected for the day after kickoff, but we were still able to accomplish several of the important tasks.

The beginnings of a prototype shooter assembly are coming together so that we can test how the ball flies and what we will need to do to actually get it in the goal.

We also did a bit of math to determine ideal wheel speeds for different distance shots. This is something that we will have to develop further while designing the shooter assembly.

Logistics continued to work on reaching out to other teams and also developing the initial ideas for our Chairman's award essay.

We did the initial wiring of several of the electrical components that we have standard wire guides for. For instance, all of our Jaguars have 4 inch Anderson Powerpole leads on each side of them. This allows us to easily swap them in and out if we ever have a failure.

We also were able to watch the field walk through that was provided by FIRST this year. This is a great addition to the manual because it allows you to actually see people interacting with the field elements. I think this provides a much better understanding of the field than the old way of having people pretending to be robots playing the game.

Tomorrow is the first after school meeting; we'll see how much we can get done on a normal day. Hopefully, we can push forward a bit to make up for lost time. (We're only one day in but I still feel a little behind.)

- Allen Gregory

"How does a project get to be a year late? ... One day at a time." - Fred Brooks

Build Update Day 3: First School Day

Monday, January 9, 2012

Turnout was a bit small today as well. But that's probably due to all the flooding in Houston. We still managed to salvage a pretty productive day.

The mechanical teams continued work on a basic shooter prototype. We should be shooting balls tomorrow.

Much of the discussion was focused on collecting balls. With the three ball possession limit this year a hopper isn't needed. However, you still have to have a collector and feeder system that is effective and efficient. This means getting the balls off the carpet quickly and never jamming. Several ideas were created for how to optimally collect the balls and move them to our shooter assembly; we should be able to begin building a prototype tomorrow.

We were able to test last year's robot climbing a simulated barrier. The heights and widths weren't correct but it was to get an idea for the dynamics of a robot climbing a curb. It was a very violent operation. I think it sounded and looked worse than it actually was, but it is definitely going to be something to put a lot of thought into.

We also discussed the bridge. One of our biggest problems is going to be not having an actual bridge to test on. We may have to build one and store it somewhere else, but it still won't be as convenient as having it in our lab.

The controls team was able to get last year's robot up and running, and has started looking into all the new features that were added to the code libraries this year.

We are off to a good start but we need to push to get as many working prototypes this week as possible. That will let us see what aspects we need to consider in our design before we build the real thing.

- Allen Gregory

"A complex system that works is invariably found to have evolved from a simple system that worked. A complex system designed from scratch never works and cannot be patched up to make it work. You have to start over, beginning with a working simple system." - *John Gall*

Build Update Day 4

Tuesday, January 10, 2012

The 1st week is moving along. We're four days in and I think we are finally starting to really understand some of the problems that we will face within our sub-systems.

The collector group began working on prototyping a spinning tube collector for the ball. This simple prototype will let us learn about how the ball is going to compress in our collector and conveyor systems.

The shooter group was attempting to get our prototype running today but it didn't get finished in time. Tomorrow night we should have a working prototype.

The bridge problem is still causing us some trouble. It's a lot harder than it looks to reach up and pull down a 26" bridge with a heavy robot on the other side while not extending past 14" from the frame. This may not even be possible, but it's worth looking into. If anyone has any ideas please share.

The chassis construction has begun with the construction of the wheel drops. They will allow us to climb over the barrier. We know the bridges make it easy but if there are already robots using them we don't want to be locked on to one side of the field and going over the barrier will be far faster. We should probably look into vibration dampening for our electrical system, after the initial test of a curb climbing robot last night. We built the sample barrier today and it's a really large climb and fall for the robot.

The programming team is getting up to speed with the new command and subsystem structure. This should make certain things really easy but there is still a learning curve we have to overcome. I think the beta test teams have a nice advantage because of this. We also have finished wiring most of the kit of parts electrical components with Anderson quick disconnects. This will make putting together the electrical system much easier in the coming weeks.

The logistics teams are hard at work. We are starting our Chairman's essay and ensuring that we are represented on many of the FIRST related sites like FIRSTwiki.net. We are also gathering initial scouting information from the teams that will be attending our regionals.

We're making a lot of progress but we quickly need to get the design ideas finalized so we can work on the detailed design of the robot. Tomorrow at 3:30, we will hold our 1st design review of the year. We'll go over each subsystem and discuss what has been accomplished, and where the design is headed. We'll also discuss different potential features and designs of the systems and their trade-offs.

- Allen Gregory

"The critical thing about the design process is to identify your scarcest resource. Despite what you may think, that very often is not money. For example, in a NASA moon shot, money is abundant but lightness is scarce; every ounce of weight requires tons of material below. On the design of a beach vacation home, the limitation may be your ocean-front footage. You have to make sure your whole team understands what scarce resource you're optimizing." - *Fred Brooks*

Build Day 5

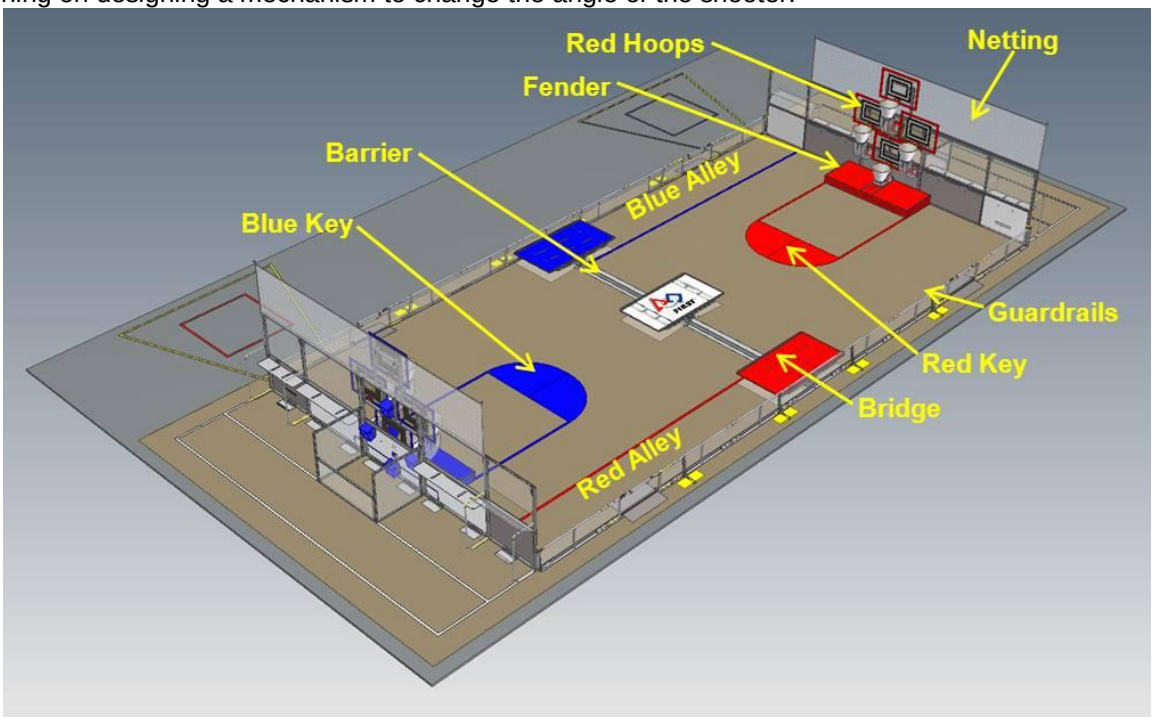
Wednesday, January 11, 2012

Design Review #1

Today was our first design review of the season. The goal of these meetings is to ensure that every member of the team knows the progress of the team and is able to give design suggestions and improvements. The meeting went long but I think most people got a better understanding of the whole robot concept.

The drive train will be similar to the chassis from last year, but with the wheels dropped slightly to allow us to climb the barrier. It was decided that the drive train needs to slow down to give us more torque for pushing and also increase the fine control of the chassis.

The shooter will be a pitching machine style shooter. It was determined that priority should be given to making shots from the key because that is where the autonomous shots will be and also the protected area. One wish-feature for the shooter is to be able to shoot from the opposite side of the barrier. We discussed various concepts such as rate of fire of the shooter and how you have to give most pitching style shooters time to regain the speed that's lost from shooting the ball. We are planning on designing a mechanism to change the angle of the shooter.



(taken from FRC 2012 Game Manual)

The collector and ball lift mechanism will allow us to raise the balls from the ground and load them into the shooting wheel. This is going to be one of the key features of the machine because if this jams we will be unable to score at all. We are hoping to have a ground-to-shooter time of under 2 seconds.

The bridge device will allow us to pull down the bridge so that we can climb on to it. We discussed the possibility of being able to lower the bridge from the raised position with another robot already on the bridge. We determined that this was a situation that wouldn't happen often enough for us to design for it. This device should also assist in preventing us from tipping over as we climb the barrier and bridges.

The controls team will be crucial in making our machine an efficient scorer. We are planning on having at least eight sensors on this robot, and there will probably be more.

The logistics teams are all working towards their goals of improving and spreading our team brand. Our Chairman's team is working on the first draft of the essay. Our ambassadors team is starting to prepare for our two regionals and will be reaching out to rookie teams to see how we can improve their season. Media is preparing ideas for various video releases and developing our website.

Today

The design review took up most of the day, but we were still able to test the shooter prototype and complete the prototype pieces for dropping the drive train. The shooter definitely still needs more work; we knew we would be going slowly but it was far too slow. We should be able to build a more realistic prototype of the shooter by the weekend.

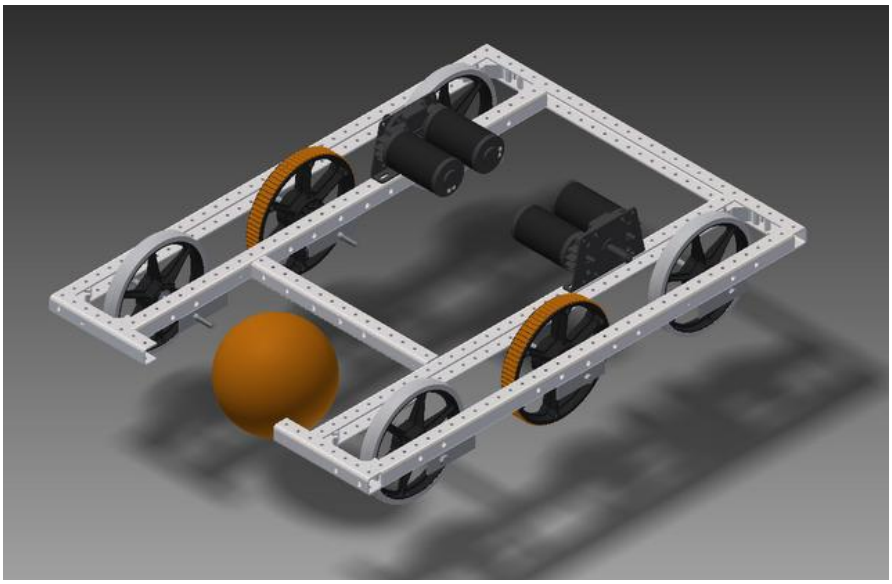
- Allen Gregory

Build Day 6

Thursday, January 12, 2012

We're getting closer to a final design. We have prototypes of most of the subsystems being worked on. The collector prototype was able to run today powered by a drill. We were able to easily suck up balls and roll them up a plank. The shooter prototype is waiting on parts to make a much faster shooter wheel. The bridge device is still in the designing phase but there has been a good amount of progress on that front.

Here is the current setup for our chassis and drive train; we should have the parts in this weekend to begin building the real version.



We're learning new things about the problems each day. For example we believe that if we shift most of our weight over the back two wheels of the robot we should be able to stay on the bridge even if are front wheels are hanging off the bridge. This will make it easier to balance and also possibly allow us to balance with 3 robots on the bridge if it comes to that.

The controls team is making a lot of progress for the FIRST week, it helps that we have an old chassis for us to test code. We've started getting feedback control working on the drive system so that we can electronically brake our wheels for shooting. We also have started thinking about automating the collector and the shooter intake mechanism.

We constructed a rim and backboard so we can start aiming with the camera as soon as it arrives this weekend.

We're approaching the point where we will be waiting for deliveries before we can make more progress. I'm trying to avoid this by ordering quickly but it doesn't always work out that way.

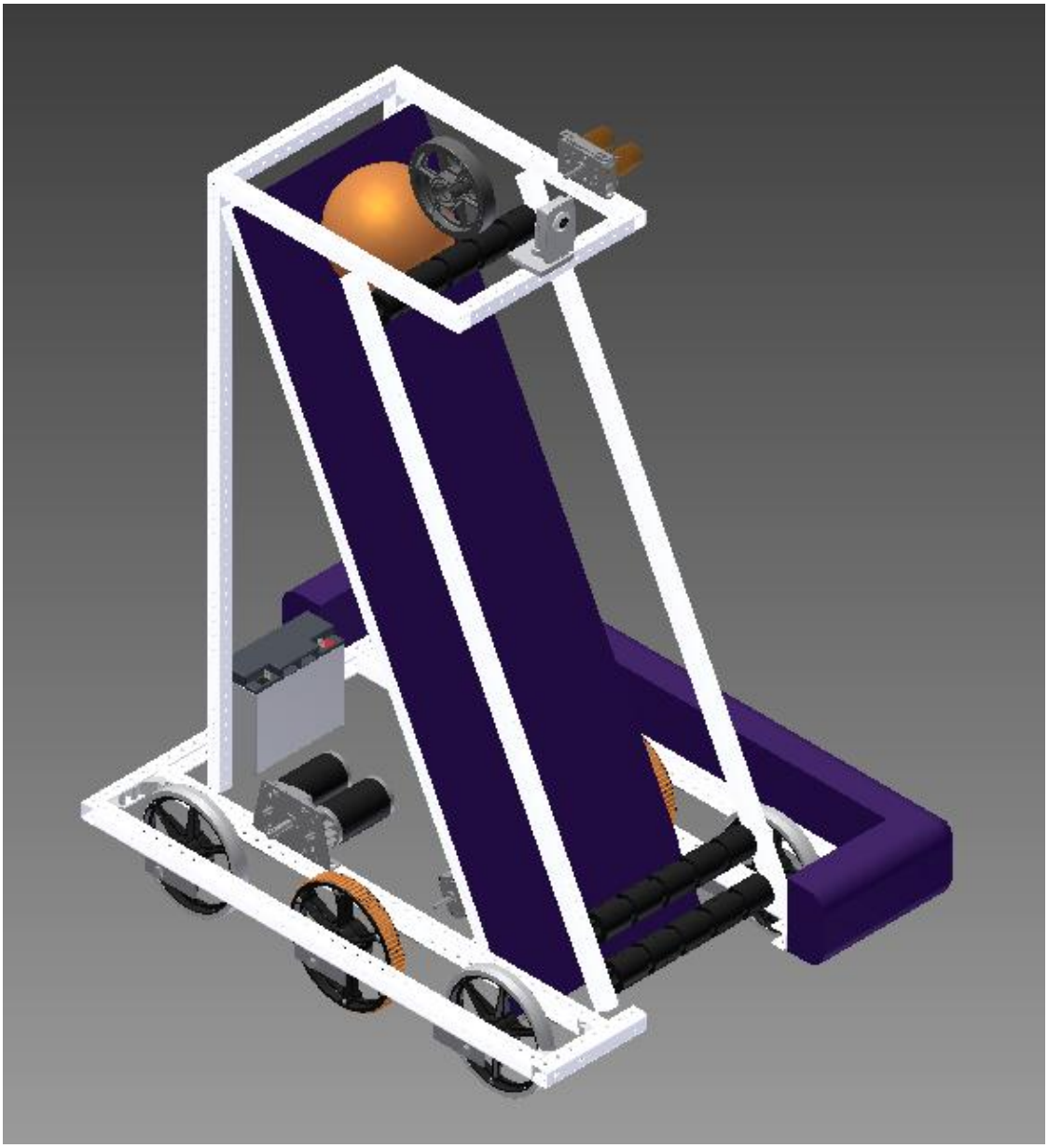
The first week has been smooth; no major problems yet. I'm hoping we can maintain these smooth operations once we start building the real robot.

- Allen Gregory

"It is common sense to take a method and try it. If it fails, admit it frankly and try another. But above all, try something." - Franklin D. Roosevelt

Build Day 7: End of Week 1

Friday, January 13, 2012



This is the mockup of our current design. A little explanation of the robot: the balls get spun up into the robot by the lowest black roller (the collector), then progress up into the elevator portion that will have belting wrapped around the two top rollers to lift the balls toward the shooter. The shooter and shooter hood haven't been CADed because we are waiting on prototypes to finish so we know how our design ideas will work.

A huge amount of work still has to go into this before it is ready to be built, but it's getting a lot closer. We're attempting to standardize as much of the robot as possible to allow for easy maintenance.

We were able to test three improvements to our prototype systems today all with promising results. We adjusted the shooter prototype to be spinning at just shy of 3,000 rpm. That gave us a good amount of velocity but we need to work on the shooter hood prototype so we can get the correct launch angles.

The ball collector had polycord bands and a second roller added to it, so we can test the elevator concept. We're hoping to be able to determine the ideal compression ratio for the ball before we start building the real robot.

The drive train had the wheel drops mounted and we tested going over the barrier but due to a failure in our chain puller we weren't able to finish. If anyone knows of a place to get a chain puller in Houston on a Saturday morning, please let me know.

The controls team was able to get back data from our IR range finder that we will use in several places to automate our collector. We're looking to get all our sensor drivers finished by the middle of next week so we can start writing the actual control code.

The two systems we haven't begun to prototype yet are the bridge device and ball deflector.

- Allen Gregory

"One of the greatest discoveries a person makes, one of their great surprises, is to find they can do what they were afraid they couldn't do." - Henry Ford

Build Day 8: Prototypes

Sunday, January 15, 2012

We tested several of our prototypes today. We're moving forward with the design and the tests all look to be going well. See our progress below.

Ball Elevator Prototype (Conveyor Belt and Ball Collector Testing 5)

The first system we tested this morning was the elevator. We made a prototype out of a hand drill, PVC, wood and 3/8" thread all. It made for a really good example of how the elevator on the real robot will lift ball up to the shooting device. With this setup, we should be able to test the proper amount of compression on the ball in the elevator.

Shooter Prototype (Second Edit of Shooter)

This is latest revision of our shooter prototype. It still needs a lot of work but we are getting closer to a real shooter. We need to increase the distance we can shoot and build the real version to be completely consistent.

Barrier Crossing (Barrier Cross Testing)

This is our most complete system. We designed wheel drops for our chassis from last year that allow it to climb over the barrier. It goes over relatively smoothly. This year's frame will be built using the same setup.

Rest of the Day

We made a lot of progress on the first day of Week 2.

- We cut and painted this year's frame.
- We started manufacturing motor mounts.
- We began developing the camera system.
- Construction on the bridge device prototype also commenced this afternoon.

- Allen Gregory

"Usage is like oxygen for ideas. You can never fully anticipate how an audience is going to react to something you've created until it's out there. That means every moment you're working on something without it being in the public it's actually dying, deprived of the oxygen of the real world." - *Matt Mullenweg*

Build Day 9: Rookie Build Day

Sunday, January 15, 2012

Rookie Build Day

For the first Sunday of the build season, we take a break from working on our robot to help other teams. We're at to the point where we are waiting on parts so it works out really well. FRC Team #57 The Leopards and #3103 Iron Plaid host a rookie build day that gives rookie teams a chance to get help from local veterans. The goal of the rookie build days is to get rookie teams as close to a driving chassis as possible. FRC has a pretty steep learning curve and this is a great way to try to make it a little nicer to new teams. We work on setting up the kit bot chassis and electrical systems and teaching some of the basic concepts that allow the teams to continue construction themselves.

One of the best parts of the rookie build day is getting to know the new members of our community. These teams will hopefully be around for a while and this is our first opportunity to work with them. The rookie teams also get contact information from the veterans so that they know that they have avenues for help.

Today's build day was pretty successful. I believe we got all of the teams set up with a chassis, drive train and a fully connected electrical panel. We weren't able to do as much with the control system as I would have liked, such as configuring radios, but that's something to remember for next year.

Spectrum's Next Step

This week we are going to get through as much of the robot construction as we can. The goal will be to have the chassis and drive train constructed and to have a working collector. We need to keep working on the shooter prototype until we can do this.

- Allen Gregory

"Good judgment comes from experience and experience comes from bad judgment" - Fred Brooks

Build Day 10

Monday, January 16, 2012

We put together the frame for this year's robot after we painted it on Saturday. We are starting to produce the real parts for the robot, like gussets, angle brackets; little things like that. It's hard to get precision measurements with the tools that we have in the shop (drill press, band saws, and a miter saw) but the team has figured out ways to get close.

We are continuing to change our shooter prototype; until we get it to 50ft we're not stopping. Hopefully, we'll have another test video tomorrow night.

The programming team is starting to work with the camera and our not-so-secret inertial measurement unit. Hopefully, we'll be able to release drivers and walk-throughs for the IMU before the end of build season. Until then, if you're interested all our code is posted at http://code.google.com/p/spectrum3847/.

We're moving forward as much as we can until parts arrive which should be late Tuesday night. We'll have them for Wednesday's build session. We're waiting on the roller materials, wheels, motors, key stock, and a whole bunch of other parts.

Tomorrow we are going to do a really quick design review to make sure the whole team is up to date with any changes in the design and to see if we can come up with any design improvements.

We still have a few questions to answer.

- Will the small (sub 11 inch) collector opening be enough for the driver to gather balls?
- How do we actually get the shooter to be able to shoot across the length of the court?
- Will the Banebots 775 have case shorts like they did last year (we will make polycarbonate mounts for them either way)?
- How are we going to practice balancing without a bridge? / How do we fit a bridge in our work space?
- How much of a problem will running over the balls be?
- How accurate can we get our shooter?

- Allen Gregory

"Any intelligent fool can make things bigger, more complex, and more violent. It takes a touch of genius -- and a lot of courage -- to move in the opposite direction." - Einstein

Build Day 11: Only 35 days left

Tuesday, January 17, 2012

I knew today was going to be light because all our parts are coming in tomorrow. Our main focus was working on the shooter prototype. The last time we tested, we were only getting about 8ft or so. Today was a drastic improvement we were able to shoot about 25ft from a very long starting height and an imperfect angle. I'll try to get video linked from today but it hasn't been uploaded yet. We still have a ways to go to before we can design the real thing.

We continued to manufacture a few of the parts we know will be on the robot, and we also painted more stuff before we start assembly. We began bumper construction today; this year's design is going to have two C shaped bumpers so they should be quick and easy to swap.

We're working on the camera code in Java and it looks like this is giving everyone headaches. Normally if they release a library for one environment, they release it for all of them; but this year only LabVIEW has the nice pre-packed rectangle tracking code. Hopefully, they'll be a library update in the near future. In the meantime, we are still getting used to the new command and subsystem structure that was implemented this year. It's a great improvement but it still seems to have its bugs, or perhaps just nuances.

Tomorrow we start roller construction and we get our 0673 FisherPrice motors and CIM-sim for the shooter.

We're pushing for a week 4 robot if we can get it. The design of the shooter assembly still needs to be finished but I think we have all the parts we will need for that no matter what we design.

Question for anyone reading, what would be the easiest way to ream a 1" hole to 1.125" for a bearing seat in the end of a plastic tube without a mill or lathe? It doesn't need to be a perfect press fit.

Also in case anyone is wondering I haven't posted new CAD shots because the design hasn't changed much since the last one, we've added a few brackets here and there but we're sticking with the previous design for the most part.

- Allen Gregory

"Everything is practice." - Pelé

Day 12: Parts arrive

Wednesday, January 18, 2012

All of our parts orders came in today. Some of the items we ordered in small quantities to see if they would fit our needs. Nothing was drastically different from what we thought, so we're full steam ahead with our design.

The shooter prototype switched from the kit HiGrip wheels, which were eating up the ball (Build Tip: don't shoot with those wheels) to 8in Kit wheels (2011 kit). The new wheels made for a much smoother release and in turn upped our distance by 10+ft. This was still shooting with a CIM 1:1 with the wheel. We are transitioning to using the CIM-sim and two FisherPrice 0673s that we got in our orders today but we are having some problems with the gearbox. Namely, if you face mount it you have to be extremely careful with the length of the bolts that you use. If you are not, then the bolts will press into the center gear and bind the transmission. We'll change the mounting tomorrow and see how far we shoot.

The collector construction started today, we received the ABS pipe that we are using for the rollers; it much easier to machine and isn't as brittle as PVC. We also received the conveyor material that we are going to wrap around the rollers. We still have to work out some of the mounting and getting the bearing to sit into the roller without the use of a lathe (I think it's going to be a Dremel job - you make do with what you have).

Brackets and other random pieces are getting cut and we need to get the drive train on the ground soon. Hopefully, by this weekend. We have all the parts just need to do a bit more machining.

We hope to have some more videos to post soon.

- Allen Gregory

"That's been one of my mantras — focus and simplicity. Simple can be harder than complex: You have to work hard to get your thinking clean to make it simple. But it's worth it in the end because once you get there, you can move mountains." - Steve Jobs 1998

Build Day 13: Busy Day (not just with the robot)

Thursday, January 19, 2012

Our build session started off with a presentation by the founders of BlueStampEngineering. They are bringing a summer engineering program to Houston and we thought it would be good for our members to hear about it and speak with a couple of professional engineers. This also gave us a chance to show off our projects as they walked around observing after the presentation.

One of our main goals for today was to finish editing our rookie guide: Spectrum Illuminations 2012. It should hopefully answer a lot of the questions that we received during the Rookie Build Day last weekend. Thank you to everyone that helped develop it; it looks great.

The robot continued to progress as well. We outfitted the shooter prototype with two of the 0673 FisherPrice motors, this gives us about twice the power of one CIM, and we should be able to change the gear ratio to get us a higher RPM and a longer range.

The collector is progressing along, we were able to seat the bearing, and we're working on mounting the conveyor tread to the initial roller. Once we finish, we'll make 2 more and be ready to go for assembly.
Here are pictures of the initial roller:

Our programming team is still going through some bugs in WPILIB. Getting sensor drivers working is becoming a challenge, but that's part of trying something new. If we get everything working it will all be worth the effort.

This weekend we should be able to have the drive train and collector assembly nearly finished. We still need to play around with the shooter design until we settle on something that works the best.

Overall, a pretty good day of build, but this weekend's progress may determine our season.

- Allen Gregory

"Sometimes the problem has to mature before the solution can mature." - Kent Beck

Build Day 14

Friday, January 20, 2012

We started off the day discussing the Chairman's Award Submission. We want to get this going as early as possible so we have time to refine it before the submission deadline (02/16/12 at Noon EST). We're making good progress. The biggest part of the early work on the Chairman's Team is deciding how we want to present ourselves to the judges.

We upped the speed of the shooter prototype after switching to the CIM-sim. It's now spinning the 8in wheels at roughly 5500RPM and it shoots to 37ft with little to no launch angle. The plan is to do more detailed tests tomorrow afternoon.

The collector rollers are coming along. We should be able to have all three nearly complete this weekend.

The drive train brackets and all of those pieces were mostly finished today, so we have everything laid out to assemble

the drive train tomorrow.

The controls groups are still working to debug some issues with the low-level digital module support in Java. We think if we use a second digital sidecar it may work, we're not entirely sure why that is, but if it works, it works. Getting SPI to function is becoming much more of a challenge than first thought.

We made good progress today, but we need to do more this weekend if we want to stay on schedule.

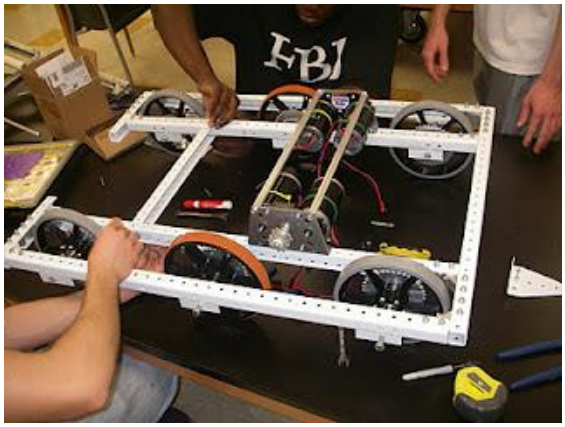
- Allen Gregory

"We are in the people business. It doesn't matter if you're in the banking business, you have customers, you're in the people business, and it's how you treat people." - Nolan Ryan

Build Day 15: Robot Is Coming Together

Saturday, January 21, 2012

The robot progressed really far today. We have most of the drive train finished, minus a few chain runs. The brackets and gussets were all finished and painted and we began riveting them together. The upper collector posts are nearly finished as well.



We finally went to the gym to do some real test shots, from about 2ft off the ground we are shooting 48ft. The shooter was pretty consistent seeing as it wasn't a rigid frame and we had people holding the angle.

The collector rollers are progressing once we get the upper frame bars we should be able to test the first one with a real setup.

The plan was to use 775s for the collector and elevator but a lot of people are still having problems with them. We may be using 550s in the CIM-U-LATORs instead. It would have been nice to decide that before we ordered the 775s, luckily we ordered just one.

We have some work to do to stiffen up the frame; we forgot how not rigid the kit chassis is, especially when you cut out a section of the front.

They released the sample Java vision tracking code today, which makes life a lot easier for the controls team. We are still having some trouble with undocumented sections of the API but we will work through them.

- Allen Gregory

"Believe it or not, it is not only possible to accomplish more by doing less, it is mandatory. Enter the world of elimination." ~ Timothy Ferriss

Build Day 16: Waiting on Paint to Dry

Sunday, January 22, 2012

We finished constructing most of the upper poles today and got them painted. A lot of the day was waiting for the paint to dry. Tomorrow we can rivet together the brackets that will hold up the bars for the collector and elevator.

The camera is coming along; we fixed some issues with the mount. The java library upgrade from yesterday helped a lot.

We finished dremeling the bearing seats for the rollers. They look pretty good. The conveyor tread that we have should suck up the balls with no problems.

This week we should get the final parts in for the initial construction phase and we should be mostly assembled by next weekend. If we can wire everything over the weekend, we should have a shooting robot next week. Then 3 weeks of making lots of improvements and getting the code working. I honestly believe that this is the first game since '06 where programming can make or break a team.

Today was the first time that we looked at the website as a team. It's off to a really good start. Still needs lots of improvement but the base is setup so we can add on to it as we go.

- Allen Gregory

"Excellence is the gradual result of always striving to do better." - Pat Riley

Build Day 17: Starting to look like a Robot

Monday, January 23, 2012

We are still waiting on some parts, but the main functions of the robot are coming together. The elevator should be completed by the end of the week. The upper bars were painted today and should be attached tomorrow. Lots of riveting over the next few days.

The electronics layout will happen tomorrow, and we should be able to test the elevator as well.

We made the stencil for the bumpers and it looks really good. We just need to get fabric and we should be able to make our first set of bumpers this week.

There are still a lot of little things to be done, including entire subsystems like the bridge device.

- Allen Gregory

"Doing something and getting it wrong is at least ten times more productive than doing nothing."
- Marc OBrien

Build Day 18

Tuesday, January 24, 2012

More assembly today. We made the Lexan back panel for our collector and elevator. We're using 1/16" Lexan because it's able to easily curve to the angles that we need for the shooter and the elevator.

We also started working on our shooter compression bar. It will enable us to rotate the bar around the shooter wheels to change the angle of our shots. This is the part of the robot that will probably have the most changes to it. We want to get to fully shooting so we can make adjustments as we go. Many aspects of the robot are designed to be easily adjustable.

The base plate was cut today that will both stiffen up the frame and also give us a plate to mount a portion of our electronics. Speaking of electronics, the electronics layout was designed today. We did it the old fashion way with paper and cardboard cutout of all the parts. It's easier to move parts around with paper templates than in CAD; it's also easier to discuss the various problems and work through them as a group. We're also looking into various vibration dampening techniques to avoid damaging anything as we traverse the barrier.

We're also getting better at painting the robot, by the end of the season most of the team will be spray painting professionals.

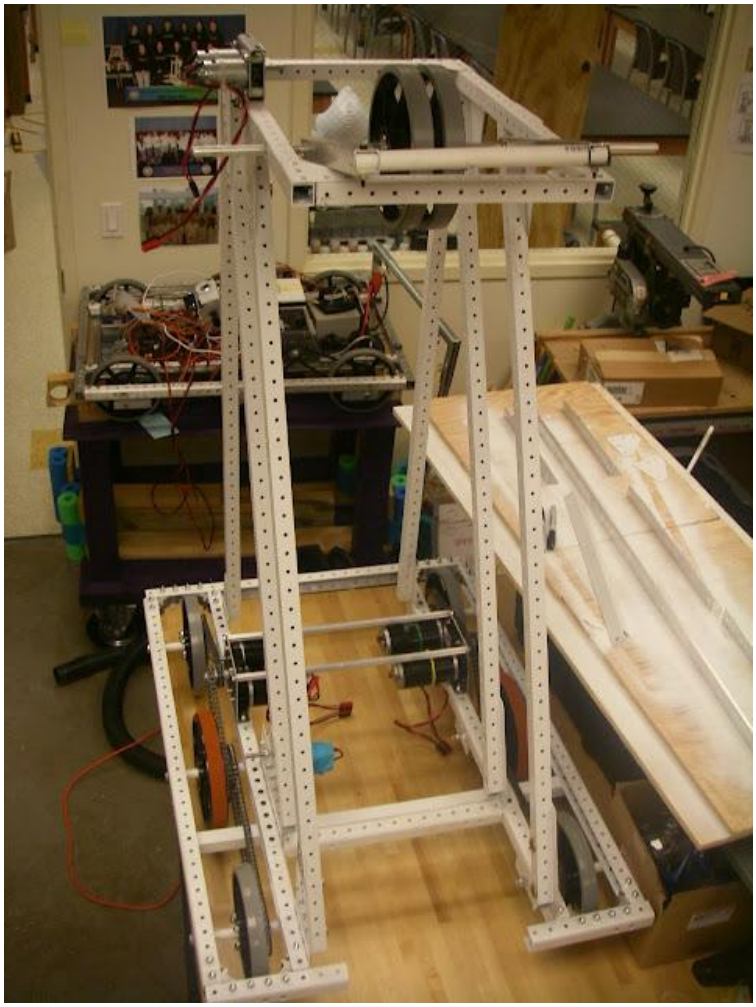
We're still on pace for a week 4 robot and then lots of testing, breaking, tweaking and improving.

- Allen Gregory

"Limits, like fears, are often just an illusion" – M. Jordan

Build Day 19: 4 Weeks Left 'til Tools Down

Wednesday, January 25, 2012



We made a huge amount of progress today because the final shipment of mechanical parts arrived.

We were able to mount the upper bars that support the shooter assembly and we made the first version of the shooter hood. The shooter motor was also attached today.

We finished the construction of the rollers and the initial polycord bands as well. Tomorrow we should be able to attach everything and test the collector/elevator. The Lexan panel for the back of the collector still needs a bit of work to make it hold the curves that we want, but that shouldn't take too much time tomorrow.

We also examined our 775 motor for a case short today and it checked out okay. The motor is insulated from the frame, a nice feature of all the spray paint. However, we may still move it to a Lexan mount just in case. After reading enough about the motors on ChiefDelphi, it seems that a lot of teams have had problems but a lot of others have used them without fail. They make our design far easier to implement because of their lower RPM compared to 550s. (read more about the problem here)

Middle of next week we should be driving and shooting. (fingers crossed)

- Allen Gregory

"I do not think much of a man who is not wiser today than he was yesterday." - Abraham Lincoln

Build Day 20: Collector/Elevator Is Coming Together

Thursday, January 26, 2012

The collector is now mounted on the robot; we had to mount it twice to fix some issues but that's why we are moving so quickly so we can catch our mistakes early. We were able to test the upper section with a drill and move the balls up and down without issue. We will try to get chain and motors driving the collector and elevator sections tomorrow.

The majority of focus will turn to the shooter tomorrow. Once we have the elevator working we want to know how it's going to interact with the shooter. We've built the robot to allow for several different variations of the shooter.

We weighted ourselves tonight.

We're going to be really light, we don't have anywhere near 60lbs to add to the robot. We only need the electronics, a couple motors, and the bridge device. We might hit 100lb if we're lucky. Because of the balancing portion of this game, it makes sense to be closer to the max weight. That way you can balance with other heavy robots. It will also give you more traction (increased normal force). We may be adding steel plates to the bottom of the robot to increase weight and move our center of gravity even lower than it already is.

Speaking of balancing…

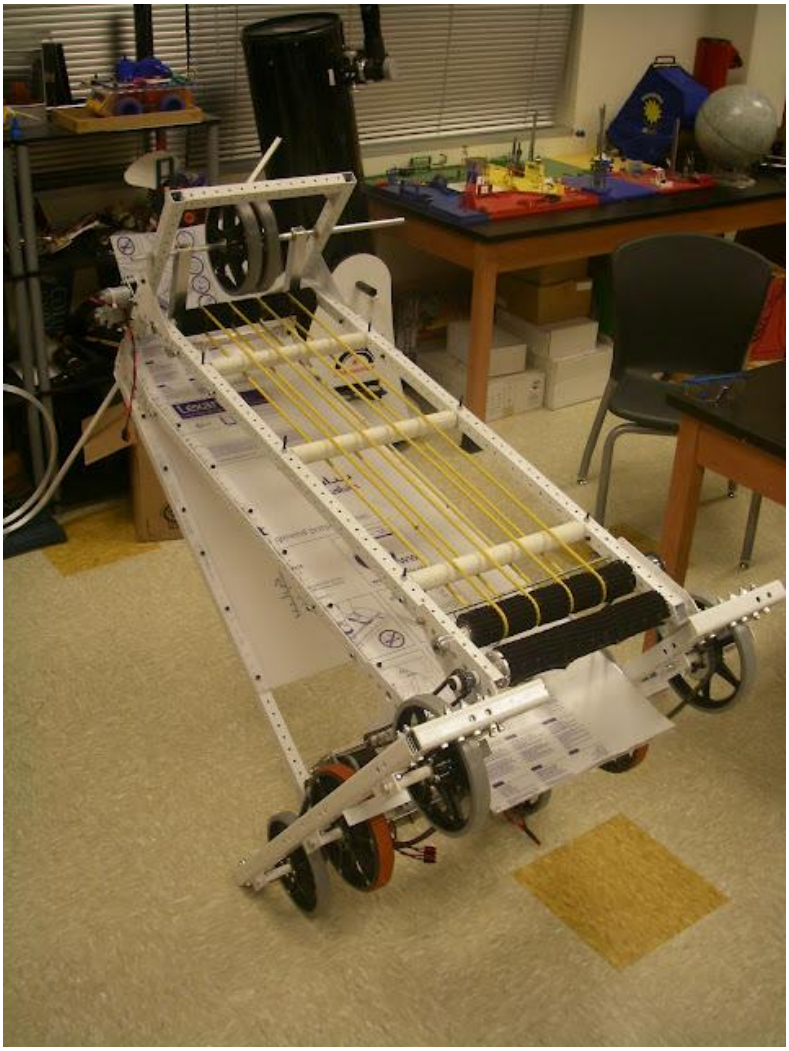
That's without the battery and electronics in the back of the robot. We should be able to easily hang the front wheels of the bridge to get three robots on.

- Allen Gregory

"Most people spend more time and energy going around problems than in trying to solve them." - Henry Ford

Build Day 21

Friday, January 27, 2012



We were able to power the collector today with motors. The tests were promising but also pointed out a couple places that we need to fix things, such as how the polycord is guided.

The picture shows that we aren't easily tipped (it's balancing on the rear frame and the rear wheels), the robot has to get well past 45 degrees before it starts to tip back by itself. The center of gravity will change a bit after we add the electronics and the battery; the bumpers will change things as well.

We began work on the window motor mount and the cam that will adjust our shooter compression bar for varying angles. That should be finished tomorrow.

We also should mount the shooter wheels, sprockets and get it to a firing state by tomorrow night.

The plan is to have the robot wired up on Monday night.

- Allen Gregory

"Aren't you oversimplifying this?
Yes. That's the whole point." - *Steve Krug*

Build Day 22: Start of Week 4

Saturday, January 28, 2012

It seems like forever a go we were watching the kickoff presentation but it's already nearing the half-way point of the build season.

We did most of the electrical layout today. Tomorrow we will make all the wires for the robot. We will have to wait on a shipment of Jaguars that should arrive Monday before we can have the robot driving. We will also work on sensor mounts tomorrow.

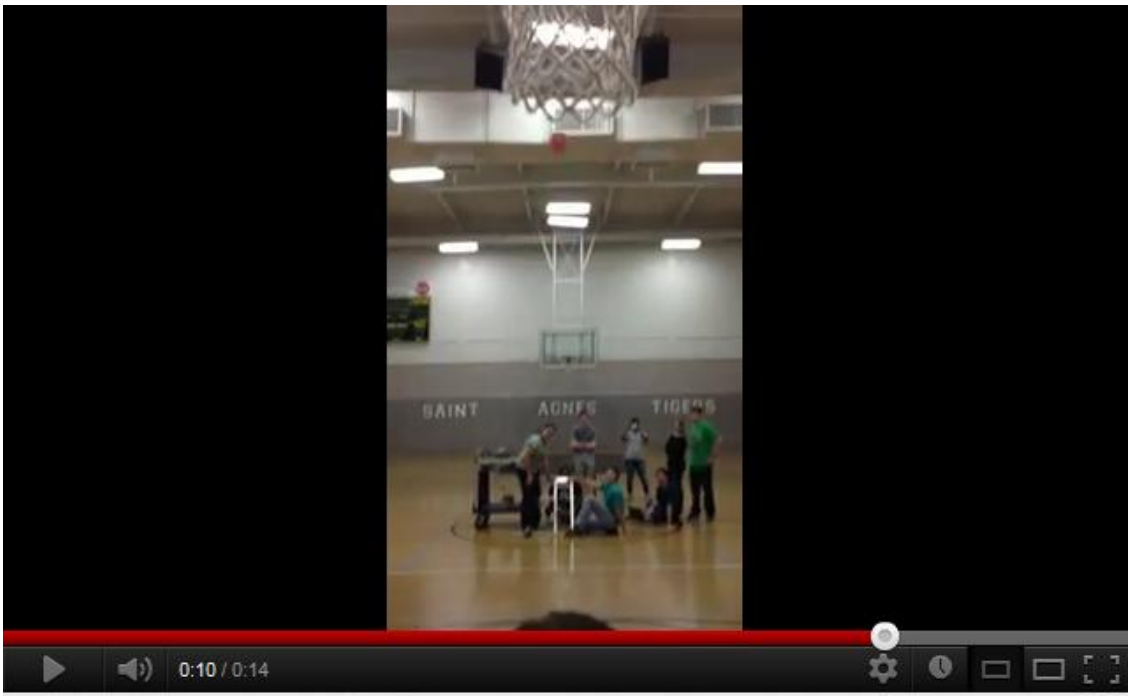
We connected the shooter to its motor and made more progress on the shooter tilt/launch bar subsystem (we don't have a good name for this yet).

We started building the support for the sidewalls of our collector; we have to make sure the ball is funneled into the shooter at the same point each time we shoot.

The base piece and some parts for the bumpers were painted. We will have to do touch up work towards the end of the build season but having the parts mostly painted before assembly is going to make it much easier to make our robot look professional.

Here are some of test shots from last weekend, keep an eye on this channel for more video updates.

Test Shooting (Shooter Video #5)



- Allen Gregory

"Diligence is the mother of good luck" - Benjamin Franklin

Build Day 24

Monday, January 30, 2012

It was a short day. Monday's seem shorter than most for some reason.

Even though we don't have the jaguars yet, we crimped all the ring terminals for the Jaguars today. The screw terminals on the jaguars should be replaced by WAGO connectors so we can get rid of our normal crimp tool. Those crimps never seem as strong as the Anderson connector crimps.

More work was done on the different brackets that will be on the robot. The mounting plates for the camera, signal light, and radio all began construction and will need to be painted tomorrow.

The base plate was mounted on to the robot and we made holes for zip ties so our wires can be nice and organized. Organized wires make the robot look so much nicer and make maintenance a breeze.

The programming team is getting ready to start ramping up there development cycles since they will be able to test with the real thing.

By the weekend, we should be fully functional and testing. The mechanical team will begin making the spare/practice parts for the robot.

A quick rundown of our motor setup:
Drive = 4x CIM motors through CIMple boxes with 12:36 gearing we will be around 11fps
Collector = 1x Banebots 550 though P60 16:1 possibly geared up to drive the roller faster
Elevator = 1x Banebots 550 through P60 16:1 possibly geared down for more torque
Shooter = 2 x Fisher Price 0673 in a CIM-sim, geared a little above 1:1 depending on the max distance we want to shoot
Shooter Tilt = 1 x Kit Window Motor
Bridge Device = 1 x Either a AndyMark PG71 or Van Door Motor either way geared down for more torque

That puts us at 10 motors total, 9 will be running off Jaguars and the Bridge device will be on a spike. We also have sensor feedback for each motor. There is not an open loop system on our robot.

This game is going to come down to practice and programming.

- Allen Gregory

"Designing a product is keeping five thousand things in your brain and fitting them all together in new and different ways to get what you want. And every day you discover something new that is a new problem or a new opportunity to fit these things together a little differently.
And it's that process that is the magic."
- Steve Jobs

Build Day 25: Three Weeks to Go

Tuesday, January 31, 2012

We're through the half-way point now, so we can begin counting down to end of build. 21 Days to go.

We finished wiring the Jaguars to the power distribution board and we are working on getting all of our sensors mounted as well.

Our electrical team is doing a great job of keeping all the wires nice and tidy. We also have everything setup to allow for quick changes if we do lose a Jaguar along the way. The power switch is inverted so you can get to it easily from the outside.

The rest of the electrical should go together with in the next couple of days and we should be able to do manual tests of all the systems by the end of the week. Then we have to do all the integration of the control systems and start tuning the control loops for each system.

We're still missing a bridge device, but we worked out a solution at the end of today that should have us building it tomorrow.

We're still finishing up all the little things that make the robot actually function but we're in the home stretch.

- Allen Gregory

"In theory there is no difference between theory and practice. In practice there is." - Yogi Berra

Build Day 26: Starting to Build Spares

Wednesday, February 1, 2012

We aren't finished with our robot yet, but we began the process of building the practice robot parts today. We know certain systems won't change drastically so we are beginning to manufacture the spare parts that we will use on our practice robot.

The focus for the main robot is now on the controls team, both programming and electrical. The electrical components will get finished tomorrow or Friday, we ran out of wire and have to get more but we will have it tomorrow. The controls team is working through vision problems and we are now considering off-loading the vision processing to a separate computer on the robot. The most likely candidate is a beagleboard-xm running OpenCV. It's a far more powerful computer than the cRIO that controls the robot and will have no problem doing vision processing at fast enough frame rates for our aiming. However, this adds another system that we have to program and another thing that could break on the robot.

The mechanical team is also working on designing some of the bodywork for the robot, to cover the shooter and other chain runs. It's also nice to have smooth surfaces for our logos and sponsors.

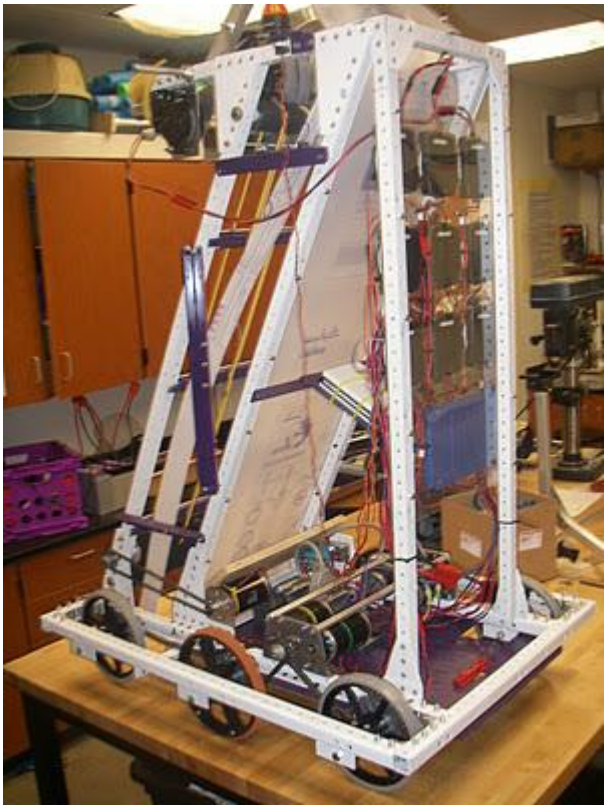
The bridge device started its construction process today – it's sort of a guess and check design. We know the motor setup will work but since we still don't have a bridge we can't test the actual device; this is something that may have several iterations before we find one that works as well as we require.

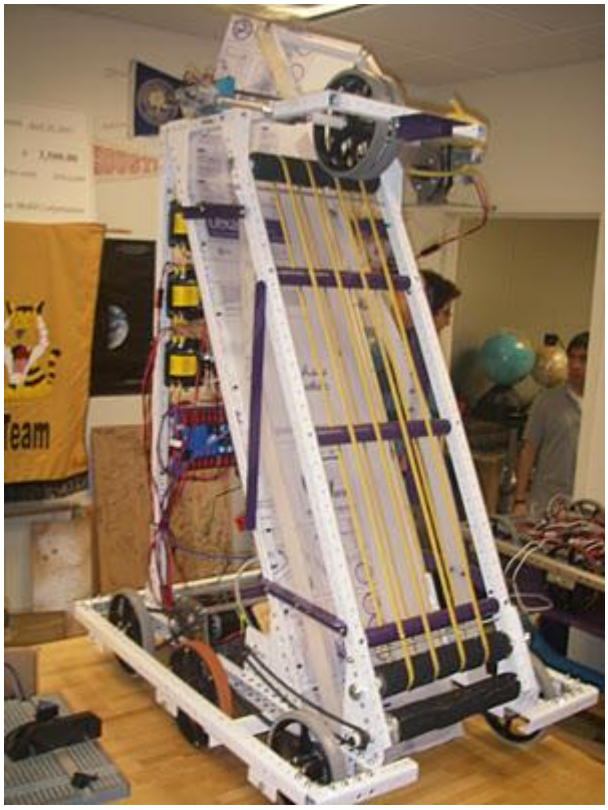
- Allen Gregory

"Teamwork is the ability to work together toward a common vision. The ability to direct individual accomplishments toward organizational objectives. It is the fuel that allows common people to attain uncommon results. " - Andrew Carnegie

Build Day 27: It Works

Thursday, February 2, 2012





We mounted the electrical panels and wired up the robot today. It still needs some wire care to make sure all the wires are tucked away nicely and won't cause us problems later. But, for now we got it working. The collector feeds the balls up to the shooter and it's able to fire them. We aren't able to do real distance shots until the weekend because we don't have a tall enough ceiling in the classroom. All the current systems on the robot check out under manual control. We have a lot of automation to put on this thing before it will work perfectly.

We also continued work on our bridge device that will be mounted to the back of the robot. Hopefully, we will have it on tomorrow.

We still are working on the bumpers – they always seem to take longer than they should. Does anyone have a good source for 1000 Denier Cordura in the Houston area?

We've also began the duplication process for this robot. Most of the parts we have CADed, so it's easy to make our replicas. They are going very quickly because we aren't really worried about them looking nice just as long as they function.

Programming has decided that the use of an off board processor will make our vision system much more reliable. The current plan is to use a Beaglebone running openCV to process the images from the camera and then send back the aiming information to cRIO.

- Allen Gregory

"Gentlemen, we are going to relentlessly chase perfection, knowing full well we will not catch it, because nothing is perfect. But we are going to relentlessly chase it, because in the process we will catch excellence. I am not remotely interested in just being good." - V. Lombardi

Build Day 28: Making Free Throws

Friday, February 3, 2012

We had the robot out at the gym making free throws tonight; we'll post video this weekend. The automation isn't there yet. We were allowing everyone to attempt shots in a very open loop control mode but we made about 4 of the 40 free throws. The shooter was actually pretty consistent with it's in-line accuracy, we just weren't controlling speed and angle consistently. We need to make a manual control scheme that is able to set wheel speed more accurately and see how precise it is. The shooter angle adjuster was working very well for such a simple device. We also think we hit the thermal cutoff on the Fisher Price motors once during our testing. We're going to need to deal with the heat that these guys generate running at a constant high speed.

We did notice a few minor collector bugs but nothing that isn't fixable in the next few weeks. The variation in the balls is even a challenge on our collector; some of them compress far easier than others and that was causing a bit of jamming. We also had one of our polycord bands hop out of its groove but it's only when we reverse the collector. One of our treads was made a bit off center so it allows it to climb out. This should be easily resolved as well.

The drive base is having a few issues because our weight is distributed to far back in our robot. It's extremely low so we won't tip even going over the barrier but turning is a bit bumpy even with the six wheel drive configuration. We should have enough leftover weight that we can play with our CG so we'll get the feel that we are looking for.

We made more progress on our bridge device but because the Van Door Motor uses metric bolts, we weren't able to mount it tonight.

Today was also our Chairman's review day. We have 13 days until the award submissions are due and this being our second year it's the first year we get to do an actual Chairman's submission. The Chairman's submission is interesting because you have to decide which parts of your team to highlight.

Everything is looking good for 16 days of practice, programming, and iteration with our competition robot. "Perfect practice make perfect", so we are going to need to get access to a field somewhere in the Houston area so we can try this thing out on an actual court.

- Allen Gregory
www.spectrum3847.org

"If you're not making mistakes, then you're not doing anything. I'm positive that a doer makes mistakes."
- John Wooden

Build Day 29: Tweaking Everything

Saturday, February 4, 2012

We worked through the list of improvements that we saw from last night's testing. We moved the polycord guides and that seemed to fix the jamming problem. We also riveted the guide rails and that made the shooter more accurate. We mounted the bridge device motor but not the device itself; that will come this week. The shooter hood needs to be refined to allow for more consistent shooting. We are planning to spring the hood forward so that the slack of the mount is taken up by the surgical tubing or other spring system.

We think the overheating issue with the Fisher Price motors is due to the CIM-sim blocking the air intake of the motors. We have a couple solutions in mind and we'll make those changes when we make a few other shooter improvements on Monday.

We mounted the camera to the front of the robot mostly just to make sure the mount will be sturdy enough with all the vibrations and impacts. We also mounted more of our sensors today. The potentiometers form Digi-Key came in last night so we made the mount for that so it can measure the angle of the shooter compression bar. We also mounted our IR range finders in the elevator (these will let us know where the ball is on the elevator). We are using them in a similar way to line break sensors but they provide a bit more feedback because you can actually detect the curvature of the ball.

We also tested our robot on carpet for the first time. It drives better than it does on the gym floor but it's still not very good; we have to adjust our center of gravity to make our pivoting much smoother. We also did barrier testing for the first time on carpet and with the shooter on. The robot climbs the barrier without any issues. It was a little scary the first few times but the robot really doesn't want to tip. In fact, if we go at a little higher speed the front wheels hit and the robot ends up driving on its back wheels until they hit the barrier. Completely skipping the middle wheels, that wasn't the design but it seems to work.

We also tested ball collection and driving over balls. Collection seems to work well but we have a problem driving over balls. We haven't tested with bumpers but we may change our bumper to design to take advantage of this handy rule clarification by the GDC (http://www.chiefdelphi.com/forums/showthread.php?t=100575).
Bumpers at varied heights could help with several aspects of the competition.

Here is a quick preview of the robot in action, more will follow.

FRC#3847: Bank Shot + Barrier from Spectrum 3847 on Vimeo.

- Allen Gregory

"I don't know if I practiced more than anybody, but I sure practiced enough. I still wonder if somebody -- somewhere -- was practicing more than me." - Larry Bird

Build Day 31: Making It Better

Monday, February 6, 2012

We were off yesterday for the super bowl and the second rookie build day in Houston. We had a smaller turnout but we were able to provide a lot of information and demo our robot.

Today we started on the long list of improvements we made during Saturday's testing. We have to get the shooter mechanically consistent before we can expect the controls team to make accurate shots. We're making small changes such as insuring that the ball aligns properly to the shooter wheels and modifying the spacing of the shooter wheels. We also rebuilt the shooter CIM-sim gearbox to make sure that there are no metal shaving on the gears and to fix the airflow issue with the Fisher Price motors.

We also are working on integrating all of the sensors that are on this robot. There are sensors for every motor and as of right now, none of the programs have been tested yet. Some of them are simple and should work right away; others are more complex and will require a huge amount of testing and tweaking.

We also are cleaning up some of the electrical system. We're making custom PWM cables for each Jaguar so there isn't too much excess wire that we have to hide. We're doing the same with all the sensor wires.

- Allen Gregory

"Mistakes are the best way to learn. Don't be afraid to make them. Try not to repeat the same ones too often." - Leo Babauta

Build Day 32: Fixing More Stuff

Tuesday, February 7, 2012

We were still in the fixing stage today but tomorrow we should be ready to test our changes.

Today we finished putting the shooter back together but we're still working out the hood design to solve the problems that we noticed over the weekend. We also spring loaded our shooter bar so that the play, which is inherent in the motor, is taken out by the spring. This way our shots are more consistent. We also fixed the problem of the polycord coming out of its groove by fixing the one misaligned tread.

We were also working on sensor mounting; the potentiometer mount that we worked out was not keeping accurate angles so we moved to a much more secure mount. Getting accurate angle readings will be crucial to making accurate automated shots. We also mounted the limit switches for our bridge device so we can easily move it up and down without problems.

We successfully tested the IR range sensors that will be controlling our collector and elevator. We are now able to get accurate distance measurements from them and stop the collector when the ball is at the sensor. We still need to test the algorithms that will keep us from jamming and will keep track of how many balls are in the collector.

We're also working on the practice robot and we are much closer to being able to assemble it.

- Allen Gregory

"Everyone you meet is better than you at something." - David Cain

Build Day 33: Testing the "Fixes"

Wednesday, February 8, 2012

Our fixes didn't exactly work out as planned. Our max range decreased and our accuracy was worse but this is why we test early so we know what works and what doesn't. We found out that how we guide the ball into the shooter is far more important to consistency and velocity than we had thought. We will begin building a redesigned hood to feed the ball to our compression bar tomorrow.

We actually did some outdoor testing in the courtyard today because our normal room was being used for another event. We took out our middle height goal and were able to shoot into it for the first time. Even our close range consistency is having problems.

We spent a lot of time working on the PID control for the Shooter velocity and for the angle control of the hood, both of which are making progress. Getting all of the code functional is becoming a higher priority as the build deadline approaches. We're still behind on the vision processing and several of the other programming features.

We also began making the motor mounts for the Banebots P60 Gearboxes that will be running our collector and our elevator. We have been using a 775 with a CIM-U-LATOR and a CIM Motor but those will finally be changed once we get our latest Banebots order.

- Allen Gregory

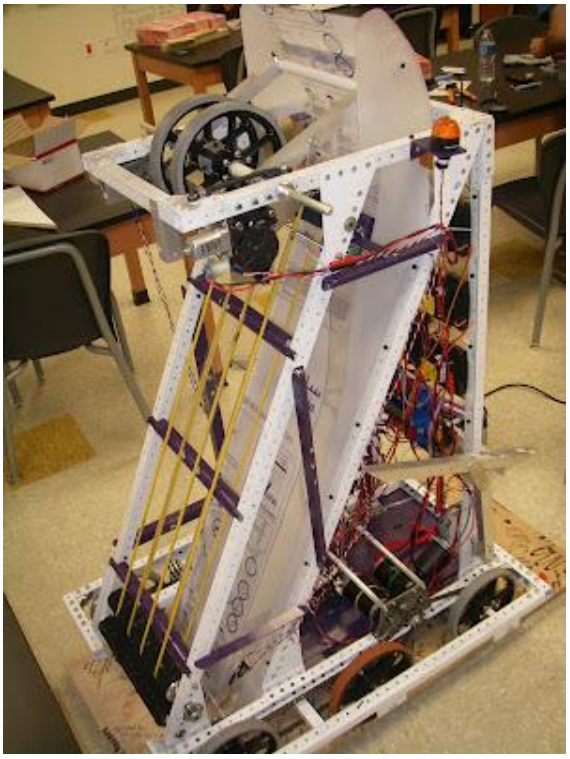
"Slow down and remember this: Most things make no difference. Being busy is a form of mental laziness—lazy thinking and indiscriminate action." - *Timothy Ferriss*

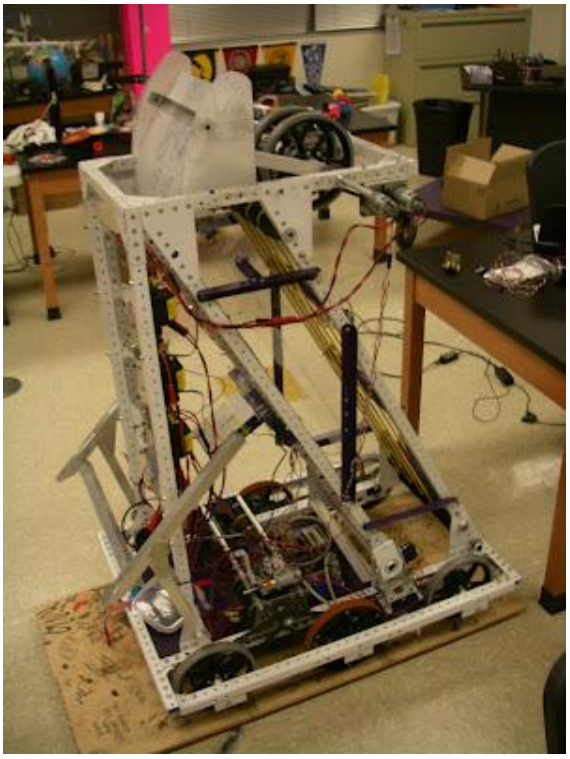
Build Day 34: Banebots Came In

Thursday, February 9, 2012

We got our shipment of Banebots motors and gearboxes today: 5 x P60 16:1 Gearboxes and 4 x 550 motors. This will give us plenty of spares for the two that we plan on using to run our collector and elevator. We finished making the mounts for them as well but we don't have them mounted because we are planning to change out the polycord that we have been testing with and mounting them would get in the way.

We also made the new and improved shooter hood. This one looks a lot better; we'll have to wait and see if it makes any drastic improvements to the hood. Below, you can see the new hood and bridge device on the robot.





We did more code testing. We are getting good signals back from the shooter wheel velocity and the angle of the hood. We need to do some tuning but those look like they will be working well. We also have valid data back from our IR sensors along the collector/elevator.

We weighed the robot tonight and we are at a very happy 96.65lbs. After bodywork (side panels and things), we should be right at 105-110 that give us 10lbs of weight to pull our CG a little more forward on the robot to help improve its turning characteristics. We have a 3/8" thick plate of aluminum that was donated to us by Trident Metal. It should be easy enough for us to machine to fit where we need the weight.

Here is a quick video of us testing the short range of robot yesterday.

3 in a Row from Spectrum 3847 on Vimeo.

- Allen Gregory

"Hard work is the price we must pay for success. I think you can accomplish anything if you're willing to pay the price." - Vince Lombardi

Build Day 35: More Progress

Friday, February 10, 2012

We did a lot to the robot today. We made new polycord belts to replace the yellow ones that we previously had. The new ones are clear. We mounted the new collector and elevator motors and they are working perfectly. The new mount is much more stable; we were even able to briefly test the sensor feedback on the collection system, and it's looking good.

We are continuing to make spare parts for the practice robot and we should be able to start assembly this weekend.

We also worked out some issues with the shooter velocity control. We are now getting a much more consistent velocity from the shooter motor, which should make testing far better. We did this by implementing a moving mean function that removes some of the erroneous values we were getting back from the sensor.

We haven't posted a CAD picture in a while because we have not been updating it much, but we did more this week.

Now you can see the side panels that will be incorporated into the robot to prevent the balls from entering certain areas. The final product will look similar to this.

- Allen Gregory

"What happens is not as important as how you react to what happens." - Ellen Glasgow

Build Day 36: Half-Court Shot

Saturday, February 11, 2012

We fixed some of the issues with the elevator by removing things, which is always a plus. The ball collector got a bit of an improvement with the addition of guide plates at the bottom to avoid messing up the balls. We are still having a bit of a problem with the polycord slipping out of its groove but we now know what's causing the problem.

The BeagleBone development is coming along and we have it sending data to the cRIO. We still have a long way to go on the vision system. The rest of the programming is coming along well but there are a bunch of things to do once the vision and IMU systems are up and running.

The shooter improvements passed testing with flying colors; we were far more consistent this time around. We are still shooting a bit left on occasion but much less noticeably than before. We were able to set the wheel speed and make the same shot consistently.

We took the robot to half court to see what it could do on the 10ft rim and it didn't have any problems. In fact this was our first shot, with just a little bit of estimating on speed and angle.

FRC#3847: Half-Court Shot from Spectrum 3847 on Vimeo.

We are continuing to work on the copybot, we have the drive base, and most of the collector bars attached. We also are making all the practice rollers for the collector and elevator. It will be awhile before it is functional though.

Tomorrow we will design something to push down the bridge.

- Allen Gregory

"Almost all quality improvement comes via simplification of design, manufacturing... layout, processes, and procedures." - Tom Peters

Build 37: Bodywork, Robot #2, and Code

Sunday, February 12, 2012

Mechanically the robot is very solid. We have some small modifications but the collector and shooter assembly are working really well. We reinforced the collector motor mount and that is taking a lot of play out of the collector chains. We are using #25 chain right now but if we have any problems, we can switch to #35 very quickly. We have to do a bit of CG management to pull our weight forward but that shouldn't be too difficult. We still need a simple solution for the bridge manipulator that will work reliably.

We did some bodywork on the robot so that we can put logos and sponsors on and protect certain areas from flying balls. We still need to add our diver's mesh to the sides for ball protection. We also still have to make our decals for our logo and sponsors.

The programming team is working on getting our BeagleBone to talk with the cRIO; we should have more progress on that tomorrow. We still have a lot of automation systems to get running and integrated but we're confident we can get it done. If we went to competition with the code that we have now, we would be very competitive but if we get all the automation working, we will be even better.

The practice robot is actually starting to take shape. We have most of the structure finished; we just need to make all the small parts and mount the mechanisms. Shouldn't take that long; hopefully we can have it ready for bag day to be able to make the change.

- Allen Gregory

"Teamwork, dedication and friendship have a lot of play in all factors of life, including a robot contest."
- Damian Eveland

Build Blog 38: More Programming

Monday, February 13, 2012

We worked out a fix for our bridge device but we still haven't tested it. We have tip bars in place in case we fall over so we don't damage our shooter motors or signal light.

We made a setup to be able to test ball velocity and exit angle from the robot. We should be able to use it at the scrimmage to get good data from our robot. We know what the shooter wheels are doing but we don't know how much of that velocity is getting imparted on the ball and at what angle compared to our compression bar.

We have been doing wire management for the last few days and it's coming along pretty well; it should be about finished tomorrow. We still have some work to do on the bumpers and our bodywork. It's nice that we have time to figure out where our decals go before competition.

The programming team made great advances. We now have the BeagleBone taking data from our IMU and sending it to the cRIO. This will allow us to know our pitch, roll, and yaw. The beagle bone will also be doing the vision processing in the near future. We worked on a couple other control loops today including our drive base brake. The robot now has a setting where it will prevent the drive wheels from turning. We haven't been able to test it with another robot but we break traction with the tile floor before the wheels ever spin. This should give a nice stable platform to shoot from.

The copy bot is coming along nicely. Getting it wired is going to take some time, but the mechanical systems should be about finished this week.

- Allen Gregory

"Truth is ever to be found in simplicity, and not in the multiplicity and confusion of things." - Sir Isaac Newton

Build Day 39: Mostly Practice Bot Parts

Tuesday, February 14, 2012

We're gearing up for the scrimmage this weekend. That means that the robot is handed over to the programming and electrical teams, while the mechanical folks work on replicating all of our parts. We are on pace to have a functional practice bot the week after we bag the real one.

We weighed the robot at the end of the night and we are right at 100lbs, which is what we were going for. This means we will have about 20lbs to play with to adjust are CG for turning. We will be messing with the weight a lot this weekend to get it to a point where we can steer perfectly.

The electrical team is cleaning up all the wiring and making sure we won't have any electrical problems during competition.

Programming is working on more of our control loops and making sure our sensor data is as clean as possible.

We should be able to do some final testing before the scrimmage on Thursday night and Friday Morning.

- Allen Gregory

"I don't care if my team wins. I care if they try their hardest to win." - pfreivald

Build Log 40: Crunch Time

Wednesday, February 15, 2012

We're coming down to the home-stretch; we only have 6 days until we have to put her in the bag.

We're making our last efforts on the competition robot before we have to bag it. We're adding the bodywork that will prevent balls from entering the robot where we don't want them to. We're also fixing a few minor issues here and there as well.

The scrimmage is coming up this weekend and we need to be ready to use the field time to the best of our ability.

The practice robot is coming along nicely though it seems like it's going to be difficult to get it to match perfectly. It will be close enough for our testing purposes but tuning on the Thursday of competition is going to be very important.

- Allen Gregory

"I do not think there is any other quality so essential to success of any kind as the quality of perseverance. It overcomes almost everything, even nature." - John D. Rockefeller

Build Log 41: More Tweaks

Thursday, February 16, 2012

We kept working on the copy bot. We have a lot of the mechanical done, but we are still missing a few parts to make it work like the real robot. Another AndyMark order and we should be home free for a second robot.

The real robot is starting to shoot inconsistently again. A couple changes in the wrong direction and now we have to fix it again. It appears that the hood and the compression bar are both not straight now. They should be relatively easy fixes but we still have to make them work, hopefully before the scrimmage on Saturday.

We did some more testing and we noticed that the battery voltage alters the shots far more than we thought possible, even with velocity control. We think it's due to the torque required to maintain speed through the ball. Because the voltage is less, the torque is less. This causes the ball slows the wheel more than at full voltage.

We worked on getting the PID controller setup for the hood and now have accurate angle control.

We also worked on adjusting the center of gravity and we have found that we can make it turn properly by adding weight to the front. It's still not perfect and it isn't how it's actually going to be for competition.

We're still missing decals and netting from the side of the robot as well. Bumpers will be finished this weekend.

- Allen Gregory

"Slow down and remember this: Most things make no difference. Being busy is a form of mental laziness—lazy thinking and indiscriminate action." - Timothy Ferriss

Build Log 42: First Day of Scrimmage

Friday, February 17, 2012

We spent the morning making more fixes and working on the practice bot. We still have a few ways to improve, but it's coming along. We fixed some collector issues where we had some jamming.

The robots counter weights got some improvements. The IR sensors and elevator automation is coming along nicely.

The second half of the day was spent working on setting up the scrimmage at Rice. We should have a few local Houston teams joining us and the Discobots tomorrow for some live game action.

At the end of the night, we had an issue with the #25 chain on our collector so we are going to be moving to #35, which we should have done a long time ago.

- Allen Gregory

“What you do every day matters more than what you do every once in a while.” - Gretchen Rubin

Build Log 43: Only 3 Days Left

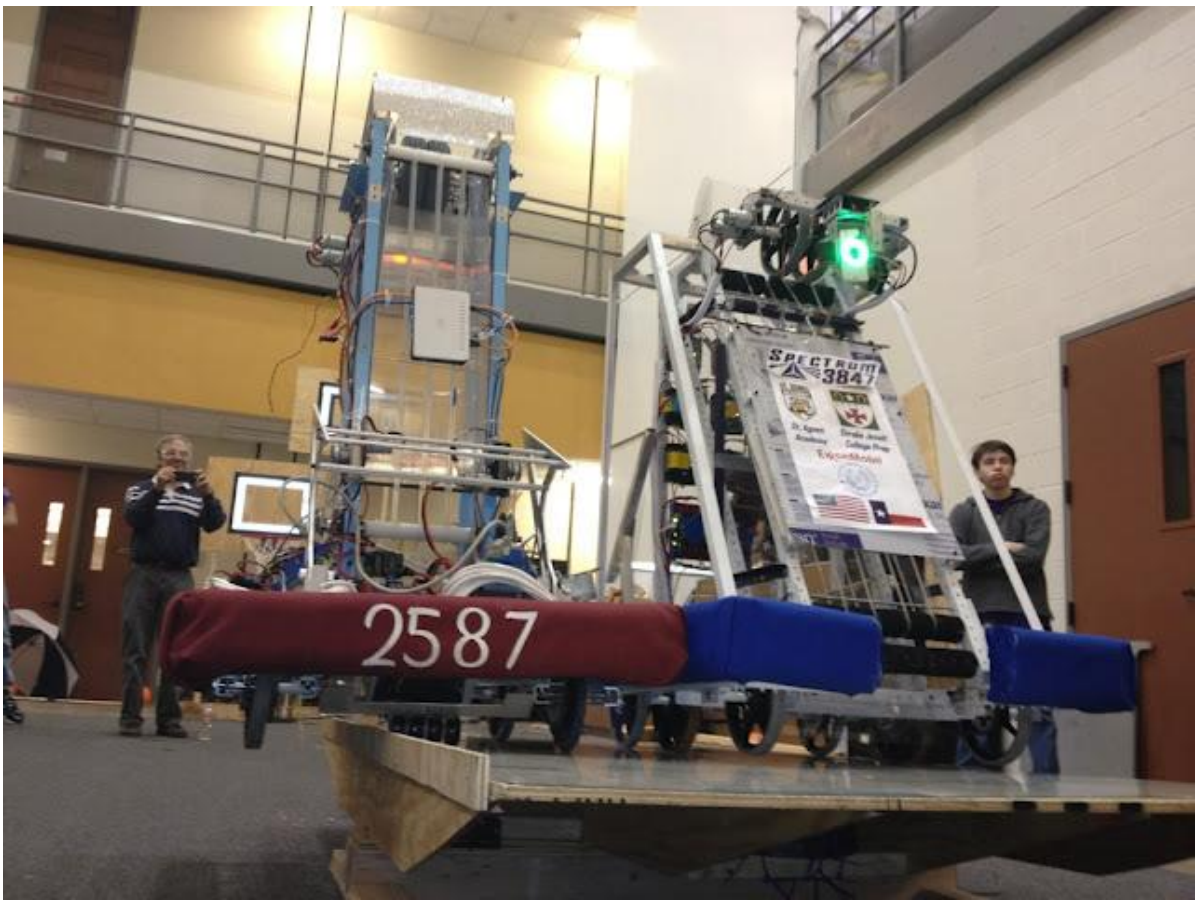
Saturday, February 18, 2012

We spent the day at the Houston Scrimmage with teams 2587, 1429, 2585, and 441. It was great to see the other teams' robots and see how ours works on something closer to the real field.

We had our share of problems today but the last few weeks of tweaking have been making us better and better. When we were working well, the collection system was feeding well and the shooter was great. We still need to work on our control panel and automation but mechanically we are looking pretty good.

The bridge device is our biggest problem, we aren't using pneumatics and using a Jaguar to run that motor seems like overkill but it's looking like a real possibility. The spike issues we had today were some of the strangest problems we have had all season. Not really sure what's going on but there doesn't seem to be a clear solution.

We did have some fun playing on the bridge with the Discobots. This was staged but it's interesting that this could even work.



We'll have some more video up tomorrow of actual shooting and driving.

- Allen Gregory

"I know you've heard it a thousand times before. But it's true -- hard work pays off. If you want to be good, you have to practice, practice, practice. If you don't love something, then don't do it." - Ray Bradbury

Build Log 44: 2nd Scrimmage Day

Sunday, February 19, 2012

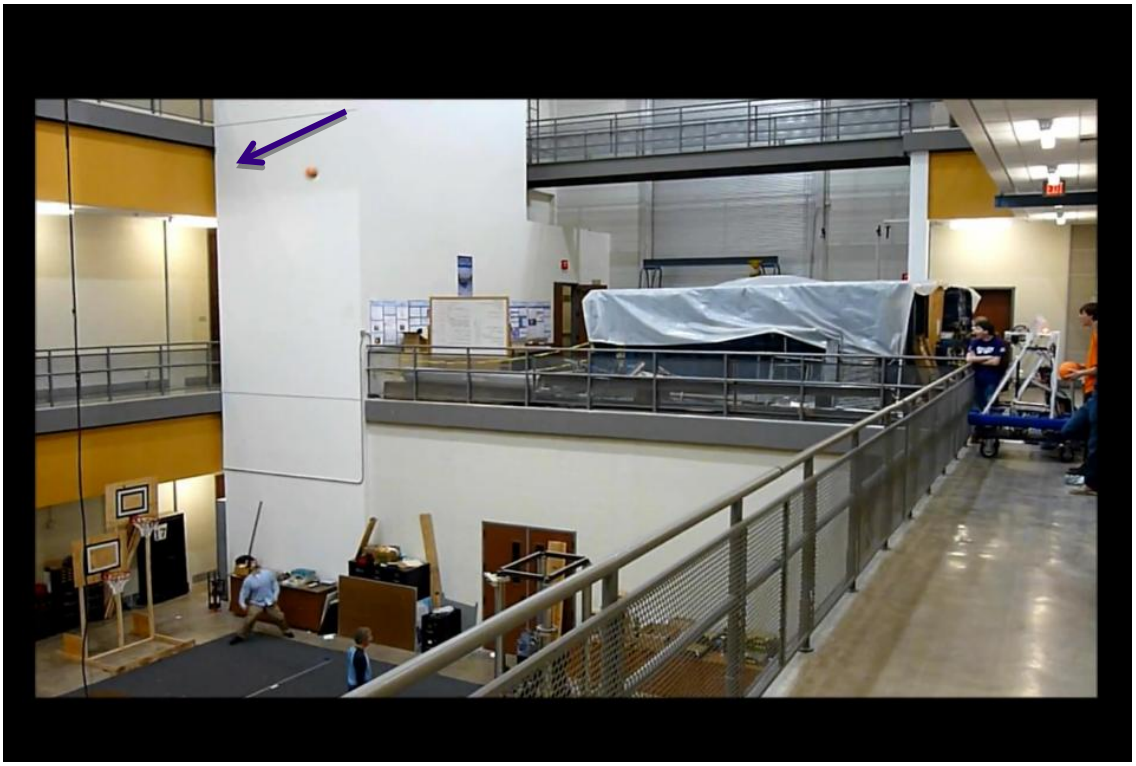
Today was the 2nd day of the Houston Scrimmage. We had a really good turnout, today. 624, 441, 3335, and 2585 all showed up for some amount of time. We are excited for the Houston Robots this year; they are coming along very nicely. Lone Star is going to be fun.

Today was almost entirely drivers practice and testing Ultraviolet (the robot). We were able to get the barrier crossing down a bit smoother. We can now controllably ride on the back wheels over the barrier providing a smoother crossing.

We had a few minor issues here and there but nothing that would have kept us out of a match at competition, so that is a good sign. We're also learning what we can make fixes to prevent those issues in the future.

We took some time working on shooting from the other side of the barrier and it was pretty consistent (> 30%) for not having any form of auto aiming. It might be a viable strategy to act as the feeder/long ranger shooter.

Here is a sneak peak at something we filmed for our release video.



FRC#3847: From the 2nd Floor from Spectrum 3847 on Vimeo.

We did some touch up painting when we got back to our lab and we have tomorrow to work through a couple fixes that we came up with over the weekend but overall she's ready to rumble (pun intended). Also we have a very long list of projects to get done between now and the Dallas West Regional.

- Allen Gregory

"People are smarter than you think. Give them a chance to prove themselves." - Timothy Ferriss

Build Log 45: The End Is Near

Monday, February 20, 2012

We're coming to close of the 2012 build season – only 1 day left and we have to put the robot in the bag.

We spent the day doing final changes to the competition bot, we fixed a few collection issues we noticed during the scrimmage this weekend, and we also made a new camera mount.

The collector is nice and speedy now, it's 1.4secs from the ground to the shooter. We have had it faster but the torque it has right now prevents some of our jamming issues.

The drive train is working great with the addition of the counter weight. It can turn on a dime with ease.

The programming team is still working on several automation issues and we are beginning to design our custom control panel. Both these tasks will carry over to the pre-competition season.

Tomorrow we will put the decals on the robot and demo it on two different occasions. We should have some more photos and videos up after that.

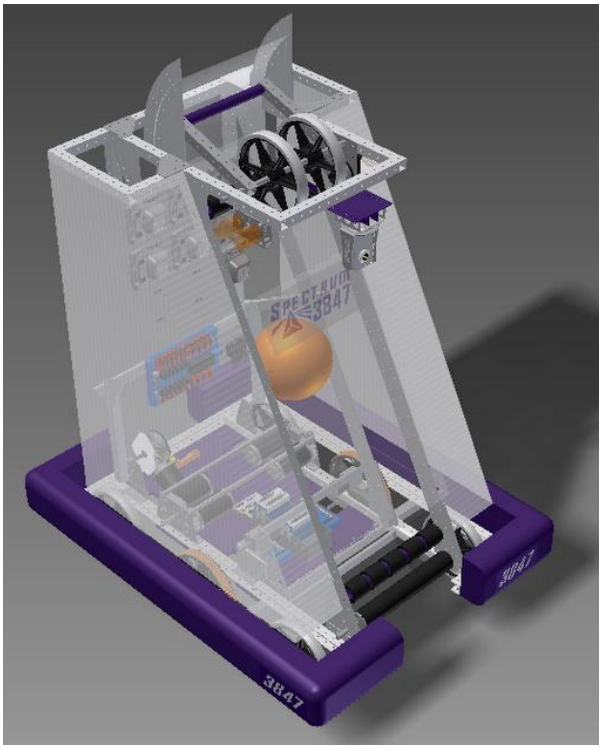
- Allen Gregory

"Individual commitment to a group effort - that is what makes a team work, a company work, a society work, a civilization work." - Vince Lombardi

Build Log 46: Last Day

Wednesday, February 22, 2012

Build Season is over.



It looks pretty close to the CAD Model

Bag and Tagged at 11:16pm

Headed to Dallas West on 29th-31st of March and Lone Star on April 5th-7th.

- Allen Gregory

Bringing the Blog Back

Sunday, May 6, 2012

We stopped updating at the end of build season but we want to get back in the habit of having an easy public source of updates about our team. People may be interested in our off-season work as well. These won't be every night, but we're planning on weekly updates.

First, let's catch everyone up on our season.

Competition season was amazing for Spectrum, we spent the 5 weeks leading up to Dallas-West working on the practice robot, and preparing for our 1st competition as Spectrum.

The robot work mostly revolved around working on the software and getting used to the robot. We did several things to improve collection but we were never really able to get our shooter consistent since we didn't have an easily accessible practice field. We were able to drive the practice bot at 118's facility on the Saturday before Dallas-West. That was a fantastic experience and we learned several things that we needed to fix on the robot. We also planned the installation of a magic jack on the robot to assist with the triple balance.

The competition planning took up a huge amount of our time because we had to acquire all the things we needed for a quality pit and put together all of our spirit and logistics items. Also, we were planning and rehearsing our Chairman's presentation.

Pit Before and After

Dallas-West was a really great regional, it was awesome to have nearly 80 teams in one venue but still get to play 11 matches. Our robot performed very well and we ended up seeded 8th at the end of qualification and then the 6th seeded alliance captain. We partnered with 456 and 3735 both fantastic alliance partners. We lost to the eventual regional finalist but we played two great matches. Awards ceremony was all that was left and we had entered our Chairman's entry here. Going in we didn't think we had much of a shot but the judges saw things differently.

http://www.justin.tv/dallasfirst2/b/313531811

We won the 2012 Dallas-West Chairman's Award as a sophomore team. Very few sophomore teams have ever won this award, by our count only 12. It took a tremendous amount of work by every member of the team to be able to transform and build this team so quickly but it was completely worth it.

We had many more problems at Lone Star than we did at Dallas-West. Thursday was very relaxed but Friday was very stressful because we had to replace our cRIO twice before we were running at the level we were during Dallas-West. This meant that many of the changes were planning to implement never happened as time was spent on fixing cRIO issues. We worked very well Saturday but we fell through the cracks and weren't picked during alliance selection.

We earned a spot at the Championship event because of our Chairman's win. The competition was extremely competitive and due to a very bad match schedule (playing 4 of the top 5 teams in our 9 matches). We were only able to walk away with a 4 and 5 record, no small task with a schedule like ours. However one of those wins was against the 2011 World Champions 254: The Cheesy Poofs. Video of that match is below. We executed our defensive strategy perfectly and were able to prevent them from easily out shooting us.

3847 vs. 254: https://www.facebook.com/photo.php?v=3863636190998

Thursday and Friday Highlight Reel: http://vimeo.com/41184828

Overall, we played very well at Championship and made a great impression for a second year team. Hopefully, we will be back in the near future.

Next Competition: July 28th Texas Robot Roundup - Anderson High School, Austin, Texas.

- Allen Gregory

"Whatever you can do, or dream you can, begin it. Boldness has genius, power and magic in it."
- Johan Wolfgang von Goethe