BROWNCOATS

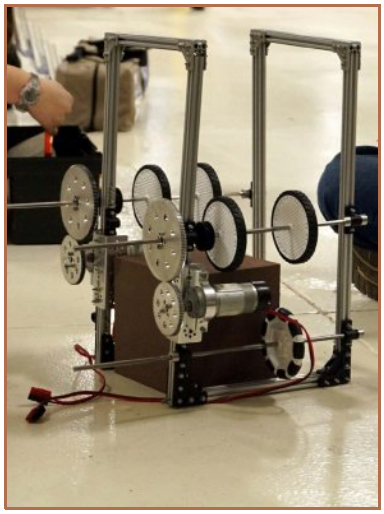
Team 7842 Engineering Notebook - *FIRST* Relic Recovery

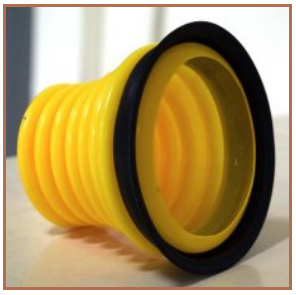
Date	Location	Start Time	End Time	Week #
October 6, 2017	AvaLAN Wireless	2:00 p.m.	6:00 p.m.	5
Meeting Goals: Mission Statement, Sub-systems				

Team Members in Attendance:
Andrew, Brooklynn, Ian, Megan, Joseph, Patrick, Rosie

Tasks	Reflections
Glyph Collection System	One of the team's mentors, Mr. Chuck, was very intrigued by the idea of suction and did a lot of research on the mechanism. Because using suction would limit the resources because of some of the rules, he made calculations and bought a sink plunger suction cup. The suction cup worked very well if the glyph was grabbed from the top, however, it wouldn't always stay in place on the side. One of the problems is that it won't release the glyph as easily as it picks it up. The suction cup also left an indent on the glyph, and while it went away after a little bit, the team can't be sure that it wouldn't be considered as field damage. Another issue would be that a large fan would be needed to power the suction, and it would strain the battery, causing it to drain faster.
Relic Arm	During the week, Megan and Joseph worked on their telescoping arm and scissor arm for the relic lift. Joseph used rulers to build his and Megan used REV extrusion to make the slides. They presented their ideas at the meeting where they discussed what they had figured out, how they built it, and what the advantages and disadvantages are. There wasn't a clear winner, so both will continue developing their design for another week, but with the additional considerations of extending to at least 40 inches and supporting a two pound weight at the end of the arm.

Relic Arm (continued)	For the scissor lift, the pros are that it's self-bracing and very stable in one dimension. It's simple and would only use one motor. The cons are that it requires many bearing surfaces which must be tight and well-constructed to maintain stability. The telescoping arm's pros are that it's light weight and it's very fast in the extension and retraction. The cons are the use of string which has been show to stretch, and that the extension and retraction would need two motors and we would need to find a way to use only one if possible.
Mission Statement	Discussion about the mission statement was reopened. We decided to make it shorter and add some of our goals as a team instead of what we plan on building for the robot.
Subsystems	Over the week, everyone is supposed to choose three main subsystems they would like to work on, and next week we will be dividing and assigning team members to begin designing, building, and programming the subsystems.





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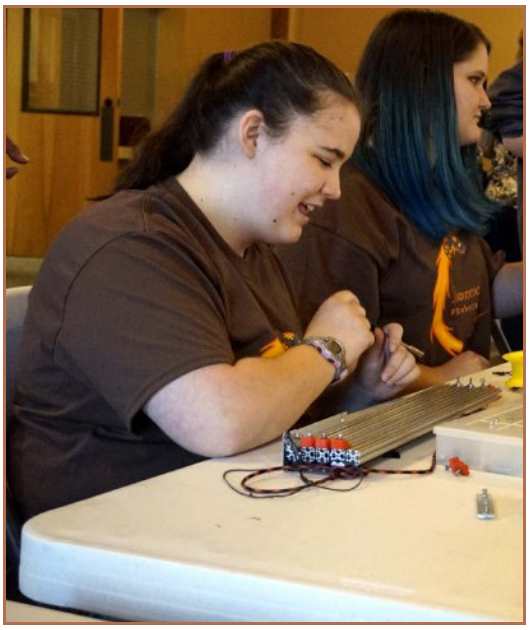
Team 7842 Engineering Notebook - *FIRST* Relic Recovery

Date	Location	Start Time	End Time	Meeting #
October 8, 2017	Holbrook's Home			6
Meeting Goals: Relic Arm				

Team Members in Attendance:
Megan

Tasks	Reflections
Relic Arm	During our meeting on Friday, I was chosen to build a prototype of the telescoping arm for the relic. I brought home a bunch of tools and REV extrusion so I could work on it over the week and present a working prototype at our next meeting. I used three pieces of REV Extrusion that were all 16 ½ inches. I strung them together used the cascading effect. For the anchors at the bottom, I used bolts and locknuts to tie the string, and on the top I used V-bearings to loop the string over. What I noticed quickly is that the string falls off a lot once it extends, and a way to fix this is using 3D printed caps to keep the string in place. We used these on our robot's lift in the previous season and they worked very well. What I did first was look at REV's explanation on how to used the double-sided sliders to connect the extrusion together. I built it like that first, putting the hex screws into the slider itself, however, this caused the extrusion to stick and required a lot of force to make it slide. At first I thought it was just a certain part I'd used that didn't fit like the others, but when I changed it out and had the same problem, I realized I would need to find a different solution to the extrusion sticking. Instead of having the screws in the double-sided slider, I placed one on either side of it and used hex nuts to keep it in place. This allowed the extrusion to slide freely requiring little to no force at all. Next, on the first beam, I tied the string to the anchor, looped it over the V-bearing on the top of the second beam, and on the bottom of the third, I tied it onto the anchor. I did the same thing on the other side, only I reversed it so that it will bring it back down. The string I used stretched far too much. For the final product, I will need to use the Kevlar anti-stretch string.



Date	Location	Start Time	End Time	Meeting #
October 13, 2017	AvaLAN Wireless	2:00 p.m.	6:00 p.m.	6
Meeting Goals: Disassemble Vera, Assign Sub-systems				

Team Members in Attendance:
Andrew, Anthony, Brooklynn, Ian, Megan, Joseph, Patrick, Rosie

Tasks	Reflections
The subsystems were assigned as follows:	
Glyph Collection System Hardware	Primary = Megan, Secondary = Rosie
Drive Train Hardware	Primary = Megan, Secondary = Ian
Relic Arm Hardware	Primary = Anthony, Secondary = Brooklynn, Megan, Rosie Today, Joseph discussed what he had researched about the scissor arm. In the end, however, the telescoping arm seemed much more mature, so the majority of the team decided upon the telescoping arm over the scissor lift. The team is not completely counting the scissor lift out, but for now, the telescoping lift will be the main priority.
Jewel System Hardware	Primary = Brooklyn, Secondary = Megan
Chassis Hardware	Primary = Rosie, Secondary = Megan
Driver Control Software	Primary = Andrew, Secondary = Ian
Vuforia Software	Primary = Joseph Joseph started investigating OpenCV as a possible improvement over Vuforia.

Autonomous Navigation Software	Primary = Joseph, Secondary = Andrew, Ian
Autonomous Jewel Software	Primary = Ian Ian worked on Jewel software for autonomous today. He explored the possibility of using OpenCV to increase Jewel accuracy and is excited to see where that goes. First revision of the color sensor code is done, and he plans to test it next week.
Autonomous Glyph Software	Primary = Ian, Secondary = Andrew
Autonomous Bonus Software	Unassigned for now
Administration Disassembling Vera Mk 4	The team spent a majority of the meeting taking apart the 2016-2017 competition robot, Vera Mk 4. They plan to harvest the parts and use them to build the Relic Recovery robot. Patrick took many pictures and assisted with the time-lapse video of the disassembly. The general consensus was that Vera was absolutely filthy, with metal flakes, dirt, and dust coating the table and everyone's hands.

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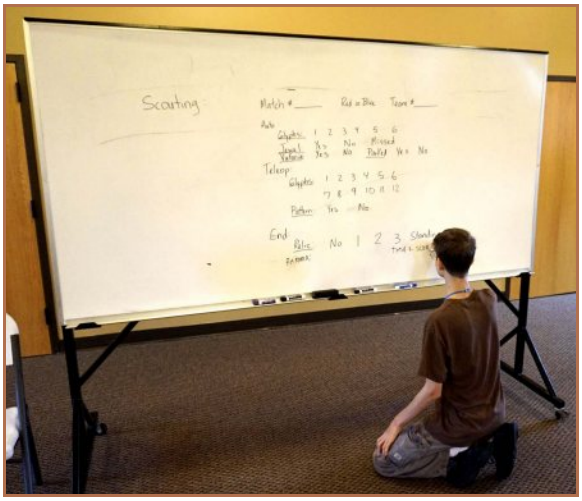
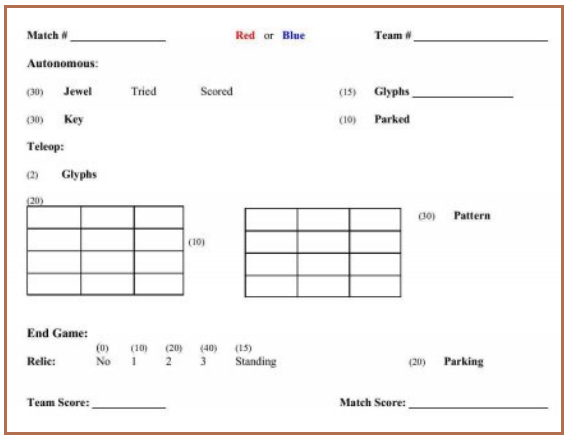
Team 7842 Engineering Notebook - *FIRST* Relic Recovery

Date	Location	Start Time	End Time	Week #
October 14, 2017	Hobbs Street Church of Christ, Athens	10:00 am	3:00 p.m.	6
Meeting Goals: Prototyping Subsytems				

Team Members in Attendance:
Anthony, Brooklynn, Ian, Megan, Joseph, Patrick, Rosie

Tasks	Reflections
Glyph Collection System	Ian did more research with OpenCV, and how to implement it in a usable fashion into our code. His goal, as a side project to learn more, is to have the robot chase a glyph from a set distance away. He made a lot of progress on this front and will continue to research throughout the week.
Drive Train	The bulk of the Swerve parts came in today, and Ian is extremely excited about that. The custom parts for Swerve should be finished soon, and then assembly will begin.
Relic Arm	Megan and Anthony worked on the relic arm, with the goal of figuring out how to use a single motor to both extend and retract the arm.
Jewel System	Brooklynn worked on the jewel system, trying out several components that might be used for the beam, servo mount, and sensor mounts.
Chassis	Rosie and Megan worked on the chassis together. They assembled a basic framework out of REV extrusions to house a proof of concept prototype of a glyph elevator.
Autonomous Navigation	Joseph also started researching OpenCV as a possible replacement for Vuforia.
Strategy	Joseph worked with Miss Jean on creating the cards for scouting.


Scouting

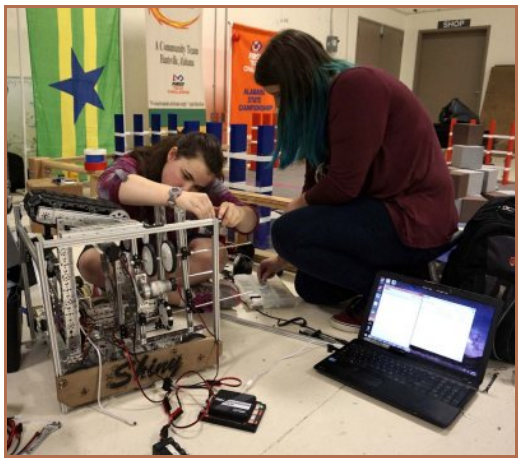

Match # _____ Red or Blue Team # _____
Autonomous:
(30) Jewel Tried Scored
(30) Key
(15) Glyphs _____
(10) Parked
Teleop:
(2) Glyphs
(20)
(10)
(30) Pattern
End Game:
Relic: (0) No (10) 1 (20) 2 (40) 3 (15) Standing
(20) Parking
Team Score: _____
Match Score: _____

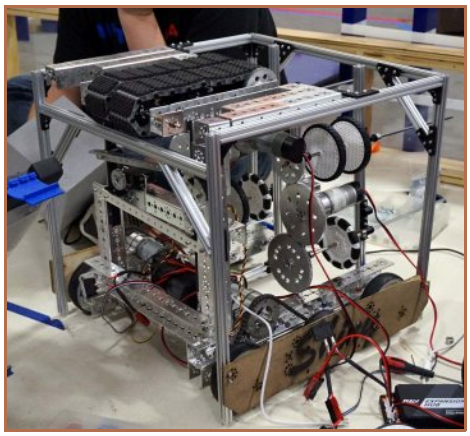
Date	Location	Start Time	End Time	Week #
October 20, 2017	AvaLAN Wireless	2:00 p.m.	6:00 p.m.	7
Meeting Goals: Prototyping Subsystems				

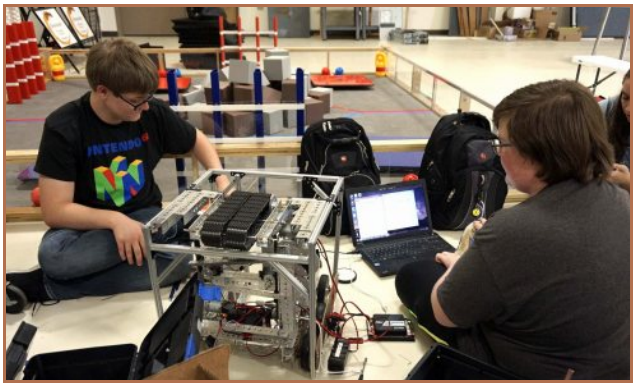
Team Members in Attendance:
Andrew, Anthony, Ian, Megan, Patrick, Rosie

Tasks	Reflections
Glyph Collection System	Last minute tweaks were made to the robot prior to 8651's scrimmage on Saturday. The elevator is really close to working, but not quite there yet. The Team plans to put Lexan on top of the elevator to pinch the Glyphs onto the conveyor, as they seem to need a channel when they hit the top of the conveyor. Ian is optimistic about the future of this design and can't wait to work on it some more, and to CAD a nicer, more optimized version. For the conveyor belt–which will drop the glyphs into the crypto box–Megan used tank treads for a prototype. In the final product, she hopes to use timing belts, which are much lighter. At first she started out with only two axles, and on each one were two evenly spaced tank sprockets. She motorized the conveyor but found with only the two tank sprockets for each tread, there was a lot of slack in the middle, and it quickly tightened and became stuck. To fix this, she added another axle in the middle and two more tank sprockets. It was still loose, and this time instead of sticking, it was slipping off of the sprockets and out of alignment. She took off a section of the tank treads to make it a lot tighter. This helped a lot. She ran the conveyor for a little bit and not once did the treads slip or stick. She put a glyph on the conveyor belt and it gripped it well enough and dropped it smoothly. After that, she didn't make many revisions to it at all, even when she mounted it to the chassis. She had to add another Tetrix beam on both sides, but other than that, it fit well on the chassis.
Relic Arm	Because the team wanted to avoid using spools and two motors, they decided to go with rack and pinion for the relic lift, which would only require one motor, and would also be a lot faster than if we had gone with spools. Megan used a Tetrix beam to connect the three racks and two slide blocks, which she placed at the beginning of the lift near where she mounted the motor, which is on the underside of the Tetrix channel. For the motor, she geared an eighty tooth gear to a forty tooth gear, which was on the axle that the pinion was mounted on.

Relic Arm (continued)	At both ends of the pinion, she screwed in a 35MM hex screw with a spacer on top and a locknut on the bottom to keep it in. Next, she slid the extrusion that the lift is made out of onto the screws. To keep the extrusion from falling off, she put 3d printed caps on the end of the extrusion, so whenever the screw hits it, it acts as a stopper. She found that the 3d printed caps the team is using to keep the string on are not the best solution. While they help immensely when the string is tight, as soon as it slackens even a little, it won't keep it in. She is currently looking for a different design for the caps.
Chassis	Megan used the drive train that the team had built over the summer to build a temporary chassis so they could begin testing all of their ideas until they have the swerve drive completed. She used four sixteen and a half inch REV extrusion and connected them to the prototype wooden side plates that are mounted on the wheels. After that, she connected four more REV extrusion of the same size on the top of the previously mentioned using 90 degree brackets. To make sure there was enough rigidity, she also used corner brackets to connect the beams.



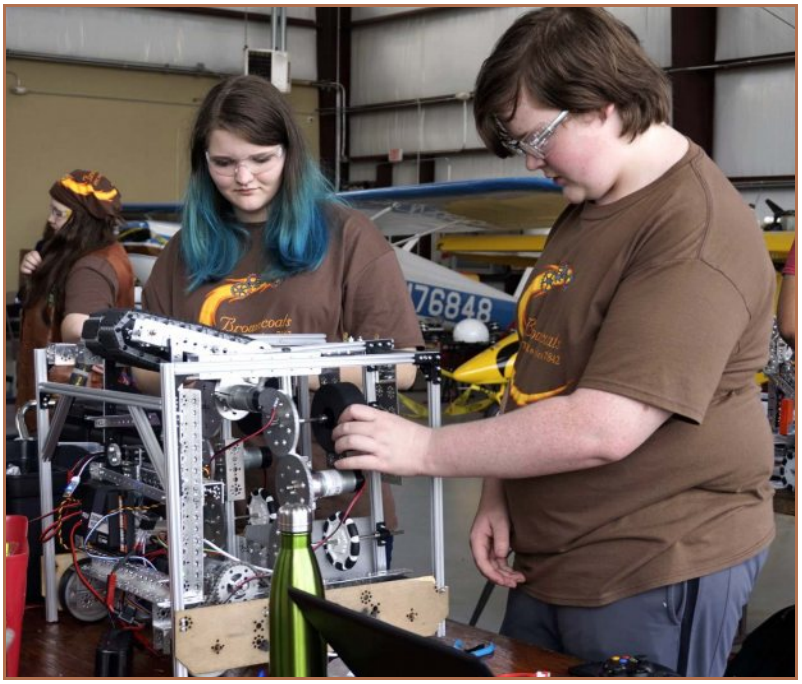




Date	Location	Start Time	End Time	Week #
October 21, 2017	Bolton, Mississippi	9:00 a.m.	3:00 p.m.	7
Meeting Goals: Elevator, Scrimmage				

Team Members in Attendance:
Ian, Megan, Patrick, Rosie

Tasks	Reflections
Glyph Collection System	The team attended the scrimmage in Mississippi hosted by FTC team 8651, Wait for It. The scrimmage was more of a build day, as most of the teams were working on drive trains. Adjustments were made to the elevator system, most notably making more of a channel for the glyphs, changing plastic wheels for foam wheels, and tweaking how much the Lexan plate moved. After these changes, the elevator can bring glyphs to the back of the robot and successfully drop them into the Cryptobox.



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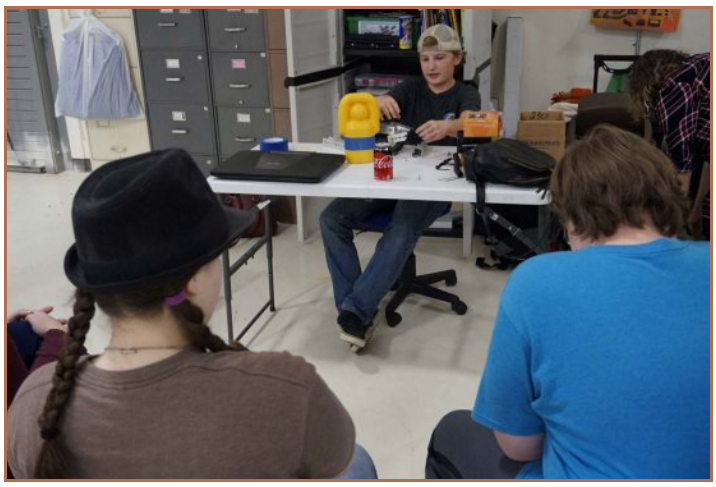
Team 7842 Engineering Notebook - *FIRST* Relic Recovery

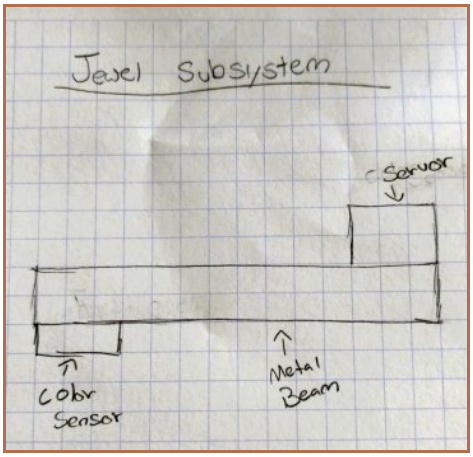
Date	Location	Start Time	End Time	Week #
October 27, 2017	AvaLAN Wireless	2:00 p.m.	6:00 p.m.	8
Meeting Goals: Elevator, Design Reviews, Prototypes				

Team Members in Attendance:
Andrew, Anthony, Brooklynn, Ian, Megan, Joseph, Patrick, Rosie

Tasks	Reflections
Glyph Collection System	Megan continued to search for a way to help the glyphs be pushed onto the conveyor belt. On the elevator, she added two hex axles on top of the foam wheels, using the pillow brackets to attach the axles to the extrusion. After that, she added one omni wheel on each side. She didn't motorize the wheels, as there wasn't any room to add another gear, and she wanted to see if motorizing it would be necessary or not. Brooklynn helped Megan add another wheel to the glyph system elevator prototype on the robot. Ian worked with a new OpenCV library today. This library allows him more freedom to customize programs, and to expand what he can do with OpenCV. He is pretty close to Glyph recognition from the Robot Controller phone and believes this will be very beneficial to our autonomous program this year.
Relic Arm	Anthony presented his design for a relic arm gripper to the team.
Jewel System	For the jewel subsystem Brooklyn was thinking that she could mount a metal beam onto a servo with a metal part next to it so there wouldn't be to much of a strain on the servo and with a color sensor on the end of the beam.
Strategy	Andrew and Joseph worked together to create some strategy for the Autonomous period, for minimum down time and maximum points.




ALABAMA
STATE
CHAMPIONSHIP


Jewel Subsystem
Servor
Color Sensor
Metal Beam