



2016 PARADE ROBOTS

History

Rocket Robotics for the last two years has been involved with the community by entering the South Milwaukee Heritage Parade. In those two years, we had built a “Parade Bot” out of left over spare parts that would contain candy in a hopper, and “spit” out candy from two sides of the robot that would cover both sides of the street. There have been problems with the robot in the previous years, which requires us to build new robots. Past problems were:

2014: Failed an axle on one wheel, and had to push the robot halfway thru the parade

2015: No failures, but robot ran out of power about halfway, and missed many people because it can only cover one side of the street at a time.

2016 Plan

This year, the mentors of Rocket Robotics is excited to announce that they would like to build two (2) parade robots to dispense candy to the people that attend the Heritage Parade on July 30th, 2016. Two teams will be selected with each team to design, build, wire, program, and test each robot before Wednesday, July 27th.

The plan for the parade is that one robot will travel the left side of the street and dispense candy to the people on the left side of the street, and the second robot will travel the right side of the street and dispense candy to the people on the right side of the street.

General Rules

1. No mentors are allowed to work on the robot, wiring, or programming!! Mentors are allowed to give advice only, and to verify proper building techniques. Mentors are allowed to verify the design, manufacture, assembly, wiring, and programming for safety and general design flaws (ex. Proper bolt tightness, proper wiring to prevent

failure, etc.) If a safety or design flaw is found, the mentor is to instruct the students what needs to be done, but cannot use tools to correct the problem.

2. If any unsafe situations are noticed, mentors will stop the situation before an accident or damage can occur. Safety is most important and should be monitored and thought out when performing work.
3. The robot will follow the rules of “Section 4” – Robot for the 2016 Stronghold Game Manual, except where noted in the specific sections of this document. If a rule does not seem to apply to this project, or a clarification is needed, ask a mentor.
4. The purpose of this exercise is to learn and create two (2) robots for the required purpose. The old robot and its design are to be an “inspiration”, teams are not to directly “copy” the design. Be inspired and creative!!
5. Students are not allowed to switch teams unless approved by all mentors.
6. Teams are responsible for their own designs, manufacturing, wiring, and programming. Team members for opposing teams are not allowed to assist opposing team members unless approved by a mentor.
7. No parts are to be used/removed from the 2016 Stronghold competition robot, our test robot (Anklebiter), or the old parade robot without approval from a mentor. Batteries are excluded from this rule.
8. Each team is budgeted for \$250 for purchased material. The following material is NOT part of the budget, as it is provided:
 - A. Pneumatic tires and hubs
 - B. Raw materials for manufacturing parts (i.e. aluminum, lexan, wood, etc.)
 - C. Kit of Parts (KOP) components from our existing inventory (i.e. cRIO/roboRIO, PDP, breakers, etc.)
 - D. Consumables (i.e. wire, bolts, nuts, washers, rivets, screws, candy for testing/parade, etc.), excluding items that need to be purchased.
9. Students are to find the needed parts on the internet by using approved vendors (i.e. VexPRO, AndyMark, Amazon, etc.). Students are to give a mentor a required Bill of Material that contains the manufacture part number, description, price, and where they found the part. Mentors need to approve all purchased parts and will order the approved parts.

10. All materials to be purchased are for the parade robots. Parts request for anything not being used for the robot will NOT be approved.
11. A list of all parts purchased will be required with the final paperwork for the robot. Each team will provide printed drawings and complete parts list for their designs.

Design

1. It is recommended that each team has a brainstorming session to determine the rough design of the robot. Teams should keep in mind that the robots are being used in the outdoors and in a “rough” terrain.
2. The drivetrain will use 8 inch pneumatic (rubber) tires and the associated hubs. The mentors will purchase the tires and hubs, and is not part of the budget constraint.
3. Bumpers are not needed, they are exempt from these robots.
4. Frame perimeter is not restricted. Robot must be able to be transported in a pick-up truck, school van, or SUV.
5. Robot weight is limited to 120lbs, without batteries. This rule is still valid so that the robots can be safely lifted/moved/transported.
6. It is preferred that designs are 3D modelled in SolidWorks. Each team should have one member that can/willing to work with the modelling. If a team does not have a person that can/willing do the modelling, they can draw their design on paper, but all manufactured parts need to have adequate dimensioning and detail so that the parts are manufactured correctly.
7. An appropriate mentor needs to approve the design of the robot BEFORE any parts are manufactured. Mentor will be checking to make sure that the design is achievable in the given time that is available, the design is safe for operation, and is safe for parade goers (i.e candy is not “shot with high velocity”, etc.).

Manufacturing

1. Part of this project is so that students understand how to read a drawing. Before a part is manufactured, the student performing the work should review the drawing for accuracy, and understand what the part is for on the robot to verify that it is being manufactured correctly. If the student has any questions about the part, drawing, or

how to manufacture the part, the student needs to work with the designer first, then a mentor if needed to resolve the issue.

2. Before a student is allowed to manufacture a part, they need to determine the tools and materials that are required. The student performing the work needs to be “signed off” that they have been trained to use any power tool that is required. Training must be done by a qualified mentor and a mentor must be present when the student uses the tool for the first time. Students that are not comfortable with using a tool can request a mentor to help them with the manufacture of the part.
3. Safety glasses and any other person protecting devices shall be used at all times when working in the shops and using tools.
4. All parts must be approved by a mentor before they are assembled onto the robot.

Assembly

1. Students can use any fastening methods normally used for a competition robot, per the FRC rules of the 2016 Stronghold Game Manual.
2. Any custom hardware not currently available in our inventory will need to be purchased from the budget amount.
3. Assembly quality and appearance is important, as they will be part of the grading.

Electrical

1. All electrical rules in “Section 4” – Robot for the 2016 Stronghold Game Manual are valid.
2. Robot may use more than one battery, but no more than 3 batteries. Batteries are to be wired in parallel to maintain 12vdc circuits. Mentors are to assist and approve any connections requiring more than 1 battery.
3. All battery connections must use the Anderson Power Pole connectors.
4. All wires shall be red for power (+) and black for common (-). Wire sizing to follow table 4-3 of “Section 4” – Robot for the 2016 Stronghold Game Manual.

Pneumatics

1. All pneumatic rules in “Section 4” – Robot for the 2016 Stronghold Game Manual are valid.
2. Any pneumatics not currently available in our inventory will need to be purchased from the budget amount.
3. All pneumatic valves should be 12vdc operated.
4. All hoses shall be red for pressured and white for return.

Programming

1. All programming is to be in Labview that supports the controller being used.
2. The FRC driver station and dashboard are to be used for control.
3. Programmers must flowchart their process before programming in Labview.
4. Programmers should keep their program on their laptop. When the competition is completed, the programs are to be copied to the Robo Room hard drive.
5. An appropriate mentor needs to approve the Labview code of the robot BEFORE loading the code onto the controllers. Mentor will be checking to make sure that the programming is achievable in the given time that is available, the programming is safe for operation, and is safe for parade goers (i.e candy is not “shot with high velocity”, etc.).

Marketing

1. A webpage will be added to the Rocket Robotics website as the main page for the 2016 Parade Robot challenge.
2. Each team will have their own webpage to be updated weekly that is linked to the 2016 Parade Robot main page. The marketing people assigned to each team will use these pages to update what is being done on their robot each week. Each week the webpage will be graded.

3. Each team will have a feature sheet for their robot. The feature sheet is to be done by the team marketing people.

Testing the Robots

1. Robot are to be fully tested before they are allowed to be used for the parade.
2. Mentors are to review the final robot to sign off that it is completed for the parade by Wednesday, July 27th.
3. Mentors have the right to operate the final robots to make sure that they are safe and presentable for the parade.

Grading the Robots

The robot drawings/modelling, parts manufactured, robot assembly quality, electrical wiring, programming, robot feature sheets, and website pages will be graded.

It is suggested that each team assemble a final “report” with costs, drawings, Labview printouts, and robot feature sheets for the judges. A list of the team members should be included and what they worked on as well.

Grading points to be in the next revision of this document.

Robot will be graded in three ways:

1. Parade performance
2. Mentors
3. Caterpillar Engineers (non-mentors)