

# 2016

SDSU

Extension



• **South Dakota**  •

# Robotics & Engineering Challenge

**Challenge Packet Star Wars**



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South Dakota State University, South Dakota counties, and USDA cooperating. South Dakota State University adheres to AA/EEO guidelines in offering educational programs and services.

## EVENT OVERVIEW

The South Dakota 4-H Robotics Challenge is an opportunity for youth who have been learning about robotics to demonstrate their learning, celebrate their accomplishments, and interact with others who share an interest in robotics. The most important part of the event is to have fun, so check your worries at the door. The Challenge is open to the public; spectators, parents, grandparents, friends, classmates, industry professionals, and educators.

## EVENT LOCATION

The event will be held Saturday September 3, 2016 on the South Dakota State Fairgrounds, Huron, SD. The exact location of the event will be released in July with the release of all other 4-H locations.

## TENTATIVE SCHEDULE

8:00 Advanced Division (Autonomous) teams check-in: Receive team table assignment

8:20 Advanced Division (Autonomous) rules and challenge release

8:30-10:15 Advanced Division (Autonomous) team work period – presentations begin at 9:45

10:15 Advanced Division (Junk Drawer) teams check-in: Receive team table assignment

10:35 Advanced Division (Junk Drawer) rules and challenge release

10:45-12:30 Advanced Division (Junk Drawer) team work period – presentations begin at 12:00

11:00 Novice Division team check-in: Receive team table assignment

11:20 Novice Division rules and challenge released

11:30-1:15 Novice Division team work period – presentation begin at 12:45

1:00 Competitive Division teams check-in: Receive team table assignment

1:20 Competitive Division Team Challenge rules and challenge released

1:30-4:00 Competitive Division team work period

4:00 Final judging Competitive Division

4:45 Awards for Competitive Division

***\*This schedule is tentative and subject to change based on facility capacity and number of teams.***

## ELIGIBILITY

1. Team registration is taken on a first-come-first-serve basis through **August 1, 2016**. This registration deadline will be strictly enforced.
2. All members of the robotics team must be a 4-H member.
3. Teams must have at least three members with a max of 5.
4. Novice teams are not required to have any experience with the robotics platforms.
5. Advanced and Competitive team members need to be proficient with their chosen platform before the event.
6. All participants must be at least 5 years old by January 1, 2016, but not have turned 19 years old prior to January 1, 2016.
7. The Novice Division has both a Cloverbud (5-7) and 4-H (8-18) division.
8. The Advance Division is for all 4-H ages (8-18)
9. The Competitive Division is divided into age groups Beginner/Junior (8-13) and Senior (14-18). The committee reserves the right to divide teams into appropriate groupings during check-in.

***\*Number of teams allowed per division will be announced after a location has been chosen.***

## EVENT CONTENT

The South Dakota 4-H Robotics Challenge is divided into the following divisions: Novice, Advanced and Competitive. The Novice Division of this challenge will be a **real time** challenge. This means that team will not know what the challenge is before the day of the event. The Advanced and Competitive Divisions in this event will be a **modified real time** challenge. This means that a portion of the challenge will be released prior to the event, but team members and coaches will not know everything about the challenge before the event day.

After check-in and set-up, teams will gather for the Challenge Release. Each team within a division will receive their Challenge at the same time. Time has been allotted for questions and clarification after the Challenge Release. After the Challenge Release, each team returns to their pit area to program their robot to complete the tasks outlined in the challenge. The last 15 minutes of each Division will be utilized for showcasing each team's final program.

### Novice Division

This division is for youth who are new to robotics and it does **NOT** require any previous experience. These are basic missions designed for entry-level teams that are just getting started. NOTE: First year teams DO NOT have to participate in the Novice Division.

Teams will be provided a LEGO® robot kit and computer at check-in. The challenge will consist of the team constructing a robot using build instructions provided the day of the Challenge. Using the instruction manual, software tutorials, and handouts provided teams will program the robot to complete a short course released the day of the challenge. 4-H staff and volunteers will be available to assist and coach. The Novice Division will be scheduled for 1 hour 45 minutes; the last 30 minutes of that time will be used by the team to demonstrate their robot skills. Skills may include: moving forward and backward, turning in circles, making precise turns, playing music, or displaying messages on the robots screen.

### Advanced Division (Autonomous)

This division is for youth who have minimal experience with autonomous robot platforms (LEGO® MINDSTORMS®, VEX, TETRIX®, etc.). The Advanced Challenge will give youth a taste of what a competitive challenge may entail.

In this division, youth will design and build an autonomous robot that can accomplish a specific set of tasks. The basics of the challenge can be found in Appendix A of this challenge packet. Teams will need to arrive at the competition with their robots constructed. They may use a stock build or design their own. It is strongly encouraged that teams take a look at the challenge before arriving, but not a requirement. They will have 1 hour and 15 minutes to program their robot.

### Advanced Division (Junk Drawer)

This challenge does not use a robotics platform, rather teams are provided a 'trunk of junk' that they must utilize to complete a task. This challenge requires teams to be creative and use their engineering skills. Teams may only use materials provide at the challenge release. The Challenge will be introduced in Appendix C, but the materials within the 'trunk of junk' will remain a mystery until the Challenge day. Teams will have an hour and fifteen minutes to design and construct their robot.

### Competitive Division

This division is for youth wishing to try a competitive robotics event. The team should have previous experience using an autonomous robotics platform (LEGO® MINDSTORMS®, VEX, TETRIX®, etc.) and arrive at the challenge with their robot built and programmed.

The competitive division will be divided into two categories Beginner/Junior (ages 8-13) and Senior (ages 14-18). Both groups will be required to complete an autonomous robotics challenge and a junk drawer robotics challenge.

Points will be awarded based upon how much of the challenge is completed, as well as for team work and technical understanding. The point breakdown can be found in the Appendix with the corresponding challenge.

The teams will have 2.5 hours to complete both the autonomous and junk drawer challenges. It is up to them to decide how they will budget their time. During this time judges will ask questions about what they are doing/ have done and will be observing their teamwork.

Teams are required to record their building and programming process as they prep for the challenge. These records will count towards their final score and can be used as the determining factor in case of a tie.

**Part 1: Autonomous robotics challenge** can be found in Appendix B. Teams will need to arrive at the competition with their robots constructed and prepared to run the challenge courses. The day of the Challenge, teams will find the courses to be slightly modified (locations may be changed or steps may be added) and released to teams the day of the challenge. Teams must be familiar enough with their program that they can easily adjust their program to complete the Final Challenge.

**Part 2: Junk drawer robotics challenge** found in Appendix C, does not use a robotics platform, rather teams are provided a 'trunk of junk' that they must utilize to complete a task. This challenge requires teams to be creative and use their engineering skills. Teams may only use materials provide at the challenge release. The Challenge is introduced in Appendix C, but the materials within the 'trunk of junk' will remain a mystery until the Challenge day. Teams will have an hour and fifteen minutes to design and construct their robot.

### WHAT TO BRING

1. Paperwork (Appendix D) — Use the Team Checklist to make sure you didn't forget anything. All documents are included in Appendix D of this packet.
2. An autonomous robot, your team notebook, and/or computer if your division allows it.
3. Robot garages—It will happen...someone will drop their robot and watch the parts explode in a million directions. It's not pretty. BRING A PLASTIC CONTAINER LARGE ENOUGH TO CARRY YOUR ROBOT DURING THE EVENT. If it drops, you have a better chance of collecting all of the parts and reassembling your robot.
4. Except for the Novice Division—Knowledge of how to build and program using their chosen platform—you will not have time to learn at the event, but we will have technical advisors available.
5. Your teamwork and engineering skills—this is your chance to show them off, be innovative, creative, collaborative, and demonstrate your ingenuity.
6. A great 4-H attitude!—This is a fun chance to stretch your skills, see what other 4-Hers are doing, and show off all the hard work you've put into the past year. Come ready to have fun and learn!

### ODDS AND ENDS

**Attendance** – When you registered for this event you indicated the number of team members attending. We understand that things happen, and a team who planned to attend may not be able to. If this situation arises, and you know in advance, please email Christine Wood at Christine.Wood@sdstate.edu so we can allow another team in.

**Supplies Check out** – Teams may be required to check supplies in and out (robots for novice division, and a 'trunk of junk' for advanced and competitive divisions). The equipment check-out agreement can be found in Appendix D. After the event, teams will be required to disassemble their robots, put every piece back in the proper compartment, and return them to the equipment check out tables. Event staff will verify that equipment is sorted properly. If not, the team will be instructed to take the kit back and finish sorting it. ***Teams may not leave the building until an event staff has signed off on their Equipment Check out Agreement.*** Please plan sufficient time at the end of the event to clean up and return equipment before leaving.

**Resources** – Before the Event: if you have any questions or concerns contact Christine Wood at Christine.Wood@sdstate.edu. At the Event: we will have technical advisors to offer limited assistance with computer, programming, or component problems. Event staff will also be available to answer questions about and clarify the challenges. We want you to have fun, learn something, and discover the amazing things you can do. We will do everything possible to make this fun and educational while keeping the playing field level. So, if you have a question, ask!

**Robot Specifications** – Competitive teams will be required to use an autonomous robot. This means robots should be programmed to run the course without any type of human intervention, so no push button commands, Bluetooth, or remotes may be utilized.

**Role of the Adult Leader/Coach** – This is the kids' event! Thank you for all the hard work you do to make these amazing experiences and learning opportunities available to 4-Hers. Now is the time to watch with pride as they once again put it all together and show their stuff. You're here to supervise and provide guidance and encouragement from your coach's box. Let's watch them shine!

**Safety** – We expect everything will go smoothly and safely. No injuries, no accidents, nothing that a hug or a bandage couldn't remedy. However, as a leader you have to be aware of your responsibilities for the care and safety of your team members, their belongings, those around you, and the facilities. It starts when you get behind the wheel and doesn't end until the last team member is safely home. There will be a lot of valuables sitting on tables around this event. The State Fair Grounds are a busy place, and there will be many people in and out of the building and spectators watching the teams work and cheering them on during the Challenge Events. Use common sense. Don't leave valuables unattended. Establish and encourage rules for your team before you arrive. Keep your team members and their belongings safe.

## SCORING OVERVIEW FOR COMPETITIVE DIVISION

Each challenge will have its own individual score sheet (found in Appendix A, B, and C). However, the challenges are not the only aspect that the teams will be scored upon. Teams will be judged according to their 4-H values, technical understanding, records, robot builds, and programing abilities.

### 4-H Values – Total possible points 1,400

Skills	Criteria				Points
	50	100	150	200	
<b>Participation</b> – All members take an active part of the team effort	Rarely	Some of the time	Most of the time	All of the time	_____
<b>Teamwork</b> – It is clear that the team works together as a unit	Rarely	Some of the time	Most of the time	All of the time	_____
<b>Communication</b> – Members take time to listen to one another and communicate issues well. Members can also communicate process with judges	Rarely	Some of the time	Most of the time	All of the time	_____
<b>Respect</b> – Team members are knowledgeable of and follow all rules involving Challenge Day. Students respectfully listen to one another, their coaches, and officials.	Rarely	Some of the time	Most of the time	All of the time	_____
<b>Integrity</b> – Coaches, parents, or other adults offer assistance, but the students are CLEARLY doing the work among themselves	Rarely	Some of the time	Most of the time	All of the time	_____
<b>Time Management</b> – Team is able to efficiently utilize time given to them to complete both the Junk Drawer and Robot missions	Rarely	Some of the time	Most of the time	All of the time	_____
<b>Sportsmanship</b> – Team members display a good attitude towards all participants and show grace in winning and losing	Rarely	Some of the time	Most of the time	All of the time	_____



**Technical Understanding and Team Notebook** – During the work period, judges will be stopping to talk with each team. They will be asking questions regarding their robot designs and programs. Also, if the team has a notebook or journal of their work, judges will look at these during this time. The notebooks can simply describe the robot build and program, but we highly encourage teams to document their entire preparation process. Notebooks can include a variety of materials: diagrams, drawings, photos, screenshots, etc. Knowing how to keep thorough records is a great skill to have and this is a great way to build it. Additionally, thorough records of your process can help with any troubleshooting that needs to be done the day of the challenge.

**Technical Understanding and Notebook Scoring Rubric – Total possible points 800**

Skills	Criteria				Points
	50	100	150	200	
<b>Questions</b> – Teams are able to answer questions from judges	Rarely	Some of the time	Most of the time	All of the time	_____
<b>Organization</b> – Records are kept in the notebook in a structured fashion that can be easily understood and followed	Rarely	Some of the time	Most of the time	All of the time	_____
<b>Neatness</b> – Notebook are easily read	Rarely	Some of the time	Most of the time	All of the time	_____
<b>Understanding</b> – Notebook provides a clear picture of the robot design process and programing process	Rarely	Some of the time	Most of the time	All of the time	_____

**Autonomous Robot Design** – Teams are expected to bring a fully constructed robot the day of the challenge. While they can use a stock build, they are encouraged to be creative and design their own robot. Along with the creativity of the build, judges will be looking at its efficiency and effectiveness. The judges will also expect the teams to be able to explain why they chose their design.

**Autonomous Robot Design Scoring Rubric – Total possible points 800**

Criteria				Points
50	100	150	200	
Design shows little to no creativity	Design has some creative aspects	Design is creative	Design is very creative	_____
Design is inefficient or uses an excessive number of parts	Design is somewhat efficient	Most of the time	All of the time	_____
Design is ineffective and does not allow tasks to be completed	Design is effective at accomplishing some tasks	Design is effective at accomplishing most tasks	Design is effective at accomplishing all tasks	_____
Team has little to no knowledge of why some parts are located as they are on the robot or what they do	Design is effective at accomplishing some tasks	Team shows moderate knowledge and understanding of their robot design	Team can thoroughly explain the design of their robot	_____



**Autonomous Robot Program** – Teams are expected to bring the program for each challenge written. The day of the challenge they will have the opportunity to tweak their program for any minor changes made to the course and to account for environmental factors that may affect the robots.

**Autonomous Robot Program Scoring Rubric – Total possible points 1,000**

Criteria				Points
50	100	150	200	
The program is disorganized	The program is somewhat organized	The program is organized	The program is logically organized	_____
Program shows little to no creativity	Program has some creative aspects	Program is creative	Program is very creative	_____
The program is inefficient – uses an excessive number of commands	Program is somewhat efficient at completing tasks	Program is efficient	Program is very efficient	_____
The program is ineffective	Program is effective at completing some tasks	Program is effective at completing most tasks	The Program can complete all tasks	_____
Team is unable to describe what the program does or why commands were chosen	Team can describe some of the pieces of the program and why they were chosen over other programming commands	Team can describe the entire program and explain why most of the commands were chosen	Team can describe the entire program and explain why all pieces were chosen	_____

**AWARDS FOR COMPETITIVE DIVISION**

Award	Description
Clover Award	Team notable for exemplarity demonstration of 4-H values
4-H Engineer Award	Top scoring team from all areas
Autonomous Robot Award	Top scoring team for the autonomous robot challenges
Junk Drawer Award	Top scoring team for the junk drawer robot challenge

**4-H ROBOTICS CONTACT INFORMATION**

**Christine Wood – Robotics Committee Advisor**

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Please contact us with any questions or concerns.

# APPENDIX A – ADVANCED AUTONOMOUS ROBOTICS CHALLENGE

**The challenge includes a scenario description and a diagram with specific measurements for each part of the course.**

## CHALLENGE 2 — FIRST ORDER RAID!

### Scenario – Intermediate

Begin Encrypted Transmission: We are beginning our attack on the First Order’s secret base. In order for our ground troops to safely land, we must remove the turbolaser towers that are protecting the entrance. There is also an area to the north that contains a number of fuel pods located within a container area. If you can move those fuel pods into the drop off zone a transport ship will be there to collect them and we can use them to help our Resistance Starfighters. End Encrypted Transmission.

Read the mission below to know your full job description.

### Mission (Figure 1)

1. Your mission goal is to score as many points as possible within the 2 minutes time limit.
2. Remove turbolaser towers and bridges (Knocking them over is sufficient and they may fall in any direction)
3. For every fuel pod that you place in the drop off zone you will receive 50 points. For every fuel pod moved outside of container area and not into the drop off zone -50 points. Blocks that are left in the container area will not have a bonus or subtraction in points.
4. The mission ends when either the timer reaches zero or your robot returns to the start location.
5. Your team will get one attempt to accomplish the mission.







### Scoring

Task	Possible Points	Max Points
Begin with Robot in Start Location	100	100
Move containers to drop off zone	50 per container	300
Knock over free standing towers	100 per tower	900
Cause bridges to Collapse	50 per bridge	200
Complete course with .01-30 Seconds Remaining	100	100
Complete course with 30.01-60 Seconds Remaining	200	200
Complete course with 60.01+ Seconds Remaining	300	300
(Take best time bonus if applicable)		
Fuel Pods Moved Out of Container Zone and not into Drop Off Zone	-50 per material	-300
Touching or Redirecting Robot (per occurrence)	-200	-200
Return to Start Location before time expires	100	100
	<b>Max Points Possible</b>	<b>2100</b>

\*Every human assist of the robot will deduct 5 points from final score

\*Sr. Division Teams will be timed.

**Challenge Dimensions:**

-  Drop Off Zone (past the line)
-  Fuel Pod 3" Sphere
-  Tower 2x2x6
-  Bridge 1/2"x 1"x 6"
-  Sheer Cliff 2'x2'x4"
-  Start Area 1'x1'

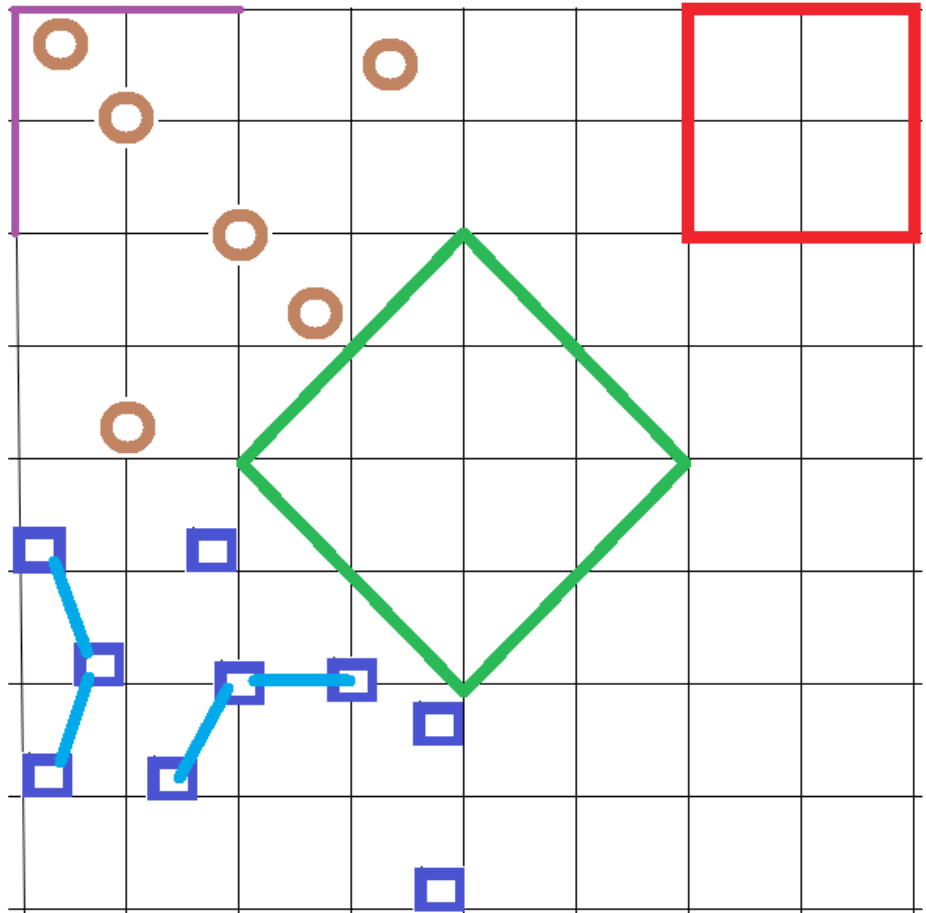


Figure 1  
\*Grid is 6 in. squares

# APPENDIX B – COMPETITIVE AUTONOMOUS ROBOTICS CHALLENGES

*Each challenge includes a scenario description and a diagram with specific measurements for each part of the course.*

## CHALLENGE 1 — STARKILLER BASE TRENCH RUN

### Scenario – Intermediate

Before our attack on the Starkiller Base, we have been able to sneak you onto the planet. However, we can only risk you being on the planet for 3 minutes before you are detected. We have a list of tasks for you to accomplish and it is your goal to get as many of them done as possible. There is a canyon separating your landing zone from two of our objectives. Luckily, Bothan spies were able to mark a path that will safely lead you through the canyon. Good luck. May the force be with you!

### Mission (Figure 2)

- Your mission objective is to complete as many tasks as possible within your 3 minute time frame. Those tasks are:
  - Press the call button
  - Follow the line through the canyon (top to bottom)
  - Follow the line through the canyon (bottom to top)
  - Disassemble the tower located at the bottom of the board
  - Deliver the dish part of the tower to the storage location
  - Collect a sample rock from the bottom of the board
  - Deliver the sample to the lab location
- If you complete at least three of the above tasks and return to the Start Box, the points for each task you complete will be doubled.
- The call button is considered to be pushed if some part of the robot comes to rest on the button for at least 1 second.
- In order to score points for either successfully delivering the rock sample or the tower dish, the object must be placed completely within its drop off zone.
- A line sensor may be used to make it through the canyon but does not have to be used
- The mission ends when either the timer reaches zero or your robot returns to the start location.
- Your team will get one attempt to accomplish the mission.

### Scoring

Mission Objectives	Maximum Possible Points
Press the call button	200
Follow the line through the canyon from top to bottom	300
Disassemble the Tower	400
Deliver Dish from Tower to Storage Zone	700
Collect a Sample (successfully pick up a rock)	200
Deliver Sample to Lab Zone	500
Follow the line through the canyon from bottom to top	300
2x Bonus for Completing 3 Mission Objectives and Returning to Start Box	2x Total Points
Additional Points Available	
Start in the Start Box (Launchpad)	100
Return to Start Box (Launchpad)	250

\*Every human assist of the robot will deduct 5 points from final score

\*Sr. Division Teams will be timed, the top time will receive an additional 10 points

### Challenge Dimensions 4'x8'

- Each Grid Represents 6"
- Squares Containing Cliffs will have a 6" vertical face. These squares will have some percentage of them covered by a cliff.
- The black line is a flat line that runs the length of the canyon
- The blue and red box is a flat surface

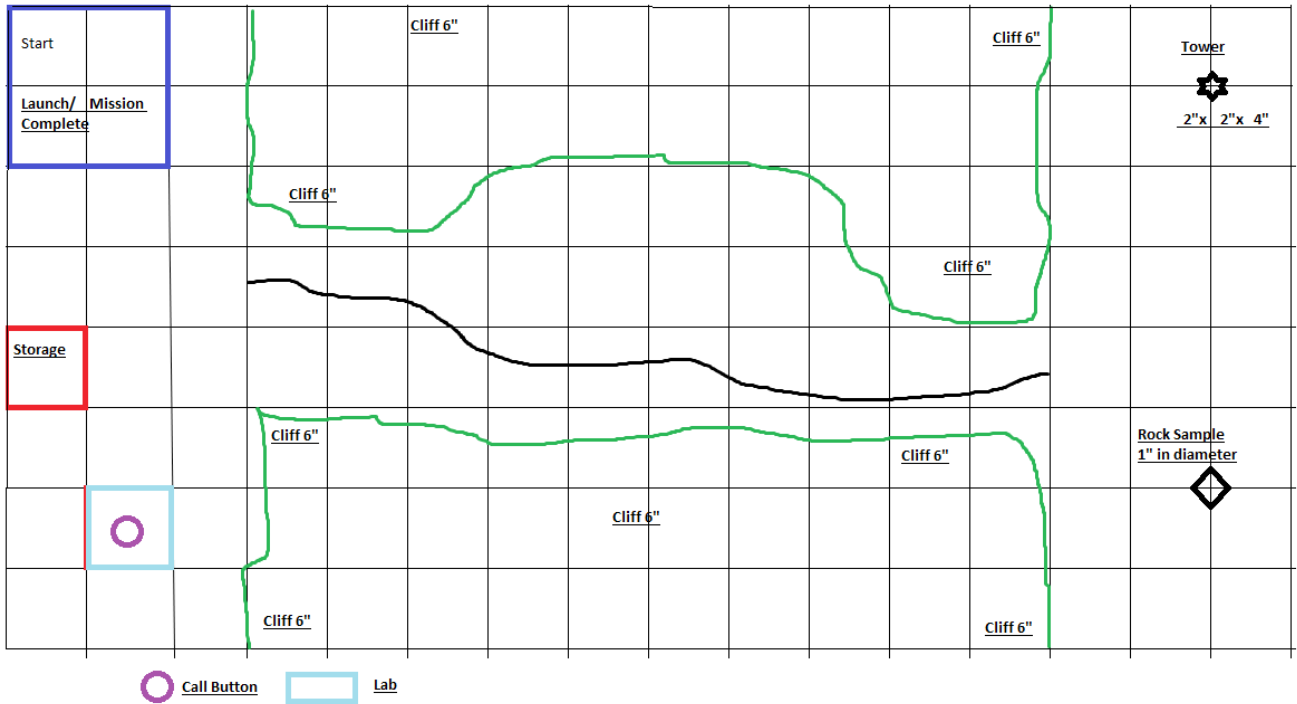


Figure 2  
\*Grid is 6 in. squares

## CHALLENGE 2 — RESISTANCE OUTPOST REPAIR

### Scenario – Intermediate

One of the Resistance’s outposts has been attacked by the First Order. It is up to us to try and help repair it as much as possible. We only have three minutes to complete the tasks assigned for us. We don’t need to complete all of them, but if we at least get three done and return to our starting position the outpost will be greatly helped! Good luck. May the Force be with you!!

### Mission (Figure 3)

1. Your mission objective is to complete as many tasks as possible within your 3 minute time frame. Those tasks are:
  - a. Push the Fuel Pod off the edge of the board
  - b. Pick up the P1 Balls
  - c. Deliver the balls to the D1 drop off zone
  - d. Pick up the Red (R1P) and/or Green (G1P) Crates
  - e. Deliver the Red Crate to R1D and/or the Green Crate to G1D
  - f. Set up fallen tower
2. If you complete at least three of the above tasks and return to the Start Box, the points for each task you complete will be doubled.
3. Balls must be fully within the drop off zone in order to be scored.
4. Touching or delivering the Blue crate will result in a deduction of points.
5. The mission ends when either the timer reaches zero or your robot returns to the start location.
6. Your team will get one attempt to accomplish the mission.

### Scoring

Mission Objectives	Points
Push fuel pod off the edge of the board	200
Pick up the balls in room 1	100 per ball picked up
Deliver balls from room 1 to drop off zone	100 per ball delivered
If all four balls are successfully delivered	200 bonus
Pick up the red and/or green crate	200 per crate
Deliver red and/or green crate to correct drop off zone	200 per crate
Pick up blue crate	-200
Deliver blue crate	-200
Set up the fallen tower	1000
2x Bonus for Completing 3 Mission Objectives	2x Total Points
<b>Additional Points Available</b>	
Start in the Start Box (Launchpad)	100
Return to Start Box (Launchpad)	250

\*Every human assist of the robot will deduct 5 points from final score

\*Sr. Division Teams will be timed, the top time will receive an additional 10 points





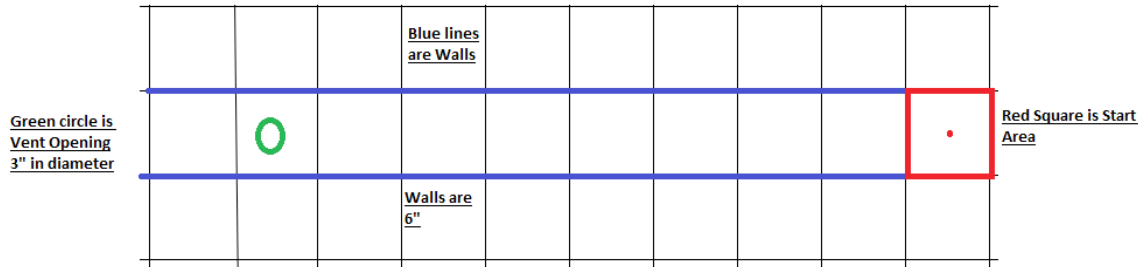
# APPENDIX C – JUNK DRAWER ROBOTICS CHALLENGE

## CHALLENGE — STAY ON TARGET

Your ship must successfully run a trench run to disable the Death Star. You only have two minutes to get your torpedo into the vent pipe. Time is running out and if you take too long you will be unable to complete the mission.

### Challenge Dimensions 4'x8'

- Each Grid Represents 6"



### Things to keep in mind:

1. You may only use materials provided in the Junk Drawer
2. You may choose anywhere in the start area to start your robot
3. If your robot fails to move, stops, tips over, or gets stuck, you may rescue your robot and attempt to fix the problem, but your robot will incur a 'touch penalty'
4. A rescue is defined as any time any member of the team touches any part of the robot after time has started
  - a. Touch Penalty: If your machine just needs a little nudge or wiggle to continue on its way, but you don't want to do a restart, you can take a touch penalty instead.
5. Restarts: If your machine fails to start, gets stuck, tips over, goes astray or needs to be reoriented, moved or in any other way rescued, you may attempt to fix the situation and restart your machine, but
  - a. Your timer will restart the clock 30 second clock but not the overall running clock.
6. The playing area may not have anything affixed to it from your junk drawer.
7. Your machine must take a minimum of 5 seconds and a maximum of 30 seconds to complete the challenge
8. You may place your machine anywhere you like in the start area, and it can move (or not) in any direction or for any distance.
9. The countdown will not begin until the judge says "Go".
10. A round is complete when the projectile lands in the vent opening and a team member declares, "Done!" or when 30 seconds have elapsed since your timer started the clock, whichever comes first.
11. If restarts force an overall time of 2 minutes the round will be immediately over and no more points can be earned.
12. Only two members of your team may be in the competition area during the round. They must remain behind or to the side of your machine.
13. Quantities of materials in each team's junk drawer are identical
14. A few supplies are limited to the number provided in the kit, however you are permitted to request more of any item. If such requests can be granted without creating an unfair advantage, they will be
15. Make requests for additional supplies to the technical advisors
16. Report broken motors and dead batteries to technical advisors for replacement
17. Your team will get one attempt to accomplish the mission.

## Scoring

Task	Possible Points	Points Earned
Landing in the Vent Opening	500	
Landing in the Vent Opening on First Attempt	200	
Slow Time (after 5 seconds team earns +10 point per second Ex. 22 seconds = 220 points)	30	
Touching Penalty	-50	
Restart Penalty	-20	

## Junk Drawer Robot Design / Engineering – Points 800 (Jr. level) or 1000 (Sr. level)

Criteria				Points
50	100	150	200	
Design shows little to no creativity	Design has some creative aspects	Design is creative	Design is very creative	_____
Design is inefficient or uses an excessive number of parts	Design is somewhat efficient	Design is efficient most of the time	Design is efficient all of the time	_____
Design does not perform the given task	Design partially performs the given task	Design is effective at performing the task	Design performs task exceedingly well	_____
Team has little to no knowledge of why some parts are located as they are on the robot or what they do	Team shows minimal knowledge of the robot design	Team shows moderate knowledge and understanding of their robot design	Team can thoroughly explain the design of their robot	_____
Team spent more than 10% over their budget*	Team spent more than their budget, but was less than 10% over*	Team was able to stay on budget but with no remaining funds*	Team was able to stay on budget with remaining funds*	_____*

\*Sr. Division teams will be required to manage a budget in addition to building their robots. This part of the rubric is for those teams only

# APPENDIX D – FORMS

## 4-H Robotics Challenge Registration - Non-competitive Divisions 4-H Robotics Challenge Registration - Competitive Divisions Equipment Check out Agreement Team Checklist

### 4-H ROBOTICS CHALLENGE REGISTRATION - NON-COMPETITIVE DIVISIONS

**DUE: AUGUST 1, 2016**

**FAX forms to:**

**Christine Wood – SDSU Extension Sioux Falls Regional Center 605-782-3294**

County \_\_\_\_\_

Team \_\_\_\_\_

Coach \_\_\_\_\_ Phone Number: \_\_\_\_\_

Email \_\_\_\_\_

Team Member	Age	4-H Member?
1.		
2.		
3.		
4.		
5.		

Division?    Novice       Advanced Autonomous (What type of robot will you be bringing \_\_\_\_\_)  
 Advanced Junk Drawer

Team \_\_\_\_\_

Coach \_\_\_\_\_ Phone Number: \_\_\_\_\_

Email \_\_\_\_\_

Team Member	Age	4-H Member?
1.		
2.		
3.		
4.		
5.		

Division?    Novice       Advanced Autonomous (What type of robot will you be bringing \_\_\_\_\_)  
 Advanced Junk Drawer

Add pages if needed!

**4-H ROBOTICS CHALLENGE REGISTRATION - COMPETITIVE DIVISIONS**

**DUE: AUGUST 1, 2016**

**FAX forms to:**

**Christine Wood – SDSU Extension Sioux Falls Regional Center 605-782-3294**

County \_\_\_\_\_

Team \_\_\_\_\_ Division \_\_\_\_\_ Bg/Jr (8-13) \_\_\_\_\_ Sr. (14-18)

Coach \_\_\_\_\_ Phone Number: \_\_\_\_\_

Email \_\_\_\_\_

Team Member	Age	4-H Member?
1.		
2.		
3.		
4.		
5.		

What type of robot/software will you be bringing? \_\_\_\_\_

Team \_\_\_\_\_ Division \_\_\_\_\_ Bg/Jr (8-13) \_\_\_\_\_ Sr. (14-18)

Coach \_\_\_\_\_ Phone Number: \_\_\_\_\_

Email \_\_\_\_\_

Team Member	Age	4-H Member?
1.		
2.		
3.		
4.		
5.		

What type of robot/software will you be bringing? \_\_\_\_\_

## EQUIPMENT AND FACILITIES AGREEMENT

For the South Dakota 4-H Robotics Challenge Event, on September 3, 2016, our club has received:

- one LEGO® MINDSTORMS® NXT robotics kit
- one LEGO® MINDSTORMS® EV3 robotics kit
- one LEGO® WeDoTM
- one laptop computer
- one trunk of junk

We understand that these materials do NOT belong to us, and that we are responsible for treating them and the State Fair Ground facilities with care and respect.

We agree to return these materials in the same condition we received them to the Equipment Table at the end of the Event. We will return all LEGO® parts to their proper holder after event staff have had the chance to take still photos of our robot. We understand that we will not be allowed to leave the building until the pieces of these kits are properly put away, any missing pieces documented, and the kits are checked by event staff.

We will report any missing, damaged, or nonfunctioning parts to the technical advisors as soon as we become aware of the problem. Technical advisors will provide replacement parts for any missing, damaged, or nonfunctioning parts for the Robotics Challenge.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Club member signatures

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Club member signatures

\_\_\_\_\_

Coach's Signature

\_\_\_\_\_

Date

**For office use only**

Robot Kit Number \_\_\_\_\_

Return inspection \_\_\_\_\_

Computer Number \_\_\_\_\_

Return inspection \_\_\_\_\_

# SOUTH DAKOTA 4-H ROBOTICS CHALLENGE

## TEAM CHECK LIST

### Did you bring all the required documentation?

- \_\_\_\_\_ Your completed Team Roster
- \_\_\_\_\_ Your signed Equipment Checkout Agreement

### Are you prepared for the challenges?

- \_\_\_\_\_ Computer(s) with platform software  
(Limit 2 per team)
- \_\_\_\_\_ Power strip and extension cable  
(To give you mobility of where to put your computer)
- \_\_\_\_\_ Robot garages  
(Two plastic containers to carry your robots during the event, to minimize damage from dropping)
- \_\_\_\_\_ Knowledge of building and programming your selected robot platform  
(Novice teams do not need experience; Technical advisors will be available to help teams)
- \_\_\_\_\_ Teamwork and engineering skills  
(Be innovative, creative, and collaborative to demonstrate your ingenuity)
- \_\_\_\_\_ Bring a great 4-H attitude!  
(This is a chance to test your skills, see what other 4-Hers are doing, and show off your hard work!))