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2018 – WIFFLE ROBOTICS

PURPOSE:

The purpose of the Robotics competition is:

- 1) Design and create a robot, within the constraints listed below that competes and wins the Robot competition described in the rules below.
- 2) The Engineer's Award will go to the team that designs, documents, and builds the best robot according to the scoring rubric

GENERAL INFORMATION:

1. A team may consist of up to 4 individual(s) working together to accomplish a common purpose.
2. Teams will be assigned a sequential number at event check-in, which will be used to call teams to the competition area. Teams not present when their number is called, will not earn points related to robotics performance.
3. The Angelina County Science & Tech Fair, George H. Henderson, Jr. Exposition Center (Expo Center), and the Lufkin/Angelina County Chamber of Commerce are not responsible for any loss or damage to materials/projects.
4. The Robot must be present to check-in.

MATERIALS PROVIDED BY SCIENCE & TECH FAIR STAFF AT EVENT:

1. Table to work on robot in the staging area.
2. Arena, wiffle balls, and pucks for competition.
3. Timer to be operated by a Science & Tech Fair Judge.
4. If electric power is needed, notify teacher to coordinate with Science & Tech Fair Staff.

SCORING GUIDELINES (See Attached Scoring Rubrics):

Robot Design

1. Robot Design:
 - a. Ability to explain robot design to judges during check-in and competition.
 - b. Teams are encouraged to develop a theme for their robot and will be scored on the basis of originality, exterior decorations, and overall appearance.



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ROBOTICS COMPETITION:

1. Safety
 - a. Participant and spectator safety is the primary concern. Any robot that appears unsafe or uncontrollable at check-in will be disqualified by Science & Tech Fair Staff prior to the competition. No competition will be attempted from an unsafe device.
 - b. Spectators will be kept a safe distance away from the competition arena (as determined by Science & Tech Fair Staff).
2. At the conclusion of competition, robots must be removed from the Expo Center. Teams are responsible for moving project from competition area to late pick-up area.

COMPETITION RULES

C1 Game Description

C1.1 The object of the game is to attain a higher score than your opponent by releasing *wiffle balls* from their chute onto the playing field and placing them in various locations in the *scoring area*. There are a total of 8 wiffle balls (7 white and 1 colored multiplier) and 2 black pucks available as scoring objects in the match.

C2 Scoring

C2.1 A wiffle ball scored in the:

Outer circle of the center scoring area is worth one (1) point.

Middle circle of the center scoring area is worth three (3) points.

Inner circle of the center scoring area is worth five (5) points.

For each remaining black puck in a team's field at the end of the match 2 points will be deducted.

A colored (multiplier) ball scored in the inner circle of the center scoring area is worth 10 points in addition to normal score.

C2.2 A bonus score of 15 points will be awarded to any team that completes the challenge with an autonomous (No user intervention) robot. In order to earn the 15-point bonus the team must score all 7 wiffle balls in either the middle or the center scoring areas.

C2.3 If a team scores 1 wiffle ball, on any level, in autonomous and later takes control of their robot (teleop) the team will earn a 5 point bonus.



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C2.4 Teams that start the match with the intent to run autonomously will not be penalized if they at any time take control of their robot, but will not be eligible for the 15 point autonomous bonus described in C2.2

C2.5 All teams will be required to sign-off on final scores.

C3 Game Setup

C3.1 8 wiffle balls (including the multiplier) will be placed in each of the ball chutes by the judges before the start of the match.

C3.2 2 black pucks will be given to each team before the match. The balls must be placed in their side of the field, but location and positioning is up to the team's discretion.

C3.3 At the beginning of a *match*, each *robot* must not exceed a volume of 18" wide by 18" long by 18" tall (45.72cm X 45.72cm X 45.72cm). An offending *robot* will be removed from the *match* at the judges' discretion. Alignment devices (templates, tape measures, lasers, etc.) that are not part of the *robot* may NOT be used to assist with the positioning of the *robot*.

C3.4 Robots will be placed in the bottom left corner (square) of their field.

C4 General Game Rules

C4.1 During a *match*, the team members must remain in their *control area* and cannot make any contact with the *field*.

C4.2 *Wiffle Balls or Pucks* that leave the playing field are considered out of play. These *pucks* will not be returned to the field during a match.

C4.3 *Team members* are prohibited from making intentional contact with any game or field object after the start of the match. The first instance of contact will result in a warning, with any following instances resulting in a disqualification.

C4.4 Scores will be calculated for all *matches* after the two minute time limit has expired. Any pucks still in motion, outside of the scoring area, after the time limit, will not be scored.

C4.5 *Robots* may not intentionally detach parts during any *match*, or leave mechanisms on the field. If a detached component or mechanism is attached to the *center scoring area* and prevents



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additional scoring of *Wiffle Balls* or *pucks*, the team will be disqualified.

C4.6 Strategies and mechanisms aimed solely at the destruction, damage, tipping over, or entanglement of *scoring areas* are not allowed.

C4.7 *Robots* must be designed to permit easy removal of *Wiffle Balls* or *pucks* from any grasping mechanism without requiring that the *robot* have power after the *match*.

C5 Game Contact

C5.1 Teams cannot break the scoring barrier threshold unless they are in the process of scoring the black pucks on the opposing team's field. Voluntary contact from both teams over the match divider is allowed with the understanding that it is the team's choice to make contact. Any damages caused by such contact are considered fair play. This contact is not considered malicious, unless the intent is to harm the opposing team rather than block them from scoring.

C6 Robot Rules

C6.1 There are specific rules and limitations that apply to the design and construction of your robot. Please ensure that you are familiar with each of these robot rules before proceeding with robot design.

C6.2 Robot can be operated via the following modes:

Autonomous: Run program without any user intervention

Tele-operated: Controlled remotely via wired or wireless communication

C6.2.1 Tele-operated control can be any wireless device(s) approved by the FCC and properly licensed by the team. (Example:4Ghz/Bluetooth/430mhz/900mhz). Teams can also use a tethered approach as long as the control wire is not used to physically move the robot during the match. The tethered wire must remain untouched by any member of the team and will be considered a part of the game field.

C6.3 Every robot will be required to pass a basic inspection before being cleared to compete. This inspection will ensure that all rules and regulations are met. Initial inspections will take place during team registration/practice time.



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- a. If significant changes are made to a robot, it must be re-inspected before it will be allowed to compete.
- b. All robot configurations must be inspected before being used in competition.
- c. Teams may be requested to submit to random spot-inspections by judges. Refusal to submit will result in disqualification.
- d. Referees or inspectors may decide that a robot is in violation of the rules. In this event, the team in violation will be disqualified and the robot will be barred from the playing field until it passes re-inspection.

C6.4 The following types of mechanisms and components are NOT allowed:

- a. Those that could potentially damage playing field components.
- b. Those that could potentially damage other competing robots.
- c. Those that pose an unnecessary risk of entanglement.
- d. Those that are designed to flip or tip over goals or other robots.

C6.5 At the beginning of any match, the maximum allowed size of a robot is 18" x 18" x 18".

- a. During inspections, robots must fit into a "sizing box" which has interior dimensions matching the above size constraints. To pass inspection, a robot must fit within the box without exerting ANY force on the box walls or ceiling (i.e., if the robot cannot be held inside the constraints by the box itself).
- b. Robots may expand beyond their starting size constraints after the start of a match.
- c. Any restraints used to maintain starting size (i.e. zip ties, rubber bands, string, etc.) MUST remain attached to the robot for the duration of the match.

C6.6 ROBOT MUST HAVE A CLEARLY MARKED MAIN POWER DISCONNECT THAT MUST REMAIN ACCESSABLE DURING THE MATCH.

C7 Chute Specs

C7.1 Top of Chute to arena side board is 33 inches (83.82cm).

C7.2 From playing field to bottom of chute is 5.62 inches (14.2748cm)



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C7.3 Chute is 3" (7.62cm) PVC pipe. Length is 2 ft. (60.96cm) with a 90 degree (1.5708 radian) sweep.

C7.4 Chute is placed on the outer portion of the arena with the center of the bottom at 39 ¼ inches (99.695cm) from left and 35 inches (88.9cm) from right.

C7.5 Pin is 5"x 3/8" (12.7cm X 0.9652cm)

C7.6 A 3" (7.62cm) nylon string will be attached to the Pin for pin removal.

C8 Materials

C8.1 NO HAZERDOUS MATERIAL ALLOWED ON THE GAME FIELD

This Includes: Non-Sealed batteries, flammable materials (including combustible engines) and/or blades.

***NOTE Lithium Polymer batteries (LiPO) will not be permitted to be charged on site without prior authorization and inspection.**

C9 Software

C9.1 Any Software can be used to program your robot! Go forth and be creative!

C10 Playing Field

C10.1 See illustrations for details and dimensions.

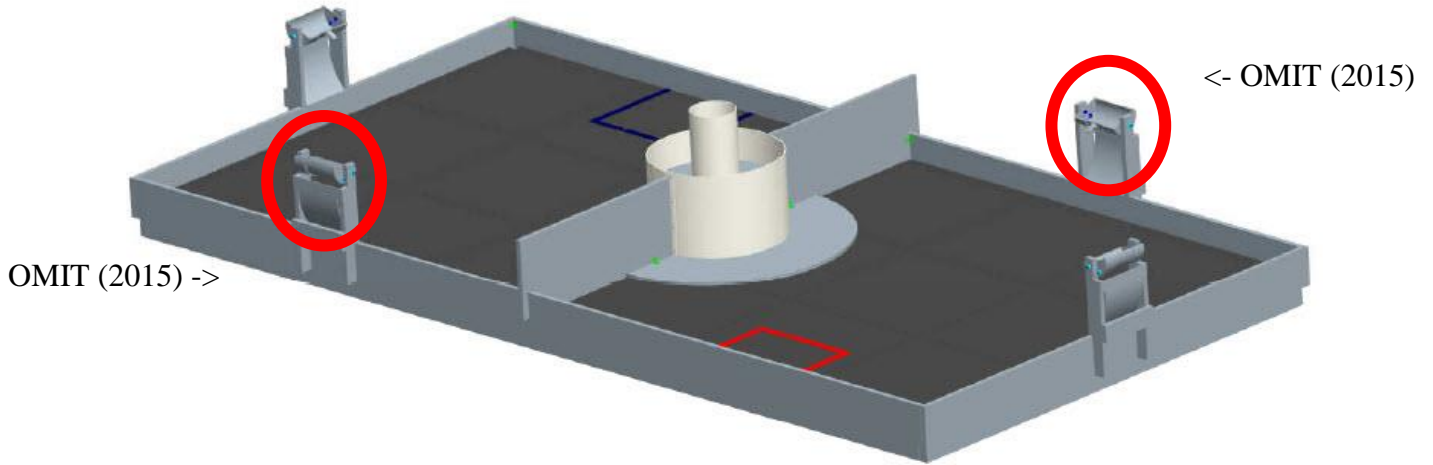
C11 Rule Changes

C11.1 Rules may change based on feedback from schools/participants.

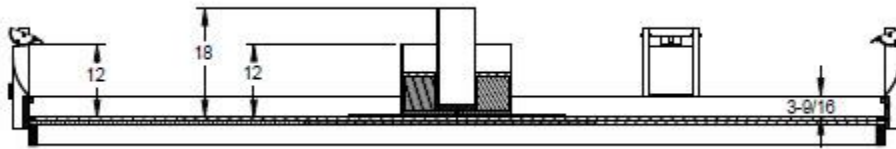
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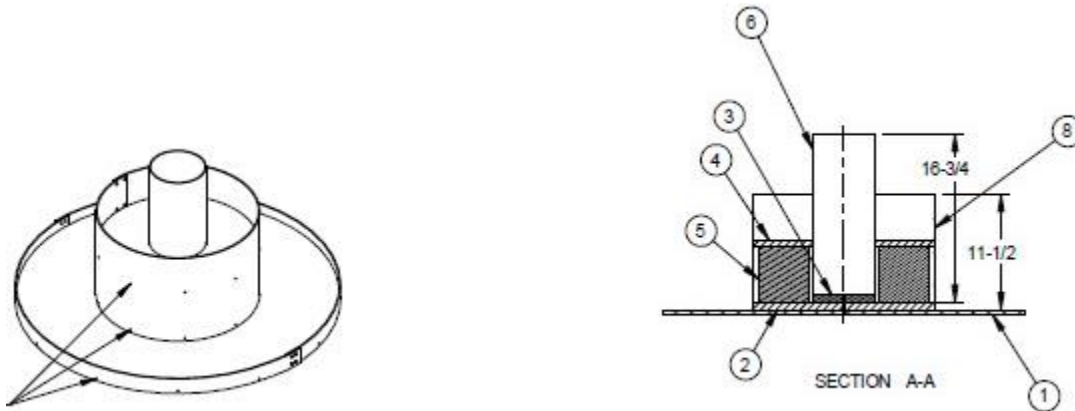
ILLUSTRATIONS:
Competition Arena



Arena Side View



Center Scoring Goal



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Wiffle Ball Chute (Side, Front, Back, Top Views)



Pin & Pin Hole





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HELPFUL RESOURCES:

- Engineering Design Process in Competition Robotics
http://www.robowranglers148.com/uploads/1/0/5/4/10542658/engineering_design_process_in_competition_robotics.pdf
- NASA Engineering Design Process
http://www.nasa.gov/audience/foreducators/plantgrowth/reference/Eng_Design_5-12.html
- The Engineering Design Process
<http://www.sciencebuddies.org/engineering-design-process/engineering-design-process-steps.shtml>

The Science & Tech Fair Staff will attempt to keep the latest version on the event website
www.angelinascienceandtech.com.

Questions and comments pertaining to the Science & Tech Fair should be directed to Susie
Cardwell via email at scardwell@lufkintexas.org.



2016 – Robotics Scoring Rubric

Team Number (Provided at Check-In):

<u>Team Member Name</u>	<u>School</u>	<u>Grade</u>
(1)		
(2)		
(3)		
(4)		

SCORING:

SAFETY (Circle One)	PASS	FAIL
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PRESENTATION AND ROBOT DESIGN		
Verbal presentation to the judges	5	
Creativity of Design & Overall Appearance	5	
PRESENTATION TOTAL	10	

Autonomous Bonus Partial (at least 1 wiffle ball)	5	
Complete Autonomous Bonus (10 wiffle balls)	15	



2017 – WIFFLE ROBOTICS

TEAM NUMBER (Provided at Check-In):

Competition Scoring

Scoring Opportunities	Available Points	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7
Outer Scoring Area (1pt)	8							
Inner Scoring Area (3pt)	24							
Center Scoring Area (5pt)	40							
Black Penalty Pucks (-2pt)	-4							
Autonomous (Bonus +15)	15							
Multiplier (colored ball, Bonus +10)	10							
TOTAL	65							