Presenters:

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Dallas County
2016 GEAR Robotics Game

- General Rules
- Team Divisions
- Match Play
- Educational Presentation
- Technical Interview
- Game Supplies
- Game Challenges

Complete game rules and challenges can be found at: http://texas4-h.tamu.edu/robotics
4-H/GEAR Robotics Game

**General Rules**

- Only one robot per team will be allowed in the tournament. Backup robots will **NOT** be allowed.
- The robot must be constructed from the Lego RCX, NXT, or EV3.
- Robots must fit in a box 12” long, 12” wide, and 12” high prior to the start of each match. Robots may expand up to 16” long, 16” wide, and 16” high after the match starts.
- All robot programming should be completed prior to the tournament. Teams are allowed to modify programs during the competition.
- Teams are required to bring their own computers, robots, and other materials as needed for match play, educational presentations, and technical interviews.

Game rules and challenges can be found at: [http://texas4-h.tamu.edu/robotics](http://texas4-h.tamu.edu/robotics)
Team Divisions

- Participants must be actively enrolled in Texas 4-H to compete.
- 4-H Age is determined as of August 31 of the current 4-H year.
- Teams will be divided into two age divisions:
  - Juniors: includes Texas 4-H juniors and intermediates (grades 3 – 8)
  - Seniors: includes Texas 4-H seniors (grades 9-12)
- Teams consists of 2-6 members within the same age division

Game rules and challenges can be found at: http://texas4-h.tamu.edu/robotics
Teams will be randomly drawn to compete in a round.
- A round consists of four 4 matches, playing on each of the 4 playing fields.
- Each match is two (2) minutes long.

Teams start with zero points at the start of match play and accumulate points based on the results of their matches.
- The lowest match score will be dropped to make up the match play score.
- The final team score will include match play plus presentation/interview score.

The top 4 teams with the highest final team scores (per age division) will advance to the final round.
- If there are fewer than 4 teams in an age division, there will be no final round for that age division.

Game rules and challenges can be found at: [http://texas4-h.tamu.edu/robotics](http://texas4-h.tamu.edu/robotics)
4-H/GEAR Robotics Game

Educational Presentation

- Theme related
- Can relate to the team’s understanding of the subject matter
- Follows 4-H Educational Presentation guidelines
- Junior Team presentation will have a maximum of eight (8) minutes in length
- Senior Team presentations will have a maximum of ten (10) minutes in length
- Score value - 75 points
- One-time presentation per tournament

Game rules and challenges can be found at: http://texas4-h.tamu.edu/robotics
Technical Interview

- Technical Interview will be restricted to engineering principles employed to build, test and redesign robot, and teamwork in preparation of all components of the contest. Programming of the robot will also be part of the technical interview.

- There is five (5) minute time limit for the technical interview.
- Score value – 75 points

Scoring of Educational Presentation and Technical Interview

- Teams can be awarded up to 150 points
- Score sheet can be downloaded from: [http://texas4-h.tamu.edu/robotics](http://texas4-h.tamu.edu/robotics)

Game rules and challenges can be found at: [http://texas4-h.tamu.edu/robotics](http://texas4-h.tamu.edu/robotics)
# 4-H/GEAR Robotics Game

## Team Game Supplies

<table>
<thead>
<tr>
<th><strong>Needed per team</strong></th>
<th><strong>Approximate Cost</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>✶ Robot – using Lego RCX, NXT or EV3</td>
<td>$300 to $400</td>
</tr>
<tr>
<td>✶ Lego Programming Software</td>
<td>$100 +/-</td>
</tr>
<tr>
<td>✶ Laptop Computer</td>
<td>varies</td>
</tr>
<tr>
<td>✶ Presentation Materials</td>
<td>varies</td>
</tr>
</tbody>
</table>

**Recommended per club/group**

<table>
<thead>
<tr>
<th><strong>Game mat – order details found on website</strong></th>
<th><strong>Order from ColdFire Signs in San Antonio</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>✶ State you want the Timewarp game mat</td>
<td>$57 to 120 - plus shipping</td>
</tr>
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</table>

**Game supplies – found at a hardware store**

$30 -45

Game rules and challenges can be found at: [http://texas4-h.tamu.edu/robotics](http://texas4-h.tamu.edu/robotics)
4-H/GEAR Robotics Objectives

- Retrieve artifacts that came through the vortex
- Deliver artifacts to containment area
- Retrieve caps for vortices
- Shutdown time circuits
- Remove debris from reactor
- Cap reactor
- Cap vortices

Game rules and challenges can be found at: [http://texas4-h.tamu.edu/robotics](http://texas4-h.tamu.edu/robotics)
Game Field Setup

Per the general rules, all scoring is tabulated at the conclusion of the match, and all items will be scored based on their final resting location. The diagram below depicts the starting positions and layout of the game pieces.

1. Random artifacts
2. Vortex containment caps
3. Holding area for artifacts
4. Time circuit breakers
5. Debris in reactor
6. Reactor containment cap
7. Time vortex

Game rules and challenges can be found at: [http://texas4-h.tamu.edu/robotics](http://texas4-h.tamu.edu/robotics)
Game Field Measurements

The picture shows two playing fields on a single table. You can create your own practice mat using these measurements and a blank sheet of vinyl. Vinyl type used by Coldfire Signs: 15-ounce smooth key banner material blockout

- All black lines are \( \frac{3}{4}'' \) in thickness
- All colored lines are \( \frac{1}{2}'' \) in thickness
- The field border is 1.50 inches.
- The dashed line denotes the dividing line between fields.
Game Pieces – Identification

Vortex Caps
Tennis balls

Vortex Cap Holder
1 ½ PVC plug
Vortices
MITRE Safety Cones
Game Pieces – Identification

Containment Area
3-Gang Electrical Box
Game Pieces – Identification

Reactor
6” Drain Grate
Game Pieces – Identification

Debris

½” PVC Compression Ring
Game Pieces – Identification

**Fuse**
- 6” Cut Off Riser

**Fuse Base**
- 1 ½” x ½” PCV Bushing
Game Pieces – Identification

Artifacts

¾” PVC Coupling
Game Pieces – Identification

Reactor Cap
Round Metal Cover
# Challenge Material List

<table>
<thead>
<tr>
<th>qty</th>
<th>item</th>
<th>last used</th>
<th>Vendor</th>
<th>Stock #</th>
<th>Price Ea.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Tennis balls</td>
<td>Up and Atom</td>
<td>Walmart</td>
<td>550441370</td>
<td>$1.76</td>
<td>$3.52</td>
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<td>1</td>
<td>1/2&quot; PVC compression coupling</td>
<td>Power Up</td>
<td>Lowes</td>
<td>23941</td>
<td>$2.68</td>
<td>$2.68</td>
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<tr>
<td>8</td>
<td>3/4&quot; PVC coupling</td>
<td>MoonPost</td>
<td>Lowes</td>
<td>23850</td>
<td>$0.27</td>
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<td>2</td>
<td>MITRE safety cones</td>
<td>Power Up</td>
<td>Walmart</td>
<td>980963</td>
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<td>$7.00</td>
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<tr>
<td>1</td>
<td>3-gang 55CU electrical box</td>
<td>Dr. Roboto</td>
<td>Lowes</td>
<td>31000</td>
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<tr>
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<td>Round Metal Weatherproof Electrical Box Cover</td>
<td>Dr. Roboto</td>
<td>Lowes</td>
<td>49218</td>
<td>$0.49</td>
<td>$0.49</td>
</tr>
<tr>
<td>1</td>
<td>6&quot; Square Outdoor Drain Grate</td>
<td>MoonPost</td>
<td>Lowes</td>
<td>118877</td>
<td>$3.65</td>
<td>$3.65</td>
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<tr>
<td>3</td>
<td>1-1/2&quot; to 1/2 PVC Bushing</td>
<td>Pyromania</td>
<td>Lowes</td>
<td>23922</td>
<td>$1.97</td>
<td>$5.91</td>
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<tr>
<td>2</td>
<td>1-1/2&quot; PVC plug</td>
<td>Pyromania</td>
<td>Lowes</td>
<td>51411</td>
<td>$1.60</td>
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<tr>
<td>3</td>
<td>6&quot; cutoff riser</td>
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<td>Lowes</td>
<td>23008</td>
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<td>5/8&quot; Velcro sticky back coins (15 pack)</td>
<td>N/A</td>
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<td>8387</td>
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<tr>
<td>1</td>
<td>3/4&quot; black electrical tape</td>
<td>N/A</td>
<td>Lowes</td>
<td>19453</td>
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<tr>
<td>1</td>
<td>1/2&quot; colored electrical tape 6pk.</td>
<td>N/A</td>
<td>Lowes</td>
<td>291607</td>
<td>$5.13</td>
<td>$5.13</td>
</tr>
</tbody>
</table>

Items in bold are **not required** if you use a pre-printed game mat.

No product endorsement implied or intended.

Total $ 42.03
4-H/GEAR Robotics Objectives

Random Artifacts
Objective: Retrieve the artifacts and bring them back to the player zone
Quantity: 8
Point Value: 5 points each
Game Elements: ¾” PVC couplings
Starting Location: Robot Zone to the left and right of the player zone

The artifacts (3/4” PVC couplings) will be randomly scattered in the robot zone areas marked by the arrows above prior to the start of the match. Random artifacts will be oriented so that they rest on their vertical orientation and should have at least one inch clearance from the inside borders made by the field markings. Each zone will contain 4 game pieces.

Teams will receive 5 points for each artifact brought back to the player zone, or delivered to the containment area. See rule DA1 for additional information on the containment area.

Total Points Possible: 40
**Deliver Artifacts**

**Objective:** Deliver artifacts to containment area

**Quantity:** 8

**Point Value:** 10 points each

**Game Elements:** ¾” PVC couplings and 3 gang electrical box

**Starting Location:** Robot Zone

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The containment area (3 gang 55cu electrical box) is placed on the field so that the open side is facing up (see diagram above for orientation). The containment area is attached to the field using 4 5/8” Velcro coins. Place one coin on each corner of the containment area.

Teams will receive 10 points for each artifact placed in the containment area.

Artifacts must fit within the inside space created by the walls of the containment area. Artifacts may not rest on the top of the walls.

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**Total Points Possible:** 80
Retrieve Vortex Caps

Objective: Retrieve vortex caps
Quantity: 2
Point Value: 10 points
Game Elements: Tennis balls, and 1 ½” PVC plug
Starting Location: Robot Zone

The vortex caps (tennis balls) will be placed on top of the 1 ½” PVC plug prior to the start of the match. The PVC plug will be oriented so that the capped side is in contact with the playing field surface.

The vortex cap holder (1 ½” PVC plug) should be attached to the playing field using a 5/8” Velcro coin. For stability purposes, you may need to use more than one Velcro coin.

Robots may only handle one vortex cap at a time and the cap may not touch the playing field at any time while being transported. Vortex caps that touch the playing field during transportation will be considered damaged and no score will be awarded for the damaged vortex cap. Referees will remove the damaged vortex caps from the field.

Once a vortex cap reaches the player zone, the vortex cap may touch the playing field surface without penalty. Should a vortex cap roll out into the robot zone, the cap will now be considered damaged.

Robots must deliver the vortex caps to the player zone before the vortex caps may be used in another challenge.
4-H/GEAR Robotics Objectives

Cap Vortices

Objective: Plug each vortex with a vortex cap
Quantity: 2
Point Value: 30 points
Game Elements: Tennis balls, and safety cones
Starting Location: Player Zone and Robot Zone

The vortices (orange safety cones) are placed on the field lying on their side with their base facing the field borders.

The vortices should be attached to the playing field using at least three of the 5/8” Velcro coins. Two should be toward the base and one towards the center where the two vortices meet. For the base area is it best to fold the Velcro along the edge of the cone.

Teams will receive 30 points for each vortex that is capped using the vortex caps.

The vortices are considered capped when the vortex caps are resting inside the vortex itself (see below). Each vortex may not have more than one cap. Additional caps in a vortex will not be scored.

Robots may only handle one vortex cap at a time and the cap may not touch the playing field at any time while being transported. Vortex caps that contact the playing field during transport will be considered damaged and no score will be awarded for that vortex cap.

Total Points Possible: 60
4-H/GEAR Robotics Objectives

Shutdown Time Circuits
Objective: Remove fuses in order to shut down the time circuits
Quantity: 3
Point Value: 25 points
Game Elements: 6” PVC cut-off riser and 1 ½” x ½” PVC bushing
Starting Location: Robot Zone

The fuse base (1 ¾” x ⅜” PVC bushing) will be oriented so that it rests in a vertical position with the hexagonal edge at the top. The fuse base should be attached to the field using at least 3 5/8” Velcro coins.

Prior to the start of the match, the fuses (6” cut-off risers) should be inserted into the fuse base so that the hex portion of the riser is resting on the top of the fuse base.

Teams will receive 25 points for every fuse removed and brought back to the player zone.

Teams must retrieve the vortex caps and cap the vortices before shutting down the time circuits. Completing this task out of sequence will result in a 0 score for this game element.

Robots may not carry more than two fuses at a time. Carrying more than two fuses will result in a 10 point penalty.

Total Points Possible: 75
Debris in Reactor

Objective: Remove debris from reactor
Quantity: 1
Point Value: 15 points
Game Elements: 6” Square Outdoor Drain Grate, and 1/2” PVC compression coupling
Starting Location: Robot Zone

The reactor (6” square drain grate) is placed on the field so that the grate area is contacting the playing field surface. The reactor should be attached to the field using at least 4 5/8 Velcro coins (one in each corner).

The debris (1/2” PVC compression coupling) is placed inside the reactor and it is oriented in a generally vertical orientation. The debris should be placed so that it is as close to center inside the inner circle of the reactor.

Teams will receive 15 points for retrieving the debris and delivering it to the player zone.
Cap Reactor

Objective: Retrieve the reactor cap and place it on top of the reactor

Quantity: 1

Point Value: 15 points

Game Elements: 6" Square Outdoor Drain Grate, and Round Metal Weatherproof Electrical Box Cover

Starting Location: Robot Zone

The reactor cap (Round Metal Weatherproof Electrical Box Cover) is placed on the field so that the raised area in the middle is in contact with the playing field (see below).

Teams will receive 15 points for capping the reactor.

The reactor cap should be placed on the reactor so that the raised area is within the inside circle of the reactor.

Total Points Possible: 15
Objectives Recap

_teams will have two (2) minutes to accomplish as many challenges as possible._

_teams will have four (4) rounds to score as many points as possible, with the their lowest scoring round being dropped._

_teams will have four (4) rounds to score as many points as possible, with the their lowest scoring round being dropped._

_teams will have four (4) rounds to score as many points as possible, with the their lowest scoring round being dropped._

_teams will have four (4) rounds to score as many points as possible, with the their lowest scoring round being dropped._

Teams will have two (2) minutes to accomplish as many challenges as possible.

Robots MUST be designed, built, and programmed prior to attending a competition.

Teams will have four (4) rounds to score as many points as possible, with the their lowest scoring round being dropped.

There are seven (7) game challenges to attempt, for a possible total of 305 points.

For game rules and challenge questions e-mail Derrick Bruton at d-bruton@tamu.edu

A complete set of 4-H adapted general rules can be found at: http://texas4-h.tamu.edu/robotics

Game specific rules can be found at: http://www.gearrobotics.org/

Password is: 0utt4T1m3 (first character is a zero)
4-H/GEAR Robotics Tournaments

4-H/GEAR Robotics Tournaments will be posted at [http://texas4-h.tamu.edu/robotics](http://texas4-h.tamu.edu/robotics).

Known Tournaments:
- Wichita County 4-H GEAR Robotics Invitational (April 23)
- Dallas Area 4-H GEAR Robotics Invitational (May 21 – pending location confirmation)

Clubs, Counties, and/or Districts are encouraged to host a tournament in their area. Contest support/guidance can be provided to organizers.
Thank you! Questions?