

# AgRobotics Game Design, Objectives, and Rules

In addition to this document, please refer to the respective show's website for general contest rules and eligibility. Designated livestock shows using this game format will use the set of known challenges, outlined below, as well as additional unknown challenges that will be released on the day of each contest. Each show's unknown challenges will be different than others. Teams must pre-build and pre-program their robot prior to the competition for the known challenges. On the day of the contest, time will be given to account for additional building and programming for the unknown challenges. Teams will be allowed access to the game tables during this time.

Contestants must be familiar with the study guide information. Teams may bring their own copies of the resource materials to use at their team table. No printed material or resources will be allowed at the game tables once match play begins.

## Game Theme

Native Bee Challenge

## Educational Background and Study Resources

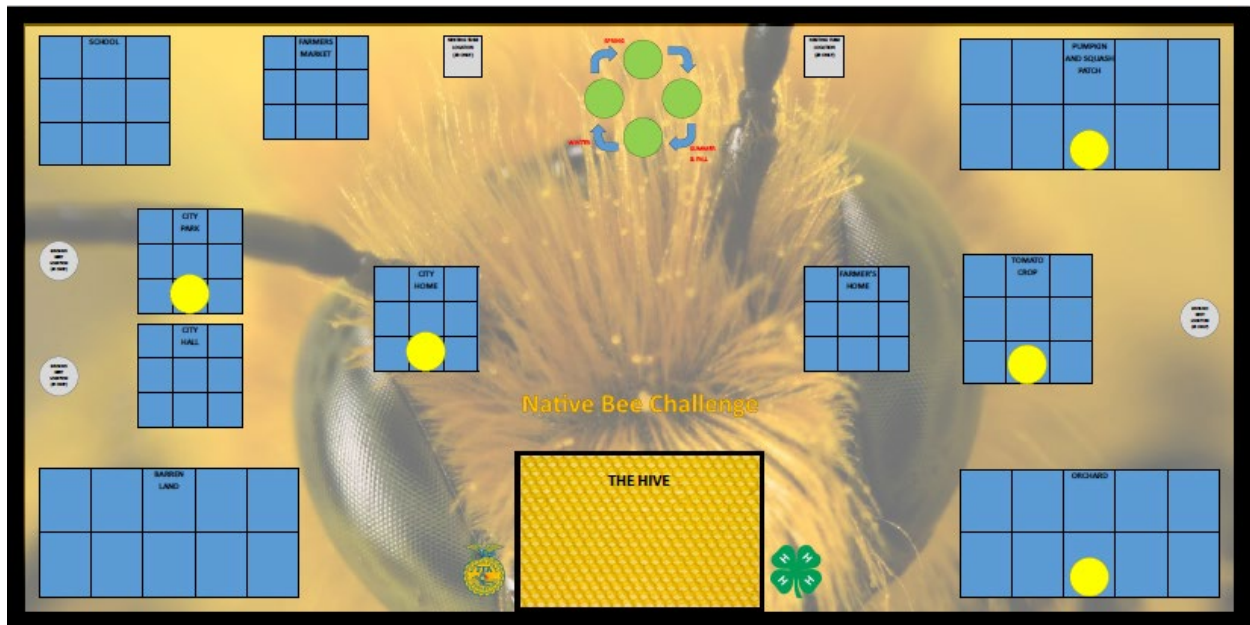
Background information and study information pertaining to the 2019-2020 AgRobotics contest can be found in the documents linked here:

<https://texas4-h.tamu.edu/projects/robotics/>

## Known Game Objectives

- Bee Life Cycle
- Crop Matching
- Pollen and Nectar Collection
- Hive & Nesting Matching
- Barren Land Restoration

## Game Mat Layout

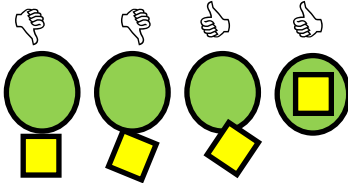


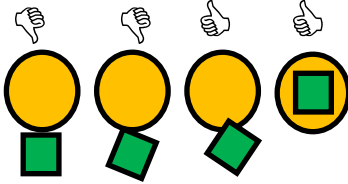
The image shown above will be available for teams to download and will be printed with a 2.5" black border. Its full dimension is 4'x8'. The border represents the same location as the 2"x4" boundary that frames the game table. In order to fit the mat inside the frame, the black border will be cut off, and thus not a part of the playable game mat at the contest. Build and program accordingly.

The area located outside THE HIVE is collectively called the GAME ZONE.

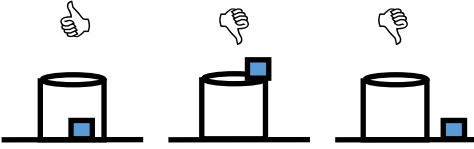
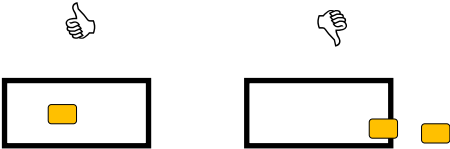
1. PLAYER ZONE
  - a) THE HIVE
2. GAME ZONE
  - a) BEE LIFE CYCLE
  - b) CITY HOME
  - c) FARMER'S HOME
  - d) CITY PARK
  - e) PUMPKIN AND SQUASH PATCH
  - f) TOMATO CROP
  - g) ORCHARD
  - h) SCHOOL
  - i) FARMERS MARKET
  - j) CITY HALL
  - k) BARREN LAND
  - l) HIVES/NESTS

## Scoring

Obj. #	Objective	Description	Point Value
1.	Bee Life Cycle	<p>There will be four foam blocks representing each of the four phases of the bee life cycle. Blocks will be placed in the RESOURCE TRAY, located outside the game table, at the beginning of the match. <b>The RESOURCE TRAY container itself cannot be used in game play.</b> Each block will have an image (from the study resource) of the life cycle adhered to it.</p> <p>Place the appropriate insect block in the proper location of the BEE LIFE CYCLE diagram printed on the game mat. The block must break the inner (green) plane of the circle. Points for this objective are awarded at the end of the match.</p> 	<p>5 points for each block correctly placed.</p> <p>10-point bonus if all four blocks are correctly placed.</p> <hr/> <p>30 points maximum</p>
2.	Crop Matching	<p>Five blocks representing the five different bees listed in the study guide will be placed in the RESOURCE TRAY, located outside the game table, at the beginning of the match. <b>The Resource Tray container itself cannot be used in game play.</b> Each block will have an image (from the study resource) of a bee adhered to it.</p> <p>Place the correct bee into each of the crop locations outlined below.</p> <p>Leafcutter bee - Placed at CITY HOME  Sweat bee - Placed at CITY PARK  Squash bee - Placed at the PUMPKIN AND SQUASH PATCH  Bumble Bee - Placed at TOMATO CROP  Mason bee - Placed at ORCHARD</p>	<p>5 points for each block correctly placed within the circle and location on the game mat.</p> <p>No points awarded if the incorrect bee block is placed in the wrong location.</p> <hr/> <p>25 points maximum</p>

		<p>Points are awarded at the time of correct placement.</p> 	
3.	<p><b>Pollen and Nectar Collection</b></p> <p>Starting location for pom poms:</p> <ul style="list-style-type: none"> <li>• yellow - squash patch</li> <li>• blue - city park</li> <li>• purple - orchard</li> <li>• red/orange - tomato</li> <li>• pink – city home</li> </ul>	<p><b>Prerequisite:</b> Objective #2 must have been awarded points (per bee/crop) before collecting pollen and nectar.</p> <p><i>Example: If the leafcutter bee is the only one properly placed in objective #2, the robot can only collect the pollen and nectar from the city home.</i></p> <p>Ten pom poms representing pollen and nectar will be randomly placed within the boundary of each zone printed on the game mat, as listed in the column to the left. Colors correspond to specific locations.</p> <p>Once the prerequisite has been met, collect pollen and nectar by any method. Pom poms must be delivered to THE HIVE. Once the pieces have been correctly returned to THE HIVE, players must store the pom poms in the RESOURCE TRAY for post-match counting/scoring. <b>The Resource Tray container itself cannot be used in game play.</b></p> <p>There are two options for collection:</p> <ul style="list-style-type: none"> <li>• Teams may drag, pull, or push the pom poms to THE HIVE. The pom poms will be considered collected once they break the plane of THE HIVE.</li> <li>• The robot may pick up the pom poms and return them to THE HIVE. The robot must break the plane of THE HIVE to collect the pom poms. Possession rule would then apply. See Rules #10-</li> </ul>	<p>5 points for each pollen and nectar piece returned to THE HIVE and stored in the RESOURCE TRAY.</p> <p>No points awarded if the prerequisite is not met.</p> <hr/> <p>250 points maximum</p>

		<p>12 for clarification.</p> <p>Once considered collected, teams may place the pom poms in their Resource Tray.</p> <p>Points for this objective are awarded at the end of the match.</p>	
<p><b>4.</b></p>	<p><b>Hive &amp; Nesting Matching</b></p> <p>PVC coupling will be adhered on the bottom of the piece and to the game mat using Velcro strips. This will affect the height of the coupling. Plan accordingly.</p> <p>Bee blocks will be located in the RESOURCE TRAY at the beginning of the match.</p> <p>Nesting tubes will be positioned horizontally.</p> <p>Ground nests will be positioned vertically.</p>	<p><b>Prerequisite:</b> Objective #2 must have been awarded points (per bee/crop).</p> <p><i>Example: Once the leafcutter bee has been placed in the CITY HOME, second leafcutter bee block (found in the RESOURCE TRAY) can then be delivered to its proper hive.</i></p> <p>There will be five blocks representing the five different bees listed in the study guide will be placed in the RESOURCE TRAY, located outside the game table, at the beginning of the match.</p> <p><b>The Resource Tray container itself cannot be used in game play.</b> Each block will have an image (from the study resource) of a bee adhered to it.</p> <p>PVC coupling, representing hives/nesting habitats, will be placed around the game table. Teams will need to deliver the correct bee block to its appropriate hive/nest. Only one bee block may be delivered per hive/nest.</p> <p>JUNIORS: Locations of hives/nests will be the same for each contest as denoted in the Game Mat Layout section above.</p> <p>SENIORS: Locations will be randomly placed on the game mat for each contest and described during contest orientation.</p> <p>Each Leafcutter and Mason bee block will be placed <b><u>completely inside</u></b> one of three nesting tubes (3" PVC coupling; horizontally oriented)</p> <div style="text-align: center;"> </div>	<p>15 points for each correctly placed bee.</p> <hr/> <p>75 points maximum</p>

		<p>Each Sweat, Squash and Bumble bee block will be placed <u>inside</u> one of two ground nests (3" PVC coupling (vertically oriented))</p>  <p>Points for this objective are awarded at the end of the match.</p>	
5.	<b>Barren Land Restoration</b>	<p>Deliver seeds to BARREN LAND area and place seeds within the planting grid. One seed should be placed in section of the planting grid. Seeds cannot be left in any type of container when placed into the grid.</p> <p>15 Seeds will be in the RESOURCE TRAY at the beginning of the match. There are more seeds available to use than will be counted for scoring. Points awarded are per grid square (10 squares total), not per seed. <b>The Resource Tray container itself cannot be used in game play.</b></p> <p>Seed must be placed completely inside the boundary of a BARREN LAND square. Seeds cannot be touching a line of the grid or outside boundary of the BARREN LAND area.</p>  <p>Points for this objective are awarded at the end of the match.</p>	<p>5 points per square of the grid that contains at least one complete seed.</p> <p>10-point bonus for placing a seed into each of the squares in the grid.</p> <hr/> <p>60 points maximum</p>
<b>ALL KNOWN CHALLENGES</b>			440 points maximum

## Game Piece List

(no product or company endorsement implied nor intended)

Game Piece	Product Description	Quantity Used in Game	Source
Game Mat	Printed vinyl	1	Sign Printing Company
Life cycle blocks for Objective #1 (color does not matter)	hand2mind 1-Inch Foam Color Cubes with Storage Tub (Set of 102)	4	<a href="#">Amazon</a>
Bee blocks for Objective #2 (color does not matter)	hand2mind 1-Inch Foam Color Cubes with Storage Tub (Set of 102)	5	<a href="#">Amazon</a>
Pom poms for Objective #3	Creativity Street Hot Colors Pom Pons, 0.5-Inch, 100-Pack (AC8114-02)	10 yellow 10 blue 10 purple 10 red/orange 10 pink	<a href="#">Amazon</a>
3" PVC coupling for Objective #4  3 oriented vertically 2 oriented horizontally	3 in. PVC DWV Hub x Hub Coupling Fitting	5	Hardware Store
Bee blocks for Objective #4 (color does not matter)	hand2mind 1-Inch Foam Color Cubes with Storage Tub (Set of 102)	5	<a href="#">Amazon</a>
Pumpkin seeds for Objective #5	Pumpkin seeds	20	Any food or seed company

## Rules of Play

1. At the beginning of the match, your team's robot must start in THE HIVE. At least one part of the robot must be touching inside the border of THE HIVE.
2. Robots must be launched from THE HIVE throughout the match. Before being launched, at least one part of the robot must be touching inside THE HIVE boundary.
3. Each match will be 3 minutes long.
4. Time begins when the announcer says "**BEGIN**" and continues until the announcer says, "**TIME**".
5. Robots must complete all challenges autonomously.
6. In addition to the official list of allowed equipment/pieces, teams may use Velcro in their build.
7. Any structures built by the team cannot be placed onto the GAME ZONE by human players but is permitted to be placed by the robot so long as it is done autonomously and is permitted by challenge rules.
8. No containers used by game officials to store game pieces can be used by the team/robot.
9. Players may retrieve their robot at any time during the match without penalty. When retrieved, the robot must return to THE HIVE. Judges will not assist in retrieval.
10. Possession is defined as a piece that is not touching the playing surface and is under the control of the robot.

11. Items in possession of a robot may be retrieved once any part/piece of the robot has broken the plane of THE HIVE boundary.
12. If the robot is in possession of a game piece in the GAME ZONE, and the robot is retrieved by the player, the game official will return the game piece(s) to its original location/state.
13. A player is not allowed to touch any game piece except when the piece is completely inside the THE HIVE boundary, OR if the robot is deemed in THE HIVE AND in full possession of a game piece(s). Once the piece is deemed inside THE HIVE, contestants may remove the game piece from the game table/robot and store it in the RESOURCE TRAY.
14. If a contestant intentionally touches a game piece in the GAME ZONE, the team will be given a 50-point penalty per occurrence. Judges will issue one warning for the first offense. In such cases, the piece will be returned to its original starting position by contest officials as quickly as possible.
15. All competing team members are allowed around the game table during competition, and any member may touch the robot if necessary.
16. Teams not competing must remain at their tables or staging area.
17. Good sportsmanship is always expected. This is crucial during practice times. Practice time on the game table may be restricted as build time progresses.
18. At the conclusion of the match, it is the responsibility of the team captain to review the score sheet with the judge and then initial at the bottom, signifying agreement of the final match score. Scores are final after this point and cannot be contested.