Robo Rage Competition Rules
“Harvest”
THEMATIC OVERVIEW

The University of Tennessee, Knoxville’s Tech CarniVOL and University of Tennessee ASME presents Robo Rage, a tournament-style robotics competition that encourages head-to-head conflict among competitor robots. In our third annual competition, “Harvest”, competitors are charged with successfully harvesting all pumpkins, before a full moon turns them into Evil Pumpkin People! Prove that you’re the best by harvesting the most of your colored pumpkins, or sabotaging other team’s efforts by destroying their harvest!

It is three minutes until the full moon rises, and your next door neighbor realizes her pumpkin patch is infected! She calls you and three other teams to ask for help in successfully quarantining the infected pumpkins before the Evil Pumpkin King transforms them all into Evil Pumpkin People! Your neighbors are all convinced the others are responsible for this infection, and want to sabotage each other’s quarantine zones. There are four different strains of pumpkins, represented by Purple, Blue, Green, and Red golf balls, and they mustn’t be allowed to remain together. Each color contains special powers that, when used together, give the Evil Pumpkin King the ability to summon them all to life! Additionally, there are 4 Mega Pumpkins, represented by racquetballs that will come to life either way, making them highly important to quarantine. Each neighbor is given the responsibility to quarantine one color and only one color of golf balls, and as many racquetballs as possible. Finally, one Evil Pumpkin King starts the match in the middle of the patch. It is imperative that this king be placed in a quarantine zone by the end of the round, and the team that does so will be handsomely rewarded.
The arena is an 8’ x 8’ plywood octagonal playing surface, raised approximately 4 inches off the ground, with short walls 1.75in tall. The main gameplay consists of the collection and removal of field components, including 40 painted golf balls, 4 racquetballs, and the *Evil Pumpkin King* (a real, small pumpkin APROXIMATELY the size of a softball) into each team’s respective quarantine zones. Two to four teams will participate simultaneously in each round. Robots will begin the round on their team’s respective ramp. A robot that is forced out of the playing field may choose to reenter using the provided ramps or by climbing any edge.

Various brackets, hinges, springs, fasteners, and other small components or adhesives may be used to help construct the arena and pillars. The playing field will be constructed such that interactions between these components and robots will be minimal. To keep the golf balls and racquetballs from moving during the field setup, small metal washers will be glued to the field surface and the field pieces will be placed on the middle hole of the washers. These will be no more than .2 inches raised, so teams who wish to employ some sort of pushing mechanism may consider not making it completely flush with the bottom of their robot. Additionally, to keep the golf balls and racquetballs from rolling down the ramps once the match starts, an approximately .5 inch lip will be provided where the ramp touches the main
playing field, as shown in the image. The lip color will indicate which team utilizes the respective starting ramp.

All surfaces (including the plywood arena and ramps, side walls, and scoring boxes) are subject to any of the following process: Sanding, Painting, and/or Gluing.

Competition organizers will construct the playing field as closely as possible to the provided specifications, but some discrepancy should be expected.

**Selected playing field approximate dimensions are provided below (inches).**

The Quarantine zones will be in-between each field entry ramp, with a small (2.75 in) tapered gap to allow the golf balls and racquetballs to be pushed through into the quarantine zones, BUT NOT the **Evil Pumpkin King**. If a
A team wishes to score the Evil Pumpkin King, they will have to maneuver it over the 2x4 side wall and drop it into the quarantine zone.

**SCORING**

At the beginning of the round, all playing field pieces are located at their respective starting positions, detailed in the image below.

Teams must collect their color of golf ball (1 point each), as many racquetballs as possible (3 points each), and the Evil Pumpkin King (7 points) and place them in their capture bin (quarantine zone) before the time runs out. If a team can score ALL of their color of golf balls IN ANY QUARANTINE ZONE, they will receive a bonus of 10 points for the successful eradication of their golf ball strain. Again, these golf balls can end up in their own quarantine zone (thus giving them a point each) AND/OR in a competitor’s quarantine zone (thus subtracting from the competitor’s score, described below). Note that the collection of field pieces must not
include intentional throwing (defined by a field piece traveling more than one foot in any direction through the air) of any components. Rolling, grabbing, pushing, collecting, and storing field components are all acceptable.

In Robo Rage “Harvest,” there are several penalties that teams will want to avoid. First, the Evil Pumpkin King (the actual Pumpkin) is an infested gourde of pure evil, and at NO time should any team break it open, either intentionally, or by accident. If the Evil Pumpkin King is split open, the very essence of all that is good in the World will die out, and the playing field will become very messy. Therefore, if the King is split open, at the judge’s sole discretion, the responsible team(s) will each face a 20 point penalty for that round. The second major penalty occurs when a golf ball of the wrong color ends up in your quarantine zone, and this results in a 3 point penalty. For instance, if you are the purple team, and a green ball enters your quarantine zone as a result of ANY action, whether an accident of your own or the maliciousness of another team (which is legal, as this is a competition after all), it will be counted as a 3 point penalty. A complete summary of all ways to score and lose points is posted below, where all items except the splitting of the Evil Pumpkin King refers to the state of each quarantine zone when the full moon rises (at the end of the 3 minute round).

<table>
<thead>
<tr>
<th>Complete Scoring Summary</th>
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</thead>
<tbody>
<tr>
<td><strong>Item</strong></td>
</tr>
<tr>
<td>Pumpkin Capture:</td>
</tr>
<tr>
<td>(your color golf ball in your capture bin)</td>
</tr>
<tr>
<td>Mega Pumpkin Capture:</td>
</tr>
<tr>
<td>(a racquetball in your capture bin)</td>
</tr>
<tr>
<td>Evil Pumpkin King Capture:</td>
</tr>
<tr>
<td>(the real softball-sized Pumpkin ends up in your bin)</td>
</tr>
<tr>
<td>Total Containment:</td>
</tr>
<tr>
<td>(all of your team’s golf balls have been quarantined among any of the quarantine zones)</td>
</tr>
<tr>
<td>Pumpkin Pollution:</td>
</tr>
<tr>
<td>(a wrong colored golf ball in your capture bin)</td>
</tr>
</tbody>
</table>
**Pestilence:**
Causing excessive damage to the **Evil Pumpkin King** -20 for responsible team(s)

If any playing field pieces leave the playing field by rolling down the ramps, a judge will quickly place them back on the field near the top of the ramp. Therefore, teams should NOT plan to maliciously break each other’s Total Containment Bonus by intentionally pushing golf balls down the ramps. It is still allowed and encouraged to maliciously score other’s golf balls in quarantine zones however. If any playing field pieces leave the playing field as a result of failed attempts to score the pieces in the quarantine zone, they will be left by the judges on the ground. Teams can collect them and place them in quarantine zones. Note that golf balls on the ground (not on the playing field or in the quarantine zone) DO NOT count toward the total containment and CAN prevent a team from receiving the 10 point total containment bonus.

The team with the most points at the end of the round wins, and advances in the tournament bracket. Because we are unsure about how many teams will be competing this year, the exact tournament style is yet to be determined, but at a minimum all teams will have a practice round and a real competition round, though it is likely each team will have several rounds of competition before eliminations occur.

**GENERAL ROBO RAGE RULES**

All robots will be impounded thirty minutes before the start of competition for safety and rule compliance inspections.

Teams whose robots are found to have minor non-compliances will have an opportunity to make corrections before competition. Judges will observe the activity to ensure that only the specified non-compliance is addressed. No other work on the robot may be conducted.

Teams will be able to access their robots 5 minutes before the beginning of their round to prepare the robot for competition. This includes activity such
as installing batteries, powering on, and testing functionality. A judge will oversee preparation activity to ensure no safety or rule violations occur.

Teams may choose one of two starting positions for their robot at the beginning of the round. Option 1 is to place the robot directly on the team’s assigned starting ramp. It is not permissible for any feature of the robot to contact the Arena surface, or otherwise extend past the starting ramp into the space directly above the arena. Similarly, no robot features may extend beyond the vertical planes defined by the left and right edges of the starting ramps. Option 2 is to place the robot on the ground at the base of the starting ramp. The robot must be placed such that it makes contact with the base of the ramp, and no features of the robot may extend beyond the vertical planes on the left and right edges of the starting ramp. The figure below supplements this description.

Once the round begins, competitors are not permitted to make contact with their robots under any circumstance. If a competitor makes contact with their robot, they forfeit the round. If the robot becomes incapacitated (i.e. damaged beyond functionality or flipped over), teams may request that a competition judge removes the robot from either the arena or “ground” (area surrounding the arena), and return it to the team. The robot may then be repaired or reoriented, and placed in the assigned starting zone to rejoin the round, time permitting. The competition clock does not stop for repairing or reorienting a robot, and other robots participating in the round may continue their activity.
Competitors may carry out any strategy to maximize their score, except actions specifically excluded by the rules. Permissible robot combat activity is limited to pushing, ramming, and lifting as a means of knocking the opponent robot off of the arena or flipping the opponent robot and rendering it immobile. Also note, any strategy that affects or damages the playing field is not allowed.

Furthermore, while robot combat activity CAN be carried out between robots on and off the Arena, a robot must be fully on the arena to interact with the scorable components. For example, a robot can NOT drive around the outside of the octagonal arena, collecting or scoring game pieces such as the pumpkin, golf balls, or racquetballs, but a robot that is not on or fully on the arena CAN complete combat activity such as pulling another robot off the arena.

A team may only interfere with their competitors by means of robot interaction. Jamming wireless connections between a competitor’s controller transmitter and robot receiver is an example of unacceptable interference.

Robots entered in this competition are subject to being damaged by another competitor’s robot. No reimbursement will be made to repair a damaged robot.

Intentional destruction of the playing field, including ramps, the main arena floor, and pillars is unacceptable and may lead to disqualification. Normal wear and tear is expected.

Safety glasses must be worn by anyone working on robots, closely observing work on robots, or standing near the course before or during competition rounds.

Unsportsmanlike conduct may result in penalties or disqualification as deemed appropriate by judges.

Additional rules and clarifications may be added in the weeks leading up to competition, and the judges will be in contact with the registered teams regarding any potential changes.
The organizers of the competition are not responsible for any injuries or destruction of property that may occur during or in preparation for this competition, such as injuries sustained during robot fabrication. Always follow safe practices when working with fabrication machinery and electrical components.

Judges reserve the right to take any corrective action, up to and including disqualification, deemed appropriate in response to any activity that jeopardizes the safety, fairness, or integrity of the competition. This includes such activities that are not necessarily listed in the above rules.

For a robot to be considered a competition participant and be eligible for prizes, it must comply with all robot specifications, climb from the starting position on the assigned ramp onto the arena on its own power, survive at least one full round (remaining mobile and controllable with available battery power at the end of the round time), scored at least one point in the competition.

**ROBOT SPECIFICATIONS**

Robots must be able to fit within a 12” x 12” x 12” cube. This is the orientation in which the robots must be placed into the starting zones and remain until the start of the round. Any expansion beyond these dimensions that occurs after the beginning of the round must be completed under the robot’s own power. Multiple robots may be used by the same team simultaneously in a round, as long as all of the robots fit within a single 12” x 12” x 12” cube.

Teams may choose to purchase commercially available robots, toys, or kits, and may choose to modify or not to modify these devices as the team sees fit for succeeding in the competition. Such devices must comply with all other rules and specifications. Note that, due to the mobile and interactive nature of this competition, all robots must be wirelessly controlled. Tethered robots will not be allowed to compete.

Robots must be constructed of “normal” engineering materials such as wood, metals, and plastics. Materials such as toxic heavy metals, hazardous
chemicals, or radioactive substances are not permitted. Judges reserve the
right to disqualify any team on the basis of questionable robot construction
material choice, not limited to examples given in this list.

Robots may not be powered by combustion, hydraulics, pneumatics, or any
other system deemed unsafe by judges. Small battery powered electric
motors and actuators are the preferred method of powering the robot. Elastic
power is also acceptable. Judges may disqualify any team on the basis of
dangerously overpowered energy systems, such as high voltage or current
electrical systems, or potentially dangerous levels of stored elastic energy.

Robot offensive or defensive systems may be designed only with the intent of
physically pushing, ramming, or grasping the opponent. Use of the following
robot weaponry will result in disqualification:

- Rotary
- Projectile
- Fluid
- Entanglement
- Cutting
- Puncturing
- Extreme temperature
- Flame
- Explosives
- Electrical
- Radioactive

If a robot is deemed unsafe to robot operators, audience, or bystanders, by
the sole discretion of the judges, it will be disqualified and not allowed to
cOMPete.
Robots must be constructed such that potentially hazardous components are protected from damage. For example, batteries must be mounted such that they are protected from potential crushing or puncturing; electrical circuitry must be sufficiently insulated to prevent arcing, etc.

CONTACT US

Website:  http://web.utk.edu/~carnivol/roborage.html

Any game rules, field specifications, or other clarifications can be directed to David Marsh. Please include “RoboRage Harvest” in the subject line. dmarsh5@vols.utk.edu