Rage in the *Mini* Cage

2022 MiniBots

Competition Rules & Regulations

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1.0 General Information

1.1 Teams

A team is defined by its name and its affiliated school. A team may be scholastic or a club. It is entirely up to the school/club to decide how the team is developed 3-6 students per team is suggested.

1.2 Competition

Only the following winners will be recognized at the annual competition: First, Second, Third place. Additional awards such as Best Engineered, Best Documentation, and Coolest Bot *may be* presented at the competition.

1.3 Resolving Problems

If there are any issues that need to be resolved, they should be brought to the attention of the Rage in the Cage Coordinator – Kirk Marshall – kmarshall@bloomsd.k12.pa.us

2.0 Registration Requirements

2.1 Eligibility

In order to be eligible to compete, teams must submit their registration packets with proper signatures and Registration fees to the event organizers at least 2 weeks in advance.

2.2 Documentation

Documentation is used to explain the design and machining processes. The documentation should include all items listed in the NRL Documentation Details available in the NRL Resource Page. Documentation must be submitted by the deadline set in the registration packet. A team that fails to provide documentation for its bot is not eligible to compete.

2.3 MiniBot Transportation

On the day of competition, once a team has checked in, the robot must remain in the team area until they are called for battle. After competing, robot should be returned to the team area until claimed by the team advisor. The MinBot must be transported to the arena in a durable box to protect others from sharp edges.

3.0 MiniBot Modifications

3.1 Weight

The MiniBot must weigh 3lbs or less to compete in the MiniBots Competition.

3.2 Robot Name, Modifications & Personalization

Teams may personalize by way of surface decoration. Paint and flat sticker type décor is permitted. Function and safety must not be affected. Team/robot logos are encouraged, but not mandatory. **The robot name must appear on the robot in at least .5" high letters (48 pt font)**

3.3 Mobility

All robots must have easily visible and controlled mobility in order to compete. Methods of mobility include:

- Rolling (wheels, tracks or the whole robot)
- Non-wheeled: non-wheeled robots have no rolling elements in contact with the floor and no continuous rolling or cam operated motion in contact with the floor, either directly or via a linkage. Motion is "continuous" if continuous operation of the drive motor(s) produces continuous motion of the robot. Linear-actuated legs and novel non-wheeled drive systems may qualify for this bonus. **There is a 100% weight bonus for non-wheeled robots.**
- Shuffling (rotational cam operated legs) **50% weight bonus**
- Ground effect air cushions (hovercrafts) **50% weight bonus**

3.4 MiniBot Control Requirements:

- Primary control and fail-safe communications to a Bot have to be via a remote radio link. Tethered control is specifically not allowed.
- A Bot may be controlled by a maximum of two Operators/Drivers *per bot.*
- A Bot must have a robust radio fail-safe that shuts off all motion-system and weapons power within one second after the remote-control transmitter is switched off, or otherwise stops transmitting. This fail-safe is required in addition to the Master Switch requirements.

- Binary (on/off) movement speed control is not allowed. Any control of the Bot speed along the ground has to be continuously variable in both forward and reverse directions.
- Any capacitors or electrical storage devices used in the system must be capable of being safely discharged without putting the students at risk at the conclusion of each match as part of the deactivation procedure.

3.5 Autonomous/Semi-Autonomous Robots:

Any robot that moves, seeks a target, or activates weapons without human control is considered autonomous. If your robot has autonomous features, contact the event organizer.

Autonomous robots must have a clearly visible light for each autonomous subsystem that indicates whether or not it is in autonomous mode, e.g. if your robot has two autonomous weapons it should have two "autonomous mode" lights (this is separate from any power or radio indicator lights used).

The autonomous functionality of a robot must have the capability of being remotely armed and disarmed. (This does not include internal sensors, drive gyros, or closed loop motor controls.) While disarmed, all autonomous functions must also be disabled.

When activated the robot must have no autonomous functions enabled, and all autonomous functions must failsafe to off if there is a loss of power or radio signal.

In case of damage to components that remotely disarm the robot, the robot's autonomous functions are required to automatically disarm within one minute of the match length time after being armed.

3.6 Batteries and Power

The only permitted batteries are ones that cannot spill or spray any of their contents when damaged or inverted. This means that standard automotive and motorcycle wet cell batteries are prohibited. Examples of batteries that are permitted: gel cells, Hawkers, NiCads, NiMh, dry cells (9V), LiFe, AGM, LiIon, LiFe and LiPoly. If your design uses a new type of battery, or one you are not sure about, please contact event organizers. Any team using LiPoly batteries are required to use Fire Retardant Lipo Charging Bags.

All electrical power to weapons and drive systems (systems that could cause potential human bodily injury) must have a manual disconnect that can be activated within 15 seconds without endangering the person turning it off. (E.g. No body parts in the way of weapons or pinch points.) Shut down must include a manually operated mechanical method of disconnecting the main battery power, such as a switch (Hella, Whyachi, etc.) or removable link. Relays may be used to control power, but there must also be a mechanical disconnect.

All efforts must be made to protect battery terminals from a direct short and causing a battery fire.

Batteries must be available for inspection and must have marking from the manufacturer that clearly identifies the type of battery. If such markings are not possible, be prepared to show another form of proof that your battery is allowed. I.E. vendor receipt, etc.

3.7 Pneumatics

Robots in this competition are **NOT** allowed to use pneumatics.

3.8 Hydraulics

Robots in this competition are **NOT** allowed to use hydraulics.

3.9. Internal Combustion Engines (ICE) and liquid fuels

Robots in this competition **NOT** allowed to use ICE.

3.10 Rotational weapons or full body spinning

Spinning weapons must come to a full stop within **30 seconds** of the power being removed.

3.11 Springs and Flywheels

Springs used in robots will use the remaining rules in this section. Safe operation, good engineering and best practices must be used in all systems.

Any springs used for drive or weapon power must have a way of loading and actuating the spring remotely under the robot's power.

Springs used for active weapons must not be loaded when the robot is out of the arena or testing area.

Springs used within switches or other internal operations are exempt from this rule.

Any flywheel or similar kinetic energy storing device must not be spinning or storing energy in any way unless inside the arena or testing area.

There must be a way of generating and dissipating the energy from the device remotely under the MiniBot's power.

All springs, flywheels, and similar kinetic energy storing devices must fail to a safe position on loss of radio contact or power.

3.12 Forbidden Weapons and Materials

The following weapons and materials are absolutely forbidden from use:

- Weapons designed to cause invisible damage to the other robot. This includes but is not limited to:
    - Electrical weapons
    - RF jamming equipment, etc.
    - EMF fields from permanent or electro-magnets that affect another robot's electronics.
- Weapons or defenses that stop combat completely of both (or more) robots. This includes nets, tapes, strings, and other entanglement devices.

- Weapons or defenses that require significant cleanup, or in some way damages the arena to require repair for further matches. This includes but is not limited to:
    - Liquid weapons. Additionally, a bot may not have liquid that can spill out when the robot is superficially damaged.
    - Foams and liquefied gasses.
    - Powders, sand, ball bearings and other dry chaff weapons.
    - Un-tethered Projectiles (see tethered projectile description in Special Weapons section)
    - Foam ablative armor.
- Heat and fire are forbidden as weapons. This includes, but is not limited to the following:
    - Flammable liquids or gases
    - Explosives or flammable solids such as: DOT Class C devices, Gunpowder / Cartridge Primers, Military Explosives, etc.
- Light and smoke-based weapons that impair the viewing of robots by an Entrant, Judge, Official or Viewer. You are allowed to physically engulf your opponent with your robot. This includes, but is not limited to the following:
    - Smoke weapons not specifically allowed in the Special Weapons section.
    - Lights such as external lasers above 'class I' and bright strobe lights which may blind the opponent.
- Hazardous or dangerous materials are forbidden from use anywhere on a robot where they may contact humans, or by way of the robot being damaged (within reason) contact humans.

3.13 Special Weapons allowed:

Tethered Projectiles are allowed, but must be no longer than 3 feet and may not cause entanglement.

4.0 Safety Rules

4.1 Safety Glasses

Safety glasses must be worn at all times when in the arena area when your bot is competing. Standard prescription glasses do not count as safety glasses. Prescription safety glasses or safety glasses designed to fit over prescription lenses are acceptable. This rule also applies to coaches and technical advisors. Safety is the responsibility of everyone. Noncompliance could result in disqualification.

All safety offenses will be handled as follows:
(1) The first safety offense from any member of the team will result in a warning.
(2) The second offense from any member of that same team will result in a 10 second controller impoundment at the beginning of your next match. This means your opponent will be able to attack your immobile robot.
(3) Violations stack so if a team has 3 infractions between matches the impoundment period would be 20 seconds.
(4) After the penalty is assessed, the team starts over meaning the next offence results in a 10 second impoundment during the next match. No additional warnings will be given.

4.2 MiniBot on Blocks

All robots not in an arena or official testing area must be raised or blocked up in a manner so that their wheels or legs cannot cause movement if the robot were accidentally turned on. Bots and weapons can only be operated in an approved safety cage.

4.3 Pit Area Restrictions

Only team members are allowed in the pit area. Team members will be required to wear the wristband provided. Guests and parents must remain in the spectator area during team competitions. There may be restrictions on the number of people allowed in the pit area, depending on the venue. Teams with over 10 students should check with the Event Organizer before a competition to find out the pit restrictions. Aisles must be kept clear of stationary objects. If needed, teams my use the area under the table for storage.

4.4 Clothing

Everyone in the pit area is required to wear appropriate clothing and this includes long pants and closed toed shoes. Long hair must be tied back and dangling jewelry is not permitted. Students, teachers or advisors without appropriate clothing will be escorted from the pit area.

4.5 Adult Supervision

When any team member is working on a MiniBot, a supervising adult (minimum age of 18 years old) needs to be present. An adult can supervise no more than 2 teams at a time. High School students, even those over 18 years of age, are not eligible to provide adult supervision. The coach is responsible for their team members at all times.

4.6 MiniBot Testing

All MiniBot drive and weapon tests need to be performed in a test box, or arena, and NOT the pit area. MiniBots and controllers must **NOT** be turned on in the pit area. When placing bot in competition arena, controller and MiniBot (with safety equipment engaged) are to be placed within arena until direction is given from referee.

4.7 MiniBot Transportation

On the day of competition, any Bot being transported outside the pit area must have provided weapon restraints in place, they must be completely deactivated and transported with all sharp edges covered.

4.8 Weapons

Under no circumstance may any body part be placed in the path of a weapon or other moveable bot part, including during installation, activation or deactivation, or removal of any safety device. A bot may never be picked up or carried by its weapon.

4.9 Weapon Restraints

Weapons must always be restrained, unless the MiniBot is in the test box or in the arena. The restraints will only be removed once the MiniBot has powered on successfully. Weapon restraints must be able to prevent the motion of the weapon.

4.10 Safety Inspector

Each competition will have a Lead Safety Inspector. This person will be responsible for inspection of each bot. This person will be the main contact for any safety related questions or comments.

4.11 Inspection

Each MiniBot must pass a visual and functional inspection before competing. Inspection involves as outlined and meets the safety requirements.

4.13 Right to Inspect/Disqualify

Event organizers reserve the right to inspect/disqualify your bot at any time during the competition. Any additions or changes to the bot must be re-inspected before competing, as well as after any significant damage during a match If event official feels a MiniBot is

unsafe for any reason and it cannot be made safe, it will be disqualified and not allowed to compete.

4.14 Match Weigh-In

All bots will be weighed at the beginning of the competition and must meet the required weight parameters.

4.15 Building Cautions

Combat MiniBot systems can be dangerous if not designed, constructed and tested properly. Damage during matches can render the bot unsafe. It is ultimately the responsibility of the bot supervisor to ensure the safety of their system.

5.0 Matches

5.1 Match Length

Each match will be 2 minutes long, unless a MiniBot is knocked out or taps out.

5.2 Tournament Placement

The placement of your MiniBot in the tournament brackets will be random. Minor adjustments may be made to ensure teams from the same school do not compete against each other in the first round.

5.3 Judging

Matches are judged on two criteria: aggression and control. If the match lasts for the entire 2 minutes, the judges will decide the winner. The winner will be the MiniBot with the judges' majority votes. There are three judges, each judge is entitled to one vote. Judges will be using a scoring card to track the match. All judges must attend training before participating at a competition or have previously served as a participant or Judge.

5.4 MiniBot Unstuck Rule

Each Bot is allowed one release during the match; this means if your Bot is stuck on the floor or under an arena rail or otherwise immobilized, the referee will stop the match, release the MiniBot without changing its position, and then restart the match.

If both competing teams' MiniBots are stuck on each other, they will be released as often as needed without changing the MiniBot's position.

5.5 MiniBot Pinning

If a MiniBot pins or traps the other MiniBot, they must release it after the referee counts 10 seconds.

5.6. MiniBot Unable to Move

If a MiniBot is unable to move during the match, the referee will start a 10 second countdown. If that Bot cannot move by the end of the countdown, it will be considered a loss, and the other MiniBot will be the winner of the match. The referee will decide whether the MiniBot shows sufficient movement. In the case of Multi-Bots, this is true if it is the "primary" MiniBot. If it is not the "primary" MiniBot, the match continues, and there is not a countdown. If both MiniBots are unable to move after the 10 second countdown, the judges will determine the winner of the match.

5.7 Tap Out

If a team wishes to stop the match at any time, they may loudly declare "Tap Out." This will be an automatic loss for that team. The other team will not be allowed to attack them after they have declared a "Tap Out."

5.8 Double Elimination

The standard competition will be a double elimination tournament. Tournament variations might occur depending on the number of robots registered.

6.0 Radio Control

6.1 Controller

The NRL recommends using a 2.4GHz type transmitter such as the Spektrum DX6, due to the corresponding receivers having SmartFail Technology. If a team is utilizing a different transmitter system for the competition, the system must meet the fail-safe protection requirements.

7.0 Rules Enforcement

7.1 Rules Compliance

In all matters of compliance with the Rules, and any applicable civil or criminal laws, the event organizers and their officials reserve the right to penalize, or disqualify a MiniBot, or to warn or, expel any team or individual from the competition.

7.2 Expelled Individual

If an individual is expelled, they must leave the premises and return any and all IDs, pit passes, etc.

7.3 Expelled Team

If an entire team is expelled, they will be asked to leave the premise and return any and all IDs, pit passes, etc. They will also need to clear their pit table.

7.4 Disqualification/Rules Enforcement

The Judge's decision on a match is final. Disqualification due to an intentional safety violation is final. Disqualification due to failure to obey event official's instruction is final.

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