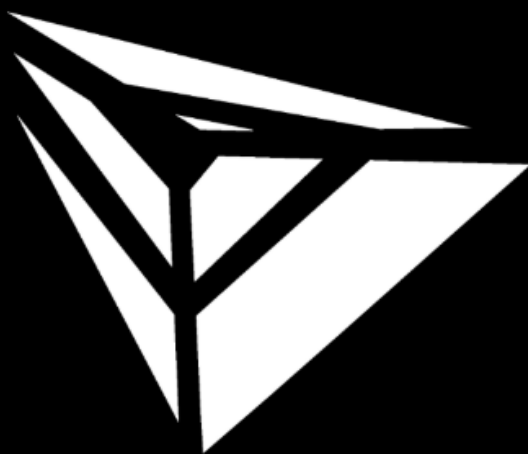
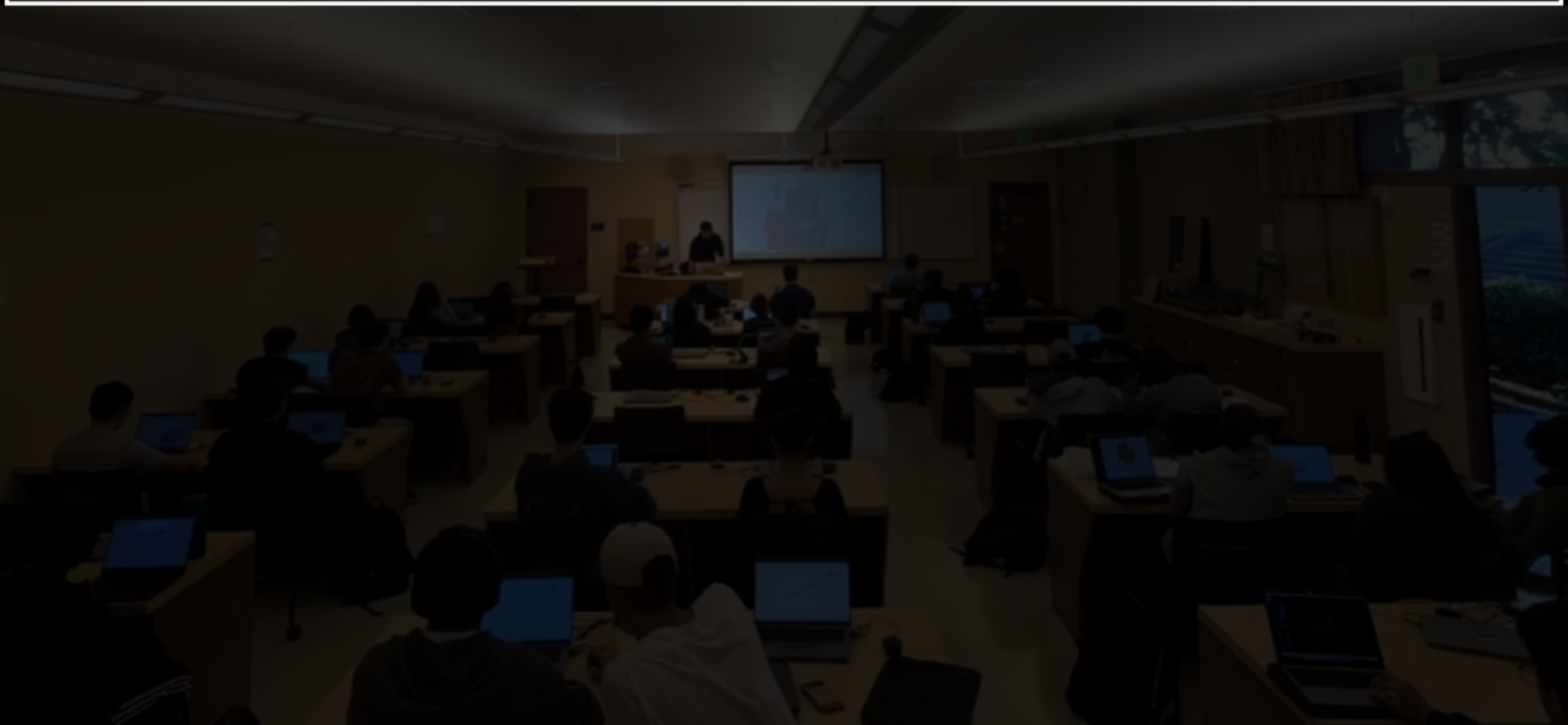




EMAMI ROBOTICS ALLIANCE





ERA CONSTRUCTION SPECS & RULESET

Based on SPARC Robot Construction standards.

1. Overview and Purpose

1.1. The SPARC Robot Construction Specifications were created to provide both builders and event organizers with an up-to-date and easy-to-implement ruleset.

1.2. The SPARC Standard Ruleset will call out areas where the rules are often altered by the events and will provide the most frequently used options for easy adaptation.

2. General

2.1. All participants build and operate robots at their own risk. Combat robotics is inherently dangerous, regardless of scale. No amount of regulation can encompass all the dangers involved. Please take care not to hurt yourself or others when building, testing, and competing.

2.2. If you have a robot or weapon design that does not fit within the categories outlined in these rules or is in some way ambiguous or borderline, please contact ERA. Safe innovation is always encouraged, but surprising the event staff with your brilliant exploitation of a loophole may cause your robot to be disqualified before it ever competes.

2.3. Each event has safety inspections. It is at their sole discretion that your robot is allowed to compete. As a builder, you are obligated to disclose all operating principles and potential dangers to the inspection staff.

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2.4. Cardinal Safety Rules: Failure to comply with any of the following rules could result in expulsion or worse, injury and death.

2.4.1. Radios that do not operate using the permitted standard outlined in this document may not be turned on at or near events for any purpose without obtaining the appropriate frequency clip or explicit permission from the event.

2.4.2. Proper activation and deactivation of robots is critical. Robots must only be activated in the arena, testing areas, or with the expressed consent of the event and its safety officials.

2.4.3. All robots must be able to be TURNED OFF in under 60 seconds by a manual disconnect (typically using a Direct Power Switch accessible from the outer case of the robot).

2.4.5. Locking devices: Moving weapons that can cause damage or injury must have a clearly visible locking device in place at all times when not in the arena. Locking devices must be clearly identified. Examples of acceptable options include neon paint, brightly colored tabs, and remove before flight tags. Locking devices must be clearly capable of stopping, arresting, or otherwise preventing the harmful motion of the weapon. Locking devices must securely affix in place on the robot such that they cannot easily come loose or fall off without intent. Unexpected runaway bots can be VERY dangerous.

2.4.6. Weapon locking pins must be in place when weapon power is applied during a robot's power-on procedure. This includes all powered weapons regardless of the power source or weight class.

2.4.7. It is expected that all builders will follow basic safety practices during work on the robot at your pit station. Please be alert and aware of your pit neighbors and people passing by.

3. Necessary Tools to Compete

(Document Actively Updated as part providers may vary, standard is not limited to specific reference purchase links within the spreadsheet)



4. Mobility

4.1. All robots must have easily visible and controlled mobility in order to compete.

Methods of mobility include, but are not limited to:

4.1.1. Rolling;

(wheels, tracks, or the whole robot)

4.1.2. Walking;

Walking 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. If you are intending to enter a non-wheeled robot in any event, contact the event as soon as possible to determine what, if any, weight bonus you will qualify for.

4.1.3. Shuffling (rotational cam-operated legs)

4.1.4. Non-Traditional

4.1.4.1. Bristle/Torque Drive:

Vibration or torque reaction of a powered system to generate motion

4.1.4.2. Gyro Walker:

Gyroscopic forces are used in conjunction with a rotating arm that tilts a portion of the robot to generate motion.

4.1.4.3. Translational Drift

4. Robot Control Requirements

4.1. Tele-operated robots must be radio-controlled or use an approved custom system as described in 4.4.3. Radio-controlled robots must use



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approved ground frequencies, typically 27/49/50/53/75/900/2400 for the United States.

4.2. Tethered control is not allowed.

4.3. Pre 1991 non-narrow band radio systems are not allowed.

4.4. Radio system restrictions for this event with corresponding weight and or weapon restrictions:

4.4.1. Radio systems that stop all motion in the robot (drive and weapons), when the transmitter loses power or signal, are required for all robots with active weapons or any robot over 12lbs. This may be inherent in the robot's electrical system or be part of programmed fail-safes in the radio. Robots weighing 1 lb or less typically require drive fail-safes.

4.4.2. All robot radio systems must have a way to change frequencies or coded channels to prevent radio conflicts. At least two frequencies or coded channels are required. Lack of extra frequencies may result in a forfeit. Digital spread-spectrum radios that use frequency hopping or automatic channel selection qualify under this rule.

4.4.3. If you are using a home-built control system or a control system not covered here, you must contact ERA and get clearance before using it.

4.4.4. Toy radio systems are sometimes allowed at events for robots up to 12 lbs with no active weapons.

4.4.5. RC systems on the AM band are sometimes allowed at events for robots up to 12 lbs with no active weapons.

4.5. This event does not require a separate power switch for the radio.

4.6. Most events do not provide reserved frequencies/channels for testing and safety.

5. Batteries and Power

5.1. The only permitted batteries are those 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, AGM,



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Li-Ion, LiFe, LiPoly, etc. If your design uses a new type of battery, or one you are not sure about, please contact ERA.

5.2. All onboard voltages above 48 Volts require prior approval from ERA. (It is understood that a charged battery's initial voltage state is above its nominal rated value.)

5.3. 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. Please note that the complete shutdown time is specified in section 2.4.3.

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

5.5. If your robot uses a grounded chassis, you must have a switch capable of disconnecting this ground.

5.6. All Robots must have a safety light easily visible from the outside of the robot that shows its main power is activated.

6. Forbidden Weapons and Materials. The following weapons and materials are absolutely forbidden from use:

6.1. Weapons designed to cause invisible damage to the other robot. This includes but is not limited to:

6.1.1. Electrical weapons

6.1.2. RF jamming equipment, etc.

6.1.3. RF noise generated by an IC engine. (Please use shielding around sparking components.)

6.1.4. EMF fields from permanent or electromagnets that affect another robot's electronics.



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6.1.5. Entangling Weapons or defenses: these are weapons or defenses that can reasonably be expected to stop drive train and/or weapon motion by being wrapped around rotating parts. This includes nets, tapes, strings, and other entangling materials or devices.

6.1.6. Weapons or defenses that can reasonably be expected to stop combat completely of both (or more) robots.

6.2. Weapons that require significant cleanup or in some way damage the arena require repair for further matches. This includes but is not limited to:

6.2.1. Liquid weapons. Additionally, a bot may not have liquid that can spill out when the robot is superficially damaged.

6.2.2. Foams and liquefied gases

6.2.3. Powders, sand, ball bearings, and other dry chaff weapons

6.3. Projectile Weapons

6.4. Heat and fire are forbidden as weapons. This includes, but is not limited to, the following:

6.4.1. Heat or fire weapons

6.4.2. Flammable liquids or gases

6.4.3. Explosives or flammable solids such as:

6.4.3.1. DOT Class C Devices

6.4.3.2. Gunpowder / Cartridge Primers

6.4.3.3. Military Explosives, etc.

6.5. 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, however .) This includes, but is not limited to, the following:

6.5.1. Smoke weapons

6.5.2. Lights such as external lasers above 'class I' and bright strobe lights, which may blind the opponent.



6.6. 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. Contact ERA if you have a question.

7. Class Specific Rules

7.1. Plastic Class LIMITED TO 1LB.

7.1.1. The spirit of these classes is to have an easy entry point for new builders and to encourage creative designs by limiting materials to plastics that are easy to work with, commonly used in 3D printers, and don't have strength characteristics common in the standard classes. Components used for structure, armor, and weapons must be 3D printed.

7.1.1. This competition uses the 1 lb (antweight) class. Robots must weigh no more than 1.0 lb and must fit within an 8 × 8 × 8 inch cube at the start of the match.

7.2. PET, PETG, ABS, PLA, PLA+, and ASA are the only materials that can be used for the chassis and weapons. No other types of plastics or materials allowed (ie. metal, carbon fiber, UHMW, etc). At their discretion, event organizers may allow additional plastics that meet the spirit of the rules. Materials that are functionally identical to PLA+ but have a different name for marketing purposes will be considered PLA+ when determining legality.

7.3. Composite and blended materials that use legal materials as a base are not permitted. Examples include, but are not limited to: Carbon Fiber PLA, Glass Filled ABS, and Flex PLA.

7.4. Non-plastic parts such as motors, electronics, axles, fasteners, and adhesives can be any material, but cannot be used in such a way to enhance the structural integrity, armor the robot, or enhance any weapon. Magnets to enhance traction or downforce are prohibited. Foam and rubber or rubber-like materials, including silicone, urethane, and TPU, are allowed for wheels and padding of electronics, provided they meet the requirements of this section. Additionally, custom cast wheels are permitted, provided they meet the requirements of this section.



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7.5. While painting robots is permitted, excessive coatings are subject to review and approval.

7.6. Robots may be disqualified at the Event Organizer's discretion if it is deemed to violate the spirit of the class. Contact ERA ahead of time if you are not sure your robot meets the above definition.

