
MINING
MAYHEM

Revision History		
Revision	**Date**	**Description**
1.0	3/24/2024	Initial Release

Contents

1.0 Introduction

What is IEEE SoutheastCon Hardware Competition?

IEEE SoutheastCon Hardware Competition is a student-centered program focused on giving college students a unique and exciting learning opportunity with robotics. Each year, teams take on a new game where they design, build, test, and program a fully *Autonomous Robot* to perform a series of tasks. The competition is held during the IEEE SoutheastCon that serves IEEE Region 3. To find out more about the conference visit https://ieeesoutheastcon.org/.

2.0 Code of Conduct

Before, during, and after the competition, we expect participants to conform to the IEEE Code of Conduct in any physical or digital space relating to the competition.
The IEEE code of conduct can be summarized as:

1. Be respectful of others
2. Treat people fairly
3. Avoid injuring others, their property, reputation, or employment
4. Refrain from retaliation
5. Comply with applicable laws in all countries where IEEE does business and with the IEEE policies and procedures

For more information check out the official document: IEEE CODE OF CONDUCT

3.0 The Competition

3.1 Overview

Team Members that engage in the IEEE SoutheastCon Hardware Competition develop Science, Technology, Engineering, and Math skills and practice engineering with hands-on projects. This section provides critical information that will help *Teams* have a fun and successful Competition Day.

3.2 Eligibility to Compete

Two types of *Teams* compete in the IEEE SoutheastCon Hardware Competition: Main *Teams* and Open *Teams*. The rest of this document and the Game Manual 2, will refer to both of these as simply "*Teams*". Both types of *Teams* must register to compete. More registration information will be posted on the IEEE SoutheastCon website, and a notification will be sent out on the IEEE SoutheastCon Discord.

3.2.1 Main Teams

Main *Teams* come from universities in IEEE Region 3. Each university can only send one Main *Team*. For a *Team* to qualify to be a Main *Team*, all of the *Team* must be undergraduate students at the university the *Team* represents. Also to be a Main *Team*, the *Team* must compete in the Design Competition, see section 7.0 for more information.

3.2.2 Open Teams

Open *Teams* have no limits or restrictions on where members can come from.

3.3 Competition Definitions

3.3.1 Overview

The following definitions and terms are used for the IEEE SoutheastCon Hardware Competition. Defined terms begin with a capital letter and are italicized throughout the manual (for example, *Robot*). Competition rules mean exactly and only what they plainly say. If a word isn't given a game definition, you should use its common conversational meaning.

Autonomous - *Robots* operate and react only to sensor inputs and commands pre-programmed by the *Team* into the onboard *Robot* control system. Human Control is not permitted.

Competition Area - The Area where all the *Fields*, Scoring tables, and other competition officials are located. Only the *Technicians* for *Teams* currently competing in a *Match* are allowed in the *Competition Area.*

Elimination Match - A *Match* during the elimination bracket used to determine the winning *Team*. *Teams* compete in a single elimination bracket of *Elimination Matches* to determine a tournament champion. A *Team* wins by scoring higher than the *Team* paired against them in the elimination bracket. Winning *Teams* continue along the elimination bracket to play other *Teams* that have won.

Field - Physical *Robot* game-playing area that consists of the border walls and everything inside of them. Information on a *Field* for a specific year will be found in that year's Game Manual 2.

Field Damage - A physical change to a *Game Element* or *Field* that affects gameplay.

Game Elements - *Game Elements* are clearly specified in Game Manual 2, but in general, they are elements designed by the *GDC* and placed on the *Field* for a *Team's Robot* to interact with to advance the game and score points.

GDC - *GDC* or Game Design Committee is a group of people who volunteer to design the game for the IEEE SoutheastCon Hardware Competition. They will have a role indicating this on Discord, and will be able to help guide you to resources. Only the *GDC* are authorized to make changes to the game rules and only through official channels. See <C00> for specifics on official information hierarchy.

Inspection - *Inspection* is a process to ensure that *Teams Robots* follow all rules and safety regulations. See Section 6.0 for more information on *Inspection*.

Launching - Propelling *Game Elements* through the air or water above the *Field* floor.

Match - A 3-minute time period where a *Team's Robot* completes challenges and scores points.

Pit Area - A space separated from the *Competition Area* where *Teams* can work on their *Robot* between *Matches*. The *Team* is provided a pit space which includes a table and a power source. Pit spaces will vary depending on the venue space. Closer to the competition, a Discord message will be sent outlining exactly what to expect in your *Pit Area*.

Practice Match - A *Match* scheduled by the tournament organizers for *Teams* to calibrate and test their *Robot* on a competition *Field*. Practice Matches will not be scored or count toward a *Team's* placement in the competition.

Qualification Match - A *Match* used to decide the *Teams* that qualify for *Elimination Matches*. *Teams* compete in three *Qualifying Matches*, only the best score of the three is counted towards advancement. Ties are broken using second and third-best scores.

Red Card - A penalty applied to a Team as a result of gameplay penalties, failure to adhere to IEEE Code of Conduct, or egregious behavior at the competition.

Referee - A *Referee* is a volunteer helping to oversee and score game *Fields*.

Robot - Any mechanism (except for *Team Game Element(s)*) that has passed *Inspection* and a *Team* places on the *Field* before the start of a *Match*. To be legal, *Robots* must comply with the *Robot* build rules in section 5.0 of this manual.

Robot Unit - A portion of the overall *Robot* that has individual *Autonomy* or self-actuation. For example, if a *Team's Robot* releases a HEXBUG onto the *Field*, that is a separate *Robot Unit*. However, if a *Team's Robot* releases a beam, that is not a *Robot* unit since it cannot self-actuate.

Team Member - A registered member of a *Team*.

Team - A collection of Mentors, Supporters, and *Team Members* registered with the IEEE SoutheastCon Hardware Competition. All *Teams* are required to register via a form sent out prior to the conference (this will get changed to a link once it is available). See section 3.2 of this document for more information about eligibility and different *Team* types.

Team Game Element - Some games allow *Teams* to bring their own game element which must follow rules outlined by GM2.

Technician - One *Team Member* representative from a *Team* that handles the *Robot* during a *Match.* This includes placing the *Robot* in the *Landing Site*, *Preloading* any applicable items, powering on the *Robot*, stopping the *Robot*, and retrieving the *Robot*.

Q&A - Official *Q&A* takes place over the course of the year on the official IEEE SoutheastCon Discord. *Q&A* answers are intended to clarify game manual rules or fix loopholes. *Q&A* answers supersede any game manual information. *Q&A* answers (from the #qna channel) or updates to the official game manuals are the only legitimate and enforceable changes to the game. See <C02> for more information on information hierarchy.

Yellow Card - A warning assigned to a *Team* as a result of gameplay penalties, failure to adhere to IEEE Code of Conduct, or egregious behavior at the competition.

3.5 Competition Rules

<C00> Information Hierarchy - Official game rules, information, and changes, will only be communicated by the GDC. Information will be proliferated by the GDC in the following locations with the following order of precedence. Higher on the list has higher precedence.

The chain of correction is:

A. Head *Referee* Decision at Competition
B. Official Q&A
C. Written rules in Game Manual 2
D. Written rules in Game Manual 1

E. Any images included in Game Manual 2
F. Any images included in Game Manual 1
G. Any other documents published by the *GDC*

<C01> Egregious Behavior - Egregious *Robot* or *Team* member behavior is not in the spirit of the Code of Conduct and will not be tolerated at the IEEE SoutheastCon. Egregious behavior includes but is not limited to, repeated and/or flagrant violation of rules, unsafe behavior or actions, and uncivil behavior towards competition personnel or event attendees. In most cases, as determined by the *Referees*, the offending *Team* will be issued a *Yellow Card* and/or *Red Card.* Subsequent violations may result in *Team* disqualification from the competition.

<C02> Referee Authority - *Referees* have final gameplay and scoring authority during the competition. Their rulings are final.

A. The *Referees* will not review any recorded *Match* replays or photographs
B. All questions about a *Match* or scoring for a *Match* must be brought forward to the *Referees* or head *Referee's* attention within 10 minutes of the end of your *Match*.
C. The Head *Referee* has the final decision at competition and is first on the chain of correction. See <C00> for complete chain of correction.
D. *Referees* will have sole discretion in assigning *Yellow Cards* or *Red Cards*.

<C03> Yellow and Red Cards - *Yellow Cards* and *Red Cards* are used to manage *Team* and *Robot* behavior that does not align with safety standards or the IEEE Code of Conduct. Yellow and *Red Cards* are not just limited to the *Competition Area.*

Egregious or repeated *Robot* or *Team* behavior at *Competition* can result in a *Yellow Card* and/or *Red Card*. A *Team* is issued a *Red Card* for any subsequent incident in which they receive an additional *Yellow Card*.

A *Red Card* causes the score of the current *Match* to be set to 0 and causes an automatic loss during *Elimination Matches*. In the case that both *Teams* in an *Elimination Match* receive a *Red Card*, both teams lose the *Match* and no *Team* is advanced. This will cause a bye for the next stage of the bracket.

<C04> Competition Area Access - Only a *Team's* singular *Technician* with an appropriate button is allowed in the *Competition Area*. Additional *Team Members* will be asked to leave the *Competition Area* immediately. *Technician* buttons are interchangeable within *Team Members* between *Matches* although only one .

<C06> Safety Glasses - All *Team* members, mentors, and their guests must wear ANSI Z87.1 certified safety glasses while in the *Pit* or *Competition Area*. Prescription glasses with ANSI Z87.1 approved side shields are also allowed.

<C07> Footwear Safety - Close-toed shoes are required for all personnel in the *Pit Area* or the *Competition Area*.

<C08> Battery Safety - Batteries must be handled safely based on their chemistry, and charged in an open, well-ventilated area.

<C09> General Safety - All personnel at the *Competition* must conduct themselves in a safe manner. Unsafe activities such as but not limited to running, skateboarding, roller skating, and/or flying drones are not allowed at any *Competition* unless allowed by game-specific rules. These and any other safety hazards that could affect *Teams,* spectators, or volunteers attending the *Competition* are not allowed at the *Competition*.

<C10> Hazardous Materials - Painting or applying harmful products, sprays, glues, or aerosols are not allowed anywhere at the *Competition*. This includes the *Pit Area. Teams* that must apply harmful products should find a safe and well ventilated area outside the *Competition* and take all safety precautions necessary when working with harmful products.

<C11> Government and Venue Requirements - *Teams* must comply with government and venue-specific requirements (for example, wearing a mask, social distancing, tornado warning procedures, etc.)

4.0 Competition Outline

Competitions pack many activities across the days of the conference. The main activities for the *Competition* are as follows:

1. *Team* check-in
2. *Robot* inspection
3. Design Judging Interviews
4. Technician meeting
5. Opening Ceremony
6. *Qualification Matches*
7. Announcement of ranking and *Teams* competing in *Elimination Matches*
8. *Elimination Matches*
9. Awards Banquet

4.1 Competition Schedule

Competition schedules will be available through the website before or at the *Competition*. *Qualification Match* schedules are created on *Competition* Day from all *Teams* that have checked in.

4.2 Team Check-In

The *Team* check-in process will take place Thursday - Friday of the week of the competition. (exact dates and times will be announced)

4.2.1 Consent and Release Forms

Each *Team Member* attending the competition must have a signed consent and release form completed by themselves or a parent/legal guardian if they are under 18. ***Team Members* cannot compete without a signed consent and release form.** More information including the form and how to fill it out will be available on the IEEE SoutheastCon website closer to event dates.

4.2.2 Team Roster

When checking in, a *Team* must provide a roster, which has the names of all the *Team Members* competing at the event, the status of their consent and release forms, and must clearly indicate a contact person for the *Team*, with their name and pronouns for *Competition* personnel.

4.2.3 Team Check-In Packets

Once checked in, the *Team's* contact person will receive their *Team* packet. *Team* packets generally include a *Technician* badge, a judging schedule, a map of the venue, and other information that is important to the *Teams*. The *Team* should review the schedule, set up their *Pit Area*, and get familiar with the venue.

4.3 Robot Inspection

Robots are required to pass *Inspection* before being allowed to compete. These *Inspections* ensure that all *Robot* rules are met. See section 6.0 for more information on *Inspection.* Inspections will take place Thursday night and all day Friday. (exact dates and times will be announced)

4.4 Design Interviews

At the IEEE SoutheastCon competition, all Main *Teams* are required to also compete in the design competition. More information about this competition can be found in section 7.0 of this document. Alongside submitting a 5-page Engineering Portfolio, each *Team* will have a ten-minute interview with a panel of judges. At the start of the interview, *Teams* will have a maximum of 5 minutes to present their *Robot* design to the judges. After the *Team's* presentation, the judges get 5 minutes to ask any questions. These interviews will be scheduled per *Team* availability on Thursday and Friday. (exact dates and times will be announced)

4.5 Technician Meeting

The Technicians' meeting takes place before the start of *Qualification Matches* and is a time when all of a *Team's* potential *Technicians* meet with the *Referees*. During this time, the head *Referee* gives a brief outline of what is expected of *Teams* and their *Technicians.* They will provide venue-specific information, such as queuing paths, and explain any signals and commands *Referees* will give during *Matches.*

4.6 Opening Ceremony

The opening ceremony is the official kickoff of the *Competition* for the *Teams*, volunteers, and spectators. During the opening ceremony, a *Competition* official or the emcee will welcome the *Teams*, and introduce the judges and the referees. Then the game will be described (usually with a video) and immediately after, the *Qualification Matches* take place. *Teams* that are scheduled in the first several *Qualification Matches* will be asked by volunteers to line up before the opening ceremonies. The *Qualification Match* schedule will be available before the start of the opening ceremony. It is the *Team's* responsibility to check the schedule and make sure they are on time for their *Matches*.

4.7 Qualification Matches

Teams are randomly assigned to *Qualification Matches*. The *Qualification Match* schedule is available before the opening ceremonies. This schedule shows the time and indicates which *Field* the *Team* will be competing on. During the *Qualification Match* timeslot, *Teams* compete in a series of rounds that will determine their ranking.

4.7.1 Calculating Scores and Ranking

Teams will play 3 *Qualification Matches*, only the highest-scoring one will be used to determine placement in *Elimination Matches.* Ties will be broken by second and third match scores. In the rare event that two *Teams* tie all three *Matches*, the final rankings will be determined by a cut-throat best-of-three rock-paper-scissors battle.

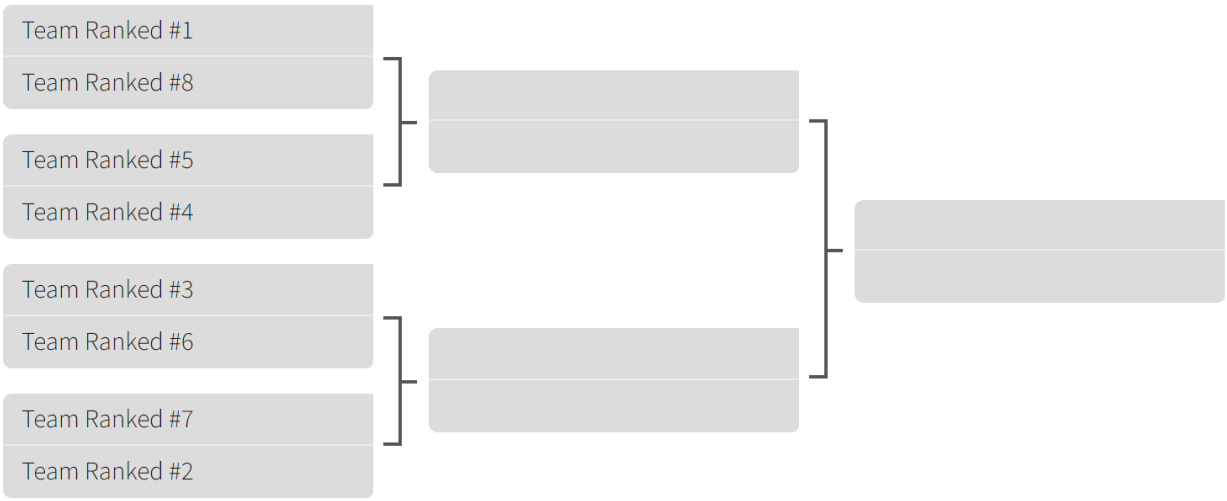
EX:
Team A scored: 130, 120, and 145 across their three *Matches*
Team B scored: 145, 125, and 110 across their three *Matches*

Team A and B have the same best score: 145, so we look at their second-best scores (130 and 125 respectively) and see that *Team* A is higher ranked.

4.8 Rankings Released and Elimination Matches

After the conclusion of all *Qualification Matches*, the emcee will announce the scores of *Teams*, and announce which 8 *Teams* are competing in *Elimination Matches*. The *Matches* are played in a seeded format where the #1 seed plays against the #8 seed, the #2 plays #7, and so on. Winners from each round will continue in that fashion until a winner is determined. Some of the *Elimination Matches* may be played at the IEEE SoutheastCon Awards Banquet.

Here is an example bracket:



5.0 The Robot

5.1 Overview

The *Robot* is a culmination of a *Team's* engineering efforts to build a system to solve challenges posed by an IEEE SoutheastCon Hardware Competition. This *Robot* should represent the efforts of the *Team* that submits it. The *Robot* must conform to a series of rules for safety, gameplay, and to encourage innovative designs. The *Robot* rules are described in section 5.2 of this document.

5.2 Robot Rules

Robot rules intend to describe the constraints for mechanical, electrical, computer, and software aspects of the *Robot*. The *Robot* rules do not specify any rules relating to the specific game or game interactions. The *Robot* rules specify constraints for the competition to be played safely, fairly, and effectively. *Teams* are required to follow all *Robot* rules and pass *Inspection* in order for their robot to be allowed to compete. If your *Team* has questions about *Robot* rules or needs clarification you should ask in the official *Q&A*.

The *Robot* rules exist to enforce a safe, fair, and engaging engineering competition environment. *Teams* should consider whether their *Robot* satisfies these constraints when determining if their designs are legal to compete with. If a *Team* is unsure they can get clarification from the official *Q&A*. General questions to answer for *Robot* legality are as follows:

- Could it injure a participant, volunteer, or spectator?
- Could it damage the *Field*?
- Could it delay the proceedings of the competition?

If the answer to any of these questions is **yes** it is **illegal**.

5.2.1 Mechanical Robot Rules

<R01> Robot Starting Size - The maximum size of a *Robot* when the *Match* starts is 12 inches (304.8 mm) by 12 inches (304.8 mm) by 12 inches (304.8 mm). Any *Game Elements* or *Team Game Elements* your *Robot* starts with may extend outside of the starting size constraint. *Robots* may expand beyond the starting size constraint after the *Match* has started.

Robot Starting Size will be tested during *Inspection* where the *Robot* must conform to the size constraint when resting on level ground without any external aides. *Robots* are allowed to apply power to actuators and move components to shrink and conform to the size constraint, however, the *Robot* must be static before the *Match* can begin. If the game permits more than one robot unit, they all must start assembled inside the *Robot* Starting Size. All *Robot* configurations the *Team* intends to use must be tested for sizing constraints during *Inspection*.

If once the *Robot* has been set up for a *Match* and a *Referee* suspects that the *Robot* is not within the size constraint, the *Referee* will request the *Technician* to make sure the *Robot* is within the size constraint. If the *Referee* still does not believe the *Robot* conforms to the constraint, the *Team* will be asked to re-*Inspect* the *Robot's* starting size before being allowed to compete in any *Matches*.

<R02> Robot Mass - *Robot* mass is constrained to 12 kilograms (~26.5 lb on Earth). This mass includes the *Robot* and all components in the *Robot's* heaviest configuration.

<R03> Start Button/Switch - If a *Team* intends to utilize a start button or switch to trigger their *Robot* to begin its *Autonomous* actions, the *Team* must follow the Start Button/Switch constraints. A start button or switch is not required if the game has rules that allow *Robots* to automatically start based on a *Referee*-controlled mechanism.

A *Team* is only allowed to use a single simple electrical button or switch as a start command for their *Robot*. The input method must be clearly marked. When instructed by the *Referee* the *Technician* can actuate the button/switch. Following the start command, the *Robot* must remain static for at least 5 seconds to allow the *Technician* to move away from the *Robot* and *Field*. Robots utilizing a Referee-controlled mechanism such as a Start LED do not have to adhere to this waiting period. Following the 5-second wait, the *Robot* can begin physical movements wherever it decides to do so. Although no physical movement is allowed during the 5-second safety period, the *Robot* is allowed to begin acting on its programming. Examples of non-physical actions include turning on an LED to indicate to the *Technician* that the start button/switch was correctly pressed.

Failure to adhere to the Start Button/Switch constraints will result in a *Yellow Card* unless the infringement compromises the competitive integrity of the *Match*, in which case a *Red Card* will be issued.

<R04> Emergency Stop - All *Robot Units* must have a clearly marked emergency stop button/switch. A *Referee* or *Technician* must be able to quickly stop the *Robot* by actuating this system. The system must be able to halt all *Robot* actions safely and quickly. In the event that a game allows for multiple independently acting *Robot Units*, each must have its own emergency stop.

<R05> Illegal Materials - The following list of materials are not allowed to be used on any *Robot* for safety or delay of match schedule concerns.

- Sharp edges or corners that could pose a threat to humans interacting with the *Robot*.
- Explosive, pyrotechnic, toxic, corrosive, or biohazardous materials.
- Flammable gasses.
- Materials that would delay *Match* schedule if released (for example, sand, loose ball bearings, a bag of coffee beans).
- Devices that electrically ground the *Robot* to the *Field*.
- Materials that are likely to damage the *Field* (for example, exposed abrasives).
- Uncontained Liquids or gels.
- Hydraulics.

<R06> Lubricants and Greases - Lubricants, greases, and other mechanism-required liquids/gels are allowed as long as they are contained and do not pose a risk of leaking onto the *Field*. The intent is to allow for necessary functional lubricants/greases in reasonable quantities. Hydraulics and hydraulic fluid are not allowed.

<R07> Pneumatics - Pneumatics are allowed provided *Teams* follow the following safety rules. *Robots* cannot contain gasses compressed over 100 psi. All pneumatic parts must have been thoroughly tested and do not raise any unresolved concerns during *Robot Inspection*.

<R08> Aerial Robots - Flying *Robots*, quadcopters, drones, balloons, or other aerial devices are not allowed unless specifically allowed by a rule in Game Manual 2.

<R09> Prompt Removal - Following the end of a *Match* the *Robot* must be able to be removed from the *Field* quickly without damaging the *Field* or *Game Elements*. *Teams* must remove their *Robot* by hand without requiring any additional tools. For example, adhesives that attach to the *Field* or *Game Elements* would not be allowed under this rule.

<R10> Robot Identification - Each *Robot* must have some source of identification as to which *Team* is associated with the *Robot*. A volunteer must be able to determine which *Team* a *Robot* is associated with from 6 feet away when the *Robot* is in *Match* start configuration. There are no

specific constraints to fulfill this *Inspection* requirement and is instead an opportunity to allow *Teams* to be creative in differentiating their *Robots*.

<R11> Field Damage - *Teams* should seek to develop their *Robots* so they are unable to damage the *Field* they are playing on. Damage to the *Field* following a *Match* will result in a *Yellow Card* or a *Red Card* at the discretion of the *Referee*. Repeated systemic *Field* damage will likely result in competition disqualification.

<R12> Launching - Launching is allowed as long as the launching does not pose a threat to nearby *Technicians*, *Referees*, or spectators. Launched projectiles should not exit the *Field*. If a *Robot* launches projectiles with velocity that a *Referee* determines unsafe, the *Team* may be instructed to improve the safety of the action or may not be allowed to launch in future *Matches*. All *Robots* that intend to launch must demonstrate their launching in *Inspection*. Game Manual 2 might contain updates to these launching requirements as required by the game.

<R13> Robot Interference - *Robots* should be expected to handle some amount of background interference given that the real world is naturally noisy and some interference can be expected. However, intentionally interfering with another *Team* is strictly illegal.

Interfering with another *Team*'s ability to engage with the competition in a fair manner is not in the spirit of friendly competition and is diluting the learning opportunities of all *Teams* involved. Interference from any source in any format that impacts another *Team*'s ability for their *Robot* to succeed will result in a *Red Card* and likely competition disqualification and removal from the *Competition Area*. Engineering competitions are best when competitors can interact in good faith and engage in friendly, productive, and educational interactions. The tournament organizers will do all in their power to support friendly competition interactions and dissuade negative interaction and interference.

5.2.2 Electrical Robot Rules

<R14> Electrical Components - Few restrictions are placed on types of electrical components that *Teams* can use to solve competition challenges. *Teams* are encouraged to think creatively and utilize whatever best fits their design. However, the safety of the *Robot* and the *Technicians* interacting with it should be considered. From an electrical perspective, *Teams* may be required to show that electrical designs are safe and do not pose a risk to participants, volunteers, and spectators.

<R15> Grounding - *Robots* are allowed to ground electronics to the *Robot* frame provided proper resistive grounding standards are followed. *Robots* are not allowed to ground the *Robot* to the *Field*, *Game Elements*, or any external components. Additionally, no elements of the *Robot* structure are allowed to be electrically charged. All electrical charges should be conveyed through properly sized electrical components.

<R16> Voltages and Currents - Flexibility is allowed in electrical power supplies, actuators, and components. However, limits are set to keep *Robots* reasonably safe. Power distribution systems must be 30V or less. All wire gauges must be sufficiently rated for the load being placed on them.

<R17> Light Sources - Light sources are allowed so long as they do not pose interference or safety issues. Lights must not be unnecessarily bright so much that they affect the ability to watch or score a *Match*. Strobe lights are not allowed. Visible light lasers are not allowed. Focused light must not pose safety risks.

5.2.3 Computer Robot Rules

<R18> Computer Devices - Any type of computational device is allowed on the *Robot* so long as the device is safely contained on the *Robot,* all processing is done on the *Robot,* and it poses no danger to other *Teams,* spectators, or *Competition Personnel*.

5.2.4 Software Robot Rules

<R19> Wireless Communication - *Robots* must act *Autonomously* which means that no outside help or human inputs can impact *Robot* decisions. *Robots* are not allowed to send or receive communication with any computers, devices, humans, or other resources that are not contained within the *Robot* when it is in starting configuration. Examples of this include but are not limited to, WiFi connection to a programmer's laptop, cellular connection to a server that does off-board processing, Bluetooth connection to a wireless controller, RC controller and receiver pairs, microphones listening for commands from the *Team*, cameras watching a human do a *Robot* controlling interpretive dance.

However, *Robots* are allowed to use wireless communication between components of the *Robot* itself. If a game allows for multiple independently acting *Robot Units*, each of the *Robot Units* can wirelessly communicate with each other. *Robots* can utilize any method to communicate between Units. It is recommended to consider that accidental interference may make wireless communication less reliable than anticipated. Additionally, *Teams* that utilize wireless devices will be required to turn them off when their *Robot* is not competing.

Any *Team* that is found to be intentionally interfering with other *Robots* through wireless interference will be subject to <R13> *Robot* Interference.

6.0 Robot Inspection

6.1 Overview

Inspection is a process for tournament organizers and *Referees* to systematically check that each *Robot* is in a legal state to be able to compete. *Inspection* is required for *Teams* to be allowed to compete in *Matches*. *Inspection* will be done prior to *Matches* and will consist of *Robot Inspection* which inspects the physical aspects of the *Robot.*

Teams are required to pass *Inspection* in order to play in the competition. *Teams* that fail the *Inspection* will be given opportunities to correct the failures and reinspect given that there is enough time before *Matches* will begin. *Teams* are encouraged to conduct a mock *Inspection* prior to traveling to the competition and attend the official *Inspection* as soon as possible to allow for the most amount of time for corrections. *Inspections* will follow the checklist provided in Appendix A.

For *Inspection* the *Robot* must be presented with all mechanisms, including all parts of each, configurations, and decorations that will be used on the *Robot* during the *Competition. Robots* are allowed to play *Matches* with a subset of the mechanisms that were present during *Inspection*. Only mechanisms that were present during *Inspection* may be added, removed, or reconfigured between *Matches.*

If *Teams* make significant changes to their *Robot* while at the competition they should have their *Robot* re-*inspected* to ensure they continue to conform to *Robot* rules. *Referees* can require *Teams* to reinspect all or part of their *Robot* if the *Referee* believes they might be infringing on a *Robot* rule.

7.0 Robot Design Challenge

All Main *Teams* must compete in the *Robot Design Challenge.*

7.1 Overview

This section provides descriptions of

- *Engineering Portfolio* requirements and recommendations
- How Judging works
- Award Criteria

Teams have spent a significant amount of time designing, building, and programming their *Robot.* For many *Teams*, the event is the reward for all their hard work throughout the season.

The Robot Design Challenge awards allow *Teams* to be recognized for strong engineering designs. These judging guidelines are a part of the roadmap to success.

All *Teams* are eligible to participate in the judging process. A *Robot*, a working *Robot*, or a *Robot* that has passed *Inspection* is not a requirement to participate in judging.

7.1.1 Key Terms and Definitions

Engineering Portfolio - The *Engineering Portfolio* is a printed document that summarizes the most important accomplishments of the *Team* in the *Team's* opinion. Guidelines on what must, should, and could be included are listed in section 7.2

Team Information - The *Team* name, a photograph of the *Robot*, a photograph of the *Team*, school or club information, *Team* city and state, etc.

7.2 Engineering Portfolio

7.2.1 Engineering Portfolio Requirements

1. To be considered for Robot Design Challenge awards, a *Team* **must** submit an *Engineering Portfolio*
2. The total number of pages for an *Engineering Portfolio* must not exceed 5 single-sided pages, plus a cover sheet for a total of 6 pages.
    a. Cover sheet may include *Team Information* and a table of contents.
    b. Cover sheet may not include other *Engineering Portfolio* content. Additional content on the cover sheet adds to the page count of the portfolio, meaning content on the last page of the portfolio will not be reviewed or considered.
    c. Pages must be the equivalent of standard A-sized paper (US 8.5" x 11" colloquially called "letter")
    d. Fonts used must be legible and a minimum of 10 points.
3. The *Engineering Portfolio* must not include links to other documents, videos, or any additional content.

7.2.2 Engineering Portfolio Recommendations

It is strongly encouraged that *Team* branding/name is at the top of each page
The body could include:

- Summary of the engineering content that includes the *Robot* design process and design decisions
- Showing Science and Math to justify decisions is highly encouraged
- Summary of the *Team Information*

Please note that the *Engineering Portfolio* is not a paper, nor should it be plain text. It is recommended to include images, graphics, and creativity from your *Team*.

7.3 Judging

During the IEEE SoutheastCon, *Teams* will take part in scheduled private interviews with a panel of judges.

Teams are asked to bring their *Robot* (if applicable) to the judge interview. This is when *Teams* will explain and show their *Robot* design to the judges.

The interview will last at most 10 minutes, during the first 5 minutes of the interview, the *Team* can present to the judges without interruption. During the last 5 minutes, the judges will ask the *Team* questions about their *Robot* and design choices.

7.4 Award Criteria

The first-place award will be given to the *Team* that reflects the best engineering design practice.

The *Team* must be able to share or provide additional information that is helpful to the judges, this could include descriptions of the underlying scientific principles and mathematics of the *Robot* design and game strategies, the designs, redesigns, successes, and opportunities for improvement.

Appendix A - Robot Inspection Checklist

Team: _____ Robot Inspection Status (circle): **Ready/Not Ready**

Check	Description	Rule # reference
	Robot Inspection	
	Robot is presented at inspection with all mechanisms, configurations, and decorations that will be used.	6.1
	Test the *Robot* in its starting configuration. The *Robot* fits within the Sizing Tool without exerting undue force on the Sizing Tool sides and top.	<R01>
	Test the *Robot* mass in its heaviest configuration, it must not exceed 12 kg.	<R02>
	Is the *Robot* start button clearly marked? (Not required if there is a *Referee*-controlled mechanism).	<R03>
	Is the *Robot* emergency stop clearly visible and accessible?	<R04>
	Does the *Robot* contain any illegal materials or illegal storage options?	<R05>, <R06>, <R07>
	Does the *Robot* contain anything that will prohibit a prompt removal from the *Field*?	<R09>
	Does the *Robot* have proper identification?	<R10>
	Will the *Robot* damage the *Field*?	<R11>
	Does the *Robot* follow *Launching* rules?	<R12>
	Does the *Robot* follow all electrical rules?	<R14> <R15> <R16> <R17>
	Does the *Robot* and/or *Team Game Element(s)* follow all game specific rules?	See GM2