

Clarification Edition

March 1st, 2022

SoutheastCon 2022
Hardware Competition Rules

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1. Introduction

Mardi Gras (from the French “Fat Tuesday”) is the oldest American Carnival party, started in 1703 in the port city of Mobile, Alabama. Mardi Gras in Mobile has changed since then and it is now a multi-week celebration with school holidays for the final Monday and Tuesday (some include Wednesday), regardless of religious affiliation.

For weeks before the “Fat Tuesday”, crowds of residents and visitors can watch different parades in the streets of downtown Mobile with sights and sounds of live marching bands, brilliant-colored floats, flying moon pies, and beads.

In 2022, besides the regular Mardi Gras parades, Mobile will host a national robotic parade competition, in which robotic floats will navigate through a smaller scale route performing similar tasks as our original Mardi Gras parade on streets. In this competition, your robot will be a float throwing beads and cleaning up obstacles from the streets while avoiding hurting the audience and the beautiful buildings of our Mobile port city. Your float will also show your pride in your school, playing a fight song or displaying your mascot.

2. Objective

Develop a robot to autonomously navigate the Mardi-Gras route while performing tasks. The robot must complete the track and/or achieve the highest possible score by making multiple rounds within the time frame.

3. Competition

The robot will traverse an L-shaped track. On the track, there will be a randomly placed obstacle (colored marshmallow) to be pushed off the track, Mardi Gras beads to be retrieved from a “tree” at the start of the course, and fishnets into which the beads will be thrown by the robot. (Important note: Here in Mobile, we use the term “bead” to refer to a closed-loop containing beads. That is, a “bead” is a necklace or bracelet of beads, not a single bead.) See the details below. Robots will receive bonus points if they include decorations that light up, move, and/or play music. Having a college-themed robot is encouraged -- use your school’s mascot and fight song, for example.

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Your robot will have 3 minutes to autonomously navigate the Mardi-Gras parade route (game board) and complete tasks to earn points. The competition will be conducted as a series of rounds as described below:

- There will be 3 rounds: a qualifying round, a semi-final round, and a final round.
- All teams will participate in the qualifying rounds.
- The top 20 teams from the qualifying rounds will participate in the semi-final rounds.
- The top 4 teams from the semi-final rounds will participate in the final rounds.
- The qualifying round will consist of two runs of 3 minutes.
- The semi-final will consist of one run of 3 minutes.
- The final will consist of one run of 3 minutes.
- The scores between the qualifying runs are cumulative.
- The scores reset between rounds.
- Runs are scheduled in approximately 5-minute intervals (subject to change).
- A lineup of time slots and team call orders will be provided and posted prior to the competition date.
- Two boards will conduct runs simultaneously. If one board completes early it will be reset and remain idle until the time slot is expended.
- Teams are given 1 minute of setup time upon arrival.
- A run within a round begins when either: a team indicates they are ready to begin **or** the 1-minute setup time runs out.
- A run within a round ends when either: a team returns to the starting square **and** indicates the robot has completed its run **or** the 3-minute timer runs out.
- The finals will be held on Saturday night during the awards banquet on a single board. Teams will be scheduled and notified of their call order.
- During the rounds, the robot may collect points by pushing a marshmallow off track, dropping beads into bins, and throwing beads into nets. The robot will incur penalties for touching or knocking over obstacles (barricade, building, trash bin, power line).
- The completion time will be used as a tie-breaker.
- The team with the highest score in the final round will be declared the SoutheastCon 2022 Hardware Competition Winner. Standings will be announced at the awards banquet.

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4. Game Board

The game board is constructed with materials from most hardware stores. Teams are advised to construct a game board along with all the additional components. A diagram, with measurements, of the game board is shown on the next page in Figure 1.

Further details about the Game Board are described in Appendix A – Game Board and Objects Specifications. Details regarding paints are described in Appendix B – Building Material Recommendation, and a parts list is shown in Appendix C – Parts List.

1. The game board is a single 4' x 8' sheet of smooth sanded plywood.
2. The game board will include a black “roadway” in an L shape. The robot is to stay on the roadway at all times. The roadway will be lined with 1 x 2 wood board barricades.
 - a. Points will be lost if the robot touches or runs over barricades.
 - b. There will be gaps in the barricades called “alleyways” to permit the marshmallow to be pushed off the road without a penalty.
3. There will be two “trees” along the course. One at the starting point, and one at the end. Both trees will be on the same side of the track. All beads to be thrown or dropped will need to be harvested from the trees at one of these locations.
 - a. There will be 10 beads on each tree in the qualifying rounds
 - b. There will be 15 beads on each tree in the semi-final rounds
 - c. There will be 20 beads on each tree in the final rounds.
4. There will be a single “jumbo” marshmallow placed randomly on the roadway.
 - a. It will be placed such that it is sitting on its base (i.e. cylinder base)
 - b. It will be placed on the board such that
 - i. It is within a 7” by 24” area centered on the centerline
 - ii. The allowable area is 2” prior to the alleyways and after the 90° turn
5. The roadway will be lined with “trash bins” and fish nets. Their positions will be random along the roadway.
 - a. There will be 4 trash bins and 3 fish nets.
 - b. Trash bins will be placed such that the center of the bin is four inches from the edge of the roadway.
 - c. Fishnets will be placed vertically such that the center of the net handle is four inches from the edge of the roadway.
 - d. There will be 7 possible locations on the board that can contain a bin or net. The distribution of the bin and net will be randomized across the locations.
 - e. The distribution of bins and nets will be revealed per run at the competition.

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6. On the outside of the game board, along the outer edge of the plywood, there will be several “buildings”. Points will be lost if the robot touches or knocks over the buildings.
7. **Start Square:** Starting position of the robot.
 - a. Reference Appendix A for precise specifications
8. **Roadway:** the black L shape on the game board.
 - a. Reference Appendix A for precise specifications
9. **Barricade:** obstacle lining the roadway
 - a. Reference Appendix A for precise specifications
 - b. Two are marked “safe to touch” and will not incur a penalty
 - i. Immediately behind the start square
 - ii. At the end of the roadway
10. **Alleyway:** a gap in the barricade for the marshmallow to pass
 - a. Reference Appendix A for precise specifications
11. **Tree:** One at the beginning and end of the roadway.
 - a. Reference Appendix A for precise specifications
 - b. A wooden dowel with a metal hook extending outward
 - c. Facing in toward the roadway, perpendicular (visually aligned, +/-10°)
 - d. Precise locations on the board are shown in Figure 1
12. **Trash Bin:** red Solo brand cups, 18oz, or similar cups with specified dimensions.
 - a. Reference Appendix A for precise specifications
 - b. Mounted to a 3D printed piece, shown in Appendix D
 - c. Affixed for stability to the board with velcro
 - d. Possible locations on the board are shown in Figure 1
13. **Fish Net:** nets representing the audience that catches thrown beads
 - a. Reference Appendix A for precise specifications
 - b. Facing in toward the roadway, perpendicular (visually aligned, +/-10°)
 - c. Mounted to a 3D printed piece, shown in Appendix D
 - d. Affixed for stability to the board with velcro
 - e. Possible locations on the board are shown in Figure 1
14. **Power Line:** rope between two poles representing a power line.
 - a. The robot must be less than 21” in height to fit under the power line.
 - b. Reference Appendix A for precise specifications
 - c. The precise location on the board is shown in Figure 1
15. **Building:**
 - a. Reference Appendix D for precise specifications

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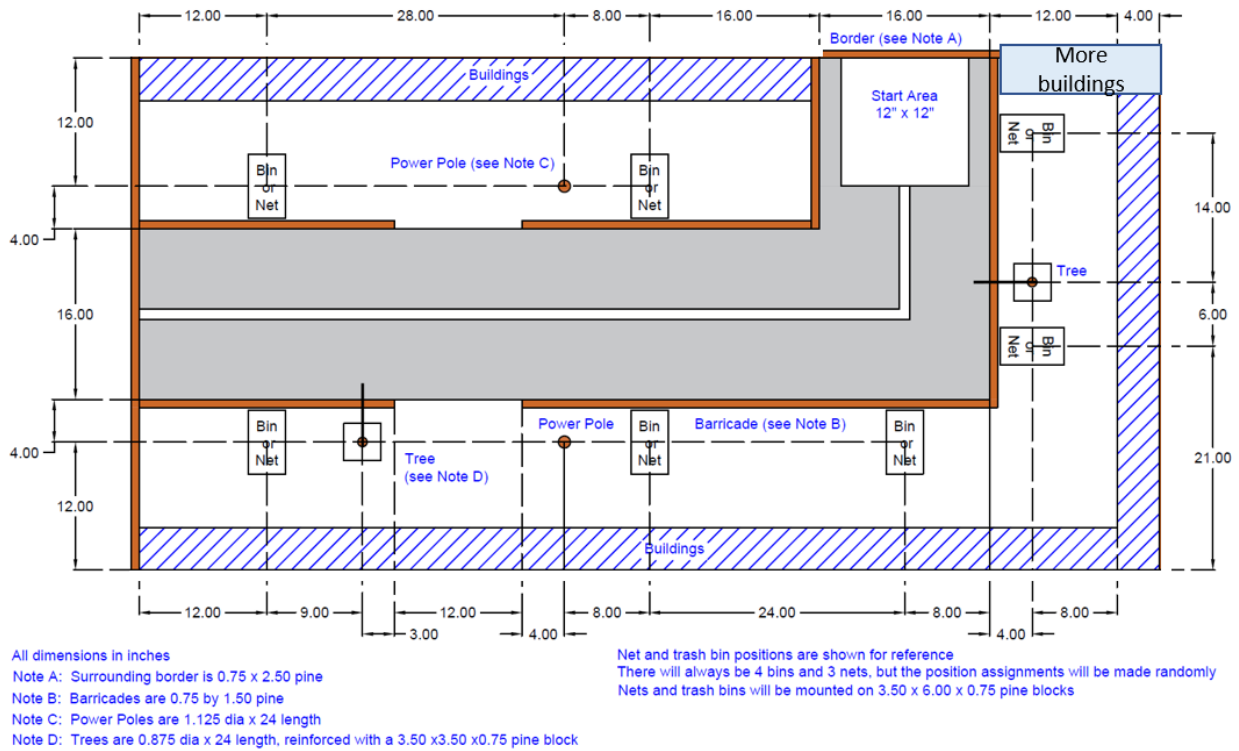


Figure 1. Game Board with Measurements.

AutoCAD diagram hosted for viewing: <https://autode.sk/3GBT5oY>

See Discord for updates: <https://discord.com/invite/ae2cqMP9X>

Disclaimer: notes on the diagram are lumber dimensions and contain discrepancies: there is no continuous border outside the plywood surface, all barricades are within the plywood surface, there is no plywood mount for bins, and nets. See Appendix D for more up-to-date specifications until a newer CAD model is released.

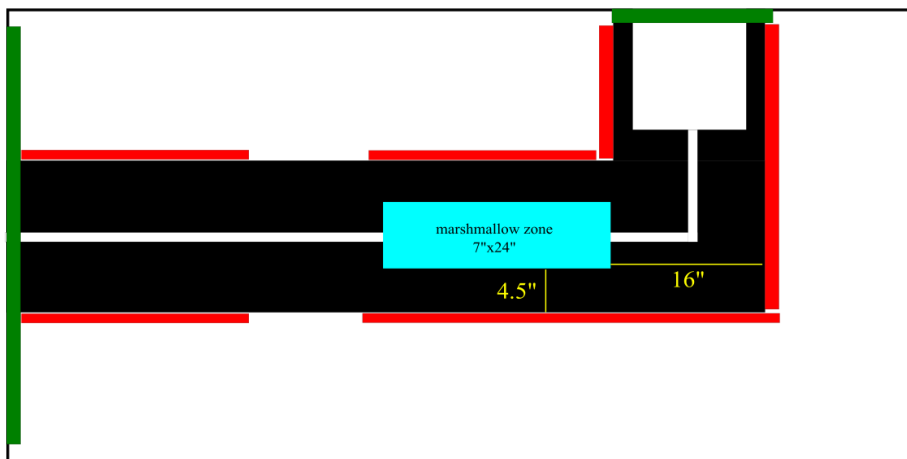


Figure 2. Allowable Area for Marshmallow Start
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5. Robot Specifications

1. Robots must operate completely autonomously once started.
2. No wired or wireless communication is allowed.
3. The maximum starting size of the robot will be restricted to 1' x 1' x 1' (*i.e.* a 1-foot cube). This will be checked every time the robot will be set on the board
4. The robot may extend arms or appendages (or flags or figures) to complete the challenges throughout the course
 - a. Appendages must at all times be wholly contained within the game board.
 - b. Robots may have one or more extendable appendages.
 - c. A robot **with** appendages must fold/constrict and otherwise fit within the 1' cube robot size restriction before a run begins. It may extend past the size restriction after a run begins.
5. Robots must have a clearly labeled start switch.
6. It is strongly recommended that robots include an emergency stop.
 - a. In the event of damage or malfunction, gameplay must be halted.
 - b. This could be a button, switch, mechanism, easily accessible power line, etc
7. Robots must be self-contained and remain a single unit, e.g. cannot break apart.
8. No aerial or flying robots are allowed.
9. No explosive, pyrotechnic, toxic, or corrosive materials. Flammable liquids or gasses are prohibited.
10. We **encourage** robots to be decorated like Mardi Gras floats and display a school logo or mascot, school flag, state flag, etc. Mascots and figures are also encouraged, as are robots that play music and have a light show.
 - a. Any flag or figure must fit within the initial size constraints of the robot. It may extend past the size restriction after a run begins.
11. Points are awarded for having a display, with additional points for lights (see section 7). A display may include:
 - a. Any distinct logo, emblem, LCD screen, arrangement of LEDs, 7-segments, other varieties of the screen, or other visual representations and/or depictions.
12. You may choose to use Sonar and LIDAR sensors. However, be advised teams are required to handle any accidental interference from other robots or other noise sources.
 - a. For example, many cameras have infrared rangefinders, and may accidentally interfere with infrared sensors.
13. While it is the team's responsibility to handle accidental interference, any intentional interference by another robot or team will not be tolerated and can result in immediate **disqualification** from the competition as a whole.

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- 14. Teams are responsible for the safety of their robot.**
- 15. If the Robot leaves the game board the round ends immediately and the scoring will be up to that point.**
- 16. The robot shall not present any danger to the judges, spectators, playing arena, or area surrounding the arena. If at any time the judges deem the robot is causing or is likely to cause harm, the judge may terminate the match immediately. The judge will have the discretion of whether any points are awarded for that match and if the robot is allowed to compete in any remaining rounds. Especially noteworthy are any machines that throw -- they must not throw objects long distances or high speeds.**

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6. Gameplay Rules

1. Teams will be assigned a play order which will be announced in advance, this play order will be maintained for all rounds of play.
2. Teams must physically qualify prior to their scheduled play slot, they must attest at that time that they will not make modifications to their robot physically or otherwise afterward. This will be tested during the wait time before stepping up to the board.
3. Missing the qualification announcement window will result in the **disqualification** of the missing team(s) from that run.
4. Teams may test their qualification as many times as needed during practice.
 - a. *Bring Your Own Beads*: The dimensions, materials, etc of the beads can be tested
5. During qualification:
 - a. The robot must fit inside a box with inner dimensions as noted in Robot Specifications.
 - b. The start button and emergency stop button (if applicable) must be specified.
6. Prior to the beginning of each run, the next team(s) to play will be announced. One team for each game board.
 - a. Teams will be called one at a time and have 2 minutes to arrive.
 - b. The play order is announced ahead of time and teams are expected to be aware of the time and call order thus far.
 - c. While the robot handler is waiting for their turn to step up to the board the robot size restrictions will be tested.
 - d. *Bring Your Own Beads*: The quantity and correct size of beads will be checked at this time as well. Beads must be surrendered for use during your run and will be returned after.
7. A 1-minute setup period will begin upon team arrival.
 - a. Obstacles will be placed on the board at this time.
 - b. Beads will be placed on the trees at this time.
 - c. Teams must place their robot on the starting square. The robot may touch the barricade immediately behind the starting square (labeled “safe to touch”).
 - d. Teams may adjust their robot’s orientation but no other physical interaction beyond pressing the start button is allowed.
8. Judges will announce the start of the round once the setup period is complete.
 - a. A timer will be started for the run duration of 3 minutes.
9. A single team member, the robot handler, should press a single start button once the Judges announce the start of the round.
 - a. The remaining team members are requested to stay within a designated team area (assigned by judges) surrounding the board.

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10. No further physical, wired, or wireless interaction between the robot and people present is allowed during the round, “hands-off” period. The robot must run autonomously.
 - a. *Illegal communication with the robot, such as wireless communication, visual communication, or auditory communication outside of the setup period will result in automatic **disqualification** from the competition as a whole.*
 - b. *Visual communication including but not limited to: symbols, gestures, or other feedback given by team members to a camera or visual input device.*
 - c. *Auditory communication including but not limited to: verbal commands, morse code, or other feedback given by team members to an auditory input device.*
11. The robot handler is not allowed to touch their robot until the round ends or a team decides to terminate its participation.
12. The robot handler may declare the end of the run in the event of emergency, idleness, or otherwise.
13. Judges will announce the end of the run once the timer completes.
14. Judges will announce the end of the round once the time slot completes.
15. Judges will end the run if a team makes contact with their robot.
16. As part of gameplay, the robot must **throw** the beads in the fish nets. Teams will **not** earn points if the robot places the beads in the net, beads must be thrown. “Thrown” is defined as having at least a 4” horizontal distance from the origin to the destination.
17. Teams are encouraged to watch gameplay as spectators to support each other. Positive encouragement from spectators is strongly encouraged.
18. Robots must not damage the game board, cause a halt of competition, or require repair of the game board, nor cause damage to the game pieces (beads, marshmallow, etc).
 - a. Intentional damage to the game pieces will be determined by the judges.
 - b. Intentional damage to the marshmallow specifically will result in the **end of the run**, scores will be kept from gameplay thus far
 - c. Intentional damage to the board or other pieces will result in **disqualification** from the competition as a whole.
19. When addressing judges with questions, teams are expected to act within the IEEE code of conduct.
 - a. Only one designated team captain can address the judges for written or verbal decision appeals.
 - b. Calm demeanor, politeness, and professionalism are strongly encouraged.
 - c. Violation of the code of conduct will result in **disqualification** from the competition as a whole.
20. Judges will interact with one team captain at a time -- other teams cannot “join in” while judges are speaking with a team. Any discussion relevant to all teams will be announced.

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21. Flash photography will **not** be allowed. On-board lighting is allowed as long as the robot is not flashing nor interfering with the operation of other robots on other game boards.
 - a. Please be respectful of the frequency of any flashing lights you may use, for those that could be affected by strobing lights
22. In general, a “redo” will not be allowed for fairness to all teams. However, judges reserve the right to make a call in the event of external interference, such as power outage, disruptive feedback, and other reasonable issues in the field.
23. Every effort will be made to maintain courses between rounds, but in the interest of time, minor scuffs (etc.) will not be addressed.
- 24. All judges' / timekeepers' decisions are final.**
25. Judge's score sheets are **final**, score sheets returned to teams are for your reference only. Any point of dispute must be present on the **judge's score sheet** in order to be considered valid.
26. After each set, teams will have a 5-minute window (after their score is displayed) to file an appeal with the judges/timekeepers if they believe a scoring error exists.
27. If any kind of dispute cannot be resolved immediately the final decision always lies with the Student Activities Chair.

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7. Scoring

Teams will be able to view standings and scores on a display located in proximity to playing fields, as well as digitally via google document. Items with caveats or clarifications are marked with an asterisk or series of asterisks

Points	Task	Repeatable?	Max Qty
+1 pt	Pushing a marshmallow off the roadway	One-Time	1
+1 pt	Each bead dropped into a bin	Per Bead*	Qualifier: 20 Semi-Final: 30 Final: 40
+1 pt	Each trash bin with one or more beads in it	Per Bin	4
+2 pts	Each bead thrown into a fish net	Per Bead*	Qualifier: 20 Semi-Final: 30 Final: 40
+1 pt	Each fish net with one or more beads in it	Per Net	3
+2 pts	Having a display	One-Time	1
+2 pts	Playing a song	One-Time	1
+2pts	Having a display that lights up	One-Time	1
+2 pts	Leaving the start square	One-Time***	1
+5 pts	Traversing the track, one direction (half loop)	One-Time	1
+10 pts	Completing the track, both directions (full loop)	One-Time	1
+10 pts	Qualified Entry In Promotional Design Competition	Per Run	1
Penalty penalties <u>cannot</u> reduce points below the amount of non-punishable points			
-1 pt	Each bead left on roadway	Per Bead*	Qualifier: 20 Semi-Final: 30 Final: 40
-5 pts	Touching any obstacles: barricade, trash bin, building, or power line	Per Obstacle**	10

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-10 pts	Knocking over any obstacles: barricade, trash bin, building, or power line	Per Obstacle**	10
<u>Ends the Run</u>	Marshmallow squashed, trampled, or intentionally damaged, at the Judges discretion. Venturing off of the game board.	Per Run	
<u>Disqualification</u>	Damage to the game board, at the Judge's discretion. Touching the robot after hands-off. Remotely operating the robot after hands-off.	Per Run OR Per Competition	
<p>*Per Bead score items are limited by the total number of beads on the board* Beads used to score in a bin cannot then be used to score in a net and vice versa</p>			
<p>**Per Obstacle penalty is limited to one time per obstacle (<i>rather than per contact</i>)** For example, contact with bin A results in a penalty repeated contact with bin A does not earn a further penalty</p>			
<p>*** Non-punishable meaning penalties do not reduce your score beyond this point ***</p>			

APPENDIX A – Game Board and Objects Specifications

- **Game Board (Overall)**
 - 4ft x 8ft sanded plywood, thickness irrelevant
 - It includes a “roadway” in an L shape flanked with “barricades.”
 - The roadway includes a centerline, painted white.
 - Note that the roadway, walls, and centerline are all painted -- they are not 3-dimensional structures.
 - Past the walls will be cups for receiving Mardi Grad beads and nets for catching Mardi Gras beads.

- **Start Square: Painted White.**
 - A 1' x 1' start square corresponds to the size restrictions of the robot.

- **Roadway**
 - Length of a lane:
 - 80” along the longest dimension of the board
 - 32” at a 90° turn from the longest dimension in an “L” shape
 - Roadway: Painted Black.
 - 16” wide
 - Centerline: Painted White.
 - 1” wide +/- 0.2”

- **Barricade:**
 - 1” x 2” wood board
 - Actual Dimensions: 0.75” x 1.5”

- **Alleyway:**
 - 12” wide
 - 24” from the end of roadway

- **Trash Bin:**
 - Red Solo brand 18oz cups or similar cups with specified dimensions
 - 4.8” tall, 3.966” top diameter, 2.25” bottom diameter.

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- **Fish Nets**
 - Fishing net with a handle cut down to size.
 - Net itself: 8 inches wide (at widest point).
 - Handle (after modification): 5.25" long
 - Note: from end to tip of the ferrule (where the net is attached)
 - Fishing net as a whole (after modification): 13½" inches tall.

- **Power Line**
 - Supporting Poles are 24" tall.
 - Placed 24" apart.
 - A sag in the power line not to exceed 3".

- **Trees**
 - Wooden dowel, 7/8" diameter, 2' tall
 - Tree limb placed at 21", tree limb extends 6" outward

- **Buildings:**
 - Reference Appendix D for precise specifications

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APPENDIX B – Building Material Recommendation

- **Game Board**

- 4ft x 8ft sanded plywood, thickness irrelevant
 - <https://www.homedepot.com/p/1-4-in-x-4-ft-x-8-ft-BC-Sanded-Pine-Plywood-235552/100063669>

- **Roadway Paint**

- Road Surface - Black
 - <https://www.homedepot.com/p/Rust-Oleum-Painter-s-Touch-32-oz-Ultra-Cover-Gloss-Black-General-Purpose-Paint-1979502/100139731>
- Road Center Line - White
 - <https://www.homedepot.com/p/Rust-Oleum-Painter-s-Touch-32-oz-Ultra-Cover-Gloss-White-General-Purpose-Paint-1992502/100156767>

- **Barricade**

- 1 x 2 wood board
 - Actual Dimensions: 0.75" x 1.5"
 - <https://www.homedepot.com/p/1-in-x-2-in-x-8-ft-Furring-Strip-Board-160954/100009348>

- **Trash Bin**

- Red, Solo Brand cups, 18oz
 - <https://www.walmart.com/ip/Solo-Disposable-Plastic-Cups-Red-18oz-50-count/26384698?athbdg=L1200>

- **Fish Nets**

- Fishing bait nets, of net diameter 8"
 - <https://www.walmart.com/ip/Frabil-Baitwell-Landing-Vinyl-on-Fishing-Net-Wooden-Handle-with-Super-soft-1-Vinylon-Mesh/16494432>

- **Beads**

- Plastic beaded bracelets
 - ¼" - ½" beads, on an elastic band, 2.5" - 3" diameter, 8" circumference
 - <https://www.orientaltrading.com/plastic-beaded-bracelet-sets-a2-13708822.fltr>

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- **Power Line**
 - Wooden dowel, 1¼" diameter
 - <https://www.homedepot.com/p/6420U-1-1-4-in-x-1-1-4-in-x-48-in-Hardwood-Round-Dowel-10001811/203334072>
 - Line itself is a rope, type irrelevant

- **Trees**
 - Tree Base
 - Wooden Dowel, 7/8ths diameter
 - <https://www.homedepot.com/p/6414U-7-8-in-x-7-8-in-x-48-in-Hardwood-Round-Dowel-10001807/203334067>
 - Tree Branches
 - 6" zinc-plated steel pegboard hook
 - <https://www.homedepot.com/p/Everbilt-6-in-Single-Peg-Hook-in-Powder-Coated-Black-Steel-Fits-1-4-in-Pegboards-69649/314015384>

- **Buildings**
 - Reference Appendix D for precise specifications

- **Marshmallows**
 - "Large" approximately 1" - 2" marshmallows
 - <https://www.walmart.com/ip/Campfire-Giant-Roasters-Premium-Quality-Marshmallows-24-oz/51923014>

- **Periphery / Misc.**
 - Painter's tape, 0.94" to paint the roadway lines
 - Wood screws, #8 x 1 ½, as needed.

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APPENDIX C – Parts List

Quantity	Item
1 Sheet	4' x 8' sanded plywood
193"	1 x 2 wood board
1 Can	Black Paint
1 Can	White Paint
4	Red Solo Cups
3	Fishing Bait Nets
40	Plastic Beaded Bracelets
1	1 1/4th Dowel
1	7/8th Dowel
2	Peg Board Hook
224"	2 x 4 stud
1 package*	Marshmallows
1 roll	0.94" Painter's Tape
1 box	#8 x 1 1/2 Wood Screws

**Note marshmallows may need replacing, depending on your environment.*

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APPENDIX D – Construction Instructions

This guide details how the barricades of the IEEE SoutheastCon 2022 hardware boards will be made and attached to the board. At the conclusion of this guide, the hardware board shall appear as shown below:



Materials used

The hyperlink for each of these items can be found in the BOM section

Item	Function
<input type="checkbox"/> 1"x2" pine wood	Barricade material (need 193" worth of wood for each competition board)
<input type="checkbox"/> Red and white stripe tape	Mark barricades that are not secured to board and are not safe to touch
<input type="checkbox"/> Green and white stripe tape	Mark barricades that are secured to board and are safe to touch
<input type="checkbox"/> Screws	Screwing end barricade to boards

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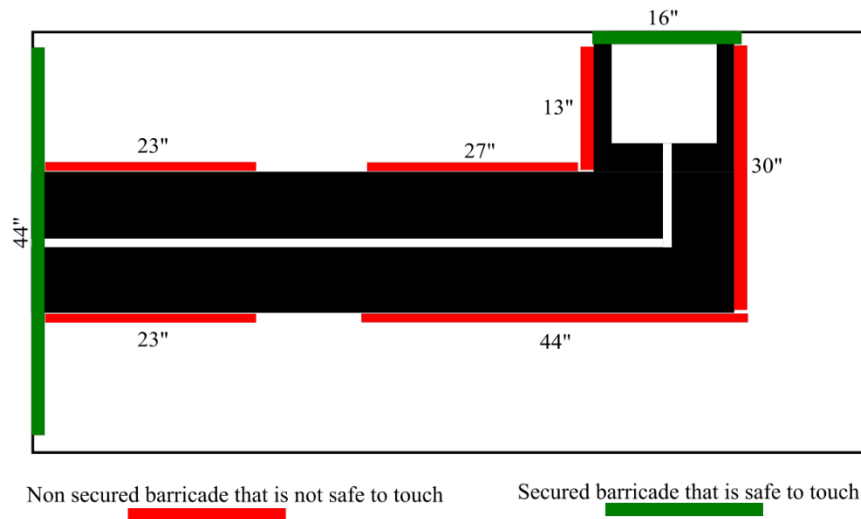


Figure 1: Barricade layout

Important: The hardware competition board will have two types of barricades; secured/safe to touch and unsecured/not safe to touch. The secured barricades will be screwed down to the competition board. The non-secured barricades are set on the board.

Steps

1. Cut the trim board to the following lengths: 13", 16", 23" (2), 27", 30", 44" (2)
2. Secure one 44" barricade and the 16" barricade to the competition board in the spots that are shown in green on barricade layout figure
3. Stick green and white caution tape to the secured barricade on the side that faces out from the competition board
4. For all remaining barricades, stick red and white caution tape on one of the 1.5" wide side
5. Place the non-secured barricades in their respective spot on the board prior to each run in the hardware competition

IMPORTANT ITEMS ABOUT THE BARRICADES:

- a) The barricades will be placed along the roadway to surround it except for a 12" gap that starts 23" from the end of the roadway. This gap will be checked before the start of each round
- b) When the barricades are in place, the black roadway will still be 16" wide because the barricades do not sit on any part of the black of the roadway.
- c) The barricades will sit 1.5" tall and .75" wide on the surface of the board.

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BOM

1"x2" boards	https://www.homedepot.com/p/1-in-x-2-in-x-6-ft-Premium-Kiln-Dried-Square-Edge-Whitewood-Common-Board-914576/100012371
Red and white tape	https://www.amazon.com/gp/product/B01JKHQGFG/ref=ppx_yo_dt_b_asin_title_o00_s00?ie=UTF8&psc=1
Green and white tape	https://www.amazon.com/gp/product/B01JKHQGN8/ref=ppx_od_dt_b_asin_title_s00?ie=UTF8&psc=1