

Robot Hockey Rules

Robot Hockey

Robots per Event: Six (3 per side)

Length of Event: One 10 minute match or Three 3-minute periods TBD.

Robot Weight Range: 15 lbs

Robot Dimensions: 18" x 18" x 18"

Arena Specifications: 24' x 12'

Robot Control: Remote Controlled

Engineering Principles: Mechanical Engineering, Electrical Engineering

Event Summary:

Standard hockey rules with a street hockey puck, two teams of three robots compete to win

Bot Hockey is an exciting and challenging game featuring teams of remote controlled robots competing to score goals using a puck similar to those used in street hockey. The game rewards teamwork and driving skill more than exotic materials and expensively built robots. The rules are a very simplified version of ice/street hockey rules with additions for the nature of the robotic players.

1.0 Robot Specifications

Bot Hockey robots are the means by which the game is played. They are small radio controlled electric powered vehicles used to move the game puck past the opposing robots to score by pushing or shooting the puck into the scoring zone. See sections 2 for details on the puck and playing rink. Strict size and weight limits on the robots encourage teamwork, practice, and creativity in the design of robots. A wise team will select robots with complimentary features to allow the team as a whole to maximize its effectiveness. Listed below are the specifications and restrictions on robots used in Bot Hockey matches.

1.1 Robot Configuration. Bot Hockey robots are normally wheeled devices with two or more powered wheels. However, other configurations such as legs, shuffle feet, ground effect hovering, and various snakelike configurations are allowed as long as the robots meet the size and weight limits listed below. Robots may not fly using airfoils, rotors, or ground effect above the height of the puck by any means.

Hopping or jumping robots are allowed as long as they are not capable of jumping out of the playing rink

1.2.1 Robots when in normal playing configuration (see 1.1.2) must fit into a square of the size specified above for each class. No vertical dimension restrictions are imposed.

1.2.2 Normal playing configuration is defined as the robot's configuration during the majority of time in the match

Flipping or shooting devices may temporarily extend past the size limit but must immediately retract. Unfolding scoops, wings, arms or other devices designed to extend and increase the size of the robot beyond the specified sizes are not allowed.

1.3 **Power.** Electric batteries and electric motors must solely power the robots. No internal combustion, fuel cell, or other means of providing power are allowed.

1.3.1 Batteries must be of a construction that is spill proof in all orientations. Suggested battery types are Nickel Cadmium, Nickel Metal hydride(and Lithium Polymer only at certain events where allowed). Immobilized electrolyte (gel-cell or absorbed glass mat) lead-acid batteries may be used as well.

1.3.2 Batteries using exotic chemistry or construction that can result in the release of toxic gas or liquid are not allowed. If in doubt about the battery type you wish to use contact the event organizer.

1.3.3 Battery voltage is limited to 48V. This is defined as the rated voltage of the battery array.

1.4 **Radio Control.** Robots are normally controlled by radio systems operating in approved frequency bands for ground vehicles in the country where the tournament is held.

1.4.1 Common frequency bands for ground vehicles are 75MHz (hobby R/C) and the 900MHz and 2.4GHz ISM bands. 72MHz band R/C radios are restricted to air vehicles and may not be used for Bot Hockey matches. Other frequency bands such as 50MHz, 433 MHz and 27MHz / 49MHz bands may also be used. Tournament organizers may disallow use of radios operating in some of these bands. Countries outside the US will have different frequency bands allowed for use. Teams are responsible to ensure their robots meet the radio requirements of the tournament. Tournament organizers will explicitly announce any restrictions or changes to the common frequency bands (75MHz, 900MHz, 2.4GHz, 49MHz and 27MHz).

1.4.2 Any type of frequency modulation may be used to control Bot Hockey robots. Specifically low-cost AM and toy style radios are allowed for all classes.

1.4.3 Digital data modem radios, wireless networking, or other types of data radios are allowed consistent with frequency band requirements in the country where the tournament is held. Tournament organizers may restrict some types of data communications such as wireless network adapters that might interfere with tournament data systems.

1.5 **Other Control Systems.** Other types of control systems such as infrared, ultrasonic, or laser may be used subject to approval by the tournament organizer. In general, non-radio control systems must be eye-safe for players and spectators and not disrupt the conduct of the tournament e.g. audible sound-based systems. Teams wishing to use non-radio control systems must receive approval from the tournament organizer before using the system.

1.6 Weapons. Bot Hockey robots should not have weapons or devices intended for damaging the competitor robots, the playing rink, or the puck. At the tournament organizer's discretion any robot may be disqualified if it is deemed to violate the spirit of this rule even if the robot otherwise meets the letter of the rules below.

1.6.1 Allowed devices for controlling opposing robots include pneumatic or electric lifting and flipping arms, clamping devices and puck shooting devices with a dual use as a means of disrupting the opposing robot's play.

1.6.2 Points, spikes and cutting edges are not allowed on robots. Any feature of a robot likely to cause injury to a person's unprotected hand while giving it a hard slap will most likely be disqualified.

1.6.3 Continuously spinning weapons or devices such as spinning saw blades, bars, drums, disks or other devices designed to impact other robots or the puck are not allowed. One exception to this rule is allowed. See Section 1.7 below.

1.6.4 Piercing or stabbing weapons such as pneumatic or spring powered spears or hammers with points are not allowed. Hammer like devices which impact downward are obviously not intended to move the puck and are not allowed even if they don't include a piercing point.

1.6.5 Entangling weapons such as string, cables, tape, nets, glue and other devices intended to entangle the opposing robots are not allowed. Puck shooting devices may be deemed entangling weapons if they present a significant risk of entanglement when not being used to move the puck.

1.6.6 No liquids of any kind may be released from the robot during use. This includes water or other liquid from cooling systems or otherwise used for robot operation. Teams may incur a forfeit loss for fouling the playing rink intentionally or unintentionally.

1.6.7 Flame weapons or effects are not allowed.

1.6.8 Electric or electronic jamming or zapping using devices such as radio jammers, high-voltage coils, stun guns, cattle prods etc. is not allowed.

1.6.9 Intentional interference with radio or other control systems is not allowed.

1.6.10 Visual interference such as bright lights, strobes, lasers, smoke, chaff or other means of interfering with the opposing drivers' view is not allowed.

1.6.11 Robots may not intentionally drop or detach parts or objects onto the rink. Devices such as caltrops, spike strips, speed bumps or any other object deployed intentionally from a robot are forbidden.

1.7 Shooters. The addition of active devices on robots to shoot, kick, or flip the puck is encouraged. These devices make for a faster more exciting game and allow teams to avoid traffic

jams and pushing matches. Passing and long-range shooting increase a team's ability to score and to benefit from set plays and maneuvers to defeat an opposing team.

1.7.1 Flipping or kicking type shooters should act in a mostly horizontal manner. Some vertical motion is allowed but penalties may result if the puck is flipped out of the playing area. See Section 3 Rules of the Game.

1.7.2 A continuously spinning shooter may be included on a robot as long as the following conditions are met.

1.7.2.1 The spinning shooter must be completely enclosed in the robot's body so that no other robot or part of the rink can contact it.

1.7.2.2 The shooter must project the puck in a horizontal fashion parallel with the surface of the rink.

1.7.2.3 Guides or other means must be provided to shoot the puck only in the intended direction. No omni directional shooters are allowed.

1.7.3 Lifting and clamping devices are allowed to control the other robots and the puck. Such devices must be designed to release on command.

1.8 **Engulfing.** The general play of the game requires robots designed to push or kick the puck toward the goal.

1.8.1 Robots may not be designed to cover or engulf the puck and hide it from view.

1.8.2 Controlling the puck by grabbing it with a clamp or claw is allowed as long as the puck is clearly visible and not enclosed in the robot's body in any way.

2.0 The Playing Rink

2.1. **Rink Size.** 2.1.1. The rink is 24 feet long by 12 feet wide, with 4 foot radius curves along the sides.

2.2. **Goals.** The goals are 24" in front of the rear wall, centered left to right, facing the center of the rink. Robots should have enough clearance to make it behind the goal, although goal access is only in the front.

2.3. **Safety Walls.** Walls are approximately 18" high.

3.0 The Rules of the Game

Bot Hockey is a game modeled on ice and street hockey. The goal of the game is to score more points than the other team by pushing or shooting a standard street hockey puck into a goal area.

In order to encourage a fast and exciting game and to accommodate the nature of the "players" the rules of ice and street hockey are highly modified and simplified.

3.1. **Game Length.** Game play takes place in three 3-minute halves. At least 5 minutes will be allowed between periods to allow repair, recharging, or replacement of robots. (Minimum game time is 19 minutes)

3.2. **Game Flow.** Bot Hockey is designed to be fast moving and to feature continuous action with very few breaks in play between periods.

3.2.1. Play starts with all robots from each team on their own half of the rink. The umpire tosses the puck approximately on the centerline and play begins.

3.2.2. Robots may move anywhere within the playing rink at any time. There are no offsides or icing penalties in Bot Hockey.

3.2.3. Checking and blocking of opposing robots is allowed at any time. There is no penalty for damage to an opposing robot when checking or blocking. Intentional damage of a disabled or partially disabled robot may be frowned upon and may incur an Unsportsmanlike Conduct Penalty.

3.2.4. Robots move the puck into the goal area on the opposing team's half of the rink to score. Scoring may take place by pushing or shooting the puck into the goal.

3.2.5. The puck must be completely over the goal line and inside the goal area for to score a goal. Goals may be scored with the puck on the playing surface or in the air above as long as the puck does not leave the playing area.

3.2.6. Pucks shot or flipped outside the playing area cause a penalty goal to be scored against the team that flipped or caused the puck to travel outside the playing area. Pucks that travel outside due to collision or by deflecting off an opposing robot or the rink do not count as a penalty goal infraction.

3.2.7. Whenever a goal is scored or the puck leaves the playing surface a puck is **immediately** placed back in play at the centerline of the rink by the umpire. Umpires should be provided with at least 2 pucks in order to place one in play immediately while the other is retrieved from the goal or fetched back to the playing area. There is no time allowed after a goal or penalty for regrouping or repositioning the robots.

3.2.8. Play continues until time in the 3-minute period has expired. When time has expired the robots are immediately removed from the rink to allow the next match to proceed. Teams will have at least 5 minutes between the two halves of the game in order to repair, replace robots, replace/recharge batteries etc.

3.2.9. The winner of the match is the team with the highest score at the end of the three periods of play.

3.3. Substitution of robots. Robots may be replaced at any time during the match or between matches.

3.3.1. Substitution procedure is as follows: first the robot to be replaced is removed from the playing rink and then the substituting robot is placed onto the playing rink. The same robot may be replaced after repair etc. if desired. Play does not stop for substitutions. At no time may a team have more than three robots on the rink.

3.3.2. If a robot is disabled in the center of the rink and cannot be reached from the edge of the rink a time-out for substitution may be called. After the next goal from either team the robot will be retrieved before the puck is put back in play.

3.3.3. If a robot is knocked or flipped out of the playing rink it is immediately replaced or may be replaced with a substitute.

3.4. Sudden Death. There are no tie matches in Bot Hockey. If time in the three 3-minute periods expires with a tie score, the game immediately moves into sudden death overtime. During sudden death overtime play proceeds as before with the first team to score a goal or receive a penalty goal being the winner of the match.

3.5. Dead Robots. It is possible that in some matches all the robots on the rink may be disabled and no substitutes are available. In this case the following rules apply:

3.5.1. If all the robots on both teams are disabled or unable to move during the first two periods of the game, the period is declared over and all robots are removed as if the period had normally expired.

3.5.2. If all robots are disabled during the third period of the game, the match is declared over and the team with the highest score wins.

3.5.3. If all the robots are disabled and the score is a tie, the team with the last robot able to demonstrate controlled movement is declared the winner and awarded a goal to break the tie.

3.6. Penalties. There are very few penalties in Bot Hockey. Those that exist are intended to keep play moving and to avoid gratuitous destruction of opposing robots.

3.6.1. **Unsportsmanlike Conduct.** If the umpire determines that a team is intentionally damaging an opposing robot not in the course of play, for example a disabled robot, the umpire may declare an unsportsmanlike conduct penalty. This results in the removal of the offending robot from the rink for the remainder of the period with no substitution allowed.

3.6.2. **Wild shooting.** If a robot shoots, flips, or otherwise projects the puck out of the playing rink a penalty goal will be awarded to the opposing team. The puck will be immediately placed back in play at the centerline as is following a normal goal. Pucks ejected in the course of collision or by deflecting off other robots or the rink will not be considered wild shooting. In this case the puck is immediately placed back in play at the centerline.

3.6.3. **Invalid Substitution.** If at any time a team has four or more robots on the rink an invalid substitution penalty will be called and the team will be required to play with only two robots for the remainder of the period.

3.6.4. **Forfeit.** If at the beginning of either half a team does not place at least one robot into play a forfeit will be declared and the match will be awarded to the opposing team assuming they have at least one robot ready to play. If both teams cannot place a robot into play the match shall be played at a later time or the event organizer may decide other resolution as long as a winner and loser are decided - there are no ties in Bot Hockey