OUTAGE powered by the *Midnight Mustangs*

2021 NEXT Robotics

Game Manual

ROBOTICON TAMPA BAY

NEXT ROBOTICS

CONTENTS

1 GAME

In OUTAGE, two alliances will compete to power their battery. Each alliance will consist of two teams that will work together to collect and shoot volts to charge their battery. Teams will be able to increase the charging rate by taking possession of the boost plate in the center of the field. At the end of the match, teams will be able to climb the power switch resulting in additional power.

During the 30 second blackout period, the teams vision will be blocked but they can use cameras or autonomous code. Alliances can score points by:

1. Completing counterclockwise laps around the field
2. Shooting volts into the battery

In the teleoperated period, teams will regain vision. Alliances can score points by:

1. Shooting volts into the battery
2. Taking possession of the boost plate to increase charging rate
3. During the surge period, last 20 seconds of the match, teams can climb the power switch

1.1 GOAL OF THE GAME

1. Complete the blackout period and begin charging your battery.

2. While in the teleoperated period teams must try to take possession of the boost plate in order to increase how much each volt charges your battery.

3. Teams will try to keep control and gain as many volt points as possible.

4. During the last 20 seconds, if teams can climb above the 12” mark on the power switch and hold on for at least 2 seconds after the match is over, they will receive points.

1.2 GAME RULES

1.2.1 BLACKOUT PERIOD

1. Alliances must begin each match by touching the opposing alliance wall.

2. At the beginning of the 30 second blackout period, each bot must be within a frame perimeter of 24” x 24” x 24”.

3. Teams vision will be blocked for the duration of the blackout period, but teams may use either a camera or autonomous code.

4. Alliances may race counterclockwise around the field (5 points per lap) with a maximum of 10 laps allowed per alliance during the blackout period.

5. Alliances may shoot volts (3 points per volt) into their designated battery during the blackout period. Each bot can start with a maximum of 10 volts, contained within their frame perimeter.

6. Teams are not allowed to use the power switch or boost plate during the blackout period.

7. Teams may not retrieve volts from the human player during the blackout period

1.2.2 TELEOPERATED PERIOD

1. After the 30 second blackout period, teams will regain vision.

2. Teams may collect and shoot volts (1 point per volt) to charge the battery.

3. Teams may take possession of the boost plate to double their charging rate (2 points per volt). The boost plate is considered in possession when the plate leans towards one alliance.

4. Shooting is allowed from anywhere on the field, but other bots cannot interfere with a bot in the designated charging zone in front of the battery. Violation of this rule will result in a penalty (5 points per second of contact).

5. There is a total of 75 volts in each power cell that is accessible by the human player.

6. When the match reaches the surge period (last 20 seconds), teams may climb the power switch, the bot must be above the 12” mark for at least 2 seconds after the match ends (20 points and 1 ranking point per bot).

1.2.3 SCORING (POINTS & RANKING POINTS)

1. Volts are worth 3 points during the blackout period and worth 1 point in the teleoperated period. When the boost plate is engaged, volts are worth 2 points.

2. Counterclockwise laps are worth 5 points during the blackout period. Points are only given for the first 10 laps per alliance. Laps are not scored during the teleoperated period.

3. Successful climbs on the power switch are worth 20 points and 1 ranking point per bot.

4. If both alliance complete the match with the same number of points, each time will receive 1 ranking point.

5. The winning alliance will receive 2 ranking points.4.

1.2.4 FOULS & PENALTIES

1. If a bot interferes with another bot in the designated charging zone in front of the battery they will be penalized 5 points per second of contact.

2. If a bot pins another bot they will be penalized 3 points per second after the initial 5 seconds of pinning. Pinning is considered stopped after 2 seconds of no contact.

3. If a bot exceeds the 6” extension of the frame perimeter, excluding the surge period, the bot will be penalized 3 points per second of being outside of the perimeter.

4. If an alliance has more volts in their power cell than designated by the max fill line, they will be penalized 2 points per second the volts are above the line.

2 ROBOT REGULATIONS

1. Robots cannot exceed 75 pounds, excluding battery and bumpers.

2. Robot must be within a starting frame perimeter of 24” x 24” x 24”.

3. Robot may extend 6” outside of frame perimeter at any point during the match.

4. Robot may exceed frame perimeter infinitely only in the charging station during the last 20 seconds of the match.

3. Robot must pass basic safety inspections.

4. Robot must have bumpers and be able to display red or blue to match alliance color.

5. Teams may not enable their robots on the field.

6. Teams may not tether to the robot while on the field except in special circumstances (during timeouts or before an immediate match replay).

2.1 ROBOT INSPECTION

1. At the time of inspection, the robot must be presented with all mechanisms and may not exceed 75 pounds excluding battery and bumpers.

2. Robot frame must be non-articulated and be within 24” x 24” x 24”. Minor protrusions less than a 1/4” are allowed.

3. For the safety of all those involved, all robots must be presented for inspection with the robot powered of, pneumatics unpressurized, and springs or other stored energy devices in their lowest potential energy states.

4. At least one team member must accompany the robot for any inspection efforts.

5. Bumpers must protect at least 4” on both sides of all outside corners. Bumper backing, may not extend more than 1” beyond robot frame.

Electrical

1. No electrical components may be modified.

2. The single 120A main breaker must be readily accessible.

3. The RoboRio and PDP must be connected via CAN wiring

4. The single PDP and PDP breakers must be easily visible for inspection.

5. A single 12 volt, 17-18.2 Ah robot battery, must be securely fastened inside robot

6. A single OpenMesh OM5P-AN or OM5P-AC radio must be powered via a VRM +12 volt, 2 amp output. The VRM must connect to the dedicated +12 volt output on the PDP. Radio LEDs are easily visible.

7. PCM modules must be connected to RoboRio via CAN bus.

8. Frame must be electrically isolated from any electronic circuit.

Pneumatic System

1. Actuator mounting pins may be removed, small labels allowed.

2. Only one compressor (max 1.1 CFM flow rate) may be used and must use a PCM or Relay module

3. A Pressure Switch must be wired directly to the PCM or RoboRio to control compressor.

4. The vent plug valve must include an easily-accessible manual vent plug valve to release all system pressure.

5. The vent plug valve tubing must be equivalent to KOP with a maximum OD of ¼" with screen printed rating or documentation.

6. Gauges must be present at both the high pressure side and low pressure regulator outlet(s) and be readily visible.

7. All pneumatic components at pressure, must be rated for at least 70 psi (~483 kPa. All components at stored pressure must be rated for at least 125 psi (~862 kPa).

8. Pneumatic solenoid valves must have a max 1/8" NPT, BSPP, or BSPT port diameter, be controlled by either a PCM or Relay Module and valve outputs may not be plumbed together.

Power On Check

1. The Robot Signal Light (two max.) from the KOP must be visible from 3' in front of the robot, and be plugged into the RSL port on RoboRio. Confirm that the RSL flashes in sync with RoboRio.

2. Disable robot and open main breaker to remove power from the robot, confirm all LEDs are off, actuate pneumatic vent plug valve and confirm that all pressure is vented to atmosphere and all gauges read 0 psi pressure.

3. Any heavy modifications to the robot will require a re-inspection.

3 FIELD

Full field specifications will be released in a designated Field Manual.