2022 State Fair
Mobile Robotics Contest

October 23, 2022

- 9:15–9:40am Contest Registration
- 9:45am Contest Briefing
- 10:00–11:00am Mobile Robotics/Engineering Practice Testing
- 11:00am–1:00pm Mobile Robotics/Engineering Performance
- 1:00pm Announcement of Winners/Awards Presentation

**Times subject to change based on performance speed & number of teams*

Contest Description

Students will work in teams of 2 to design and build a robot in advance to accomplish the tasks outlined on the competition course. Students will bring their robots assembled and will be given 1 hour to test and make minor changes to their robot as needed. Following the testing phase, teams will compete in multiple rounds of competition, including autonomous and manual operation modes.

1. Contestants must be high school, middle school or postsecondary students in a related curriculum.
2. Contestant must furnish their own equipment, tools, robot and power cord.
3. Must have safety glasses and necessary personal protective equipment.
4. Contest limited to 20 qualified teams.
5. Entry Deadline – October 10.

Competition Field

The Game:
This year's NC State Fair Mobile Robotics challenge is played on a 12'x12' square field configured as seen above. Teams are tasked with moving and stacking yellow cones strategically on to red or blue cone shaped goals. The object is to score as many points as possible during a two-minute autonomous and operator controlled round.

The Field:
The field contains 19 yellow cones, 6 Mobile Goals, and 4 preload yellow cones. The object is to have your robot pick up yellow cones and place them on the red or blue cone shaped goals and/or move the scoring objects into a color coordinated corner on the field. The field contains two different scoring zones based on color of mobile bases and squares. Cones stacked on a mobile base are worth 1 point each. If the cone is on a mobile base that has been moved to corresponding colored square the cone is now worth 5 points each. A mobile goal placed on the matching color square is worth 15 points each.

The Round:
The competing robot will begin the round positioned completely inside the starting area comprised of the three black squares between the two red outside squares. For the first 60 seconds of the round, the robot operates completely autonomously. Using sensors and/or preprogrammed instructions, the robot must attempt to strategically pick and place yellow cones on to red or blue cone shaped goals. Up to four preload cones will be allowed during the autonomous period. Any points earned during the autonomous will be scored double their normal value in the remote-control round. The field will be reset before the remote round. During the next 60 seconds of the round, drivers take control of the robot and try to score as many point as possible during the time period. There will be up to six rounds. This will be determined by the judges on competition day.

2022 State Fair Contest Robot Kit
VEX V5 Clawbot Kit Components

The following components or equivalent may be used.

V5 Electronics

- (1) V5 Robot Brain
- (1) V5 Controller
- (1) V5 Robot Radio
- (1) V5 Robot Battery Li-Ion 1100mAh
- (1) V5 Robot Battery Cable
- (1) V5 Robot Battery Charger
- (4) V5 Smart Motors
- (2) Bumper Switch v2

V5 Smart Cables

- (3) 300mm Smart Cables
- (1) 600mm Smart Cable
- (1) 900mm Smart Cable

Charging Cable

- (1) USB A to Micro Cable

Wheels

- (2) 4" Omni Wheels
- (2) 4" Wheels

Other Motion Components

- (1) V5 Claw Assembly

Nuts & Connectors

- (30) #8-32 Hex Nut
- (15) 1-Post Hex Nut Retainer w/ Flat Bearing
- (5) 1-Post Hex Nut Retainer
- (7) 4-Post Hex Nut Retainer

Shaft Hardware

- (5) Flat Bearing
- (23) Rubber Shaft Collar
- (6) 0x2 Connector Pin
- (8) 1/8" Nylon Spacer
- (4) 3/8" Nylon Spacer
- (3) 1/2" Nylon Spacer
- (2) 7/8" Nylon Spacer

Screws

- (30) #8-32 x 3/8" Star Drive Screw
- (2) #8-32 x 1.000" Star Drive Screw
- (4) #8-32 x 1/2" Locking Star Drive Screw
- (4) #8-32 x 1.500" Locking Star Drive Screw

Shafts

- (2) 2" Shafts
- (2) 3" Shafts
- (1) 3.5" Shaft
- (3) 4" Shafts

High Strength Gears & Inserts

- (1) 12T Metal Pinion
- (1) 12T Metal Pinion Insert
- (1) 84T High Strength Spur Gear

(10) High Strength Gear Shaft Inserts

Steel Structure

- (3) 2x2x2x20 Steel U-Channels
- (2) 1x2x1x15 Steel C-Channels
- (2) 1x2x1x25 Steel C-Channels
- (2) 2x2x14x20 Steel Angles

Tools

- (2) V5 Battery Clips
- (2) #32 Rubber Bands
- (2) T15 Star Drive Key
- (50) 4" Zip Ties