



**SERIES: TECHNOLOGY EVENTS**  
**CONTEST: ELECTRONICS TECHNOLOGY**



Series Director: JAYLENE dosSANTOS • 508-529-7758 ext. 2139 • jdossantos@valleytech.k12.ma.us

Competition: Blackstone - Electronics Shop Room 643 with Event Manager: Frank Legassey

**REQUIREMENTS AND SCOPE OF CONTEST**

Advisors will be sent log-on information for the **Learning Management System**, which will be open on April 10.

Contestants must submit an electronic copy of their resumé to the **LMS** by April 26, by 5:00pm.

**Clothing Requirements: avoid a clothing penalty**

Blue work pants, as shown

SkillsUSA Massachusetts T-Shirt, provided

Safety shoes

NO jeans

Safety glasses

NO cell phones or SmartWatches allowed

**Safety: avoid a safety violation or being removed from the contest**

NO loose/long hair (must be secured)

NO loose clothing

NO jewelry

NO sneakers

**Tool Requirements: Contestants must submit online a one-page type-written resume, failure to do so will result in a 50-point penalty**

1. Small Hand Tools and Supplies Provided by Contestant

Diagonal cutters

Hook-up wire (10' of #22 gauge)

Soldering iron

Solder wick

Long nose pliers

3 Solderless breadboard 3" x 6"

Solder

Jewelers slotted screwdriver

Wire strippers

Safety glasses

De-soldering tool

Logic Probe

2. Test Equipment

All test equipment will be supplied, however, if you wish to bring your own DMM or VOM it will be acceptable.

**National Skills:**

The six-hour contest is divided into four sections that are designed to test the contestants' knowledge of analog and digital circuitry; ability to troubleshoot electronic circuits; ability to construct and test experimental circuits; to design and select circuit components; and to assemble an electronic circuit. In addition, all aspects of the contest test the contestant's ability to use and calibrate electronic equipment, record and organize data, and demonstrate good safety practices.

**State Skills:**

Contest will include a written exam and the construction of multistage circuit using digital, analog, and discrete components. Safety procedures will be observed.



**SERIES: TECHNOLOGY EVENTS**

**CONTEST: ROBOTICS & AUTOMATION TECHNOLOGY**



Series Director: JAYLENE dosSANTOS • 508-529-7758 ext. 2139 • jdossantos@valleytech.k12.ma.us

Competition: Blackstone - Room 320 & 308 with Event Manager: Bryant Abbot

**REQUIREMENTS AND SCOPE OF CONTEST**

Advisors will be sent log-on information for the **Learning Management System**, which will be open on April 10.

Contestants must submit an electronic copy of their resumé to the **LMS** by April 26, by 5:00pm.

**Clothing Requirements: avoid a clothing penalty**

Blue work pants, as shown

SkillsUSA Massachusetts T-Shirt, provided

Safety shoes

NO jeans

Safety glasses

NO cell phones or SmartWatches allowed

**Safety: avoid a safety violation or being removed from the contest**

NO loose/long hair (must be secured)

NO loose clothing

NO jewelry

NO sneakers

**Tool Requirements: One-page type-written resume required for every contestant, failure to do so will result in a 50-point penalty**

The team will require the following equipment and material to complete the competition. The Technical Committee provides most of the required equipment and materials, but the team must bring certain items.

Robotics and Automation Technical Committee provides:

Speed-controlled conveyor

Microswitches

Plastic and metal blocks

Power strips and Extension cords

Proximity sensor

Template storage area

Task assignment

Scorbot-ER 4u robot with controller, power supply, cables and Scorbase Pro software

Photoelectric sensor

Templates, portable and overlays

Notebooks

Contest Site provides:

3' x 6' Tables

Chairs (2 at each table)

110 VAC at each workstation

Teams provide:

Computer System (Pentium 4 800MHz or higher, 2GB RAM, 2GB free space on hard drive, USB port, CD-ROM drive, Windows XP or Windows 7 with administrative access.)

Each Team's computer MUST have a MINIMUM of 2GB of RAM available

Also, each team MUST download and install the SCORBASE software before they arrive at the contest site. It can be downloaded from the following link: Scorbase\_Robocell\_V5335.zip

When installing the software, please select "SCORBASE for the ER-4u"

Hookup wire 20-24 awg (3 different colors, 100 feet total)

Wire Cutters

Phillips Screw Driver

Tie wraps

Templates allowed for Flow Chart

Wire Strippers

Needle nose pliers

Pencils (2)

Multimeter

Flat Head Screw driver

Safety Glasses with clear lens

Straight edge

Blue Painters Tape

Notebooks: Each team will be issued a notebook and information packet. This will be a three-ring binder in which the team will complete the documentation of its assigned task.

**State Skills:**

Teams of two will demonstrate their ability to perform, exhibit, and compile skills and knowledge necessary from the following list of competencies determined by the Robotics and Automation Technology SkillsUSA Technical Committee members. The team will be provided with a written description of the task requirement and a list of the available equipment and material. The team will develop a system layout and robot program, and then demonstrate its product. Upon completion of this task, the team will be given a requirement to refine its system design and again demonstrate its functionality. [Here is a Resource Guide: https://www.skillsusa.org/wp-content/uploads/2022/01/SkillsUSA-RAT-Contest-resources.pdf](https://www.skillsusa.org/wp-content/uploads/2022/01/SkillsUSA-RAT-Contest-resources.pdf)

- A. Perform Analysis of Task
  - 1. Evaluate written task
  - 2. Evaluate provided equipment and material
  - 3. Evaluate system revision
  
- B. Design, Sketching, Planning
  - 1. Determine sequence of operation
  - 2. Select equipment and material to meet functional need
  - 3. Create flow chart
  - 4. Create layout
  - 5. Process system revision
  
- C. Implement Design
  - 1. Develop robot program
  - 2. Install equipment
  - 3. Integrate equipment with system controller
  - 4. Modify system to meet revision requirements
  
- D. System Performance
  - 1. Perform functional test for total system operation
  - 2. Present system for evaluation
  - 3. Perform functional test to meet revision requirements
  - 4. Present revised system for evaluation

### Group Organization and Goals

This is a group competition and all members may interact at will. It is our hope that the competition will run much like actual industry.

- 1. The robot programmer will program the robot and peripheral equipment.
- 2. The electro-mechanical integrator will install the peripheral equipment and integrate it into the system.

We expect that when a team member has spare time he or she will help the other team member. It is our hope that one person will not dominate a team. It is in no way desirable for one person to do all the work while the other team member merely assists. Each team member must take an active role in this competition.

We have taken this course to promote creativity in the organization of production responsibility. All members are responsible for double-checking a team member's work and quality control.

### General Information

- 1. This competition will be executed using intelitek's Scorbor-ER 4u robot, speed-controlled conveyor, and experiment table.
- 2. Other equipment and material is from local supply sources.
- 3. Each team will provide one working computer with Windows XP or Windows 7, 2GB RAM, 2GB free space on hard drive. Student or instructor must have administrative access to install robot software (SCORBASE).
- 4. Teams will consist of two members.

### Goals

- 1. To have every team complete the contest.
- 2. To have each team member demonstrate reading and writing skills.
- 3. To have each team member use his or her critical thinking and problem-solving abilities.
- 4. To have each team member illustrate responsibility, teamwork, and self-management skills.



**SERIES: TECHNOLOGY EVENTS**

**CONTEST: MOBILE ROBOTICS TECHNOLOGY**



Series Director: JAYLENE dosSANTOS • 508-529-7758 ext. 2139 • jdossantos@valleytech.k12.ma.us

Competition: Blackstone - Café Annex & Teacher’s Lounge with Event Manager: Olivia Houle

**REQUIREMENTS AND SCOPE OF CONTEST**

Advisors will be sent log-on information for the **Learning Management System**, which will be open on April 10.

Contestants must submit an electronic copy of their resumé to the **LMS** by April 26, by 5:00pm.

**Clothing Requirements: avoid a clothing penalty**

Blue work pants, as shown

SkillsUSA Massachusetts T-Shirt, provided

Safety shoes

NO jeans

Safety glasses

NO cell phones or SmartWatches allowed

**Safety: avoid a safety violation or being removed from the contest**

NO loose/long hair (must be secured)

NO loose clothing

NO jewelry

NO sneakers

**Tool Requirements:** Contestants must submit online a one-page type-written resume, failure to do so will result in a 50-point penalty

Team Provided Components:

Options:	Quantity:	Motor Product Clarification:	Product Number:
<b>Option 1</b>	1	VEX EDR V5 Competitor Super Kit	276-6650
	unlimited	V5 Smart Cables for connecting motors and sensors only	
	unlimited	Zip Ties	
<b>OR</b>			
<b>Option 2</b>	1	Vex EDR Cortex V4 Classroom & Competition Super Kit	276-3000
	4	2-Wire Motor 393	276-2177
	4	Motor Controller 29	276-2193
	1	additional 393 Motor Turbo Gear Set 4-Pack	276-3527
	1	additional 7.2V Robot Battery NiMH 3000mHh	276-1491
	1	additional Power Expander	276-2271
	1	standard 9V Battery, used as the backup battery for the VEXnet System	
	unlimited	Extension Cables for connecting motors and sensors only	
	unlimited	Zip Ties	

VEX items can be purchased from Vex Robotics at <https://www.vexrobotics.com/vexedr/products/view-all>

- |   |                                     |                           |
|---|-------------------------------------|---------------------------|
| Engineering Notebook  | Safety Glasses and Work Gloves      | Imperial Allen Wrench Set |
| Power strip and extension cord  | Calculator (standard or scientific) | Tape measure or ruler     |
| Hammer  | Philips and standard screwdriver    | Metal file                |
| Dremel (or similar) rotary tool with appropriate attachments  |                                     | Drill and drill bits      |
| Aircraft metal snippers for cutting Vex material  |                                     |                           |
| A WiFi enabled laptop equipped with licensed Vex programming software and suitable presentation software. |                                     |                           |

THESE ARE THE ONLY ITEMS ALLOWED IN THE COMPETITION AREA DURING COMPETITIONS:

- |                                    |                                  |                                     |
|------------------------------------|----------------------------------|-------------------------------------|
| Pliers                             | Graph Paper                      | Pens and Pencils                    |
| Electrical Tape                    | Clear Tape                       | Markers                             |
| Scissors                           | Grease or graphite (NON-AEROSOL) | Empty small containers or part bins |
| Tap Set                            | Vex competition switch simulator | Vex programming cable               |
| Replacement batteries and chargers |                                  |                                     |

ALL 7.2V ROBOT BATTERIES MUST BE MADE BY VEX ROBOTICS

9V and AAA can be manufactured by any vendor

## CONTEST: MOBILE ROBOTICS TECHNOLOGY CONTINUED

### Contest Guidelines:

1. Teams must be comprised of two members. **Teams should arrive to competition with robots already constructed. Be sure to double check that contestants are using the SECONDARY BUILD INSTRUCTIONS and not the Post Secondary Instructions.**
2. Teams are given a task that they will solve using a mobile robotic system provided by the technical committee.
3. Each team must bring their **Engineering Notebook to the contest location.**
4. Each team will be scheduled a presentation time during the contest, to explain their notebook.  
The presentation should discuss the following:
  - design challenges
  - engineering design process
  - game strategies and robot designs
  - project and team management
5. Teams can only use an engineering notebook during the contest as a reference tool in the construction and programming of their robot.
6. The engineering notebook is a tool for students to document their designs prior to the competition. It can include pictures, printed out sections of code, detailed assembly instructions, etc. All pages must be bound and numbered.
7. Robot(s) can only be constructed **with the materials listed.**
8. Teams will have two scored chances to solve the mobile robotic challenge.
9. Once a team has performed the required task or set of tasks, a design change may be introduced.
10. Contestants are required to adhere to industry safety standards using the hardware and software provided.
11. All team members are responsible for double-checking each other's work and quality control.
12. All engineering notebooks, forms, documentation and programs **must be turned in to the judges.**
13. National game manual link:  
<https://www.skillsusa.org/wp-content/uploads/2022/11/Mobile-Robotics-Technology-Game-Manual-S-and-PS-2022-23.pdf>

### Standards and Competencies:

Demonstrate knowledge in safety rules and practices

- 1.1 Maintain a safe work area
- 1.2 Demonstrate correct use of hand tools
- 1.3 Follow safety rules during robotic assembly
- 1.4 Demonstrate proper use of safety equipment including eye protection
- 1.5 Define and document all safety issues

Produce technical documentation

- 2.1 Maintain professional engineering notebook
- 2.2 Document assembly instructions and illustrations
- 2.3 Produce Bill of Materials (BOM)
- 2.4 Document the engineering design process
- 2.5 Produce CAD drawings of the robot

Apply knowledge of robotic assembly and part identification

- 3.1 Identify various parts used on a mobile robot (wheels, motors, gears, etc.)
- 3.2 Identify the various systems in a mobile robot
- 3.3 Demonstrate the use of various components of a mobile robot
- 3.4 Demonstrate proper assembly techniques

Understand mechanical systems of a robot

- 4.1 Understand and identify the various types of gears and their application
- 4.2 Demonstrate the use of gears on a mobile robot
- 4.3 Understand and identify the various types of chain and sprocket mechanisms
- 4.4 Demonstrate proper mechanical component alignment

Mobile Robotics Technology  
2022-23 Game Manual for Secondary & Post-Secondary Teams  
Presented by: Competition Pros Inc.  
Adapted from: VEX Robotics Competition Spin Up  
In Partnership with: VEX Robotics & REC Foundation

Mobile Robotics Game Manual  
Secondary & Post-Secondary Teams

1

11/1/2022

Wire a mobile robot

- 5.1 Demonstrate proper wiring techniques
- 5.2 Maintain and analyze battery voltage
- 5.3 Understand and use multiple types of mobile robotic sensors

Produce examples of basic computer programming and flowcharting

- 6.1 Draw a programming flow chart representing a robot program for a given scenario
- 6.2 Develop a basic computer program to control robot
- 6.3 Manipulate feedback from robotic sensors in a program
- 6.4 Demonstrate proper commenting of code in a mobile robot program

Presenting technical information and technical problem solving

- 7.1 Demonstrate the knowledge of various visual aids used to present technical information
- 7.2 Present technical material in a professional manner
- 7.3 Define team roles and responsibilities
- 7.4 Demonstrate ability to solve problems as a team in a given time frame
- 7.5 Demonstrate and document a comprehensive plan to solve an engineering problem
- 7.6 Use proper time management when solving a problem
- 7.7 Demonstrate efficient project management and planning

Identify communication protocols for mobile robots

- 8.1 Understand basic communication techniques in mobile robotics
- 8.2 Demonstrate proper communication between a transmitter and a robot



**SERIES: TECHNOLOGY EVENTS**

**CONTEST: URBAN SEARCH AND RESCUE**



Series Director: JAYLENE dosSANTOS • 508-529-7758 ext. 2139 • jdossantos@valleytech.k12.ma.us

Competition: Blackstone - Room 200B with Event Managers: Ashley Hammond and Nathan Weidman

**REQUIREMENTS AND SCOPE OF CONTEST**

Advisors will be sent log-on information for the **Learning Management System**, which will be open on April 10.

Contestants must submit an electronic copy of their resumé to the **LMS** by April 26, by 5:00pm.

**Clothing Requirements:** avoid a clothing penalty

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Safety shoes

Safety glasses

SkillsUSA Massachusetts T-Shirt, provided

NO jeans

NO cell phones or SmartWatches allowed

**Safety:** avoid a safety violation or being removed from the contest

NO loose/long hair (must be secured)

NO loose clothing

NO jewelry

NO sneakers

**Tool Requirements:** One-page type-written resume required for every contestant, failure to do so will result in a 50-point penalty

1. Supplied by technical committee:
  - a. Challenge Field: 30' x 40 simulated neighborhood Field elements.
  - b. Challenge Field Test: Components of an urban area and obstacles to traverse, open, and manipulate in order to locate and dispose of simulated explosive ordinances.
  - c. Skills Challenge: Individual components needed to test unique skills typically used in Urban Search and Rescue events.
  - d. A command center area equipped with a table, a driver chair, spotter area, a video monitor, and two-way communication equipment for driver and spotter.
  - e. General workspace for each team designated as a "pit" area, including one table, two chairs, and access to a 120-volt electrical supply.
2. Supplied by the contestant:
  - a. Safety equipment — eye protection is required at all times in the contest area
  - b. Laptop computer (optional for technical presentation purposes only. Laptop not used for robot operation)
  - c. Fully assembled, tested, and operational ordnance disposal robot conforming to the guidelines and parts restrictions listed in this document (see "Urban Search and Rescue Challenge Kit Bill of Materials" in Appendix)
  - d. Team number affixed to robot
  - e. Presentation software for oral presentation to judges (optional)
  - f. CAD/CAM software for blueprint design (optional)
  - g. Completed Engineering Notebook (Note: Technical drawing/blueprint of robot drive chassis must be included in notebook)
  - h. Pens, pencils and paper
  - i. Tools:
 

Pliers (needle nose or regular)	Set of box wrenches
Allen wrench set (English)	Multnut pliers
Power strip	Tape measure
Hammer	Flat-head and Phillips-head screwdrivers
Wire strippers (one set)	Roll of electrical tape
4" nylon wire ties (25 pack)	Multimeter

**Event:**

The Robotics: Urban Search & Rescue Challenge: Explosive Ordnance Disposal (EOD) enables students to create a mobile robot like those employed by emergency service personnel (fire, police, military). The robot is designed to secure an area by locating, neutralizing, moving, and disposing of explosive materials. The demand for designers, skilled technicians, and manufacturing workers who are fluent in mechanical design and electrical systems and highly skilled in troubleshooting and maintenance of robotic systems is projected to continue to grow. The current generation of students is expected to take artificial intelligence and robotics into the evolving world of emergency services, finding new ways to help trained personnel react more quickly and effectively. Therefore, it is imperative that our future labor force be on the leading edge of current and emerging technologies and possess the technical and team skills necessary to maintain industry leadership in design, manufacture, maintenance, and operation of life-saving robotic equipment.

## CONTEST: URBAN SEARCH AND RESCUE CONTINUED

**Approved Materials:** Approved robot materials and quantity to be used:

### Urban Search and Rescue Challenge Bill of Materials

4" wheel	6	180 Servo	2	40T Gear	2
16T sprocket	4	Single Servo Bracket	2	Electronics Deck	1
24T Sprocket	6	Bronze Bushing	24	Lid	1
32T Sprocket	2	Axle Hub	12	Top Card	1
Chain w/Link	1	Motor Hub	2	Side Label Sticker	1
Chain Breaker	1	1/8" Axle Spacer	24	Camera Pack	1
Gear Hub Spacer	10	3/8" Axle Spacer	6	900 MHz Camera 19-volt Adaptor 1	
100 mm Axle	12	Motor Power Cable	2	Camera Mount	1
DC Drive Motor	2	On/Off Switch	1	Control System 2.4 GHz 6ch R/C Controller 1	
Motor Mount	2	12-volt TETRIX Battery	1		
Axle Set Collar	12	Motor Speed Controller	1	<b>Camera Specifications:</b>	
288 mm Channel	6	1/2 SHCS	200	Camera Sensor Type: CMD	
160 mm Channel	4	Hex Keys	1	Camera Viewing Angle: 170 degrees	
96 mm Channel	4	Zip Tie Pack	20	Camera Reverse Image: Selectable	
32 mm Channel	6	Kep Nut	200	Transmitter Voltage: 12 VDC	
L Bracket	6	3/8" BHCS	50	Transmitter Frequency: 2400-2483 MHz	
Flat Building Plate	2	NiMH Battery Charger	1	Receiver Voltage: 12 VDC	
Flat Bracket	6	288 mm Flat Bar	4	Receiver Frequency: 2400-2483 MHz	
2" Standoff Post	12	Servo Pivot w/Bearing	1		
1" Standoff Post	12	80T Gear	2		

### Additional parts and raw materials legal for use:

1. TETRIX Building System parts ([http://www.pitsco.com/Robotics\\_Urban\\_Search\\_and\\_Rescue\\_Challenge\\_Kit](http://www.pitsco.com/Robotics_Urban_Search_and_Rescue_Challenge_Kit), 800-835-0686, or [competitions@pitsco.com](mailto:competitions@pitsco.com))
2. Other robot parts similar in size and design to Urban Search & Rescue Challenge Kit materials
3. (1) 12" x 24" sheet of acrylic plastic, maximum thickness of 0.250"
4. (1) 12" x 24" sheet of aluminum, maximum thickness of .080"
5. 3D-printed parts of original design
6. Raw material used for fabricating custom robot parts

**Massachusetts State Competition Requirements: No Pneumatics or air compressors allowed**  
**Teams should arrive to competition with robots already constructed.**

**Purpose:** To evaluate team members' skills and preparation for employment in fields related to and including robotics, engineering, automation, manufacturing, electronics, and emergency services. To recognize outstanding performance by participants in scenarios that require problem solving and teamwork in a real-world situation.

### State Skills:

Competencies evaluated on the project will be general principles used in robotics.

### Event Overview

A two-member team builds its robot and arm mechanism prior to the competition. Then, during the competition, there will be two separate but related challenges. The first will be a demonstration of proficiency in five specific skill test challenges. The second is a simulated urban search and rescue mission to traverse a course and locate, secure, and properly dispose of ordinances. Both challenges will require teams to demonstrate proficiencies such as remotely operating the robot via camera, navigating, manipulating the arm mechanism to collect simulated ordinances, traversing various types of terrain, and communicating between driver and spotter.



## CONTEST: URBAN SEARCH AND RESCUE CONTINUED

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Each team will perform one round of the three skill trials and one round of the simulated mission to locate and dispose of two ordinances. In both challenges, teams will be under time constraints to complete the objective.

Challenge breakdown is as follows:

1. Arm Mechanism Skill Challenge: Teams will demonstrate how effective they can open mailboxes and remove ordnance at three levels of increasing difficulty.
2. Camera POV Skill Challenge: Teams will demonstrate their Tele-Op/remote control driving proficiency using only POV (point of view) information transmitted from an onboard camera by navigating through a complex tunnel.
3. Communication and Collaboration Skill Challenge: Teams will demonstrate communication and collaboration skills by navigating a course using only direction from a spotter. This simulates a potential hardware failure on a robot where the driver must depend only on information from the spotter for successful completion of the challenge.

Each skill area will have a unique simplified field area from the overall Urban Search and Rescue field set up. (This is not to say that specific aspects of the overall field might not or could not be used for an individual skill area.) For example, the end effector manipulation skills challenge might be three mailboxes lined up next to each other with different levels of difficulty to open and remove the ordnance for each one.

### **Urban Search and Rescue Field Challenge:**

For the simulated urban search and rescue mission, a total of two ordinances will be placed. One of the ordinances will be placed in a specified location. The other ordnance will be placed in a random location determined by the event chairperson. The random location will likely change from one run to the next. For the known ordnance location, there will be two obvious routes. One route will be higher risk but with potential time savings. The other route will be lower risk but could potentially take longer. These routes will be determined by the event chairperson. Teams should strategize when determining their route to the known ordnance.

### **Skill and Challenge Course Rules**

1. Note: All teams will be expected to adhere to the official rules for the Urban Search & Rescue Challenge competition and compete in a positive and professional manner.
2. All teams will be required to compete in all three Skill Challenges prior to the Urban Search and Rescue Field Challenge.
3. At the competition site, the simulated urban area will be provided and maintained by the technical committee. During competition, the course will be reset to its original state before each team competes. The ordnance pieces will be randomly placed before each team competes.
4. The Urban Search & Rescue Field Challenge: Explosive Ordnance Disposal event will consist of a single timed mission for each team. During the mission, the robot has up to six minutes to navigate the course, complete the challenge, and return to home base.
5. Each team will operate its mobile robot and navigate by line of sight and by the video feed from an onboard wireless camera. The command center will be within view of the playing field. The driver must remain seated at the command center and the spotter must stay within the boundaries of the spotter station while competing.
6. An official will be in charge of placing the team's robot at the starting point on the challenge course. (Reminder: The robot must fit within an 18" x 18" x 18" space at the start but may expand to any size after it enters the neighborhood.)
7. After a "clear" signal is issued by a challenge course official, time will begin as soon as the robot moves. Following completion of a mission, time will stop upon successful return to home base following disposal of two simulated explosive ordinances or time limit expires.
8. Robots should remain on roads and paths within the urban area in order to avoid property damage. Shortcuts are not allowed and will result in penalties.
9. The Urban Search & Rescue Field Challenge will be a maximum of six minutes.
10. Team members are not allowed to touch their robot at any time while a Skill Challenge or Urban Search and Rescue Field Challenge is in progress, unless instructed to do so by a judge.
11. The containment unit where the ordnance pieces are placed by the robot after removal from the course must remain outside of the field of play and as close to the starting position as possible. Any team that deliberately moves the containment unit from its starting point may be disqualified.
12. An official will award points for the team's mission based on the official "Urban Search and Rescue Skills and Field Challenges" rubric.

# CONTEST: URBAN SEARCH AND RESCUE CONTINUED

## Scoring Rubrics

Judges will award points for the team's mission based on the following rubrics:

### Camera POV Possible Points: 100

Performance skill challenge of POV camera system	15
Challenge goals achieved	60
BONUS Robot found, entered, navigated, exited, returned on time with correct critical mission data	25

### Communication & Collaboration Possible Points: 100

Skill challenge of Spotter's verbal communication skills	15
Skill challenge of Driver's listening comprehension skills	15
Challenge goals achieved	45
BONUS Robot successfully traversed full course, collected, disposed of ordnance on time, without issue	25

### Arm Mechanism Possible Points: 100

Performance skill challenge of arm mechanism	15
Performance skill challenge of gripper	15
Overall performance of arm and gripper assembly	15
Challenge goal achieved	30
BONUS Successfully opened all mailboxes and removed all ordnances under time proficiency target	25

### Challenge Course Mission Possible Points: 200

Ordnance retrieval and containment	200
- Deduction: Loss of ordnance	- 5 points per incident
- Deduction: Vehicle stalled, official asked to help	- 5 points per incident
- Deduction: Robot intentionally outside of boundaries	- 5 points per incident

### Engineering Technician Notebook Possible Points: 125

Overall content format and appearance	25
Logical structure and documentation	25
Technical accuracy and bill of materials	25
Technical drawing quality	25
Accuracy of technical drawing to assembled drive train	25

## Penalties

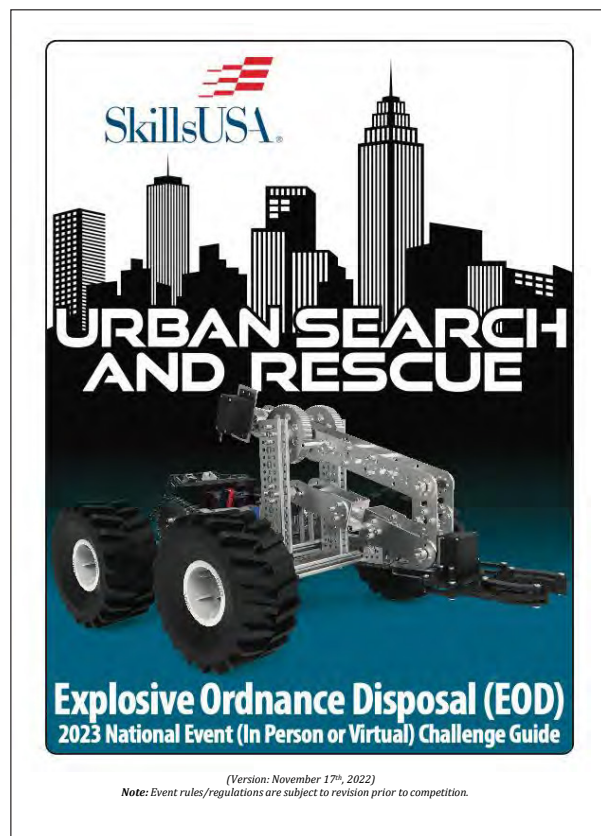
1. A deduction will be assessed each time an ordnance is dropped.
2. Each time the robot stalls or becomes hung up and has to be freed by an official, a deduction will be assessed. An official will free a robot only at the request of a team member, but a deduction will be assessed.
3. A deduction will be assessed whenever a robot goes off the designated path within the neighborhood or outside of the course boundaries. Shortcuts are not allowed.



Ordnance (wooden block)



Mailbox handle



For additional **Scoring Rubrics and a complete list of competencies**, see the USAR2023 Challenge Guide, shown above.

Access the guide here: <https://www.skillsusa.org/wp-content/uploads/2022/11/Robotics-USAR-Skill-Challenge-Guide-20238.pdf>