MOBILE ROBOTICS TECHNOLOGY

PURPOSE
To evaluate each contestant’s preparation for employment in the field of robotics with emphasis on the team approach to problem solving in a work environment. To recognize outstanding students for their excellence and professionalism in the emerging field of mobile robotics.

ELIGIBILITY
Open to a team of two active SkillsUSA members enrolled in a career and technical education engineering program or a program that integrates robotics, engineering or pre-engineering techniques as an integral component of the instructional program.

CLOTHING REQUIREMENTS
NYS Business Casual - which consists of:
- Button-up collared, white dress shirt, white blouse (collarless or small-collared) or white turtleneck, with any collar.
- Black dress slacks (accompanied by black dress socks or black or skin-tone seamless hose) or black dress skirt (knee-length, accompanied by black or skin-tone seamless hose)
- Black dress shoes - no open back or open toed shoes

Note: Contestants must wear their official contest clothing to the contest orientation meeting. Also bring #2 pencil, resume and safety assurance form.

EQUIPMENT AND MATERIALS
1. Supplied by the technical committee:
   a. All necessary information for judges and technical committee
   b. One standard 120-volt electrical outlet
   c. One standard 6’ conference table
   d. Two chairs
   e. Description of robotic challenge
   f. Junior Mobile Robotics Teams will receive VEX IQ Robotic equipment for building their robot at NLSC. Post-Secondary and Secondary Teams must bring their own robots.
2. Supplied by the contestant:
   a. Computer with programming software installed and licensed
   b. Programming cable or other connection devices
   c. Engineering notebook
   d. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.
   e. Post-Secondary and Secondary Teams: Fully built mobile robot as specified in the current SkillsUSA Mobile Robotics Technology game manual. Robot must be capable of being re-programmed and minor physical design modifications
   f. Any non-powered hand tools necessary to modify their robot as needed.

Note: Your resume may be judged as part of your contest” Check the Contest Guidelines and/or the updates page, for contest packet, on the NYS SkillsUSA Web site: http://www.nysskillsusa.org

SCOPE OF THE CONTEST
Teams are given a task they are asked to solve using a mobile robotic system. Post-Secondary and Secondary Teams will come prepared with a fully built robot capable of being re-programmed quickly to adapt to modifications of the game presented to the teams during Orientation. Middle School Mobile Robotic Teams will be given new VEX IQ kits to assemble their robot during the competition. The contest will test the ability to document, construct, program and exhibit their solution to
industry-based judges. Teams will be given two interviews, the first for their overall design process, and the second for their programming solution to the problem.

Knowledge Performance
The contest will include the SkillsUSA Framework Essential Element Assessment. This will be given during Orientation.

Skill Performance
The contest will include activities that simulate situations encountered by robotic programmers and support professionals.

Contest Guidelines
1. Teams must be comprised of two members.
2. Teams are given a task that they will solve using a mobile robotic. 
3. Each team will have 10 minutes to present its engineering design process to the judges.
4. Each team will have 10-minutes to present its programming code to the judges.
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. Each team will be given points for CAD drawings of their robot. These drawings should be included in the engineering notebook.
8. Robot(s) can only be constructed by the materials specified in the SkillsUSA Mobile Robotics Technology game manual.
9. Teams will have six scored chances to solve the mobile robotic challenge three chances for Programming Skills and three chances for Driving Skills. The highest score in each Skill will be recorded and submitted for judging.
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, and résumés must be turned in to the judges at Orientation. Notebooks will be returned no later than the start of the debriefing session.
13. All team members and advisors are required to attend the debriefing session after the competition has concluded.

Standards and Competencies

MR 1.0 — 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

MR 2.0 — 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

MR 3.0 — 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

MR 4.0 — 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
**MR 5.0 — 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

**MR 6.0 — 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

**MR 7.0 — 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

**MR 8.0 — 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
Special Instructions to Contestants

Due by Feb 1, 2020

Date submitted: ___March 11, 2020___

Contest Name _______ Mobile Robotics _________

Chairperson: __________________TBA_______________________

Only Special Instructions received by Feb. 28, 2020 will be posted on the website!!!

Deleted Materials & Supplies:

Additional Materials & Supplies:

Other: