Science, Technology, Engineering & Math
Department H
Division 861 – Robotics

This category involves many different aspects of Robotics. Participants will learn more about how robots are designed and developed as well as the mechanical and electronic elements of robots. Involvements in STEM Robotics give participants a first-hand experience of modern technology.

Rules

1. The name and county of each exhibitor should appear separately on the back of each board, poster or article and on the front cover of the notebooks so owner of the exhibit may be identified if the entry tag is separated from the exhibit.
2. Reports should be written using the scientific method whenever possible (Background, the Question or hypothesis, what you plan to do and what you did, Method used and observations, Results: what you learned. All reports should be computer generated and enclosed in a clear plastic cover. The reports should be attached securely to the display.
3. Posters can be any size up to 28" by 22" when ready for display. Example: tri fold poster boards are not 28" by 22" when fully open for display.

For General Rules click here

Eligibility
All static exhibits must have received a purple ribbon at the county fair to advance to the State Fair.

Scoresheets, Forms, and Contest Study Materials
Scoresheets, forms, contest study materials, and additional resources can be found at http://go.unl.edu/ne4hrobotics.

Divisions - Robotics

CLASS 1 **ROBOTICS POSTER** (SF236)

Create a poster (28" X 22") communicating a robotics theme such as "Robot or Not", "Pseudocode", "Real World Robots", "Careers in Robots" or " "Autonomous Robotics", "Precision Agriculture" or a robotic topic of interest to the 4-H'er.

CLASS 2 **ROBOTICS NOTEBOOK** (SF237)

Explore a robotics topic in-depth and present your findings in a notebook. Documentation should include any designs, research, notes, pseudocode, data tables or other evidence of the 4-H'ers learning experience. The notebook should contain at least three pages. Topics could include a programming challenge, programming skills, calibration, sensor exploration, or any of the topics suggested in Class 1.

CLASS 4 **ROBOTICS/CAREERS INTERVIEW** (SF239)

Interview someone who is working in the field of robotics and research the career in robotics. Interviews can either be written or in a multimedia format such as a short video uploaded to a cloud sharing service. Include a QR code with your project to allow for judging access. State Fair qualified videos should be submitted to https://go.unl.edu/2024nesfset by August 10th, 2024, or videos can be uploaded to a video streaming application and exhibitors MUST provide a hard copy QR code for viewing. Exhibitors are encouraged to test their codes or links on several devices to check for appropriate permissions for public viewing. Written interviews should be in a notebook. Written reports should be 3 to 5 pages, double spaced, 12-point font, and 1" margins. Multimedia reports should be between 3 to 5 minutes in length.

CLASS 5 **ROBOTICS SENSOR NOTEBOOK** (SF241)

Write pseudo code which includes at least one sensor activity. Include the code written and explain the code function. Codes can be submitted as a multimedia format uploaded to a cloud sharing service. Include a QR code with your project to allow judging access. Mulitmedia presentations should be 3 to 5 minutes in length. State Fair qualified videos should be submitted to https://go.unl.edu/2024nesfset by August 10th, 2024. Videos can also be uploaded to a video streaming application and exhibitors MUST provide a hard copy QR code for viewing. Exhibitors are encouraged to test their codes or links on several devices to check for appropriate permissions for public viewing.

CLASS 7 **KIT LABELED ROBOT (CANNOT BE FREE PROGRAMMED) AND NOTEBOOK** (SF243)

This class is intended for explorations of robotic components such as arms or vehicles OR educational kits marketed as robots that do not have the ability to be programmed to "sense, plan and act." The exhibit should include a notebook with the robot the youth has constructed. Included in the notebook should be (1) a description of what the robot does, (2) pictures of programs the robot can perform, (3) why they chose to build this particular form, and (4) how they problem solved any issues they might have had during building and programming. A picture story of assembly is recommended. If a robot is more than 15" inches wide and 20" inches tall they may not be displayed in locked cases.

CLASS 8 **3D PRINTED ROBOTICS PARTS -** (SF244)

This class is intended for youth to create parts through 3D printing, that help create their robot or aid the robot in completing a coded function. Project should include notebook describing the process used to create the project, describe the success of your designed piece (did it work), intended use of the product and the modifications made to the item.

ROBOTICS SHOWCASE

Rules

1. Team Entries: To qualify for entry at the Nebraska State Fair team materials entered in robotics classes that are clearly the work of a team instead of an individual must have at least 50% of all team members enrolled in 4-H. Additionally, all enrolled 4-H members on the team should complete and attach an entry tag to the materials. A supplemental page documenting the individual contributions to the project should be included. The entry will be judged as a team, with all team members receiving the same ribbon placing.

2. Creating a video of your robot in action would be helpful for the judges but is not mandatory. Videos should be uploaded to a video streaming application and exhibitors should provide a hard copy QR code for viewing. State Fair qualified

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JUNKDRAWER ROBOTICS

All exhibits should be original designs made with objects and materials from your trunk of junk. Kits purchased commercially will not be accepted.

The following classes are not eligible for State Fair consideration

CLASS 901 JUNKDRAWER ROBOTICS LEVEL 1

Youth will exhibit one of the following from the level 1 manual.

- a self-designed balance beam you have created
- a self-designed mechanical arm that has at least two of the three axes of movement
- a self-designed gripper for your mechanical arm.

CLASS 902 JUNKDRAWER ROBOTICS LEVEL 2

Youth will exhibit one of the following from the level 2 manual.

- a can-can robot that will make drawings on paper
- a rover (Es-Car-Go) with a gear train that is able to climb a ramp
- a design for an underwater ROV that can be powered to go up and down in a tank of water.

CLASS 903 JUNKDRAWER ROBOTICS LEVEL 3

Youth will exhibit one of the following from the level 3 manual.

- a self-designed and built or modified machine that will travel forward and backward using electrical power
- a self-designed mechanism that will sense a barrier (both front and back) and change motor or wheel direction.
- Build and compare at least two types of circuits.
- A self-designed original robot that can perform a specific task

Resources

Junk Drawer Robotics 1
Discover the design and functions of robotic arms; Build a robotic arm that moves
URL: https://4hcurriculum.unl.edu/index.php/main/program_project/136

Junk Drawer Robotics 2
Explore robot movement, power transfer, and locomotion; Design and build machines the roll, slide, draw or move underwater
URL: https://4hcurriculum.unl.edu/index.php/main/program_project/137

Junk Drawer Robotics 3
Make the connection between the mechanical and electronic elements of robots; Explore sensors, write programs, build circuits and design your own robot
URL: https://4hcurriculum.unl.edu/index.php/main/program_project/138

EV3 Robotics 1 and 2
Activities are based on the EV3 Core Set available from LEGO® Education.
URL: https://shop4-h.org/collections/science-technology-engineering-math-curriculum/products/lego-robotics-curriculum-with-ev3
URL: https://shop4-h.org/collections/science-technology-engineering-math-curriculum/products/robotics-2-ev3n-more

Robotics Platforms
Use commercial robotics kits to explore the world of robotics; Learn to program your robot using sensors, loops and conditional statements
URL: https://4hcurriculum.unl.edu/index.php/main/program_project/139