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

This category involves the many different aspects of Robotics. Participants will learn more about how robots are designed and develoepd as well as the mechanical and electronic elements of robots. Involvements in SET Robotics gives participants a first-hand experience in 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. Several classes require a display board which should be a height of 24 inches and not to exceed 1/4-inch thickness. A height of 24 7/8 inches is acceptable to allow for the saw kerf (width) if two 24 inch boards are cut from one end of a 4 foot by 8-foot sheet of plywood. Nothing should be mounted within 3/4 inch of the top or bottom of the board. (Example: Woodworking & Electricity.)
3. Fabricated board such as plywood, composition board, or particle-type lumber may be used for demonstration displays.
4. Demonstration boards should be sanded and finished to improve their appearance. The finish on a demonstration board will be judged as a woodworking exhibit.
5. Demonstration boards should include an overall title for the display, plus other necessary labeling.
6. 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.

CLASS 1 **ROBOTICS POSTER (SF236)**

Create a poster (14" 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, a programming skill, calibration, sensor exploration, or any of the topics suggested in Class 1.

CLASS 3 **ROBOTICS VIDEO (SF238)**

This class should be displayed in a notebook. The notebook should include a video clip on a CD/DVD that demonstrates the robot performing the

programmed function. Include your pseudo code and screenshots of the actual code with a written description of the icon/command functions. If chosen for state fair, All videos for state fair should be emailed to Amy Timmerman atimmerman2@unl.edu before August 15. Files must be saved in a PC compatible format with county name and last name of participant before emailing.

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 (CD/DVD). 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.

CLASS 6 **BUILD A ROBOT (MAY USE KIT) (SF243)**

Include a robot and notebook including the pseudocodes for at least one program you have written for the robot, the robots purpose, and any challenges or changes you would make in the robot design or programming. If robot is more than 15" inches wide and 20" inches tall they may not be displayed in locked cases. We recommend that you submit the project under class H861003 – Robotics Video. Junk Drawer Robotics do not qualify.

CLASS 7 **KIT LABELED ROBOT (CANNOT BE PROGRAMMED) (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 project the youth has constructed, a description of what it does and an explanation of how it is similar to and different from a robot. If robot is more than 15" inches wide and 20" inches tall they may not be displayed in locked cases. We RECOMMEND THAT YOU SUBMIT THE PROJECT UNDER CLASS 3 – ROBOTICS VIDEO.

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.

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

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

Virtual Robotics

Learn how robots are designed and developed; Program your own virtual robots and test it in a variety of environments

URL: https://4hcurriculum.unl.edu/index.php/main/program_project/135