

# Robotics

Robots do surgery, build cars, and assist us with our complex modern lives. This project is all about these amazing machines and learning to build and program your own robots to solve issues you face.

## Project Levels

### ROBOTICS 1

In level 1, use LEGO® EV3 technology to learn what a robot is, how to build one, and how to program it.

### ROBOTICS 2

In level 2, use LEGO® EV3 technology to learn new robot configurations and programming challenges.

### ROBOTICS 3

In level 3, learn to program non-LEGO® robots using free range open source hardware and software. Learn how to build and program a robot, understand difference of closed and open source design, and configure robots.

### JUNK DRAWER ROBOTICS LEVEL 1

In level 1, build robots from everyday items without using computers. Explore robot arms, pneumatics, arm designs, and three-dimensional space. Order the Presenter's Guide and the Youth Notebook.

### JUNK DRAWER ROBOTICS LEVEL 2

In level 2, build robots from everyday items without using computers. Explore robots that move with legs and wheels and move underwater. Order the Presenter's Guide and the Youth Notebook.

### JUNK DRAWER ROBOTICS LEVEL 3

In level 3, build robots from everyday items without using computers. Explore sensors, analog, and digital systems. Order both the Presenter's Guide and the Youth Notebook.

### **Resources to help you learn**

- *Robotics 1 with EV3*
- *Robotics 2 with EV3*
- Robotics 3: Check out online resources [HERE](#).
- *Junkdrawer Robotics 1: Presenter's Guide*
- *Junkdrawer Robotics 2: Presenter's Guide*
- *Junkdrawer Robotics 3: Presenter's Guide*
- *Youth Notebook*

### **ROBOTICS 1 BEGINNING (NOT ELIGIBLE FOR STATE FAIR)**

Exhibitors should complete Activities 1-6. Exhibitors will design, build and program a robot that can autonomously follow a predetermined path that changes direction at least 4 times during a single run. They will bring their Robotics Notebook to share what they learned about the engineering design process and programming.

### **ROBOTICS 1 INTERMEDIATE (SF 50285)**

Exhibitors should complete Activities 7-12. Exhibitors will design, build and program a robot that uses at least one sensor to autonomously follow a path, respond to, and or avoid obstacles. Exhibitors in this class must use at least one sensor in their robot design. They will bring their Robotics Notebook to share what they learned about the engineering design process and programming.

### **ROBOTICS 2 (SF 50286)**

Exhibitors should complete Activities 1-7. Exhibitors will design, build and program a robot that uses sensors and programming to complete one of the provided challenges. They will bring their robot and Robotics Notebook to share changes they made to the robot and/or program along the way, and to describe their experience with completing the challenge.

### **ROBOTICS INNOVATION OPEN SOURCE CLASS (SF 50292)**

**Open to youth enrolled in Robotics 3, but may also include youth in Robotics 1 or 2 if the exhibits meets the guidelines.**

Exhibit an original robot, either homemade or a kit that does not fall under Robotics 1 or 2 that can complete a task using MULTIPLE sensors. If a robot kit is used, then some parts of the robot must be built using other components such as wood, plastic or metal. The robot can include any types of motors, pneumatics or sensors. The Innovation class can also be used for LEGO Mindstorms or Vex kits where the exhibit does not fall under Robotics 1 or 2 exhibit option. Autonomous control of the robot may also be achieved using an “open source” platform such as Arduino or Raspberry Pi and can be programmed using a coding language that is publicly available. Exhibitors in Robotics Innovation/Open Source class must bring a detailed engineering notebook that describes how the exhibitor designed, built and programmed the exhibit.

**JUNK DRAWER ROBOTICS**

All exhibits should be original designs made with everyday objects and materials. Exhibits with purchased kits will not be accepted. Exhibitors are also required to bring their Junk Drawer Robotics Youth Robotics Notebook with the sections completed for the project they are exhibiting, including the sections leading up to the activity they are exhibiting. For example, if a youth is bringing Activity E from Junk Drawer Level 1, they should have robotics notebook sections A-E completed.

**JUNK DRAWER ROBOTICS 1 (NOT ELIGIBLE FOR STATE FAIR)**

Exhibit any item from the “To Make” activity from the Junk Drawer Robotics Level 1 Book. Be sure all robotics notebook sections within the module being exhibited are filled in.

**JUNK DRAWER ROBOTICS 2 (SF 50288)**

Exhibit any item from the “To Make” activity from the Junk Drawer Robotics Level 2 Book. Be sure all robotics notebook sections within the module being exhibited are filled in.

**JUNK DRAWER ROBOTICS 3 (SF 50289)**

Exhibit any item from the “To Make” activity from the Junk Drawer Robotics Level 3 Book. Be sure all robotics notebook sections within the module being exhibited are filled in.

### **ROBOTICS READY4LIFE CHALLENGE (SF50293)**

#### **Open to 11- to 18-year-olds enrolled in any Robotics project**

Exhibits in this category must include the following: a) a physical representation of the career or business product such as a model, prototype or display/portfolio that includes images of accomplished work; b) verbal or written explanations that demonstrate knowledge of the related career or business fields, potential careers, and the appropriate requirements for achievement in those fields. The judging criteria for this class values thoroughness of career and/or business exploration and pursuit above the workmanship of the physical specimen on display.

### **ROBOTICS MAKER (SF 50400)**

#### **Counties may submit 3 entries TOTAL combined from all Maker exhibit divisions.**

Exhibits in this category are designed to be multi-disciplinary in nature, innovative, and must not fit into any other exhibit category. To qualify for this category, your project **MUST** abide by the following guidelines:

- Exhibits must be an object or device that has an intended purpose and uses technology in either a mechanical way, digital (computer) way, or combination of the two.
- The device must be something that can be used in everyday life by multiple people (a target audience), and **MUST** be manufactured/built by the exhibitor (If not fully manufactured by the exhibitor, the device **MUST** be modified structurally or be reprogrammed to perform a different function other than what it was designed to do)
- Exhibit **MUST** be able to interact with the outside world. (e.g. an on off switch, input sensors, feedback, etc.)
- Exhibits **MUST** include a detailed build log with instructions on how to make or build the exhibit, **AND** contain either a 3D rendering or detailed and labeled sketches of the device/product.
- All parts and software used in the design/build **MUST** be listed in a detailed Bill of Materials including cost per item and total cost. Total time spent on the build must be documented in your build log.

In addition, exhibitors are HIGHLY encouraged to use tools such as 3-D printers, laser cutters, routers and/or other hand/power tools to help in the manufacturing process (**NOTE: Simply 3-D printing or laser cutting an object without the other specifications does not qualify as a Maker Project**). It is also HIGHLY encouraged that exhibits use Open Source Software and/or Hardware in the build.