

Merit Badge Workbook



This workbook can help you but you still need to read the merit badge pamphlet.

This Workbook can help you organize your thoughts as you prepare to meet with your merit badge counselor. You still must satisfy your counselor that you can demonstrate each skill and have learned the information. You should use the work space provided for each requirement to keep track of which requirements have been completed, and to make notes for discussing the item with your counselor, not for providing full and complete answers. If a requirement says that you must take an action using words such as "discuss", "show", "tell", "explain", "demonstrate", "identify", etc, that is what you must do.

Merit Badge Counselors may not require the use of this or any similar workbooks.

No one may add or subtract from the official requirements found in Scouts BSA Requirements (Pub. 33216 – SKU 653801). The requirements were last issued or revised in <u>2011</u> • This workbook was updated in <u>June 2020</u>.

Scout's Name:		_ Unit:	
Counselor's Name:	Phone No.:	Email:	
	http://www.USScouts.Org •	http://www.MeritBadge.Org	

Please submit errors, omissions, comments or suggestions about this <u>workbook</u> to: <u>Workbooks@USScouts.Org</u> Comments or suggestions for changes to the <u>requirements</u> for the <u>merit badge</u> should be sent to: <u>Merit.Badge@Scouting.Org</u>

NOTE: Requirements 4 and 5 require you to document your work in a robot engineering notebook. That notebook should be separate from and in addition to this workbook.

1. Safety. Do each of the following:

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a. Explain to your counselor the most likely hazards you may encounter while working with robots and what you should do to anticipate, mitigate and prevent, and respond to these hazards.

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Hazard:	
Anticipate:	
Mitigate & Prevent:	
Respond:	
Hazard:	
Hazard: Anticipate:	
Anticipate:	
Anticipate:	
Anticipate:	
Anticipate: Mitigate & Prevent:	
Anticipate:	
Anticipate: Mitigate & Prevent:	
Anticipate: Mitigate & Prevent:	
Anticipate: Mitigate & Prevent:	

Hazard:	
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Respond:	
Hazard:	
Anticipate:	
Mitigate & Prevent:	
J. J	
Respond:	

Describe the appropriate safety gear and clothing that should be used when working with robotics.

b. Discuss first aid and prevention for the types of injuries that could occur while participating in robotics activities and competitions, including cuts, eye injuries, and burns (chemical or heat).

Cuts,:	
Eye injuries:	
Chemical Burns:	
Heat burns:	

- 2. Robotics industry. Discuss the following with your counselor:
 - a. The kinds of things robots can do and how robots are best used today.

		-	•
	What they car	n do:	
	How they are	best used:	
b.	The similarities	s and differe	nces between remote-control vehicles, telerobots, and autonomous robots.
	Similarities:		
	ľ		
	Differences:		

c. Three different methods robots can use to move themselves other than wheels or tracks.

1.	
2.	
3.	

Describe when it would be appropriate to use each method.

- 1.

 2.

 3.
- 3. **General knowledge**. Discuss with your counselor three of the five major fields of robotics (human-robot interface, mobility, manipulation, programming, sensors) and their importance to robotics development. Discuss either the three fields as they relate to a single robot system OR talk about each field in general.

Human-robot interface	
Mobility	
Manipulation	
Programming	

Find pictures or at least one video to aid your discussion.

4. Design, build, program, test. Do each of the following:

- a. With your counselor's approval, choose a task for the robot or robotic subsystem that you plan to build. Include sensor feedback and programming in the task. Document this information in your robot engineering notebook.
 -] b. Design your robot. The robot design should use sensors and programming and have at least 2 degrees of freedom. Document the design in your robot engineering notebook using drawings and a written description.

c. Build a robot or robotic subsystem of your original design to accomplish the task you chose for requirement 4a.

d. Discuss with your counselor the programming options available for your robot.

Then do either option 1 OR option 2.

- 1. **Option 1**. Program your robot to perform the task you chose for your robot in 4a. Include a sample of your program's source code in your robot engineering notebook.
- 2. **Option 2**. Prepare a flowchart of the desired steps to program your robot for accomplishing the task in 4a. Include procedures that show activities based on sensor inputs. Place this in your robot engineering notebook.
- e. Test your robot and record the results in your robot engineering notebook. Include suggestions on how you could improve your robot, as well as pictures or sketches of your finished robot.

- 5. **Demonstrate**. Do the following:
 - a. Demonstrate for your counselor the robot you built in requirement 4.
 - b. Share your robot engineering notebook with your counselor. Talk about how well your robot accomplished the task, the improvements you would make in your next design, and what you learned about the design process.

How well your robot accomplished the task:

Improvements you would make:

What you learned:

- 6. **Competitions**. Do ONE of the following.
 - a. Attend a robotics competition and report to your counselor what you saw and learned about the competition and how teams are organized and managed.

What you saw:

Wł	you learned:
Ho	teams are organized and managed.
b. Lea tim	about three youth robotics competitions. Tell your counselor about these, including the type of competition, commitment, age of the participants, and how many teams are involved.
С	npetition1:
	Type of competition:
	Time commitment:
	Age of the participants:
	How many teams are involved:
С	npetition 2:
	Type of competition:
	Time commitment:
	Age of the participants:
	How many teams are involved:

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