OVERVIEW

Teams develop a working digital device (product) with real-world applications. Through a multimedia presentation, product demonstration, and documentation, the team demonstrates in detail its knowledge of microcontroller programming, simple circuitry, and product design and marketing. The project should have educational and/or social value and conform to the theme for the year. The theme will be posted on the TSA website (www.tsaweb.org) under Competitions/Themes and Problems. Teams demonstrate and promote their work in a timed presentation.

ELIGIBILITY

Participants are limited to one (1) team of three to five (3-5) members per chapter. Up to three (3) team members may participate in the presentation.

TIME LIMITS

A. Entries must be started and completed during the current school year.

B. Teams will be allowed five (5) minutes to set up for their presentation, five (5) minutes for the actual presentation, and three (3) minutes for removal of any items used in the presentation.

ATTIRE

TSA competition attire, as described in the National TSA Dress Code section of this guide, is required.

PROCEDURE

A. Teams submit their documentation portfolio at the time and place stated in the conference program. At this same time, teams sign up for a presentation time.

B. Portfolios are reviewed by evaluators in advance of the presentations.

C. Teams report to the designated event area at the specified time in the conference program. Teams must bring with them

the device (product) and multimedia presentation. Products are judged during the presentation.

D. No more than three (3) team members are allowed to participate in the presentation in which they will explain their research, the value of their product, and its marketability; they also will demonstrate their product's functionality. Evaluators may ask questions after the presentation is finished.

It is essential that students and advisors routinely check the TSA website (www.tsaweb.org) for updated information about TSA general rules and competitive guidelines. This information is found on the website under Competitions/ Competition Updates. When students participate in any TSA competitive event, they are responsible for knowing of all updates, changes, and clarifications related to that event.

REGULATIONS

A. Documentation materials (comprising a "portfolio") are required and should be secured in a clear front report cover. (Click here for a sample.) The report cover must include the following single-sided, 8½" by 11" pages, in this order:

1. Title page with the event title, the conference city and state, the year, and the team/chapter ID number; one (1) page
2. Table of contents; pages as needed
3. Description of the team's project, including an explanation of the educational and/or social value of the project; pages as needed for each requirement.
4. Research into the problem; three (3) pages maximum.
5. Plan of Work log that indicates preparation for the event, as noted by date, task, time involved, team member(s) responsible, and comments (See Plan of Work log); one (1) page
6. Circuit diagrams
7. Source code
8. Product marketing plan
9. Print out of multimedia presentation
10. Materials list
11. Team's evaluation of its work
12. List of references used for the project

B. Product

1. The device (product) must include a programmed microcontroller that controls the device functionality.
2. Aesthetics—the product must be well-designed and show good craftsmanship.
3. Functionality—the product must operate as intended; remote control technology may be used to operate the device.
4. AC/ power and/or a dry cell batter may be used.

C. Presentation—Teams are given five (5) minutes to set up their device and multimedia presentation; five (5) minutes to explain the problem their device solves, demonstrate the functionality of the device, and describe their marketing plan. Judges may ask questions after the presentation.

D. Teams will be allowed three (3) minutes for the removal of any items used in the presentation. All portfolios and presentations become the property of TSA, Inc., and will not be returned after the event.

EVALUATION

Evaluation is based on the quality of work and overall benefit showcased in the participant portfolio; on their multimedia presentation; and on their ability to promote their device (product), both to expand end-user usage and attract future developers. Please see the official rating form for more information.

PROJECT IDEAS AND MICROCONTROLLER TRAINING:

http://www.avr-tutorials.com/

http://www.pictutorials.com/what_is_microcontroller.htm

https://www.newbiehack.com/MicrocontrollerTutorial.aspx

http://people.ece.cornell.edu/land/courses/ece4760/FinalProjects/

http://www.circuitstoday.com/8051-projects-and-circuits

STEM INTEGRATION

This event aligns with the STEM educational standards noted below. Please refer to the STEM Integration section of this guide for more information.

Science, Technology, Engineering, Mathematics

COMMON CORE STATE STANDARDS (CCSS) INTEGRATION

Please refer to the Common Core State Standards (CCSS) Integration section of this guide for more information.

LEADERSHIP SKILLS

Leadership skills promoted in this event:

- Communication — Students communicate with team members and other project developers, debuggers, and documenters. Suggested leadership activities: *Chefs In The Kitchen* and *Communication Breakdown*
- Critical thinking — Students analyze and evaluate a problem in order to arrive at an acceptable solution. Suggested leadership activities: *Rebus Puzzles* and *Thinking Like Tarzan*
- Problem solving — Students design a solution to a problem. Suggested leadership activities: *Breaking It Down* and *Finding A Way*

Additional leadership skills promoted in this event:

- Self-esteem
- Teamwork
- Organization
- Decision making
- Ethics
- Creative thinking
- Evaluation

TSA AND CAREERS

This competition has connections to one or more of the career areas featured in the TSA AND CAREERS section of this guide. Use The 16 Career Clusters chart and the TSA Competitions and Career Clusters grid as resources for information about careers.

CAREERS RELATED TO THIS EVENT

- Manufacturing
- Software engineer
- Technical writer

TECHNOLOGY STUDENT ASSOCIATION
PLAN OF WORK

	Date	Task	Time involved	Team member responsible	Comments
1					
2					
3					
4					
5					
6					

Advisor signature _____

MICROCONTROLLER DESIGN
EVENT COORDINATOR INSTRUCTIONS

PERSONNEL

A. Event coordinator

B. Evaluators, two (2) or more

MATERIALS

A. Coordinator's packet, containing:
    1. Event guidelines, one (1) copy for the coordinator and for each evaluator
    2. TSA Event Coordinator Report
    3. List of evaluators/assistants
    4. Results envelope with coordinator forms

B. Chairs, one (1) per participant

C. Stopwatch for timing presentations

RESPONSIBILITIES

A. Upon arrival at the conference, report to the CRC room and check the contents of the coordinator's packet. Review the event guidelines and check to see that enough evaluators/assistants have been scheduled.

B. Inspect the area(s) in which the event is being held for appropriate set-up, including room size, chairs, tables, outlets, etc. Notify the event manager of any potential problems.

C. One (1) hour before the event is scheduled to begin, meet with your evaluators/assistants to review time limits, procedures, and regulations. If questions arise that cannot be answered, speak to the event manager before the event begins.

D. Check in the entries at the time stated in the conference program. Anyone reporting who is not on the entry list may check in only after official notification is received from the CRC. Late entries are considered on a case-by-case basis and only when the lateness is caused by events beyond the participant's control. Requirements for attire do NOT apply during check-in.

E. Each entry must include the participant's identification number in the upper right-hand corner of the entry.

F. Assign students a five (5)-minute time frame for their presentation at check-in.

G. Evaluators independently review each entry.

H. For participants who violate the rules, the decision either to 1) deduct 20% of the total possible points or 2) disqualify the entry, must be discussed and verified with the evaluators, event coordinator, and CRC manager, who all must initial either of these actions on the rating form.

I. Inspect the area in which the presentations are to be held. There must be seating for at least five (5) people at a table with space for a computer and a display.

J. Conduct presentations. Evaluators may ask questions after the presentation.

K. Evaluators determine ten (10) finalists. Evaluators discuss and break any ties.

L. Complete and submit the finalist results and all related forms in the results envelope to the CRC room.

M. Manage security and the removal of materials from the area.

Participant/Team ID# _____

MICROCONTROLLER DESIGN

2016 & 2017 OFFICIAL RATING FORM	MIDDLE SCHOOL

Documentation (20 points)

CRITERIA	Minimal performance 1-4 points	Adequate performance 5-8 points	Exemplary performance 9-10 points	
Evaluators: Using minimal (1-4 points), adequate (5-8 points), or exemplary (9-10 points) performance levels as a guideline, record the scores earned for the event criteria in the column spaces to the right. The X1 or X2 notation in the criteria column is a multiplier factor for determining the points earned. (Example: an "adequate" score of 7 for an X1 criterion = 7 points; an "adequate" score of 7 for an X2 criterion = 14 points.)				
Portfolio components See Regulation A (X1)	Portfolio is unorganized, missing three or more of the required components (such as circuit diagrams, source code, and marketing plan, etc.), and/or components are of poor quality.	Portfolio is somewhat organized, contains most components, and is of adequate quality.	Portfolio is organized and includes all required components.	
Research (X1)	Research is inadequate, and/or very few credible sources are referenced.	Research is adequate, and mostly credible sources are included.	The research is comprehensive, and credible resources are included.	
			SUBTOTAL (20 points)	

Product (90 points)

CRITERIA	Minimal performance 1-4 points	Adequate performance 5-8 points	Exemplary performance 9-10 points	
Design principles (X1)	Product demonstrates little to no use of design principles.	Product demonstrates adequate use of design principles	Product demonstrates exceptional use of design principles	
Complexity (X2)	Product is not complex, or not very complex; it includes little or no code, and/or circuit design and control technology complexity.	The product exhibits some degree of complexity; it includes code, circuit design, and control technology complexity.	The product is complex and highly functional; it includes code, circuit design, and control technology complexity.	
Creativity (X1)	The product lacks creativity; very little original thought in developing the project is evident.	Some elements of creativity are expressed; the product is somewhat original.	The work exudes creativity; the product is highly original.	
Technical skill (X2)	Little technical skill is exhibited in the code and circuit design.	A beyond-basic degree of technical skill is exhibited in the code and circuit design.	A level of mastery of coding and circuit design is exhibited.	
Effectiveness (X1)	Product does not appropriately provide a solution to the problem.	Product loosely provides a solution to the problem.	The solution to the problem is clear in the product.	
Educational and/or social value (x1)	Product does not have any, or has very little, educational and/or social value.	The product has adequate educational and/or social value.	The product has extreme social and educational value.	
Marketability (x1)	Product is not marketable or not very marketable, and/or there is no plan, or only a minimal plan, for marketing of the product.	The product is somewhat marketable as defined; there is a plan for marketing the product, but it is incomplete.	The market for the product is well thought out; the product itself is very marketable.	
			SUBTOTAL (90 points)	

Presentation (60 points)				
CRITERIA	Minimal performance 1-4 points	Adequate performance 5-8 points	Exemplary performance 9-10 points	
Organization (X1)	The team seems unprepared and unorganized for the presentation.	The team is prepared but somewhat disorganized in its presentation to judges.	The team's presentation is logically organized and effectively presented.	
Knowledge (X1)	Team members seem to have very little understanding of the concepts in their project; they provide vague answers to questions.	Team members have a general understanding of the concepts in their project and answer questions adequately.	There is clear evidence that all team members have a thorough understanding of the concepts presented in their project; they answer questions well and confidently.	
Articulation (X1)	The team's presentation is not logical or articulate.	The team's presentation is logical, though some points are confusing.	The team provides a concise, logical, and clear explanation of the product.	
Team participation (X1)	Only one team member communicates with judges; there is no participation from other team members.	Team members participate equally, but only one member seems to fully understand the concepts.	All team members seem to fully understand the concepts and share an equal role in the presentation.	
Delivery (X1)	The team is verbose and/or uncertain in its presentation; participants' posture, gestures, and lack of eye contact diminish the presentation.	The team is somewhat well-spoken and clear in its presentation; participants' posture, gestures, and eye contact are acceptable in the presentation.	The team is well-spoken and distinct in its presentation; participants' posture, gestures, and eye contact result in a polished, natural, and effective presentation.	
Product demonstration (x1)	Team members are unable to successfully demonstrate their product, and/or the product does not work, or barely works, as intended.	Team members are able to partially demonstrate the functionality of their product; the product somewhat works as intended.	Team members are successful and effective in their product demonstration; the product works exactly as intended.	
			SUBTOTAL (60 points)	

Rules violations (a deduction of 20% of the total possible points for the sections above) must be initialed by the evaluator, coordinator and manager of the event. Record the deduction in the space to the right. Indicate the rule violated: _____	

Time violation (a deduction of five points total will be incurred for exceeding the five-minute presentation time limit). Record the deduction.	

(To arrive at the TOTAL score, add any subtotals and subtract rules violation points, as necessary.) **TOTAL (170 points)**	

Comments:

I certify these results to be true and accurate to the best of my knowledge.

Evaluator

Printed name: _____   Signature: _____