MESA USA
NATIONAL ENGINEERING DESIGN COMPETITION (NEDC)

2018-2019
MESA Arduino STEM Solutions
CALIFORNIA ADDENDUM

In addition to the NEDC guidelines on the following pages, teams in California MESA must also consider the following:

-Participation logistics and limits and competition facilities may vary by host site. Advisors and students are responsible for verifying this information with their Center Director. This includes, but is not limited to, time limits for the portions of the competition, which portions will be contested at the event, local and regional deadlines for submittals, etc.

-Tri-fold presentation boards with maximum dimensions of 36" x 48" will be allowed for the project/symposium poster.

-Teams will consider the cost of shipment of their prototype and materials to local events. Teams must design their prototype to be disassembled for shipment in a large suitcase(s).

-Project Labeling: Project report, poster and prototype must be clearly labeled with student(s)' names, school and MESA Center. A 25 point penalty will deducted from total score if either of the above are not properly labeled.

All other competition guidelines will still apply.

MESA USA

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Overview

In order to maximize each team's experience during this event, it is important to properly execute all aspects of the judging process and event administration. Although each MESA state may elect to present this event in different format(s), the MESA USA host site and the corresponding National Event Planning Committee will adhere to the processes outlined below. Please note that the following processes not only outline the event but also the roles and responsibilities of student team members and advisors.

MESA USA Code of Sportsmanship

During the course of this event, MESA students, staff, advisors and supporting family members will be expected to act in a professional and courteous manner at all times. All judges' decisions are final. Staff, advisors and parents shall not engage judges during the event.

Contents:

Introduction:

There's an old saying that states "Necessity is the mother of invention." Humans have always been most creative, most inventive when they've had a need and lacked a way of resolving it. This idea is the basis for what we know as the field of Engineering.

As a way to find a solution to a need, engineers implement the **Engineering Design Process**. This process allows Engineers to systematically identify the need and any obstacles or challenges; draft ideas for a solution applying their knowledge of math and science; refine their ideas through testing; and ultimately develop a way to meet the initial need.

Human-Centered Design is an approach in engineering that focuses on people and their specific needs. According to IDEO.org (http://www.designkit.org/human-centered-design), **"Human-centered design is all about building deep empathy with the people you're designing for…"** IDEO further suggests that Human-Centered Design consists of three phases.

1. Inspiration - Engineers learn directly from their client in order to deeply understand their needs.
2. Ideation - Analysis of what's learned from the client leads to design ideas and possible prototypes.
3. Implementation - building of the final proposed solution knowing that it meets the needs of your client.

Competition Overview:

MESA USA presents the National Engineering Design Competition specifications for the 2018-2019 year. **Arduino Based Solutions for Humans** asks students to implement the Human-Centered Design approach to find a client in your community who has a need, engineer a solution for this need using Arduino as the key component, and present your solution and recommendation(s) for next steps at the MESA USA National Engineering Design Competition. All projects should be new and original work. No projects from previous years may be used.

MESA states may choose to keep the event open-ended or may require teams to focus on a particular area of need (i.e. agriculture, physical disabilities) or provide a specific client for teams to focus on at their state competitions.

The components listed below will be used to assess the effective implementation of a Human-Centered Design approach, effective implementation of the Engineering Design Process, the functionality of the prototype, and successful integration of Arduino as the main component of the prototype.

High school and middle school teams selected to participate at the national event will compete in the four components below:

1. **Technical Presentation & Interview**- The objective is to provide an overview of the prototype functionality including a technical explanation of the mechanical operations, software operations, and integration of the two. Students will prepare a short presentation and demonstration of the functionality of the prototype followed by a question and answer session with judges.
2. **Poster & Symposium** - The objective is to provide an overview of their project, highlighting key points of the design process including relevant data, presenting the resulting prototype, and share conclusions and recommendations for further development. Students will prepare a printed academic poster which can be used during a public poster symposium to provide an easily understood overview of the project and the prototype. The poster will also be required during the Technical Presentation & Interview.

3. **Project Report** - The objective is to provide an overview of the design process and demonstrate team's effective use of the Engineering Design Process. Students will write a 5-10 page report that contains their problem statement, summary of the design process, results, conclusion and next steps supported by pictures, charts, tables, and/or graphs. The report should be a journey through the design process and demonstrate key points of the process and why design choices were made. The report will have an appendix containing the commented Arduino code and detailed budget.

4. **Prototype Pitch -** The objective is to convince investors or management that the design meets the client's needs, is superior to other options available, and has business value as a product. Students will prepare a creative, engaging presentation to pitch their prototype to an audience, including a group of judges. The presentation should define the problem; provide a detailed description of their client and their needs; discuss current solutions to the problem and their weaknesses; provide a demonstration of their prototype highlighting its advantages, and demonstrate the business value of the product including a market analysis and marketing plan.

Each competing team must consist of 3- 4 students who are active members of a MESA program in a MESA USA state. Individual states should encourage their respective teams to participate in all performance components at the statewide level. Although states may opt not to do all components or alter some requirements for their local and state events as needed. Individual states will determine the dates and location of their respective events.

The first place middle and high school teams from State events will travel to the national competition. These teams must compete in all tasks listed above. This event is scheduled to occur in **June 2019** hosted by Arizona MESA.

Plagiarism Policy

Academic honesty and personal integrity are essential to ensure future success as college students and STEM Professionals. As such, MESA USA expects that the work presented as a part of the National Engineering Design Competition will be solely the work of the students. If the work or ideas of another are used to further students' work then proper credit must be given to the owner (see resource document for information on citing sources). Failure to do so will result in an act of Plagiarism. If it is determined that a student committed plagiarism, they will be disqualified from the competition and they will be ineligible to receive any awards. They may also risk further sanctions from MESA USA and/or their MESA state organization.

Scoring Summary

Final team rankings will be based on the total score, which is derived by adding all of the component scores

Technical Presentation & Interview	100 points
Poster Symposium	50 points
Project Report	100 points
Prototype Pitch	100 points
Total	**350 points**

<u>**Technical Presentation and Interview:**</u>

Overall Objective
The Technical Presentation and Interview allow judges the opportunity to determine student knowledge of their project, gain information about the design process the students used during the project, and determine viability of the design for the client. A technical presentation has a different focus than a pitch, and therefore, this presentation should be different from the Project Pitch component of the National Engineering Design Competition.

Students will organize and deliver a focused, coherent presentation to provide an overview of the development of their design (including research, experimentation, iterations, and conclusions), the technical components of their design, and demonstrate the functionality of the prototype. The presentation should provide an overview and demonstration of the prototype functionality as well as include an explanation of the mechanical operations, software operations, and the integration of hardware and software. After students present, judges will follow up with a Technical Interview. Students should use their poster, prototype, and other relevant materials as support during the Technical Presentation and Interview session. Displays and speeches must be the original work of the students.

The technical presentation is a summary of technical aspects of the project and the interview is a discussion with the judge panel. Together, they should include:
1. Project Objective
   a. Who is the client and what are the client's needs?
   b. How does this project fulfill the client's needs?
2. Description of Design
   a. How does the design function mechanically?
   b. How is Arduino integrated into the design?
   c. How does the software function?
3. Engineering Design Process
   a. What was your team's methodology and process?
   b. What research did your team do for the project?
   c. What were other solutions that your team thought of to fill the needs of your client?
   d. What were any major challenges and any correlating solutions?
   e. What were the major design choices?
   f. How did the iterations of the design evolve during the project?
4. Conclusion and Recommendations for their project
   a. What tests were completed on your prototype?
   b. What is your final assessment/evaluation of your prototype?
   c. What are the next steps for the implementation of your project?
   d. Are there any suggestions for improvement and/or redesign?
5. Prototype Demonstration:
   a. Teams should be able to adequately discuss their prototype design, chosen materials, chosen hardware, and rationale behind choices, as well as the flow of data from input to output.
   b. Teams should be able to discuss any testing they did during development and how that testing informed their design choices. Teams should be able to discuss how the features that are unique to their design were developed through this process.
   c. Teams should demonstrate the usability of the prototype and how it meets the needs of the client. Teams should have a working prototype. If not, some areas will not be able to be scored.

Technical Presentation and Interview Rules
1. Teams will be randomly selected to determine order. Students must conduct presentations and interviews in the order drawn. No exceptions or late arrivals are allowed.\
2. The Technical Presentation and Interview session will last a maximum of 20 minutes. Teams will have up to 10 minutes to deliver a technical presentation <u>and</u> demonstrate the prototype (presentation time). The remaining time will be used for a technical interview (interview time) with the judge panel.
   a. Judges will notify teams when they have 1 minute remaining in the presentation time (at 9 minutes). At 10 minutes the presentation will be stopped. Teams are allowed to incorporate time for judges to interact with their prototype, but the interaction must be concluded within the time allotted for the presentation.
   b. If the team is finished with their presentation before 10 minutes, the team will give an indication to judges that they are ready for the interview portion of the session to begin.
   c. Judges will announce when there is 3 minutes, and 1 minute remaining in TOTAL time (at 17 minutes and 19 minutes).
3. Teams are to use support material during the technical presentation and interview.
   a. Teams must refer to their poster for support during the presentation.
   b. Teams are encouraged to use other materials such as their engineering notebook, Arduino code, or other visual aids as needed to supplement their technical presentation and interview.
   c. Teams are not allowed to use electronic presentations during their technical interview.
4. Judges will be given a set of prompting questions to use during the technical interview. Questions will typically focus on gaining clarification about the team's project, gathering specific details about information the team presents, or will be in alignment with the major content areas of: Usability, Team Objective, Engineering Design Process, Materials and Technology, Data, Conclusions and Recommendations, and Support Materials.

Materials Provided
- Easel or ample wall space for poster.
- Table for display and/or demonstration.
- Electricity will be available for the Technical Presentation and Interview.
- Wireless Internet may be available, but is not guaranteed.

Poster & Symposium:

Overall Objective: Provide an overview of the project, highlighting key points of the design process including relevant data, presenting the resulting prototype, and share conclusions and recommendations for further development. Students will prepare a printed academic poster which will be used during the Technical Presentation & Interview and during a public poster symposium to provide an easily understood overview of the project and the prototype.

The Poster is an important support element that as a standalone should help the observer understand the overall scope, resulting prototype, and next steps of the project. As a visual aid the poster can be a powerful providing important graphics and highlights of key features to emphasize points made verbally during any presentation.
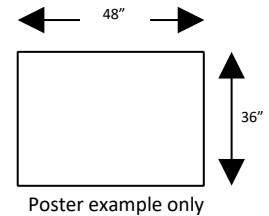
Poster Symposium

● Students will be expected to participate in a poster symposium at the National Event. Students will display their posters and prototypes and be available to present their designs and answer any questions to those attending the symposium. This event will be open to all event attendees and will provide an opportunity for student teams to interact with one another and learn more about each other's projects.

Poster Requirements

1. Size and Type. Teams <u>must design and print</u> a single poster for the National Event. The maximum size of the poster is 36" by 48". The minimum size is 24" by 36".
   **State and local events may opt to allow tri-fold presentation boards with maximum dimensions of 36" x 48". Tri-folds brought to the National Event will receive zero points for their poster.
2. Posters should include a title at the top of their poster.
3. A team section must be present and should include:
   a. School Name
   b. Grade level representing (Middle School or High School)
   c. State representing (Optional at State and Local Events)
   d. Team members' names.
4. An Official MESA logo should be included (contact your state office for a logo).
5. Posters should include the following elements:
   a. Problem Statement: This defines the problem to be addressed. This section could include:
      i. Description of variables and how they are addressed.
      ii. Description of problem(s) addressed by prototype
      iii. Scope of the project and any priorities in design
   b. Objective: This defines how the problem is being addressed. This section could include:
      i. Specific variables addressed.
      ii. Desired attributes of the design
      iii. Design choices to fulfill client's needs
   c. Prototype: A picture/schematic of the prototype. This section could include:
      i. Short descriptions of important pieces of prototype
      ii. Highlights of device
      iii. Unique elements of prototype
   d. Code: How the Arduino is coded. This section could include:
      i. Commented code
      ii. Psuedocode flowchart
   e. Trade table: A comparison between the prototype and current products on market. This section could include:
      i. Cost
      ii. Features
      iii. Specifications
   f. Data: The relevant data that helped drive the prototype. This section could include:
      i. Line graphs
      ii. Circle graphs
      iii. Bar graphs
   g. Results/Conclusions: The end result of the prototype. This section could include:
      i. Summary of results
      ii. Next steps

      iii. Future of prototype
  h. Engineering Design Process: The team's methodology. This section could include:
      i. A flowchart of your processes.
      ii. A graphic of your processes.
      iii. An arrow diagram of your processes.
  i. Title & Tagline: Identifiers for your project. This section could include:
      i. A take away for people who read the poster.
      ii. An identifier for the project

6. The team's Engineering Design Notebook should be available during your presentation so your team, or judges, can refer to it.
7. Electronic media are not allowed.

Materials Provided

- Easel or ample wall space for poster – or cafeteria-style table (approximately 30" x 72" x 29").
  If a table is provided, teams will need to provide their own poster stand.

Project Report

Objective: Demonstrate the successful development of a prototype through implementation of the Engineering Design Process. This report should be a summary of your project that leads judges through each stage of the Design Process. You should provide an assessment of the problem you are addressing; identify your client(s) and provide an evaluation of the needs that informed your design choices; present your decision making processes including testing and data analysis; and present the progress or results of your work.

Required Elements:

The report should include the following sections

1. Title Page - must include authors/team members, school, MESA state, and date of publication.
2. Problem Statement –a detailed assessment of the client(s) and their needs, an evaluation of the specific need(s) addressed by the proposed solution, and any limitations that influenced the project.
3. Design Process
   a. Key design choices based on prior knowledge, research, and client's needs.
   b. Prototype development showing an iterative process with clear linkages between client's needs, testing conducted, and data analysis. This should include a discussion of the math and science concepts used in design development, testing, and data analysis.
   c. Discussion on the use of and integration of Arduino.
4. Results - final iteration of the prototype highlighting strengths
5. Recommendations for further development or next steps for production
6. Appendix
   a. Data (Charts, Graphs, Tables)
   b. Commented Arduino Code (see examples in the resource document)
   c. Detailed Budget Sheet (see examples in the resource document)
7. Bibliography

Length:

The report should be no less than five pages and no more than ten pages in length not including the Title Page, Appendices or Bibliography. Thorough but concise reports are encouraged.

Conventions (Format, Language, Grammar, etc.)

Each of the standards listed below, though they are scored at a lower level, make an enormous difference in your team's ability to create a well-organized, compelling report. Do not forget to check your report length, make sure all sections are included, and adhere to the font, spacing, layout, and grammar standards below:

a. The report length should be 5 to 10 pages not including the title page, appendices or bibliography
b. Remember to include the key sections in your report (listed above)
c. Your title page must include authors/team members, school, MESA state, and date of publication.
d. Be sure to use 1" margins and double-space your text using 12 pt. Times New Roman font.
e. Remember to use spelling, sentence, paragraphing and transition conventions that are appropriate to standard business English throughout the paper.

Written Presentation

The report should be typed, double-spaced, and have a cover sheet. When possible, graphics should be computer-generated. The above conventions should be followed. Readability will help your report achieve a higher score during judging.

Deadline:

- *Local/State. Check* with your local MESA office for the procedure for local/state competitions.
- *National Competition. For teams advancing to the national competition,* the project report must be submitted via e-mail to Arizona MESA on or before 4:00 pm in your local time zone, on **June 7, 2019** (subject to change)**.** Papers should be submitted by a student team member. The papers will be judged and scored prior to the National Competition. Late papers will be assessed a 25 point deduction from their report score, and no reports will be accepted after **June 10, 2019.**
- Technical reports **MUST** be submitted in Portable Document Format (.PDF). Teams shall ensure the submitted final product can be read using Adobe Reader (10.0 or newer) and that it matches your original, printed document. The maximum file size for submission will be 9MB. A PDF version of the final report must be e-mailed to: Arizona MESA, Head Judge at azmesa@email.arizona.edu. Check the MESA USA national website at mesausa.org for further information.
- ***Please note that the host and Head Judge are not responsible for any Internet service delays or misdirected reports. It is the responsibility of the student team members to ensure that the report is delivered successfully in the proper format prior to the deadline. Therefore, submission of materials in advance of the above-listed deadline is highly recommended.***

Prototype Pitch:

Objective:

The objective is to convince investors or management that the design meets the client's needs, is superior to other options available, and has business value as a product. Students will prepare a creative, engaging presentation to pitch their prototype to an audience, including a group of judges. The presentation should define the problem; provide a detailed description of their client and their needs; discuss current solutions to the problem and their weaknesses; provide a demonstration of their prototype highlighting its advantages, and demonstrate the business value of the product including a market analysis and marketing plan. The pitch should differ from the Technical Presentation and be a complete presentation as questions will not be allowed.

Pitch Rules
1. Teams will have 10 minutes to present. A 5 point deduction will be assessed for each minute over the allotted time. Judges will provide time signals to presenters at 1 minute before the 10-minute limit and every minute thereafter. After +2 minutes (a total of 12 minutes), judges will stop the presentation.
2. The pitch will be open to the public. States may opt for private sessions at state and local events.
3. Teams will present a prototype pitch to the audience, which will include a group of judges.
4. Teams are allowed to bring additional audio and visual aids to enhance their presentation.
5. The pitch must include and will be assessed on the following:
   a. Client Introduction and Problem Definition
      i. Describes the client base
      ii. Describes the problem they are solving and its impact on the client
      iii. Describes how design requirements keep target users in mind
      iv. Discusses the current market solutions
   b. Product
      i. Defines the proposed solution through the prototype
      ii. Explains the originality and innovativeness of their design.
      iii. Presents the advantages of the presented prototype
   c. Demonstration of the prototype
      i. Explains key features and functions
      ii. Explains how design meets client's criteria for look, feel, and functionality
      iii. Provides evidence that design is easy to use by clients
      iv. Describes the potential of the design as a product and/or in the current market
   d. Business Value
      i. Provides a market analysis
      ii. Considers the price point and strategy
      iii. Includes a marketing plan
6. Teams will also be assessed on the quality of the presentation, including:
   e. The effectiveness of their communication (speaking volume and pace, body language, eye contact)
   f. The organization of their presentation
   g. The depth and understanding of the content
   h. Quality and creativity of the presentation including any visual aids
   i. Introduction and participation of all team members in the presentation
7. Teams will be randomly selected to determine the order of presentations. Teams must give their pitches in the order drawn. No exceptions or late arrivals.

Materials Provided:
- A projector and laptop with PowerPoint and internet access.
- Wireless Presentation Remote
- Access to electricity for prototypes
- Cafeteria-Style Table (approximately 30" x 72" x 29")
- Special Requests for other materials will be considered but are not guaranteed.

School: _____ MS HS **State/Center:** _____

Technical Presentation and Interview Rubric:

	LEVEL OF MASTERY						
	Exceptional (5 points):	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)	Notes
Design Overview: The client is well defined and the design meets all of the requirements and the needs of client.							
Design Knowledge: Team demonstrates adequate knowledge of project. All design elements are intentional and thought out.							
Usability: The team can adequately articulate prototype instructions and purpose. Judges can understand how the prototype is used by the client.							
Prototype Demonstration: During the presentation time, the prototype is working and can be demonstrated effectively and with ease.							
Project Impact: The presentation, without additional clarifying questions, increases judges' understanding of the importance of project and future impact.							
Materials: All materials are appropriate for design and for use by the client. Team is logical in material usage and budget consideration. Team can articulate and is knowledgeable about the rationale and purpose for materials used.							
Mechanical Design: The team can articulate and is knowledgeable about details, reasoning, and purpose for the mechanical components of the design.							
Technology Usage: Sensors, Wiring, Breadboard, Etc. Technology is appropriate for the design. The team can articulate and is knowledgeable about all technology used. The use of Arduino hardware and sensors is innovative, effective, and relevant to project. Rationale for selection of hardware components used is conveyed adequately.							
Arduino Usage: Programming Logic Flow The team's Arduino code is logical and team can explain, with adequate detail, their coding choices, modifications, and programming logic.							
Data Collection: Input The selected Arduino hardware and/or sensors efficiently and effectively collect input data. The prototype is able to process input data appropriately. The team can convey what data the device collects and/or what variables are used to result in an output. This includes knowledge of input code and hardware.							
Data Response: Output The selected Arduino hardware and/or sensors respond to data efficiently and effectively. Output is appropriate. The team can convey the output process and what happens during use of the prototype. This includes knowledge of output code and hardware.							

Technical Presentation and Interview Rubric:

	LEVEL OF MASTERY						Notes
	Exceptional (5 points):	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)	
Engineering Design Process: The team conveys their methodology and process, including the research, planning, creation, testing, and improvement phases, adequately well.							
Challenges and Solutions: The team conveys their project challenges and correlating solutions through presentation or interview. The team is able to incorporate how their research informed their solutions adequately well.							
Testing: Design Choices/Iterations Multiple tests were conducted, documented, and used to improve the design. The team is able to convey testing conditions, variables, and results of most tests. All testing was appropriate for their project. The team can convey how the tests helped to inform their design choice(s).							
Conclusions and Recommendations The team is able to effectively present their final product and discuss conclusive findings, limitations, next steps, and recommendations for further development through presentation or interview. The team is able to incorporate how their tests resulted in their conclusions and discuss the future impact of their project.							
Presentation Skills: The team displays relaxed, self-confident nature and is mostly free of fidgeting and/or nervous movement. Body language was appropriate and did not detract from presentation. The team uses direct eye contact and holds the audience's attention.							
Verbal Skills: The team shows enthusiasm and can verbally convey knowledge about the topic during the presentation and interview session. Team members speak in clear voices and use technical terms correctly. The team shares equally in the presentation and interview time and all show adequate skill and knowledge.							
Support Material: The team is able to effectively use support materials (e.g., poster, logic diagrams, engineering notebook, etc.) to increase the audience's understanding of the project.							
Response to Questions: The team's responses to technical questions demonstrate adequate technical knowledge of the concepts and processes used in the project.							
Team Contribution: All members contribute to the presentation and to answering questions. Team has shown that all members have contributed to the overall project.							
Column Totals:							
GRAND TOTAL:							

Judge Name: _____

School: _____ MS HS **State/Center:** _____

Poster Rubric	LEVEL OF MASTERY						
	Exceptional (5 points):	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)	Notes
Problem Statement: The team adequately defines the problem being addressed by the team in 50 or fewer words							
Objective: An adequate describes how their project address the problem and may include information about the variables addressed, desired attributes, and/or design choices made in 50 words or less							
Prototype: A visual graphic of the prototype is present and highlights innovations and/or important components of the design							
Code/PsuedoCode: Includes an adequate description or example of the processes that run the Arduino and the prototype that can be understood by most observers.							
Trade Table: Provides an adequate comparison between the prototype and current products on the market. Includes at least two points of comparison							
Data: Provides a graph or table that presents relevant information from the results of testing to increase the observers understanding of the project.							
Results/Conclusions: Includes an adequate summary of design process including final results and discussion about the next steps of the project to improve design or bring it to market							
Engineering Design Process: A graphic adequately illustrates the iterative process the team went through to accomplish their objective.							
Readability: The poster is easy to read and has a balanced amount of graphics vs. text			Graphics: About half Text: Concise	Graphics: Some Text: About half	Graphics: A few Text: More than half.	Mostly text	
Title/Tagline: Includes a title and takeaway line for the poster.			Creative & Memorable	Sufficiently Explanatory	Simple Summarization	None	
Size: No more than 36" x 48" and no less 24" x 36"					Yes	No	
School Name included					Yes	No	
Team Member's Names included					Yes	No	
Official MESA logo included					Yes	No	
Column Totals:							
Grand Total:							

Judge Name: _____

School: _____ MS HS **State/Center:** _____

Project Report Rubric	LEVEL OF MASTERY						
	Exceptional (5 points):	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)	Notes
Problem Statement The problem is adequately articulated with organized criteria and constraints. The needs of the client have been sufficiently examined to design a solution.							
Design Process - Inspiration: Research Prior knowledge, research, and client(s) interviews are adequately articulated and a specific list of needs has been selected.							
Design Process–Inspiration: Client's Needs The client's needs are adequately accounted for as initial design choices are analyzed.							
Design Process – Inspiration: Client's Needs Client's needs to be addressed are adequately organized and present requirements or limitations							
Design Process – Inspiration: Evaluation(x2) The design process is sufficiently iterative and design changes are examined using previously selected criteria and constraints							
Design Process – Ideation: Arduino Integration (x2) Integration is appropriately adapted, somewhat innovative, and adequately executed to address criteria and constraints							
Design Process – Ideation: Design (x2) Development of prototype is sufficiently connected to knowledge gained and reasoning for design choices is appropriately illustrated.							
Design Process – Ideation: Math and Science (x2) Applied math and science concepts are sufficiently suited for design development and analysis of data to inform design choices							

__Project Report Rubric__	LEVEL OF MASTERY						
	Exceptional (5 points):	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)	Notes
Design Process – Implementation: Testing(x2). Various testing methods were chosen to analyze if design effectively meets established criteria and constraints.							
Design Process – Implementation: Data Data analyzed is mostly clear, sufficiently concise, and relevant to project. Data illustrates claims made.							
Design Process – Implementation: Data Charts and graphs are suitably chosen, labeled and fairly easy to interpret.							
Design Process – Implementation: Data Analysis (x2) Data analysis is used to examine strengths, weaknesses, effectiveness. Results of testing are used to implement design changes.							
Spelling & Grammar				No errors	Minor errors	Many errors	
Code				Easy to read Clear comments	Difficult to read.	Minimal/ non-existent.	
Budget				Complete	Mostly Complete	Inadequate	
Bibliography				Complete research & data. Consistent format.	Most research & data Consistent format.	Inadequate research & data	
Length				5-10 pages	4-11 page	<4 or >11	
Column Totals							
Total							

Judge Name: _____

School: _____ **MS** **HS** **State/Center:** _____

Pitch Presentation Rubric	LEVEL OF MASTERY						Notes
	Exceptional (5 points):	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)	
Client Intro and Problem Definition (Total 20 Points)							
Client description - Client base is identified and a adequate profile, including information on population size and location is provided so that observers have few questions about the client base.							
Problem Description and Impact - A clear and suitable description of the problem and its impact to the client is provided and some crucial aspects that need to be addressed have been explained.							
Human Centered Design - While keeping the target user(s) in mind – teams adequately explain the design requirements needed for the solution to succeed.							
Current Market Solutions – Some current solutions are listed and teams sufficiently articulate improvements over existing products.							
Product (Total: 15 points)							
Define Proposed Solution - Team adequately defines their proposed solution through their prototype and is able to sufficiently articulate how their research, design, and testing led to the prototype.							
Originality and Creative Ability - Team adequately explains how their design and approach to solving the problem is mostly original and/or somewhat innovative and are able to sufficiently explain how their research helped to design a solution in a creative way.							
Advantages of solutions - Team suitably describes advantages of prototype over other solutions for client - citing a few reasons for being the best solution for client.							
Prototype Demo (Total: 20 points)							
Demonstration – Sufficiently explains key features and functions of the prototype.							
Product look, feel and functionality - Teams adequately explain how their design met the client(s) criteria for functionality, elegance, aesthetics and cost effectiveness. The product is suitably safe to build, use, store and dispose of.							
Ease of use – Team provided adequate evidence that the client was able to use it with no assistance from team. It was functional, mostly smooth, with few pauses or bugs.							
Potential of design -Team sufficiently describes the next steps they need to undertake to bring prototype to the client and/or the market –Explaining their forward thinking of product scalability and design improvements.							

MESA
Mathematics
Engineering
Science
Achievement

Pitch Presentation Rubric	LEVEL OF MASTERY						Notes
	Exceptional (5 points):	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)	
Business Value (Total: 15 points)							
Market Analysis - Provides assessment of the potential market for their product. Considering market size, buying patterns, competition and possible barriers.							
Price Point Considerations - Teams identify a retail price for their product and explain their pricing strategy.							
Marketing Plan - Teams are able to share a suitable plan for their marketing and advertising efforts.							
Presentation (Total: 30 points)							
Speech organization - Presents ideas and information effectively and includes an Intro, Body and Conclusion. Introduction is suitable and inviting, body is mostly focused and suitably arranged, closing is adequate in unifying entire presentation							
Delivery - Shows an appropriate degree of understanding of ideas, concepts, themes and information. Overall presentation shows sufficient evidence of creativity, enthusiasm, value and believability.							
Visual Aids/Creativity - Adequately demonstrated the use of relevant and appropriate equipment, materials, and props to provide a solid, convincing and interesting presentation.							
Audience Interaction - Team can adequately hold the audience's attention throughout most of the presentation. Audience is sufficiently interested, engaged, entertained and impressed with the teams approach to the problem.							
Communication - Presentation flows well with minimal distracting pauses, speakers are mostly clear and loud and not going too quickly or too slowly.	▓	▓					
Eye Contact & Body Language- Most team members used natural movements and gestures, looks poised and confident. Keeps eye contact with audience most of the time & rarely uses notes or slides.	▓	▓					
Intro of team members Adequately introduced all team members	▓	▓	▓	Yes, Creatively	Yes	No	
Participation All team members should speak and present equally.	▓	▓	▓	All team members participated and spoke equally	All team members participated and spoke but not equally	Not all team members presented and spoke	
Time 5 point deduction for every minute over the allotted 10 minutes.							
Column Totals							
Total							

Judge Name: _____