

LEVEL:	Middle School and High School
NUMBER OF TEAMS:	One (1) team per school can participate at the MESA Day state competition. Up to three (3) teams can participate at MESA regional events. Subject to change.
TEAM MEMBERS:	Two (2) to Six (6) Students per team
OBJECTIVE:	Students will use the Human Centered Design model to design a mobile phone app (Android or iOS) or another solution that includes coding to solve a problem in their community.
MATERIALS:	MIT App Inventor (https://appinventor.mit.edu) or other app creation Software. For non-mobile app solutions teams can use other platforms that require coding like Arduino, Micro:Bit, or Circuit Playground Express.

BACKSTORY:

Apps are the way computers and phones run their programs. There are apps to order food, apps to play games, apps to read the news, apps for anything. The ability to develop an app (computational thinking) is an essential skill for the 21st century world.

This design challenge is partially based on the **Technovation Girls Challenge**. MESA teams whose members identify as female, trans, nonbinary or gender nonconforming may be eligible to enter this challenge with the same app developed for MESA. For more information visit <https://technovationchallenge.org/>.

NOTE: Teams that win first place in this event at MESA Day will represent Arizona at the National Engineering Design Competition in June. In the event the first-place team cannot attend, the next place team will replace them. Teams that move on to the National Competition will receive guidance and assistance from MESA staff and potentially industry mentors to assist them in preparing their materials to meet the MESA USA NEDC specification requirements which will differ from the rules below.

DESIGN PARAMETERS

1. Design Theme: Projects must be designed to address Goal 3 of the UN Sustainability goals, to **“Ensure healthy lives and promote well-being for all at all ages.”** For more information including key targets and indicators for achieving the goal visit <https://sdgs.un.org/goals/goal3>. **Or**, projects can address an inequity of an individual or group in their community.

Examples of Designing for Equity in Your Community can be (but are not limited to) projects that address:

- a. A physical or learning disability;
 - b. Food scarcity;
 - c. Access to healthcare;
 - d. Access to clean water or other resources;
 - e. Access to employment or education; or
 - f. A social inequity.
2. Designs must be:
 - a. Coded and designed in a program like MIT App Inventor, Thinkable or similar program if creating a mobile app.
 - b. Research, Developed and Designed by students
 - c. Designed to solve a problem or inequity in their community
 3. Code: Teams may use publicly released libraries, example code, and tools, but your team must also develop original code.

4. Deliverables:

a. Design Brief which will include:

- i. School Name
- ii. Team Members Names
- iii. App Name
- iv. Project Purpose: In one or two sentences explain what this project intends to do. (50 word maximum)
- v. Abstract: In one paragraph provide a brief overview of your project. The abstract should:
 1. Introduce the User. Describe the people who will benefit from the project and any unique situations they face.
 2. Identify the challenge the user faces. What barriers exist that limit their opportunities to live a healthy life.?
 3. Describe the proposed solution. How will this project minimize or eliminate these barriers to a healthy life?
- vi. Adoption Plan
 1. Explain the testing process. Did potential users help to test? What feedback did they have?
 2. Discuss strategy for marketing to new users. How will you get people to use your design?

b. Pitch

- i. Must be 5-7 minutes long
- ii. Teams may use computer to present their pitch. Computers will be Windows.
- iii. Pitch should (see the rubric for additional information about scoring):
 1. Describe the Problem the project addresses and why it is important to the team and the community.
 2. Discuss research about the problem and how it relates to either UN Sustainability Goal Number 3 or an inequity faced by someone in your community.
 3. Introduce the project and describe how it functions, including unique and innovative features
 4. Explain how the project solves the problem for the user
 5. Explain how it differs and/or improves on similar solutions
 6. Discuss user feedback that influenced design choices and design improvements throughout the design process.
 7. Explain future goals and plans for the project.

iv. Demo Project

1. Must be no longer than 2 minutes of total pitch
2. Teams may use a recorded demonstration or demonstrate the project live
3. Demonstration should (see the rubric for additional information about scoring):
 - a. Shows the design and how it works
 - b. Show what works successfully and explain what coding was required to make it work
 - c. Show what doesn't work yet and what could help make it work
 - d. Share future features team would like to add, if any.

c. Poster:

- i. All sections should use as few words as possible to adequately present the information. Any section requiring written explanation should be succinct. Generally, it is encouraged to use bullet pointed lists instead of text in paragraph form.
- ii. Posters should include
 1. A title at the top.
 2. School name.
 3. Team members' names.
- iii. Problem Statement and Objective: This defines the problem to be addressed. This section could include:
 1. Description of problem(s) addressed by prototype.
 2. Description of users for whom the prototype is designed.
 3. List of the primary objectives of the project

- iv. **User Requirements:** This section describes the needs of the user and how your prototype meets those needs. This section could include either a graphic explaining requirements or a bullet point list of requirements.
- v. **Prototype:** A picture/schematic of the prototype. This section could include:
 - 1. Short descriptions of important pieces of the prototype using callouts or short lists.
 - 2. Highlights of the device and labeling of main parts.
 - 3. Unique elements of prototype.
- vi. **Visual Data:** A graphic that shows relevant data from testing and helps readers understand the project. The graphic could be a:
 - 1. Line graphs.
 - 2. Circle graphs.
 - 3. Bar graphs.
 - 4. Tables.
- vii. **Results and Conclusions:** Discusses the final prototype. This section could include:
 - 1. Summary of results.
 - 2. How the prototype improves the user's capabilities because of the prototype.
 - 3. Changes to the user's experience in the world.
 - 4. Success and/or failure to meet primary objectives.
 - 5. Next steps for project.
- viii. **Source Code**
 - 1. Students should include key pieces of their source code including embedded notes
 - 2. Important pieces of Code to include:
 - a. **API Keys** - Application Programming Interface Keys are used to get information from another website or database. Often used to assist in tracking and controlling how the interface is being utilized.
 - b. **Database Usage** - Information stored on or accessed by a phone are often stored in databases. Your app must incorporate use of a database. Examples of databases used in phone include contacts, stored messages, and bookmarks in a web browser.
 - c. **Phone Function or Sensor Incorporation**
 - i. Phone Functions include Camera, Speaker, Microphone, GPS, Storage, and more.
 - ii. Phone Sensors include: Accelerometer, Pedometer, Gyroscope, Magnetometer, Clock, Location Sensors, Proximity Sensor, etc.
 - 3. Teams should highlight both functional and non-functional elements.

TESTING GUIDELINES:

1. At least two (2) students must be present during testing.
2. Teams are allowed to use presentation software (PowerPoint, Google Slides, etc) and emulators to demonstrate their app.

SUBMISSION GUIDELINES:

1. Posters and Design Briefs will be due two (2) weeks before competition
2. If MESA Day is moved to a virtual event a recorded pitch/demo may be requested and will be due two (2) weeks before competition
3. Materials unable to be accessed by MESA staff will not be considered for scoring. It is the team's responsibility to ensure materials are accessible.
4. Late materials will not be accepted. It is the team's responsibility to ensure materials are submitted prior to the deadline.

SCORING CRITERIA:

1. Teams will be judged on the following categories (see Rubrics for more details):
 - a. Design Brief (23 points)
 - b. Pitch and Demo (60 points)
 - c. Poster (40 points)
2. The Performance Score will be determined by adding together the points received for Design Brief, Pitch, and Poster

RESOURCES:

MIT App Inventor - <https://appinventor.mit.edu/>

Technovation:

- Challenge Information - <https://technovationchallenge.org/>
- Curriculum for App, Pitch, and Business Plan development - <https://technovationchallenge.org/curriculum-intro/registered/new/>

School: _____ Name: _____

For Official Use Only

Design Brief Score (max 23):	
Pitch/Demo Score (max 60):	
Poster (max 40):	
Performance Score (sum of all above):	
Total Score	

Judge's signature: _____

Student signature: _____

Jude Notes:

Parts of these rubrics are adapted from the rubric for the Technovation Girls Challenge.

School: _____

Division: ☐ Middle School ☐ High School

Design Brief Rubric:	LEVEL OF MASTERY					
	Exceptional (5 points):	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
School Name: Name is present						
Team Members Names: Names are present						
App Name: Name is present						
Project Purpose: Adequately explains what the project intends to do in one or two sentences and no more than 50 words.						
Abstract: Adequately introduces the people who will benefit from the project and any unique situations they face.						
Abstract: Clearly identifies the challenges the user faces that will be addressed by the project and adequately explains how the project will address these challenges						
Adoption Plan: Adequately explains the testing process and how they will market to new users						
COLUMN TOTALS:						
TOTAL (23 points max):						

School: _____

Division: ☐ Middle School ☐ High School

Pitch/Demo Rubric:	LEVEL OF MASTERY					
	Exceptional (5 points):	Excellent (4 points)	Met Criteria (3 points)	Fair (2 points)	Poor (1 point)	Not Present (0 points)
Clearly states the problem and shows why the problem is important to the team and the community						
Adequately explains what the team researched about the problem and how it relates to the United Nations Sustainable Development Goal 3 or an inequity faced by people in their community						
Includes a clear introduction of the design and adequately describes functionality, including unique and innovative features.						
Is convincing in explaining that the proposed solution will adequately solve the problem						
Explains why the project is a good tool to solve the problem						
Shows how it is a better solution compared to what already exists						
Explains user feedback on the problem and solution and shows how they made changes based on the feedback						
Explains future goals and plans for the project						
Shows the prototype and adequately explains how it functions.						
Discusses elements that are successful and the coding required to make them function.						
Discusses elements that are not functional and what could be done to make them functional						
Discusses future features that could be added						
COLUMN TOTALS:						
Time Penalty: Pitch is less than 5 or more than 7 minutes long (- 5 points)						
TOTAL (60 points max):						

School: _____

Division: ☐ Middle School ☐ High School

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)
Problem Statement and Objective: The team adequately identifies the user, defines the problem being addressed, and provides a bulleted list of the primary objectives.						
User Requirement: A graphic or list adequately shows requirements identified by the user.						
Prototype: A graphic of the prototype is present and main components are labeled, and functionality is clear. Titles and descriptions are included. If needed, a scale is present.						
Visual Data: A graph and/or table adequately presents relevant information from the results of testing and increases the observer's understanding of the project.						
Results and Conclusions: The team adequately describes how the prototype meets user requirements and works to achieve equity for the user. The team adequately describes improvements they would make if continuing this project.						
Source Code required elements were easy to identify. Notes are present						
Source Code successful and non-functional elements are highlighted						
Readability: The poster is easy to read and has a balanced number of graphics and text.			Graphics: About half Text: Concise	Graphics: About half Text: Concise	Graphics: A few Text: More than half.	Mostly text
Title, School Name, and Student Names included				All present	Missing some	None
COLUMN TOTALS: (40 max)						
POSTER TOTAL:						