



## How to make presentation boards

Boards can be used for judging or pits, or both! The choice is yours. The first step to making a presentation tri-fold board is deciding the format/platform. Creating the information that will go on your board, digitally, keeps things simple and neat. We have found google slides to be really simple and helpful, however, any platform or format of your choice can be used. You may handwrite/hand draw the information on your boards as well. Just make sure it's something your whole team is able to view and edit!

Your board should include the things your team thinks are the **most** important and it's a good idea to follow the season rubric.

- For project, things that should be included are...
  - Problem statement and Solution
  - Data/statistics/diagrams
  - Experts and how they have helped
  - Important documents
  - Bill Of Materials- if applicable
- For robot, things that should be included are...
  - Pictures of your robots
  - Mission strategy/mission map
  - Code
  - Points
  - Missions your robot is completing
  - Other important documents/information
  - Unique features of your robot
- If you would like to have a core values board, some things that could be included are...
  - Pictures your team
  - Fun team activities
  - Team impact/impacting the community
  - Ways you have used core values
  - A little bit about each team member and their interests

The information on your boards will vary from team to team (and season to season), but make sure that your boards are...

- Readable
  - Font is clear and simple (arial or times new roman work best- avoid fancy cursive fonts)
  - Use different sizes to show emphasis or bold the font
  - The font should be big enough to read from a distance, about 6ft, if you want the judges to be able to read it during judging. If it is just for your pit, 14-18 point is large enough for your body copy.
- Highlight/bold important information/data/statistics
- Fun- stickers, pictures, glitter

**If you choose to make your boards digitally, the final step is to print everything. Make sure you print in black and white first, this lets you see where changes in font size need to be made.**

# Finished board example

## Problem

### Problem Statement

Batteries in semi and delivery trucks fail without warning, causing delays.



Delays in Product/Material Delivery = Unhappy Customers, Lost Money, Loss of Products

### Research Problem Identification

- The cost of a dead battery could be thousands of dollars, including towing, labor, and replacement cost.
- Batteries usually die when a truck stops, and the wait for tow trucks can cause 40 minutes to an hour in delays.
- Truck drivers often leave their trucks running to avoid battery failure, which leads to more problems with the energy in the battery running out.
- 60% of customers are willing to buy from a retailer if their packages are delayed.
- 82% of vehicle breakdowns in a year are due to faulty batteries.
- Battery failure occurs daily for truck companies.



### Current Solutions

**Current Solution #1 - Jumpstarting**

Description - A procedure of starting a vehicle with a failed battery requiring a temporary connection to an external power source.

**Why it doesn't work** - It's a temporary solution, and has the potential to damage the car; it also brings the risk of fire.



**Current Solution #2 - Heavy Intelligent Battery Sensor**

Description - Continuously monitors current and voltage going to battery.

**Why it doesn't work** - Doesn't integrate weather forecast, have an app interface, or predict battery life.



**Current Solution #3 - Battery Checks at Auto Service Stores**

Description - A load tester can apply a load to a battery and measure the voltage. If the voltage drops below 9.6 volts, it must be replaced.

**Why it doesn't work** - It's inaccurate, wastes time, is inefficient, and it's difficult to check all of the company cars.



## Research-Problem Analysis

### Causes of Battery Failure

- Extreme temperatures, especially heat...
- Cycling (charging and discharging)
- Corroded battery connections
- Overcharge



### Design Reviews



### Experts & Sharing

**13 Experts:**

- Bill Ross - Battery Consultant
- Jason Fair - Chief of Engineering at Clarion
- David Leach - Mechanic
- Craig Piggly - VP of Technology at Clarion
- Jason Seale - VP of Product Management at Clarion
- Zou Jin - Director of Marketing at Clarion
- John Banta - Product Management Leader at Clarion
- Ron Oates - Technical Lead at Clarion
- Mark Gusterson - Global Electronics Manager at Clarion
- Dave Woods - Sr. Engineer, Advanced Eng. & Applied Research at Regal Rexnord
- Wyatt Pratt - Patent Attorney
- Mike Mueller - President of Remy Battery
- Roger Musaad - CEO of Battery Council International
- Rick - Shop Foreman at Kenworth Wisconsin

**5 Groups who would benefit:**

- Anne Weyandt - Director of Driver Recruiting at Schneider National
- Matthew Elert - Supply Chain Manager for Fleet Inc.
- Jan Sucharski - LDCO National Business Development Manager at Fleet Inc.
- Amy Swann - Director of Operations
- Guy Caserio - VP of CMI Trucking (Inc)

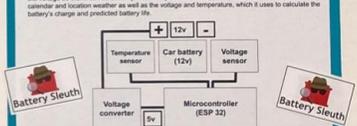
## Solution

### Innovative Solution

#### ★ The Battery Sleuth ★

**Description/How it works**

The Battery Sleuth uses the accumulated temperature over time to predict the end of the battery life. The power for the Battery Sleuth is supplied by the battery, and a voltage converter converts the voltage so that it can be used by the Battery Sleuth. The app will receive information about the calendar and location weather as well as the voltage and temperature, which it uses to calculate the battery's charge and predicted battery life.



### Specs/Design/Input

**Device Requirements**

- Monitors the following: Temperature, Voltage
- Alerts directly to battery

**App Requirements**

**Layout -**

- Screen showing battery voltage (or remaining voltage)
- Estimated time left for battery life
- Temp of battery, graph/meter to show danger zone
- Tips on how to conserve battery life

**Other -**

- Will hotspot connectivity
- App sends notifications to customer



### How Does it Work?

Once the app completes the data, it is sent to the cloud.

Weather, Calendar, Voltage, Temperature

**APP**

**Data**

The data is accessible by the company.

When the battery is close to the end of its life, the company replaces the battery.

**Company**

**Replace**

Once the battery is replaced, the used battery is recycled.




## Manufacturing Plan

Create an injection-molded electronic enclosure out of polycarbonate plastic.

Receive electronic components (temperature sensor, voltage sensor, microcontroller, voltage converter, PCB, wiring harness).

Program the microcontroller, then test the electronics.

Electronic components soldered together & the device is assembled by grad workers on an assembly line.

The device is inspected, and if it passes inspection the enclosure is filled with epoxy, sealed, & a Battery Sleuth logo is applied.

The Battery Sleuth unit is packaged & sent to retail stores and distribution centers.

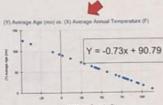
### Bill of Materials & Total Cost

Name	Cost	Total Cost
Temperature Sensor	\$2.00	\$11.70
Voltage Sensor	\$0.20	\$2.91
Microcontroller with Bluetooth	\$4.00	\$3
Custom Voltage Converter	\$2.00	\$7
PCB (printed circuit board)	\$0.80	\$5
Electronic Enclosure	\$0.60	\$20.38
Wiring Harness	\$1.50	\$48.99
Epoxy Resin	\$0.50	
<b>Total</b>	<b>\$11.70</b>	

## Life Prediction Equation

$Y = \text{Predicted Lifespan}$        $X = \text{Battery Sensor Temperature}$

$Y = -0.73x + 90.79$



**IF ATDF ≤ 0°C**  
Winter = True

**IF ATDF > 0°C**  
Summer = True

**IF Winter = True & RR > 75%**  
REPLACE

**IF Summer = True & RR > 80%**  
REPLACE

Replacement Ratio (RR) = Length Installed/Predicted Lifespan (Y)

ATDF = The Average of the 7 day weather forecast from our app.

## Who Benefits

- Customers
  - Their products will arrive on time
- Truck drivers
  - They won't have to waste time getting their truck fixed
  - They will arrive at their destination on time more often
  - Product transportation companies
    - They will not lose as much money on truck shipping
    - They will be a more reliable way to transport goods
- Companies that sell products
  - Their products will be delivered on time
  - Time-sensitive products will not be wasted or spoiled
- Stores
  - The products they buy will arrive on time
  - They will have more products on their shelves

### Next Steps

- Contact battery sensor manufacturers
- Begin implementation of marketing plan
- Platform field test with Kenworth Wisconsin.
- Continue sharing the product with the community
- Gather input from community members about product
- Have the prototypes tested by potential consumers

Depending on what color board you are using, choose a contrast color for backing. This way, the information will be easier to read, and look more presentable.

The section headers also follow the rubric standards.