

ROBOBOTS DOCUMENTATION TRAINING

2017 Competition



KEYS TO SUCCESS

- Follow Instructions- read the rubrics
- Use the guidelines posted in your Google Drive folder
- Post your materials in a timely manner
- Document EVERYTHING- should include minutes, decision making matrixes, timelines, project plans and evidence. (include photos)
- Have someone else review your documentation
 - Does is make sense?
 - Are there mistakes you didn't catch?
 - How would they score it using the rubric?



THE GOOGLE DRIVE

- USE THE 2017 Folders
- Documentation 2015 and 2016 contains your previous work as a reference.
- READ THIS FIRST

Documentation Submissions Guidelines

- 1) Familiarize yourself with the electronic submission template. Inside your Google Doc folder you will find the following folders:
 - a. Design Motivation and Strategy
 - b. Team Procedures
 - c. Design Process
 - d. Organization
 - e. Documentation Rules

- 2) Notify Dione DeMitre @dionedemitro@lakelandcc.edu immediately of any additional emails that need to have access to your folder.

- 3) Within each folder you will want to save a PDF of the content associated with the folder as described in the rules.

Example: Within Design Motivation and Team Procedures there should be up to ten total files in the folder. Each file would be named according to the description in the rubric.

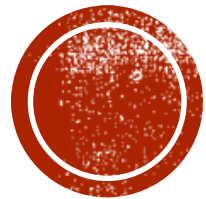
- Influences
- Offensive
- Defensive
- Winning
- Team Management
- Material Management/ Bill of Material
- Accounting/ Budget
- Time Management/ Project Scheduling
- Data Management
- Promotional/ Fundraising

You certainly could include multiple topics in one file. However, make sure the clearly name the file. If, as an example, you include influences, offensive, defensive and winning all in one file, then name it, "Influences, Offensive, Defensive and Winning". **Make it easy for the judges to find.**

- 4) All electronic submission will be due on April 19th in order to be considered for judging. You must still bring a complete portfolio to the interview on April 28th.

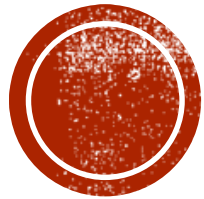
- 5) Each team will participate in an interview on the safety check day. Your entire team should be prepared to answer questions about the manufacturing process and design strategy.





RUBRICS- USE THEM

Interview and Documentation Rubrics are in your google drive.



DOING WELL IN THE INTERVIEW



INTERVIEW

- The entire team is expected to participate.
- Make a good first impression.
- You know the questions in advance, be prepared to answer the questions in advance.
- You must bring a hard copy of your binder with you. You can bring in additional materials, but you may not get to share them.
- You will be interviewed by a team of 2-3 judges for approximately 15 minutes
- The top three teams from Friday will be invited back BEFORE the competition begins Saturday morning.



STRONG DOCUMENTATION

Don't make it hard on the judges!!!



DESIGN MOTIVATION / STRATEGY

■ Influences

- If the team had a bot the previous year, review
 - What was good about the bot?
 - What should be changed in the future?
- Research other robot/battle bot competitions and the different kinds of bots that won and lost to come up with ideas
- What the judges look for:
 - Good: Did team do research on bots prior to deciding on a design?
 - Excellent: Does the team show understanding of what has worked in the past and how that affects the design?

■ Offensive

- How is your bot going to inflict damage on other bots
- What are the strengths of the weapon?
- What the judges look for:
 - Good: Does the team list the strengths of the weapon?
 - Excellent: Does the team understand how to use the strengths of their weapon to take advantage of opportunities



DESIGN MOTIVATION / STRATEGY

■ Defensive

- How is your bot going to prevent damage being incurred? Special Armor?
- What the judges look for:
 - Good: List of special or designs to help prevent damage?
 - Excellent: Does the team understand how to avoid having their opponent expose the weaknesses of their bot?

■ Winning

- Of the different aspects that the bot is judged on, what is the focus of the design that will make it win matches?
 - Aggression
 - Speed
 - Damage
- What the judges look for:
 - Good: Description of the focus of the bot
 - Excellent: Does the team understand why a certain strength (aggression, speed, damage) was chosen to be the priority to make the bot win?



TEAM PROCEDURES

■ Team Management

- Every meeting held by the team should have meeting minutes. Meeting minutes should include:
 - Topics discussed
 - Team members in attendance
 - Date of meeting
 - Any decisions made at the meeting
 - Any actions from the previous meeting plus new actions from the meeting (this should be an ongoing list with assignees and estimated completion dates)
- Role Management
 - How did the team assign the necessary roles?
- What the judges look for:
 - Good: Are there meeting minutes (See example on next page)
 - Excellent: Are the meeting minutes organized and functional to help the team get the work done? Did the team choose roles in a strategic way (looking at skill sets of the team members) or was it random?



Team Procedures

Team Management Example

Meeting Minute Template

| Attendees: | | | |
|-------------------|---|---|--|
| Date of Meeting: | | | |
| Decisions made: | Any decisions about the bot or otherwise should be noted. | | |
| Topics Covered: | What was done that meeting? i.e. worked on documentation, build rails for bot, tested bot (summarize test), etc | | |
| Action | Responsibility | Estimated Completion Date | Status |
| Action to be done | Who is the ONE person responsible for the action? | When is has the responsible person committed to completing the action? Is it early enough for the timeline to remain intact? | If the action goes over several meetings, note the date and then the status at that time in this box. Do not delete previous comments- this gives you history for your documentation |



TEAM PROCEDURES

■ Material Management

- Track all material purchased for the bot. This can be done through copies of purchase orders
- A Bill of Material showing how all of the material relates to each other (qty needed for the bot, where the part is used in the bot, etc.)
- What the judges look for:
 - Good: Are all of the materials listed?
 - Excellent: Is there a Bill of Material showing how the materials are related?

■ Accounting/Budget

- This should be a listing of all expenses incurred. This can be tracked during the project through Purchase orders, then make a list at the end of the project to summarize
 - Purchase orders of all of the material
 - Purchase orders of t-shirts/promotional materials
- What the judges look for:
 - Good: Is there a budget?
 - Excellent: Budget that is clearly organized, and money adds up correctly



TEAM PROCEDURES

Time Management

- A project plan is necessary to make sure all aspects of the project get completed in time.
- MS Excel is a project management tool that can be used. Be sure to list all major steps that need to happen
 - Order t-shirts
 - Brainstorm design of bot
 - Finalize design and do CAD drawing
 - Order parts
 - Build bot
 - Test bot
 - Complete documentation

What the judges look for:

Good: Is there a project plan?

Excellent: Does the plan list all actions, including responsibility, comments (any progress or if have to wait on another action before it can)- any indicators that show it was used throughout the project



Team Procedures

Time Management Example

| Item | Priority | Group | Action | Responsibility | Initiation Date | Due Date | Completion Date | Status | Comments |
|------|----------|-----------|--|----------------------------|-----------------|----------|-----------------|------------|--------------------------------------|
| 10 | | Design | Research other combat robots and see what design features are preferred. | Team | 15-Oct | 7-Nov | 7-Nov | Complete | |
| 20 | | Design | Look at roles and see which one best meets the girls' skills. Have them prioritized. Driver will be determined later | Team | 15-Oct | 7-Nov | 7-Nov | Complete | |
| 32 | | Design | Brainstorm design of bot | Team | 7-Nov | 7-Nov | 7-Nov | Complete | |
| 20 1 | | Documents | Promotional/Fundraising Doc | Nia Everett/Emily Salomone | | 31-Mar | | Waiting | Waiting on posters |
| 19 1 | | Documents | Time Management | Reilly Girardot | | 15-Apr | | Waiting | Waiting on everything to be finished |
| 33 1 | | Documents | Testing Results | Alli Kulbago | | 15-Apr | | In Process | |



TEAM PROCEDURES

- **Data Management**
 - This is how you keep all of the information and materials collected throughout the project together in a way that's easy to access and refer back to.
 - Is it easy to find items in your binder?
 - Is it organized to be functional for the needs of the project?
 - **What the judges look for:**
 - Good: Is the binder organized and easy to follow?
 - Excellent: Does the binder follow the rubric exactly? Is it easy for the judge to find each section?
- **Promotional/Fundraising**
 - Have a copy of any posters that were made to post at the school to get others to attend,
 - Document any fundraising events that happened including date of event, money raised, method of raising funds
 - **What the judges look for:**
 - Good: Is there a description of the promotions/fundraising?
 - Excellent: Are there pictures of the promotional material? List of fundraising events and money accrued (if applicable)



DESIGN PROCESS

■ Research Methods

- Show the different designs that were considered
- Results of any brainstorming sessions to determine design.
- What the judges look for:
 - Good: Evidence of research done on design
 - Excellent: Evidence of other designs researched

■ CAD Models

- 3D models from CAD of your bot design
- What the judges look for:
 - Good: 3-D model available
 - Excellent: 3-D model with good formatting and labeling of key parts to the bot



DESIGN PROCESS

■ Refinement

- List what refinements were done based on the risk analysis and testing
- What the judges look for:
 - Good: List of refinements
 - Excellent: Risk analysis (see example on next page) or some sort of evidence of analysis of weak points of bots and fixes done to eliminate or minimize those weaknesses

■ Structural Analysis

- Pros and cons of your bot design
- What the judges look for:
 - Good: List of strengths and weaknesses of bot design
 - Excellent: Understanding of bot structure strengths and weaknesses



Design Process Refinement Example

| Item and Function | Potential Failure Mode | Existing Conditions | | | | | | Current Controls and/or Recommended Actions |
|-------------------|------------------------------|--------------------------------|---|----------|------------|-----------|-----|---|
| | | Potential Effect(s) of Failure | Potential Cause of Failure | Severity | Occurrence | Detection | RPN | |
| Spinner | Could catch and break a belt | No weapon | Debris | 4 | 5 | 1 | 20 | Extra Belts |
| Remote Control | Batteries could die | Loss of Function | Weak batteries Something is pulling too much power | 5 | 1 | 4 | 20 | Extra batteries |
| Remote Control | Switch in wrong position | Weapon wouldn't move | Not putting it back in starting position | 2 | 1 | 1 | 2 | Turn it off and turn it back on |

Look up FMEA online to get a template for this



DESIGN PROCESS

■ Engineering Drawings Set

- These drawings should come from CAD, and should include dimensions on fabricated parts, and should include the specific parts used (i.e. specs of motors, screw specifications, etc)
- What the judges look for:
 - Good: CAD drawing of finished bot
 - Excellent: Set of CAD drawings that includes finished bot, plus any parts that had to be made

■ Material Selection

- List what materials were used to build your bot (the parts that were fabricated) and why you decided to use these materials(i.e. strength, cost, etc).
- What the judges look for:
 - Good: List of materials used for machined parts
 - Excellent: Evidence of understanding of why material for made parts was used



DESIGN PROCESS

■ Manufacturing Plans

- Written procedure to show how to assemble the bot. This should include pictures with indicators of where the pieces go.
- What the judges look for:
 - Good: A written instruction on how to build the bot
 - Excellent: Clear instructions with pictures that is easy to follow

■ Assembly Models

- This should include pictures of any models(i.e. cardboard cutouts of anticipated design) that were made of the bot before the actual build to work on design.
- What the judges look for:
 - Good: 3-D CAD model
 - Excellent: Pictures of cardboard cutout models or other models done prior to bot build



DESIGN PROCESS

- **Weapon System Details**
 - Description of the weapon on the bot with advantages and possible disadvantages of this choice
 - What the judges look for:
 - Good: A clear description of the weapon
 - Excellent: Evidence of why the weapon was chosen-advantages/disadvantages
- **Drive System Details**
 - Description of the choice of drive systems, and why it was chosen over others.
 - What the judges look for:
 - Good: A clear description of the drive system
 - Excellent: Evidence of why the drive system was chosen-advantages/disadvantages



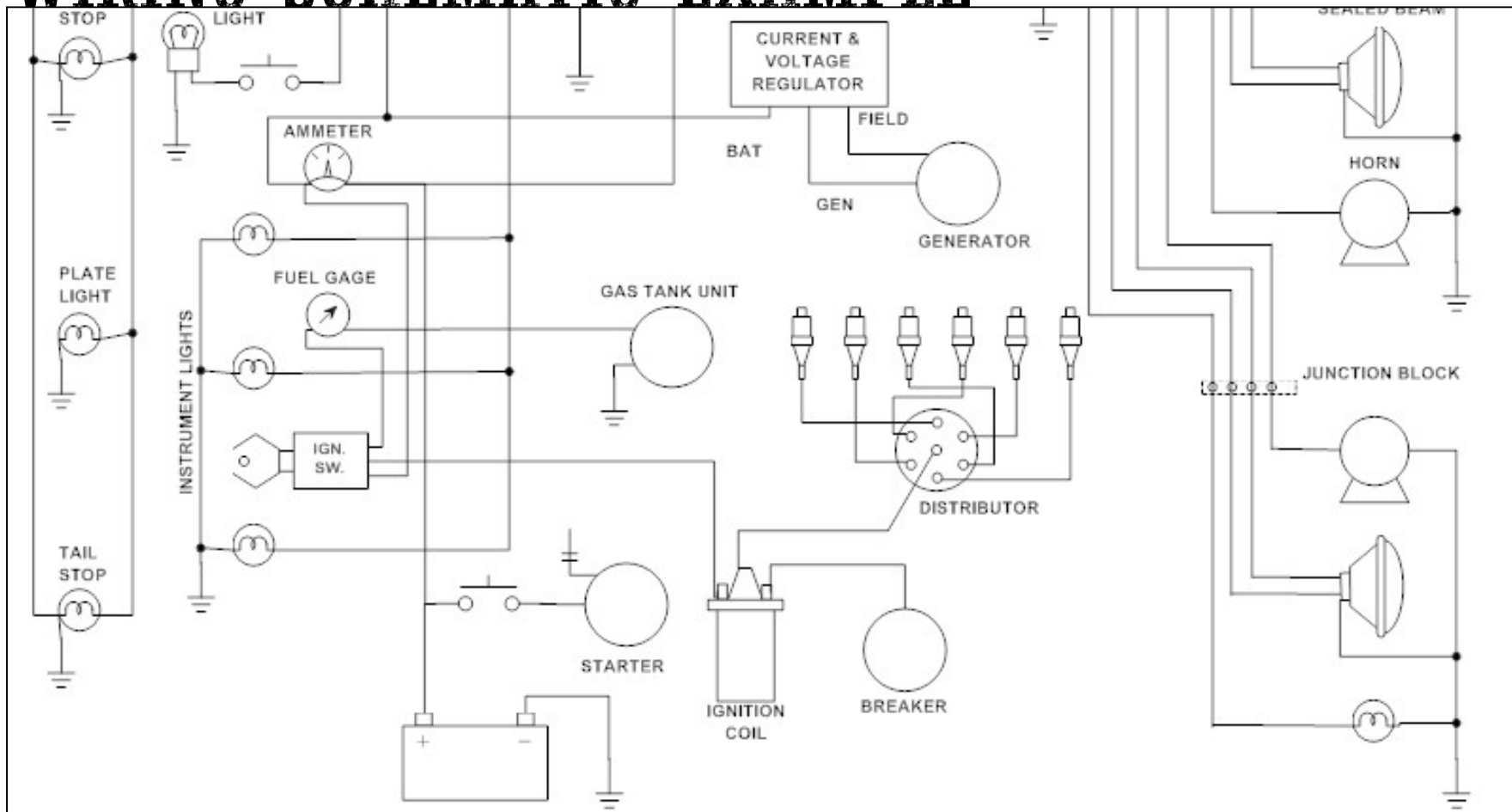
DESIGN PROCESS

- **Power System Details**
 - Description of the choice of power systems, and why it was chosen over others.
 - What the judges look for:
 - Good: A clear description of the power system
 - Excellent: Evidence of why the power system was chosen- advantages/disadvantages
- **Wiring Schematic**
 - Drawing (could be in CAD- there are also software programs online) of the electrical wiring for the bot.
 - What the judges look for:
 - Good: Wiring diagram
 - Excellent: Wiring diagram that is done digitally that is clear and well-marked



DESIGN PROCESS

WIRING SCHEMATIC EXAMPLE



WIRING DIAGRAM
 AUTO ELECTRICAL WIRING DIAGRAM

DRAWN BY

CHECKED

DATE

SCALE

SHEET NO.

DESIGN PROCESS

- **Testing Results**
 - Tests should be via the scientific method.
 - Results should be quantifiable and documented.
 - Tests should be repeated to ensure repeatability of the performance of the bot
 - **What the judges look for:**
 - Good: Description of testing and results
 - Excellent: Evidence of Aggression, Durability, AND maneuverability testing. Quantifiable results presented in a neat data-driven format

