Bell Advanced Vertical Robotics Competition
Guide for a Perfect Presentation & Notebook
17 November 2024

Each category is worth up to 22 points. I recommend structuring your slides in the following order and hitting all of the bullet points.

Cover Slide: Prioritize professional looks over "fun" looks.

Teamwork (This section should be called **"Project and Engineering Management")**
☐ Did you identify team captains and subsystem leads? e.g., Team Captain, AVR lead, RVR lead, Sphero Lead, etc., and possibly hardware / software lead or chiefs.
☐ Did you assign responsibilities based on skillsets?
☐ Did you show a tier-based organization chart? Show a hierarchy.
☐ Did you show a task-based project management system? Even something as simple as a whiteboard / Kanban / Notion / Trello, etc.
☐ Did you identify major milestone dates (e.g., begin / complete brainstorming, begin / complete preliminary design, begin / complete critical design, complete production, begin testing)
☐ Did you use a Gantt chart?
☐ What were your communication channels? Slack? Discord?
☐ **Did you show evidence of all of these steps above using charts / tables / graphics / images?**
☐ **Are you using / saying the key words: "project management", "task management", "schedule management"**
Do not waste too much time introducing each other. 15 seconds to identify all members
1-2 minutes

The next 3 sections should be your "System Design" section, and should be blended together
{

Design approach process
☐ Did you use an Engineering Development Process? (e.g., Agile / Systems Engineering V/ basic engineering development process, PLTW process).
☐ Did you show evolution from research > brainstorming > concepts > down selection > preliminary design > final design > testing > revision / iterations?
☐ For your down selection, did you use a guided methodology? (e.g., decision matrix, scored rubric, etc.)
☐ Are you discussing that you went from hand sketches, and rapid prototypes (but low fidelity, such as cardboard) before going straight into 3D printing?
*It's a **bad thing** if judges see you jump straight into CAD and 3D printing without basic prototyping.*
☐ **Did you show evidence of all of these steps above using charts / tables / graphics / images?**
☐ **Are you using / saying the key words: "iteration", "conceptual design", "prototype design", "final design", "decision making"**

Demonstrated engineering skills (IGNORE BARE MINIMUM SKILLS: 3D printing, block coding, soldering, assembly, basic tool use)
☐ Are you show casing any unique engineering skills, besides the minimum skills listed above?
Examples below:
☐ Weight and balance / Center of Gravity analysis & optimization

- [ ] Rewriting basic code to improve performance / reliability
- [ ] Aerodynamics evaluation (AVR down wash, maximizing Conex “flow-through”)
- [ ] Specialized 3D printing / infill modification / unique features
- [ ] Methods to improve reliability (e.g., passive systems, reduction of reliance on 2.4 GHz Wi-Fi, fail safe, self-actuated systems)
- [ ] Materials analysis to support: crash resistance, ductility, etc. Use material science terms.
- [ ] Vibration attenuation (NOT the same as vibration compensation)
- [ ] Design for manufacturing (e.g., making parts printable)
- [ ] **Did you show evidence of all of these steps above using charts / tables / graphics / images?**
- [ ] **Are you using / saying the key words: "optimization", "improvement"**

Demonstrated research and effort

- [ ] What research did you perform? How did your research **influence** the design of your system?
- [ ] Consider: magnetic systems research, radio-frequency research, autonomy, material properties, flight dynamics / properties, 2 vs 3 bladed props
- [ ] Did you perform any engineering analysis? How did that **influence** your design?
- [ ] What future areas of research are you interested in to improve the performance of your team?
- [ ] What extra effort did you put in? (e.g., Max's autonomy code, extreme focus on weight reduction, passive systems, reduction of reliance on the 2.4 GHz frequency)
- [ ] What were the biggest challenges you wanted to mitigate the impacts of? (e.g., downwash, Wi-Fi un-reliability, small, netted area)
- [ ] **Are you using / saying the key words: "design influence”, "research" , "analysis"**
- [ ] Do not just say you studied the game manual.

4-5 minutes

}

Game winning strategy (DO NOT regurgitate the game manual objectives). Recommend calling it **"Mission Planning & Strategy"** or something similar

- [ ] What is your predicted score?
- [ ] Discuss points optimization: which points have most reward with low risk? Which points have high risk low reward?
- [ ] Discuss flight plan / path plan for AVR, RVR and Sphero. Consider pre-positioning.
- [ ] Communication strategies? Are you implementing concise comms?
- [ ] How are you playing to your system’s strengths?
- [ ] Discuss changes to game strategy based on practice runs and competition runs.
- [ ] Did you analyze your own competition video? What were the top 3 failures?
- [ ] Optional: Any mitigation / plan B strategies? What do you do if your AVR fails? What to do if ___ fails? (Don’t spend too much time on this, but good for bonus points)
- [ ] **Did you show evidence of all of these steps above using charts / tables / graphics / images?**
- [ ] **Are you using / saying the key words: "flight plan", "mission plan", "de-briefing", "execution strategy", "strategy optimization", "feedback loop"**

1-2 minutes

Lessons Learned consider this your **"Future Improvement Plans & Lessons Learned"**

☐ (DO NOT discuss basic lessons learned (e.g., learned how to code / solder / 3D print, communicate, teamwork, management… everyone does this)
☐ What critical issues did you encounter with your drones? What was the issue, and *quickly* walk through a root cause analysis (Strongly recommend using: 5-WHYs, fishbone diagram, FMCEA, etc.)
☐ What repeated issues did you team continue to encounter? How will your team be ***proactive*** and not ***reactive*** in preventing these issues next year? Consider structural changes / checklists / management changes, inspection processes, better training, etc.
☐ Discuss areas for future optimization to drone.
☐ Do not use generic failure terms: "___ failed" or "___ broke" or "___ didn't work", "____ fried". Use detailed engineering language.
☐ Do not say your solution was to just "read the manual" or "check the forum". Use detailed engineering language
☐ **Did you show evidence of all of these steps above using charts / tables / graphics / images?**
☐ **Are you using / saying the key words: "proactive improvements", "structural improvement", "documented for future use", "root cause", "failure analysis"**

1-2 minutes

Quality of presentation

- [ ] Are we using a CLEAN presentation template that is not too busy, and looks professional.
    - I recommend using a white background with color accents, rather than colored backgrounds.
- [ ] Do you have at least one meaningful graphic / chart / image / table per slide?
- [ ] Where possible, are you using GIFs / automatic videos in place of images? Picture worth a thousand words, video is worth a million.
- [ ] Are we handing props / vehicle components to the judges during the presentation for closer inspection?
- [ ] Are you well-rehearsed and well spoken?
- [ ] Are you hitting the 9-minute mark exactly?
- [ ] Are you responses to questions concise (**e.g., less than 1 minute**)?

    HINT: If judges think you are missing in one area of your presentation, we are asking you questions to help YOU gain back points. If you can answer questions more concisely, and allow more time for MORE questions, than you are getting more points.

    It's a good sign if the judges ask challenging questions - it means you hit all topics well, and are now farming for extra points.
- [ ] Are you using smooth / non-distracting / non-gimmicky slide transitions?
- [ ] Is your presentation downloaded in case Wi-Fi fails?
- [ ] Are you doing your best to cover as much meaningful content in a short amount of time?
- [ ] Are you removing things from your presentation that is considered average / what everyone else is doing?
- [ ] Are my bullet points concise? Are we avoiding paragraphs?
- [ ] Is your color scheme consistent?
- [ ] Using GPT to spell check and improve quality of bullet points?
- [ ] Are you prepared to defend your claims? Judges may call you out if you claim to do something but provided minimal evidence.

Things Worth Ignoring / Spending minimal time on (allocate more time towards the important stuff)

- [ ] Safety procedures
- [ ] Artistic design (besides T shirts)
- [ ] Community outreach (judges will look through books for this)
- [ ] Thank the judges after your presentation, not during (wasted time)

Notebook Advice

1. Follow the same advice as the presentation, but a little more detail. Still **focus on graphics over text**. Judges cannot read every word, and rely on information graphics to convey story
    a. Notebook should be able to be skimmed through in 5 minutes, with key focus on engineering design.
2. Order it in the same order as your presentation. Don't follow Appendix C too closely. It's not that good
3. Add page dividers with tabs. Make sure judges can easily locate the engineering section, and that it is one spot, and not spread out.
4. Use GPT to help you write. It is an aid, not a crutch
5. Notebook scoring is ranked. Points that you earn denies points from other teams.
6. **Things that WILL earn you points:** everything in the presentation
7. **Things that honestly will not earn you points.**
    a. Safety section. Just provide the basics
    b. Meeting Minutes / Logs. Just provide the basics. Highlight takeaways at top of page, in **bold**. Put logs and meeting notes in the back.
    c. Artistic Elements. Put in the back of book.
    d. Team bios: Just provide the basics and team organization. Front of book with project management section.