

Robot Design

Overview

Getting to see how the robots work





FLL Overview: Technical Design

The Robot Design session allows teams to show off the **DESIGN** of their robot

Teams do **NOT** operate their robot. There is no FLL table in the room

Teams should:

- **Demonstrate:** How attachments move and operate.
- **Describe:** Show code, display documentation, describe the development process etc
- **Answer Question:** The judges will ask for more information

2 x Coaches are welcome to observe, but they cannot speak, help, or participate in **ANY** way.



FLL Overview: Project Rubric



Robot Design Team Number _____
Judging Room _____

For each Robot Design criteria, clearly mark the box that best describes the ability of the team to demonstrate or provide evidence (such as analysis or test data) that their robot and processes meet that level of achievement. If the team does NOT describe a particular criteria at all, then put an 'X' in the first box for Not Demonstrated (ND). Please provide as many written comments as you can to acknowledge each team's hard work and to help teams improve. Use the back for additional comments if needed.

Ratings

		Beginning	Developing	Accomplished	Exemplary
Mechanical Design	Durability	Robot designed to maintain structural integrity and have the ability to withstand rigors of competition			
	N	quite fragile; breaks a lot	frequent or significant faults/repairs	rare faults/repairs	sound construction; no repairs
	D				
Mechanization	Mechanical Efficiency	Robot designed to be easy to repair, modify, and be handled by technicians			
	N	excessive time to repair/modify	inefficient to repair/modify	appropriate time to repair/modify	streamlined time to repair/modify
	D				
Programming	Programing Quality	Robot mechanisms designed to move or act with appropriate speed, strength and accuracy for intended tasks (propulsion and execution)			
	N	imbalance of speed, strength and accuracy on most tasks	imbalance of speed, strength and accuracy on some tasks	appropriate balance of speed, strength and accuracy on most tasks	appropriate balance of speed, strength and accuracy on every task
	D				
Strategy & Innovation	Automation/Navigation	Programs are appropriate for the intended purpose and should achieve consistent results, assuming no mechanical faults			
	N	would not achieve purpose AND would be inconsistent	would not achieve purpose OR would be inconsistent	should achieve purpose repeatedly	should achieve purpose every time
	D				
Strategy & Innovation	Design Process	Programs are modular, streamlined, and understandable			
	N	excessive code and difficult to understand	inefficient code and challenge to understand	appropriate code and easy to understand	streamlined code and easy for anyone to understand
	D				
Strategy & Innovation	Mission Strategy	Robot designed to move or act as intended using mechanical and/or sensor feedback (with minimal reliance on driver intervention and/or program timing)			
	N	frequent driver intervention to aim AND retrieve robot	frequent driver intervention to aim OR retrieve robot	robot moves/acts as intended repeatedly w/ occasional driver intervention	robot moves/acts as intended every time with no driver intervention
	D				
Strategy & Innovation	Innovation	Developed and explained improvement cycles where alternatives were considered and narrowed, selections tested, designs improved (applies to programming as well as mechanical design)			
	N	organization AND explanation need improvement	organization OR explanation need improvement	systematic and well-explained	systematic, well-explained and well-documented
	D				
Strategy & Innovation	Innovation	Clearly defined and described the team's game strategy			
	N	no clear goals AND no clear strategy	no clear goals OR no clear strategy	clear strategy to accomplish well-defined goals	clear strategy to accomplish most/all game missions
	D				
Strategy & Innovation	Innovation	Team identifies their sources of inspiration and creates new, unique, or unexpected feature(s) (e.g. designs, programs, strategies or applications) that are beneficial in performing the specified tasks			
	N	No original feature(s)	original feature(s) with some added value or potential	original feature(s) with the potential to add significant value	original feature(s) that add significant value
	D				

Categories

Comments

Comments

Great Job... Think about...



FLL Overview: TD Rubric

Part 1: Mechanical Design

		Beginning	Developing	Accomplished	Exemplary
Mechanical Design	Durability	Robot designed to maintain structural integrity and have the ability to withstand rigors of competition			
	N	quite fragile; breaks a lot	frequent or significant faults/repairs	rare faults/repairs	sound construction; no repairs
	D				
	Mechanical Efficiency	Robot designed to be easy to repair, modify, and be handled by technicians			
	N	excessive time to repair/modify	inefficient to repair/modify	appropriate time to repair/modify	streamlined time to repair/modify
	D				
Mechanization	Robot mechanisms designed to move or act with appropriate speed, strength and accuracy for intended tasks (propulsion and execution)				
N	imbalance of speed, strength and accuracy on most tasks	imbalance of speed, strength and accuracy on some tasks	appropriate balance of speed, strength and accuracy on most tasks	appropriate balance of speed, strength and accuracy on every task	
D					



FLL Overview: TD Rubric

Part 2: Programming

Beginning

Developing

Accomplished

Exemplary

Programming	Programming Quality		Programs are appropriate for the intended purpose and should achieve consistent results, assuming no mechanical faults		
	N	would not achieve purpose	would not achieve purpose	should achieve purpose	should achieve purpose
	D	AND would be inconsistent	OR would be inconsistent	repeatedly	every time
	Programming Efficiency		Programs are modular, streamlined, and understandable		
	N	excessive code and difficult to understand	inefficient code and challenge to understand	appropriate code and easy to understand	streamlined code and easy for anyone to understand
	D				
Automation/Navigation		Robot designed to move or act as intended using mechanical and/or sensor feedback (with minimal reliance on driver intervention and/or program timing)			
N	frequent driver intervention to aim AND retrieve robot	frequent driver intervention to aim OR retrieve robot	robot moves/acts as intended repeatedly w/ occasional driver intervention	robot moves/acts as intended every time with no driver intervention	
D					



FLL Overview: TD Rubric

Part 3: Strategy and Innovation

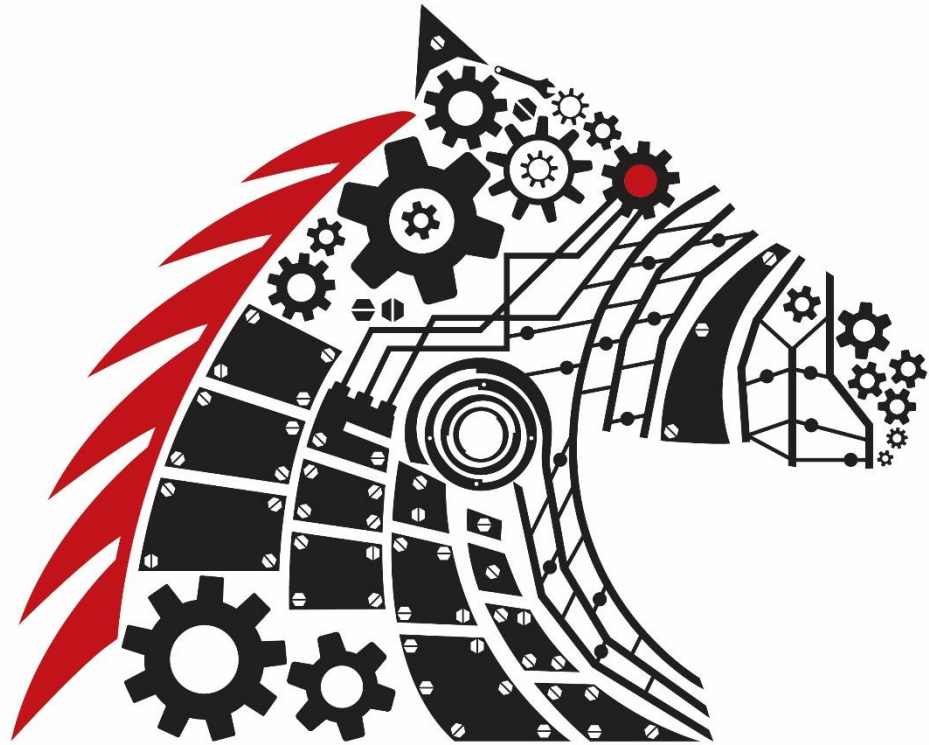
Beginning

Developing

Accomplished

Exemplary

		Beginning	Developing	Accomplished	Exemplary
Strategy & Innovation	Design Process	Developed and explained improvement cycles where alternatives were considered and narrowed, selections tested, designs improved (applies to programming as well as mechanical design)			
	N D	organization AND explanation need improvement	organization OR explanation need improvement	systematic and well- explained	systematic, well-explained and well-documented
	Mission Strategy	Clearly defined and described the team's game strategy			
	N D	no clear goals AND no clear strategy	no clear goals OR no clear strategy	clear strategy to accomplish well-defined goals	clear strategy to accomplish most/all game missions
	Innovation	Team identifies their sources of inspiration and creates new, unique, or unexpected feature(s) (e.g. designs, programs, strategies or applications) that are beneficial in performing the specified tasks			
	N D	No original feature(s)	original feature(s) with some added value or potential	original feature(s) with the potential to add significant value	original feature(s) that add significant value



PROJECT BUCEPHALUS

Robot Design

RDES

Robot Design Executive Summary

(See Challenge Guide)





FLL Overview: Technical Design

The RDES is a template to help teams explain the robot to Judges.

It is **NOT** a requirement for Australian Competition

However, the RDES is a very useful tool for getting teams through the Technical Design Session.

All teams have to do is read from a piece of paper. There is no need to memorise anything, or put on any kind of show!

Note: There is a limit of 4 minutes



FLL Overview: Technical Design

RDES Outline:

- **Robot Facts**
- **Design (Fun)**
- **Design (Strategy)**
- **Design (Process)**
- **Design (Mechanical)**
- **Design (Programming)**
- **Design (Innovation)**

Important: There is no need to describe every detail.
Choose the highlights!



PROJECT BUCEPHALUS

Robot Design

5 Tips for Judging Success





Robot Design: 5 Tips

1. Practice answering questions
2. Be organized (packing and unpacking)
3. Everyone is an expert in something
4. Always take time for code
5. Style: Comment, MyBlock, Naming Conventions



PROJECT BUCEPHALUS

Robot Design

Documentation

(See Engineering Notebook)





Robot Design: Documentation

Spend some extra time on this one

- Team Name/Logo
- Robot Design Summary (use pictures)
- Robot Development Process (Pictures or Text)
- Code (Print Summary)
- Innovations
- Challenges/Lessons

Engineering Notebook provides a template



Robot Design: Documentation




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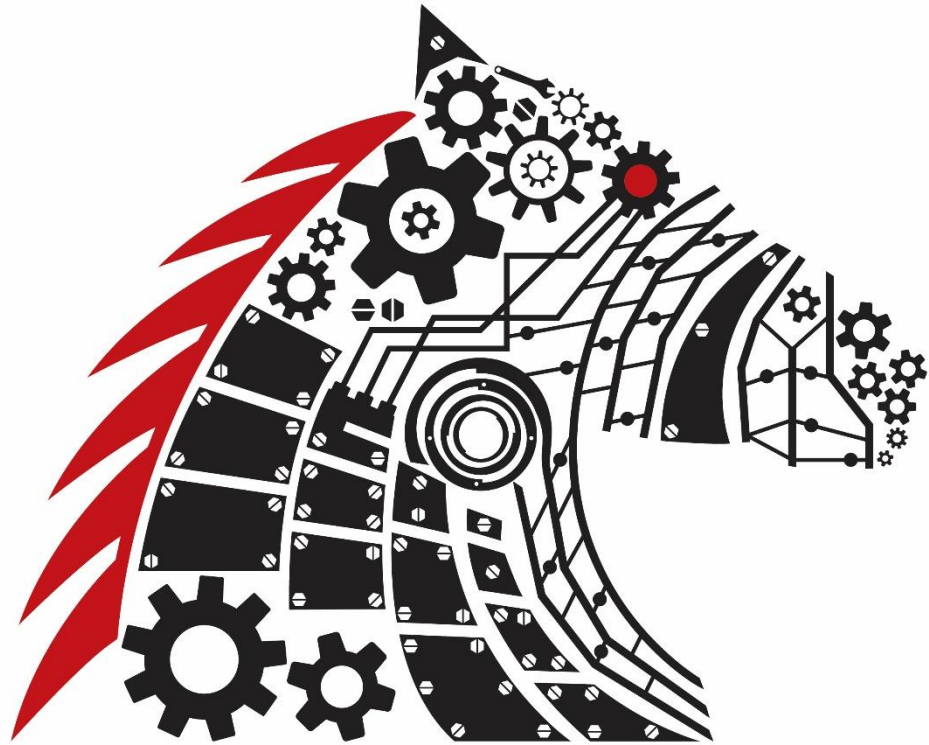
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