Welcome to the *Robot Design* Session

Presenter: Tom Hand

FLL®, FTC®, FRC® Judge

Agenda

- Introduction
- Awards
- Different Judge Approaches
- How to Win
- How to (Not) Win
- Judging Questions
- Summary and Questions

Introduction

- Tom Hand, retired Honeywell Electro-Mechanical Engineering
  - FRC Mentor 2007 to 2015
    - Team 1987: 2007-2010 (Championship ¾ years)
    - Team 2894: 2008-2010
    - Team 2346: 2011-2014
  - FRC Regional and Championship Judge, 2008-present
  - FLL Judge from 2009
  - FTC Judge from 2013

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Award: *Mechanical Design*

- *This award recognizes a team that designs and develops a mechanically sound robot that is durable, efficient and highly capable of performing challenge missions.*

  - Durability: sound construction: no repairs
  - Mechanical Efficiency: streamlined use of parts and minimal time to repair/modify
  - Mechanization: balance of speed/strength/accuracy on EVERY task

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Award: *Programming*

- *This award recognizes a team that uses outstanding programming principles, including clear, concise and reusable code that allows their robot to perform challenge missions autonomously and consistently.*

  - Programming Quality: should achieve purpose EVERY time
  - Programming Efficiency: streamlined code and easy for ANYONE to understand
  - Automation/Navigation: robot moves/acts as intended EVERY time with no driver interaction

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Award: Strategy and Innovation

- *This award recognizes a team that uses solid engineering practices and a well developed strategy to design and build an innovative, high performing robot*.

  - Design Process: systematic, well explained and documented
  - Mission Strategy: clear strategy to accomplish most/all game missions
  - Innovation: original feature(s) that add(s) SIGNIFICANT value

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Different Judge Approaches

- Judges may:
  - ask to run missions
  - ask questions during/after missions
  - discuss programming during/after missions
  - question team

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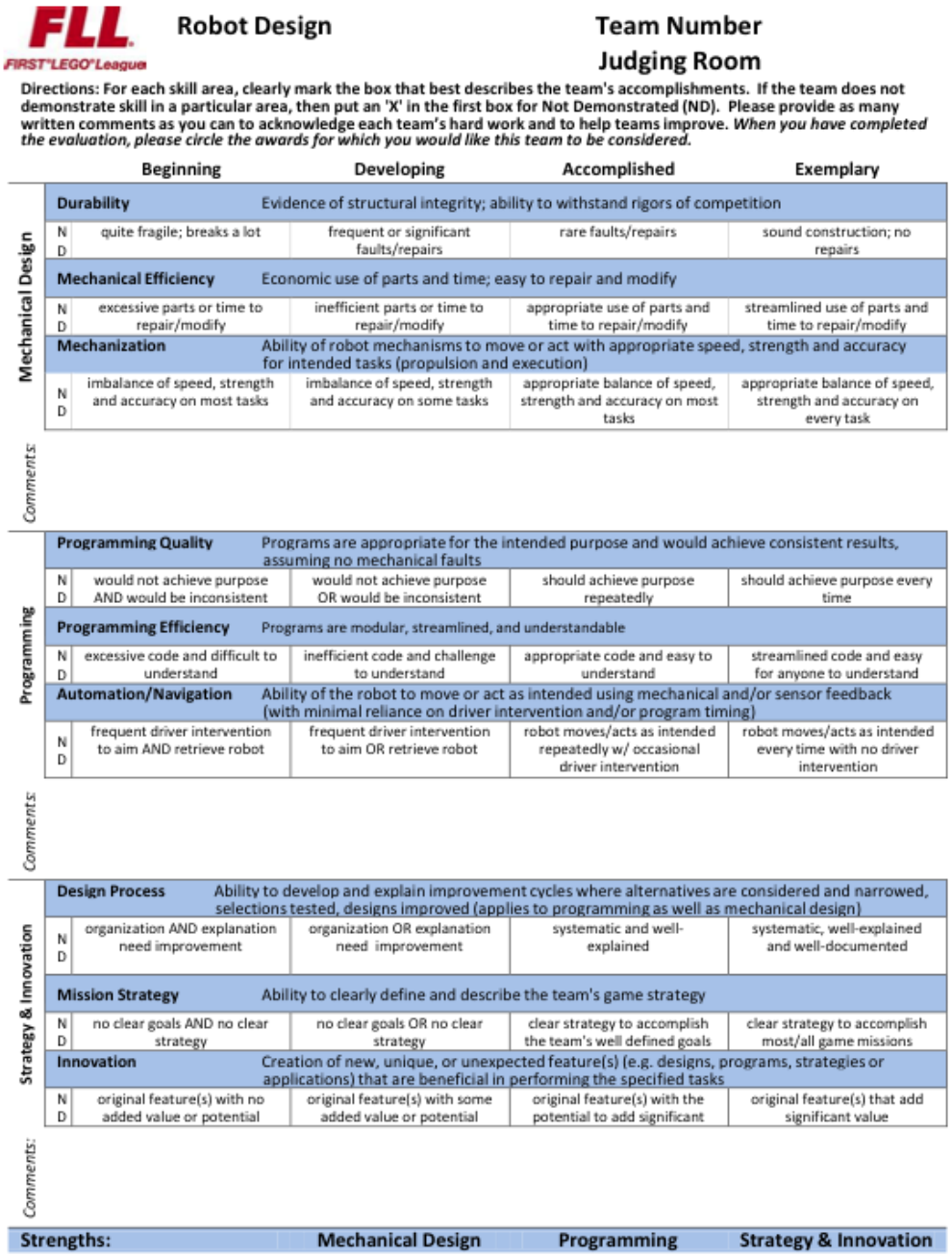
Different Judge Approaches

- What I/we like
  - Introduce Team/members
  - ***Summarize*** how/why robot designed
  - ***Summarize*** how/why robot programmed
  - ***Summarize*** strategy
    - Discuss unique features
  - Ask what we do not hear

How to Win

- Work to "*Exemplary*" column of Rubric

How to Win: The Rubric



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Robot Design | **Team Number** | **Judging Room**

Directions: For each skill area, clearly mark the box that best describes the team's accomplishments. If the team does not demonstrate skill in a particular area, 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. *When you have completed the evaluation, please circle the awards for which you would like this team to be considered.*

		Beginning	Developing	Accomplished	Exemplary
Mechanical Design	**Durability**	Evidence of structural integrity; ability to withstand rigors of competition			
	ND	quite fragile; breaks a lot	frequent or significant faults/repairs	rare faults/repairs	sound construction; no repairs
	Mechanical Efficiency	Economic use of parts and time; easy to repair and modify			
	ND	excessive parts or time to repair/modify	inefficient parts or time to repair/modify	appropriate use of parts and time to repair/modify	streamlined use of parts and time to repair/modify
	Mechanization	Ability of robot mechanisms to move or act with appropriate speed, strength and accuracy for intended tasks (propulsion and execution)			
	ND	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
Comments:					
Programming	**Programming Quality**	Programs are appropriate for the intended purpose and would achieve consistent results, assuming no mechanical faults			
	ND	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
	Programming Efficiency	Programs are modular, streamlined, and understandable			
	ND	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
	Automation/Navigation	Ability of the robot to move or act as intended using mechanical and/or sensor feedback (with minimal reliance on driver intervention and/or program timing)			
	ND	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
Comments:					
Strategy & Innovation	**Design Process**	Ability to develop and explain improvement cycles where alternatives are considered and narrowed, selections tested, designs improved (applies to programming as well as mechanical design)			
	ND	organization AND explanation need improvement	organization OR explanation need improvement	systematic and well-explained	systematic, well-explained and well-documented
	Mission Strategy	Ability to clearly define and describe the team's game strategy			
	ND	no clear goals AND no clear strategy	no clear goals OR no clear strategy	clear strategy to accomplish the team's well defined goals	clear strategy to accomplish most/all game missions
	Innovation	Creation of new, unique, or unexpected feature(s) (e.g. designs, programs, strategies or applications) that are beneficial in performing the specified tasks			
	ND	original feature(s) with no added value or potential	original feature(s) with some added value or potential	original feature(s) with the potential to add significant	original feature(s) that add significant value
Comments:					

Strengths:	**Mechanical Design**	**Programming**	**Strategy & Innovation**

How to Win

- Work to "*Exemplary*" column of Rubric
- Come prepared with oral/printed Summary
- Introduce Team
- All participate
- Have fun
- Be polite (to all)
- Bring documentation/programming
- Wow us!

How to (Not) Win

- What hurts to see/hear
  - Kids running loose
    - Have to ask:
      - about robot
      - who did what
      - why it was built like it was
      - when team started.
    - Silence

Judging Questions

- **What did each of you do for the team?**
- **How did you decide what missions to run?**
- **What is your favorite mission? Why?**
- **What is the hardest mission? Why?**
- **Did you use sensors? Why?**
- **What programming language did you use? Why?**
- **Does your robot stay together?**
- **What is giving you trouble and can you fix it?**
- **Are you having fun?**

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Summary and Questions

- Thanks for all that you do
- Questions:
  - our approach,
  - the rubric,
  - past experiences,
  - anything?