

Portfolio

Joseph Ruan

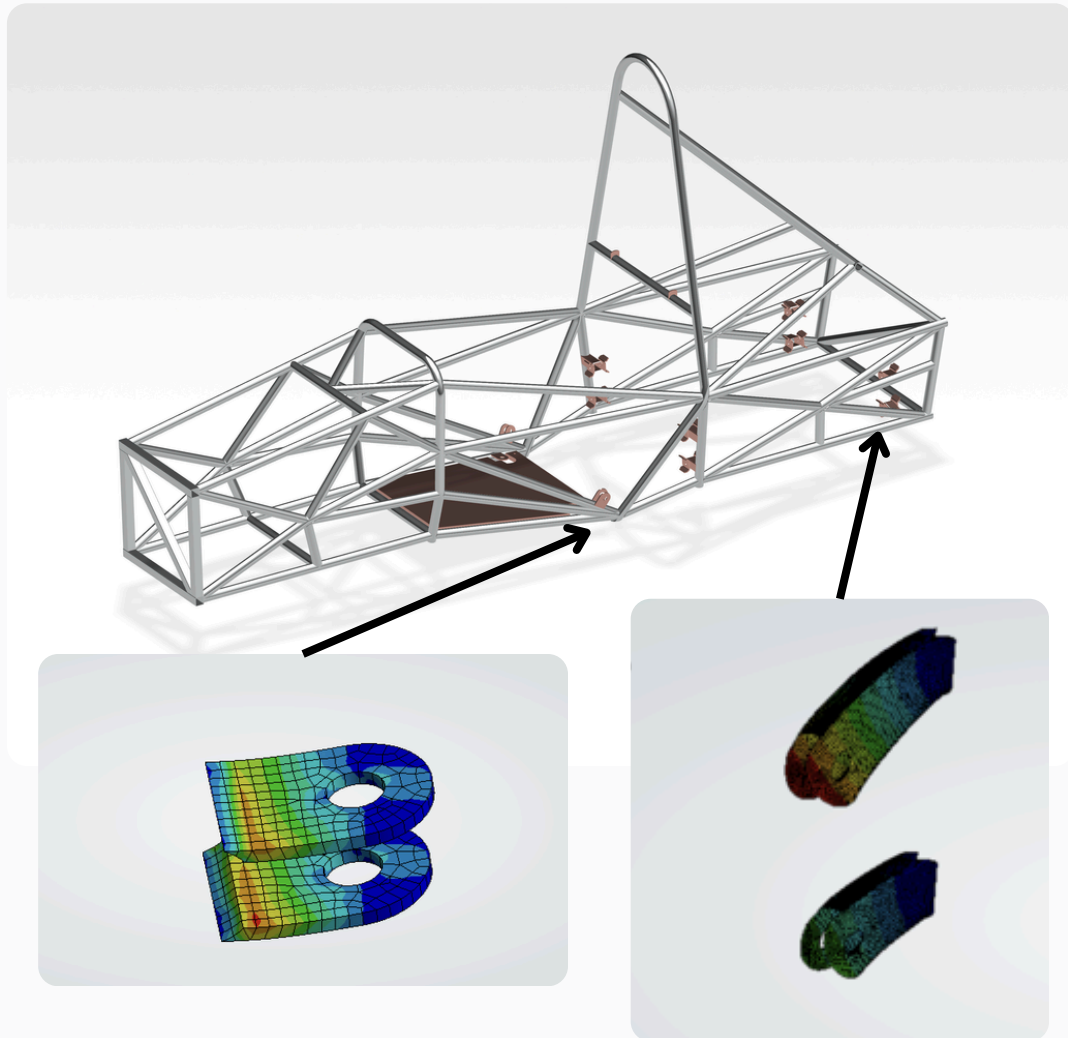
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**Mechanical Engineering
Purdue 2027**

Purdue Electric Racing

Chassis Team Member & Harness Project Owner



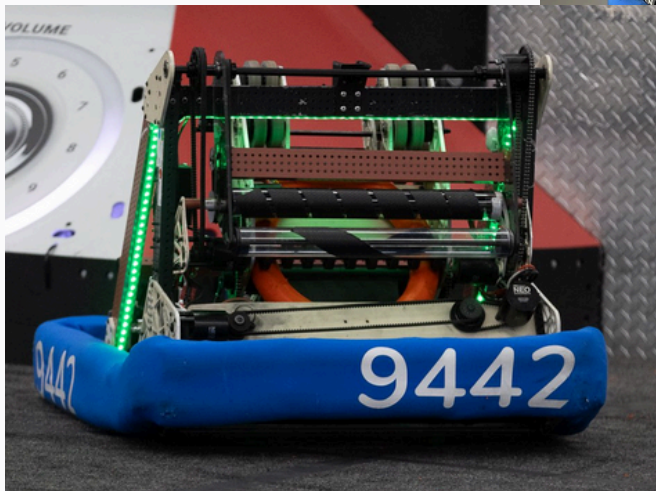
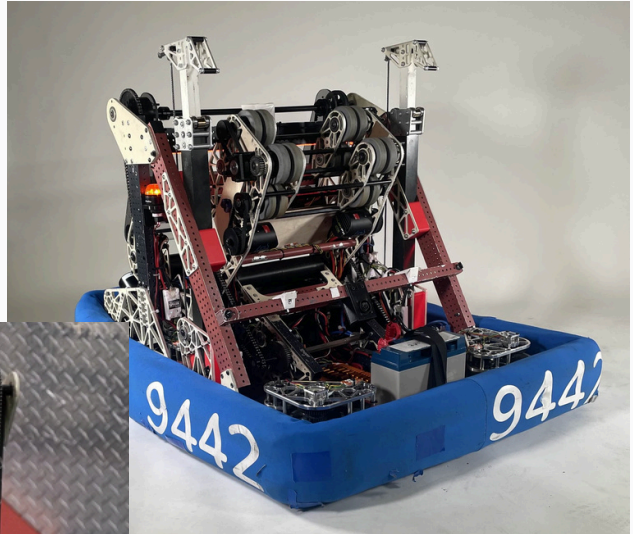
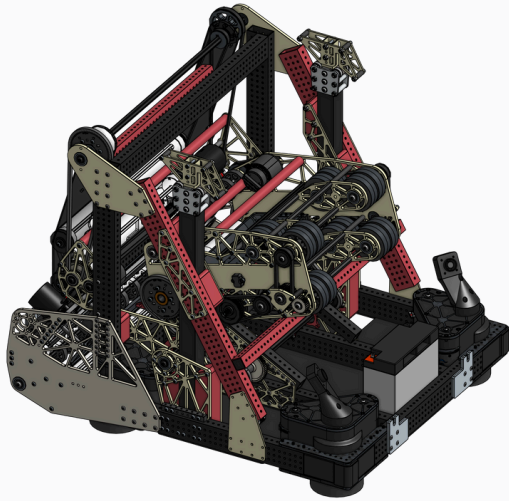
Clockwise from top left: render of chassis, FEA of battery mount, FEA of harness tabs

Skills Used: ANSYS, NX, Composites, Welding/NDT

- Designed harness tabs using NX and optimized harness ergonomics
- Designed chassis closeouts using NX to isolate cockpit and driver from debris
- Designed battery mounts using NX to secure EV accumulator during motion
- Used ANSYS to verify all parts complied with rigidity/deformation targets
- Manufactured chassis tubes using multi-axis manufacturing methods
- Utilized composite manufacturing techniques to fabricate closeouts
- Helped design and manufacture jig and tooling for assembly
- Assisted with chassis welding and weld validation using non-destructive testing

Miso Mechanics 9442 (FRC)

Captain, Designer, and Lead Programmer



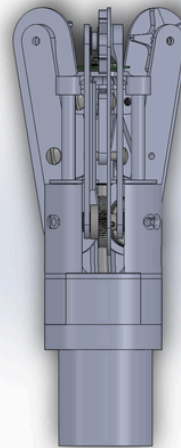
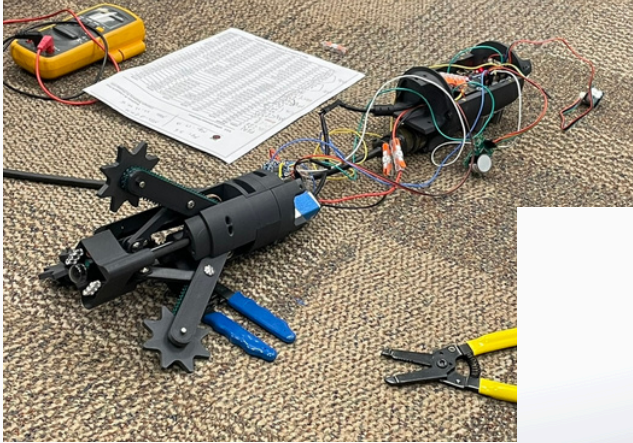
Clockwise from top left: CAD for competition robot, robot at photoshoot, robot at competition

Skills Used: Onshape, Java, Computer Vision, Motion Planning, Autonomous Systems

- Founded and led rookie FIRST Robotics team, fundraised over \$40K USD
- Utilized 3D printing and laser cutting for rapid prototyping and iteration which reduced traditional timelines by half compared to leading teams
- Designed multiple subsystems in Onshape for competition robot which ranked at 20th offensively while competing out of all 3,500 teams worldwide
- Developed computer vision system using PhotonVision and custom camera assemblies to detect game objectives while minimizing cost
- Created motion planning system for autonomous routines allowing for real-time decision-making to aid in gameplay, ranked top 5% autonomous worldwide

Soil Microbiome Measuring Bot

Student Researcher @ Collaborative Robotics Lab



Clockwise from top left: field repair of robot during test, CAD of robot head, field testing at USDA Ames

Skills Used: SolidWorks, Embedded C++, Python, Computer Vision, Autonomous Systems

- Designed slip ring assembly for tether reel of robot as well as sensor array and module mounting system in Onshape and SolidWorks
- Developed Python data parsing script for timestamp sync to simplify SLAM/edge computing odometry
- Planned and executed field testing strategy at multiple off-site locations, identified 300% more error than previous procedure
- Collected data and presented findings at the United States Department of Agriculture's Ames National Laboratory along with two senior lab members