Shashank Chaudhary

(448) 500-6131 | Tallahassee, FL | Portfolio | s.chaudhary2k25@gmail.com | **linkedin**.com/in/shashch99

TECHNICAL SKILLS

Design and Analysis: Adams CAR, AutoCAD, ANSYS, Catia V5/V6, Creo, Pro E, Siemens NX, SolidWorks.
Product Lifecycle Management (PLM): SmarTeam, Teamcenter, Windchill.
Languages: Arduino, C/C++, Curve Fitting, MATLAB, Python, STM32.
Manufacturing: ASME Y14.5, GD&T, Laser cutting, 3D Printing, Sheet metal, Injection Molding, Die Casting/cutting.

EDUCATION

Master of Science, Mechanical Engineering, Florida State University, Tallahassee, FL | **GPA- 3.53/4** | Aug 2023 - May 2025

Bachelor of Science, Mechanical Engineering, Madan Mohan Malaviya University of Technology, India | **GPA- 3.3/4** | Jul 2017 - Aug 2021

PROFESSIONAL EXPERIENCES

DANFOSS TURBOCOR, Tallahassee, Florida | ***Mechatronics Engineering Intern*** **| Sept 2024 - Present**

- Led change management for 3 chiller systems, improving sensor accuracy by 10% through p-h diagram validation and sensor analysis.
- Commissioned systems and performed testing to ensure sensor accuracy within 0.5% using calibration tests and instrumentation, including accelerometers, validating system performance across the application range.
- Developed 3D models and 2D drawings using **Catia** for product and fixture design, applying machine design principles, adhering to **ASME Y14.5** standards, and analyzed potential failure modes for 2 compressor models.
- Performed **Finite Element Analysis** on 7 shaft kits using **ANSYS**, applying solid mechanicals principles, and conducting model validation to ensure accuracy and reliability of the analysis results.
- Utilized manual machine shop equipment and measurement equipment to fabricate and test prototypes, ensuring precision and accuracy in component manufacturing.

MECHANICAL ENGINEERING DEPARTMENT, FSU, Tallahassee, Florida

Teaching Assistant **| Jan 2024 - Present**

- Taught and mentored 50+ engineering students through lab exercises, boosting student engagement and hands-on learning, which improved average practical exam scores by 15%.
- Evaluated 100+ student assignments and projects, providing feedback to enhance understanding of mechanical engineering principles.

Research Assistant **| Jun 2024 - Dec 2024**

- Devised and tested a thermoelectric generator prototype, optimizing performance through Heat transfer analysis to support carbon neutrality.
- Conducted data analysis of industrial process heat decarbonization, generating reports based on 2 industrial site visits to recommend energy-saving techniques for the DOE Industrial Assessment Center project.

SONA COMSTAR, Gurugram, India | **Graduate *Engineering Trainee*** **| Nov 2021 – May 2023**

- Accelerated new product development by 20% through cross-functional coordination and material selection, contributing to **BOM** creation.
- Ensured **GD&T** and tolerance compliance; conducted stack-up analysis and **DFMEA/PFMEA** to mitigate failure risks.
- Improved design for manufacturability and assembly (**DFM/DFA**), cutting development time by 20% using **CAD** tools for modeling, simulation, and drafting, and operating **CNC** mill and CNC routers for prototyping.
- Optimized material and design for **EV/hybrid** differential assemblies, achieving 5% weight and 15% NVH reduction for enhanced efficiency and cost savings.

SPONSORED PROJECTS

SUPRA SAE INDIA STUDENT FORMULA, Formula SAE | Buddha International Circuit, India | Nov 2018 - Jul 2019

- Co-headed a team of 15 members, managing project timelines and resources effectively, and secured All India Rank 30 out of 128 teams.
- Developed vehicle chassis and components in **SolidWorks**, ensuring 100% compliance with **SAE** regulations.
- Devised the design using **Finite Element Analysis** principles, resulting in an **83**-kg weight reduction.
- Engineered a gear-by-wire system, decreasing shift times by 40% and increasing cockpit space by 15% for enhanced driver ergonomics.

BAJA SAE INDIA STUDENT FORMULA | IIT Ropar, India | Jun 2018 - Mar 2019

- Spearheaded powertrain optimization initiatives, enhancing engine efficiency by 12%, achieving All India Rank **33**.
- Engineered prototypes to ensure 100% compliance with SAE rules and regulations and secured sponsorship of $4000.

ACADEMIC PROJECTS

- **Double Wishbone Suspension System Design** – FSU, Nov 2023
  Designed in Creo and analyzed in MSC Adams, optimized geometry for handling and tire wear.
- **Seeding Mechanism Design and Analysis** – MMMUT, Oct 2020–Jul 2021
  Led design and simulation of a row-based hand-pulled seeder; collaborated in a 4-member team.
- **Waste Plastic to Fuel Conversion** – MMMUT, Jun–Sep 2020
  Performed theoretical analysis of pyrolysis process; developed a detailed process report.
- **Arduino-Based Surveillance Drone** – MMMUT, Aug–Oct 2019
  Built an aluminum-frame drone with MPU6050 and wireless camera; programmed using Arduino IDE.

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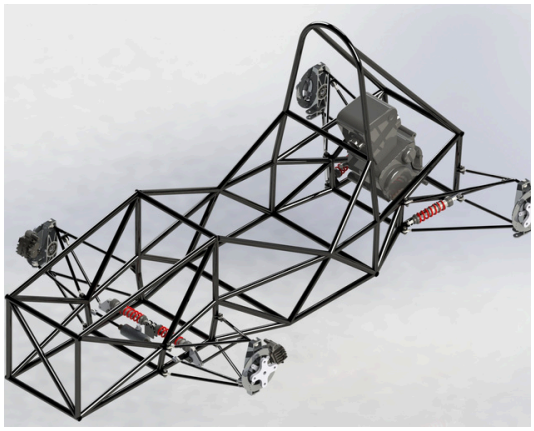
🛠️Design Projects

FORMULA SAE 2019



What?

- Designed and fabricated a single-seat formula racing car under SAEINDIA regulations.
- Performed a suspension analysis to initiate the design process

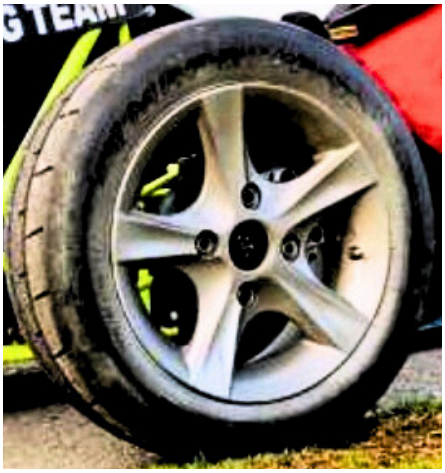
How?

- Contributed as a core design engineer in a 15-member team,
- Responsible for steering, rims, seat, and chassis components using **SolidWorks** and **CATIA** adhering to **GD&T**.

Results

- Successfully passed all technical inspections and ran on India's premier racetrack (BIC), securing All India Rank 36 among university teams.
- Reduced 83 kgs of weight utilizing **FEA**.

RIM DESIGN FOR FORMULA SAE



What?

- Designed a 15-inch alloy wheel rim for a Formula SAE race car to match the exact specifications of the physical rim used in the vehicle.

How?

- Used precision measurements from the actual rim and modeled it in **SolidWorks**, incorporating key geometric features such as hub bolt patterns, ventilation cutouts, and offset.
- Performed stress and fatigue analysis using **ANSYS** to validate structural integrity under cornering and vertical loads based on race conditions.

Results

- Achieved a highly accurate digital twin of the physical rim with dimensional tolerances under 0.5 mm.
- Simulation showed safety factors >1.5 under maximum expected loads, enabling use of the model for dynamic vehicle simulations, assembly clearances, and future optimization.

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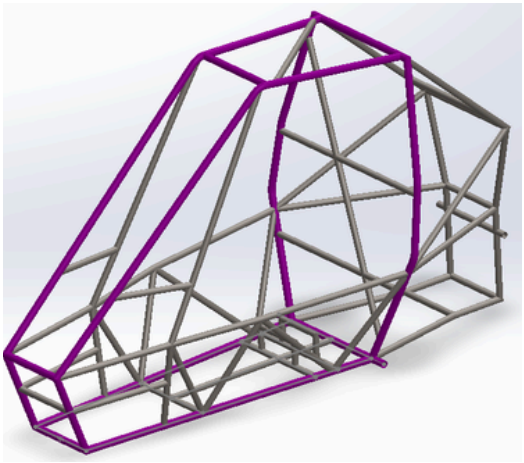
BAJA SAE INDIA 2018



What?

- Designed, analyzed, and prototyped a single-seater off-road BAJA SAE vehicle, focusing on both the chassis and powertrain systems.

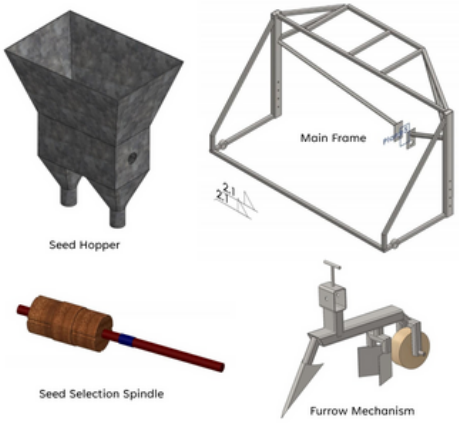
How?

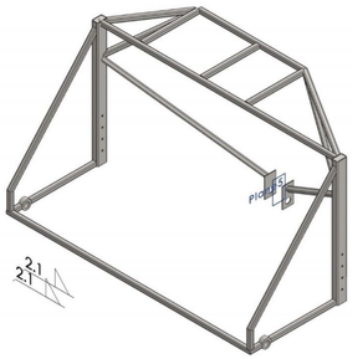
- Led the vehicle prototyping phase using a modular fabrication approach for quicker iteration.
- Conducted powertrain calculations including torque-speed matching for **CVT tuning**, gear ratio selection, and drivetrain layout to optimize for acceleration and rugged terrain.
- Used **SolidWorks** and **ANSYS** for CAD modeling and structural analysis, ensuring durability under extreme conditions.

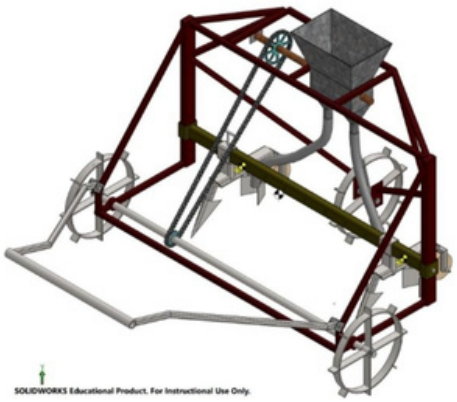
Results

- Successfully built the first-ever BAJA vehicle from my college to qualify for and complete the endurance race.
- Achieved 20% drivetrain efficiency gain over initial prototype via gear optimization and alignment.
- Reduced total weight by 12 kg (approx. 9%) through design simplification and material selection.

DESIGN AND STATIC ANALYSIS OF SEEDING MECHANISM







What?

- Designed and analyzed a low-cost, manually operated seeding mechanism intended to optimize seed spacing and reduce labor for small-scale farms in rural India.

How?

- Developed a rotating-disc seed metering system in **SolidWorks** for uniform seed delivery and minimal clogging, targeting crops like maize and mustard.
- Performed static structural analysis in **Solidworks Simulation** to ensure frame integrity under soil resistance and operator load, validating a safety factor >2.5.

Results

- Completed detailed design and full **CAD** assembly with manufacturing drawings ready for prototyping.
- Project was not fabricated due to university workshop closures and funding delays during COVID-19 lockdowns.

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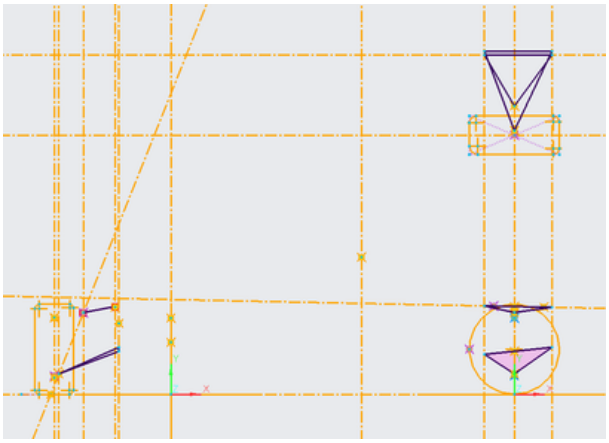
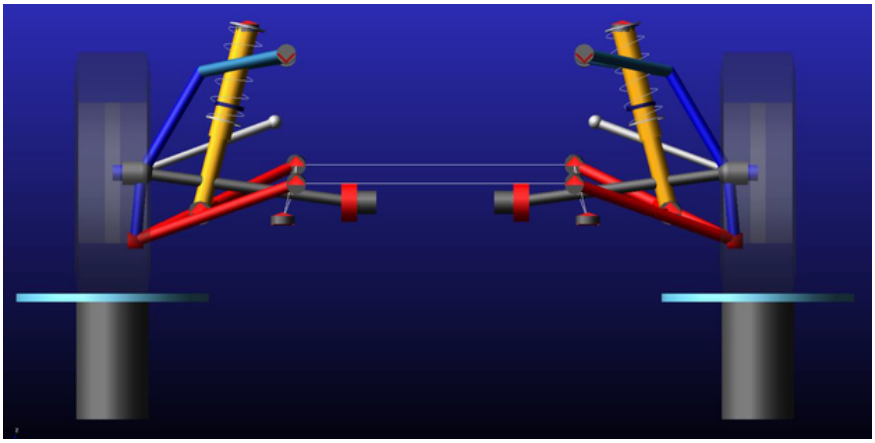
Analysis Projects

DOUBLE WISHBONE SUSPENSION DESIGN





What?

- Designed and dynamically analyzed a double wishbone suspension system for a formula-style race car to optimize handling, cornering stability, and ride performance under competitive conditions.

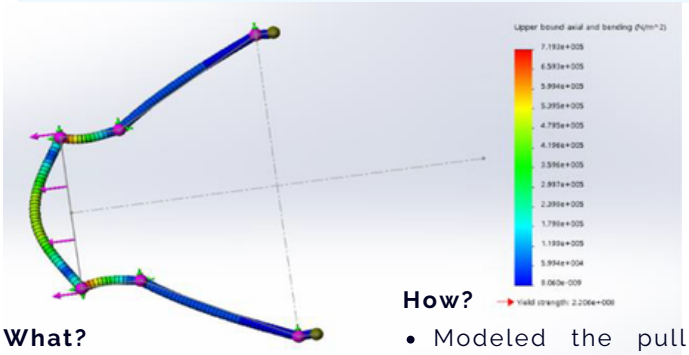
How?

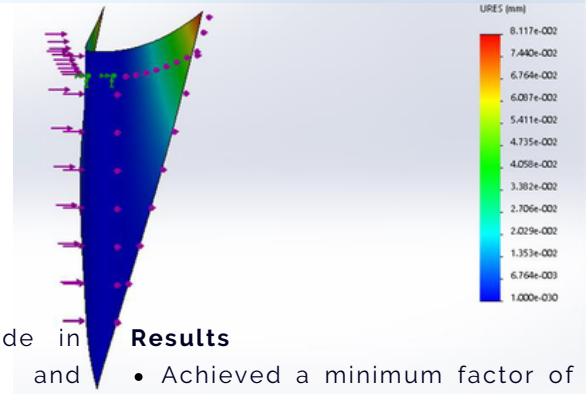
- Modeled the full suspension geometry in Creo, calculating critical dimensions like upper/lower arm lengths, track width, roll center height, and kingpin angle based on packaging and performance constraints.
- Transferred geometry and parameters to ADAMS Car to simulate the system's behavior under various maneuvers including cornering, bump, and braking events.

Results

- Reduced body roll by 12%, improved tire contact consistency by 15%, and minimized bump steer to <1.5 mm over operational range.
- Delivered a high-fidelity digital twin of the suspension system, validated through simulations and ready for physical prototyping.

PULLING HANDLE AND FURROW BLADE - STATIC LOAD ANALYSIS





What?

- Analyzed the pulling handle and furrow blade components of a manual seeding mechanism to ensure structural integrity under field load conditions.

How?

- Modeled the pulling handle and blade in **SolidWorks** based on ergonomic and functional dimensions.
- Applied boundary conditions simulating user-applied pulling force (~300 N) and soil reaction forces on the blade (approx. 150 N distributed).
- Conducted static structural analysis in **SolidWorks Simulation**, evaluating equivalent stress, deformation, and factor of safety.

Results

- Achieved a minimum factor of safety of 2.4 under full load.
- Reduced max stress on the blade tip by 18% through profile refinement.
- Ensured that both components could withstand repeated field use without yielding.

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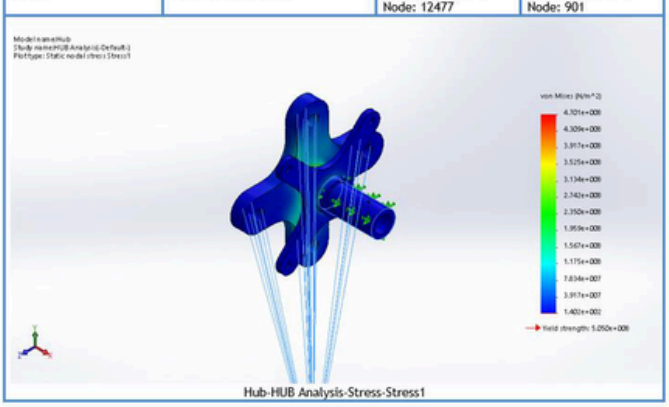
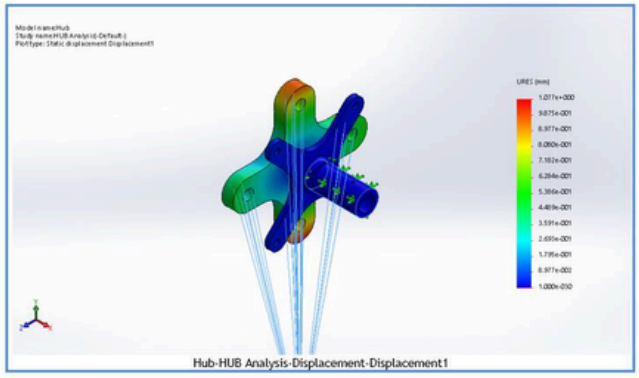
WHEEL HUB AND FRONT UPRIGHT - STATIC LOAD-BEARING ANALYSIS

Name	Type	Min	Max
Stress1	VON: von Mises Stress	1.402e+002N/m^2 Node: 12477	4.701e+008N/m^2 Node: 901



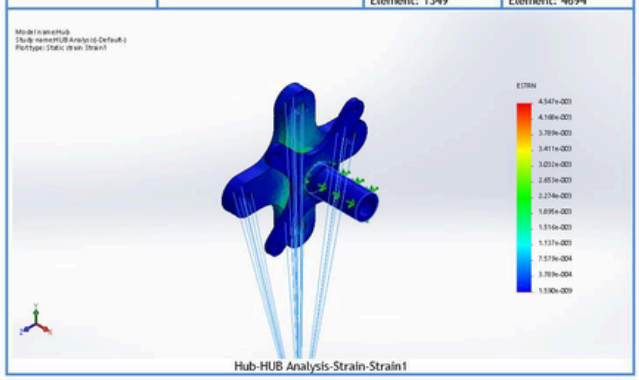
Hub-HUB Analysis-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 1	1.077e+000mm Node: 1333



Hub-HUB Analysis-Displacement-Displacement1

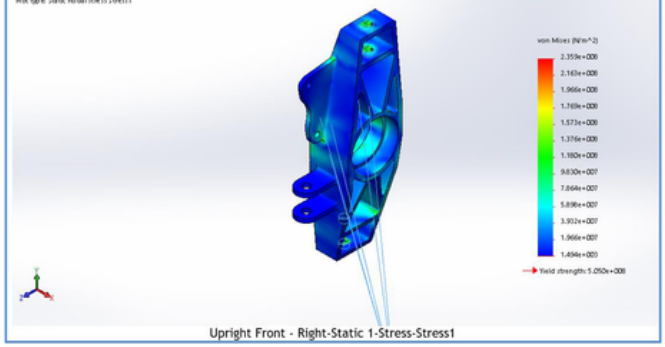
Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	1.590e-009 Element: 1349	4.547e-003 Element: 4694



Hub-HUB Analysis-Strain-Strain1

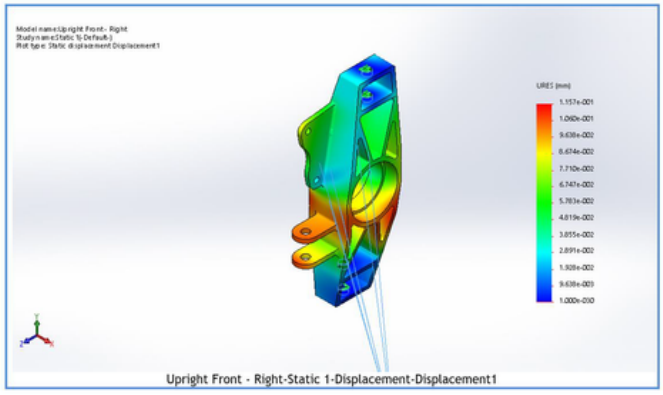
Name	Type	Min	Max
Factor of Safety1	Automatic	1.074e+000	3.603e+006

Name	Type	Min	Max
Stress1	VON: von Mises Stress	1.494e+003N/m^2 Node: 6352	2.359e+008N/m^2 Node: 5164



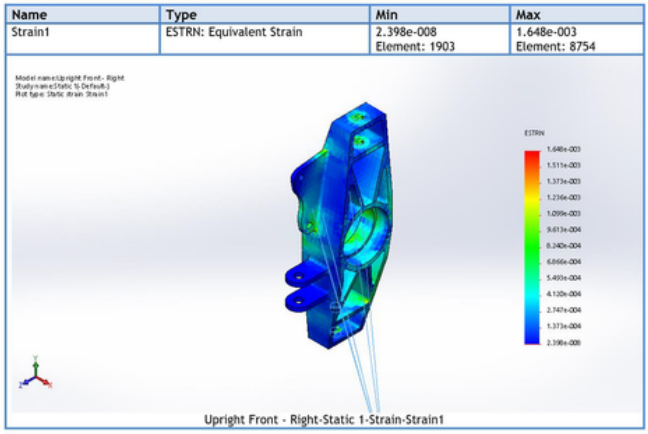
Upright Front - Right-Static 1-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm	1.157e-001mm



Upright Front - Right-Static 1-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	2.398e-008 Element: 1903	1.648e-003 Element: 8754



Upright Front - Right-Static 1-Strain-Strain1

What?

- Conducted static structural analysis of the wheel hub and front upright assemblies for an **FSAE** race car to ensure safety and performance under high-speed maneuvering and braking.

How?

- Designed geometry in Catia V5, considering packaging, suspension geometry, and steering constraints.
- Simulated in SolidWorks Simulation with boundary conditions mimicking peak cornering (~2g lateral), braking (~1.5g), and vertical loads (~1000 N).
- Assessed Von Mises stress, strain, displacement, and calculated the factor of safety.

Results

- Design met performance targets with a minimum factor of safety of 2.1.
- Confirmed no yielding or excessive deflection under simulated loads.
- Final design approved for **CNC** machining and assembly into the suspension system.

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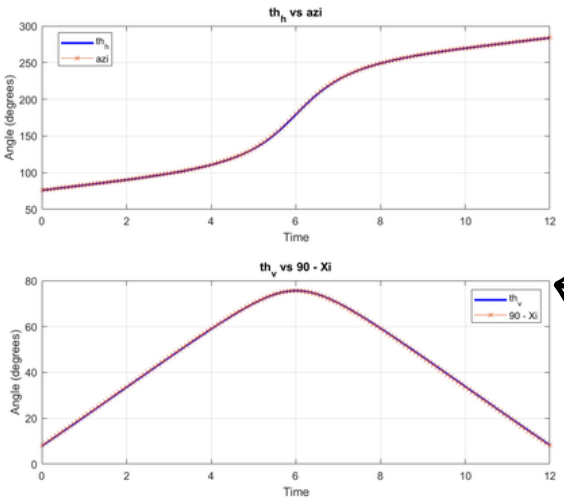
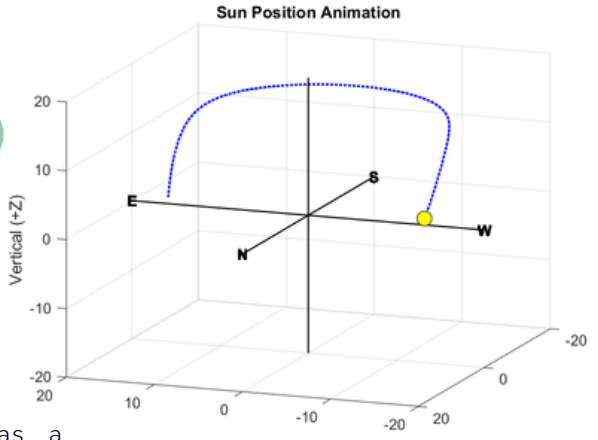
Robotics & Control Projects

OPTIMAL CONTROL OF SOLAR TRACKING PANEL



Comparison of solar panel angle with the sun's position.



What?

- Designed and simulated a solar tracker that maximizes solar incidence using a control-optimized dual-axis mechanism.

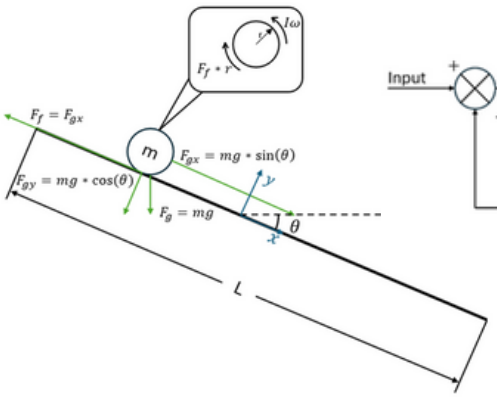
How?

- Formulated the system as a second-order nonlinear plant and designed a feedback controller in MATLAB.
- Applied optimal control theory to compute energy-maximizing trajectories for the panel angle.
- Ran extensive simulations comparing open-loop vs. feedback-controlled tracking.

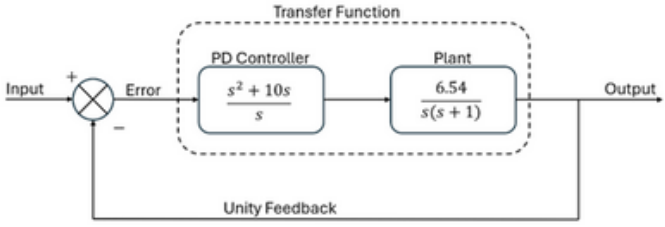
Results

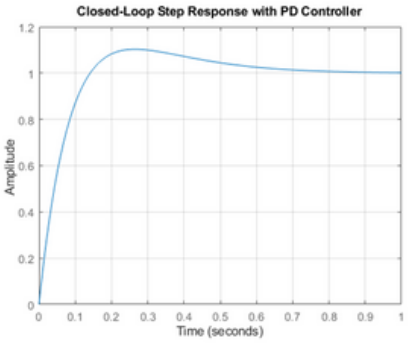
- Increased simulated solar energy capture by 32% compared to fixed-angle panels.
- Controller successfully adapted to disturbances such as actuator delay or cloud occlusion.

OPTIMAL CONTROL OF BALL ON PLATE SYSTEM



2-D Free-Body Diagram of Simulated System.





What?

- Simulated a closed-loop control system to balance a ball on a flat plate.

How?

- Modeled the system as a multi-variable nonlinear control problem.
- Implemented PD control for each axis using **MATLAB**, tuned gains for fast response and minimal overshoot.
- Simulated ball dynamics under initial displacement and noise.

Results

- Stabilized ball from 10 cm offset in under 1 seconds.
- Maintained position within ±1 cm under random external disturbances.

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FABRICATION OF ARDUINO-BASED SURVEILLANCE DRONE

What?

- Designed and built a surveillance drone prototype using Arduino as the primary flight controller, incorporating onboard sensors and a wireless camera for aerial monitoring.

How?

- Used Arduino with MPU6050 sensor for flight control and stabilization. Built the initial aluminum frame and programmed flight algorithms in Arduino IDE.
- Added a wireless camera and tested transmission. Later compared with a carbon fiber frame and KK2.1.5 flight controller for performance evaluation.

Results

- Achieved stable flight and effective video transmission. The carbon fiber frame improved durability and flight time, while the KK2.1.5 controller offered better control compared to the Arduino prototype.