Danish Shakil

danishshakil3264@gmail.com

Portfolio

Content:

1. Heavy category Battle Bot – CAD Design (Project Lead)
2. Line Following Robot – Chassis Design
3. Autonomous Car Parking System
4. Footstep Power Generator – Mechanical System
5. GIKI Clock Tower – SolidWorks Design
6. Ball Balancing Robot (In-Progress)

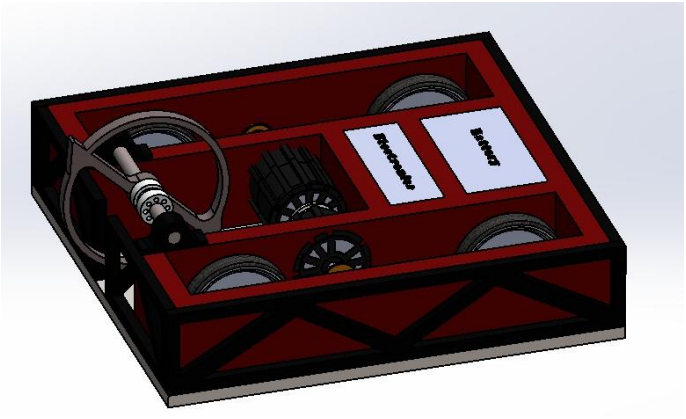
1. Heavy category Battle Bot – CAD Design (Project Lead)

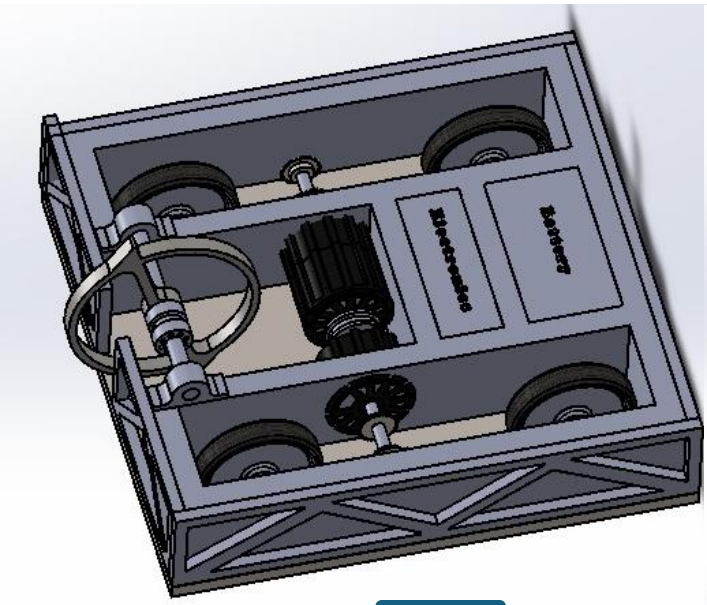
Description:

As the head of the battle Bot project, I oversaw a group of eight people and was responsible for creating the whole SolidWorks battle Bot model. The goal of the project was to maximize performance by optimizing the armament system, drivetrain, and mechanical construction. All necessary design and simulation work has been finished, even though the project is still in the design stage and has not yet been manufactured.

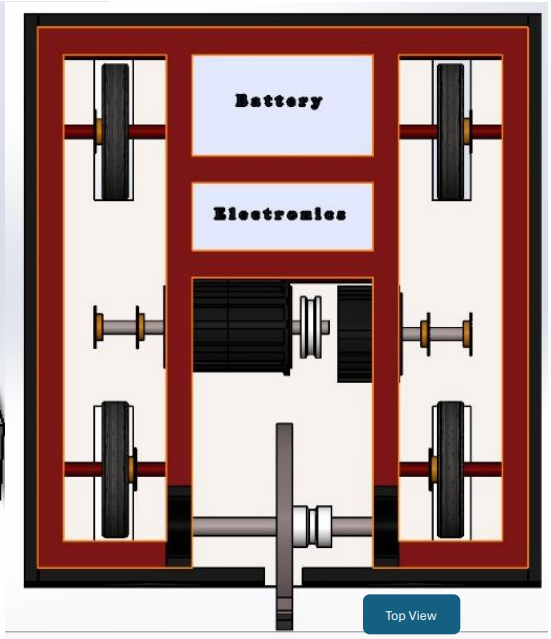
Steps:

1. Research & Conceptualization – Studied battle Bot designs and defined specifications.
2. Chassis Design – Created a truss structured chassis for weight optimization.
3. Weapon & Drivetrain Integration – Developed a 4.3 kg vertical spinner weapon and a custom drivetrain system.
4. CAD Modeling & Analysis – Designed and optimized components in SolidWorks.
5. Simulation & Testing – Conducted MOI calculations, impact force analysis, and weight distribution optimization.

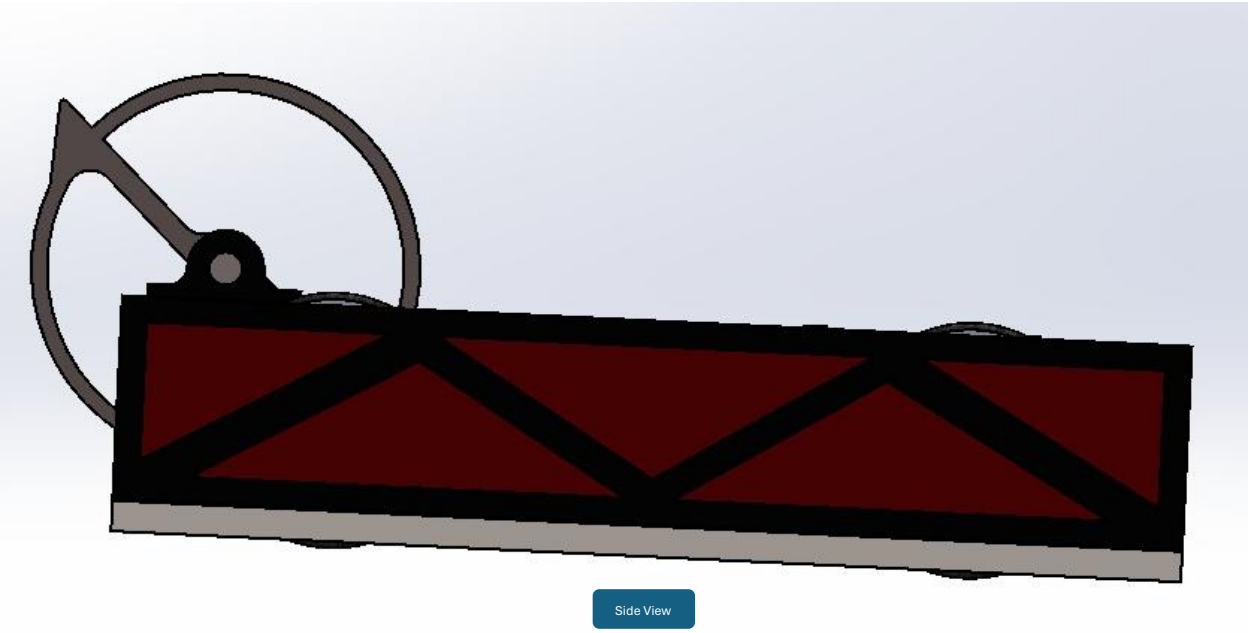




Isometric View



Top View



Side View

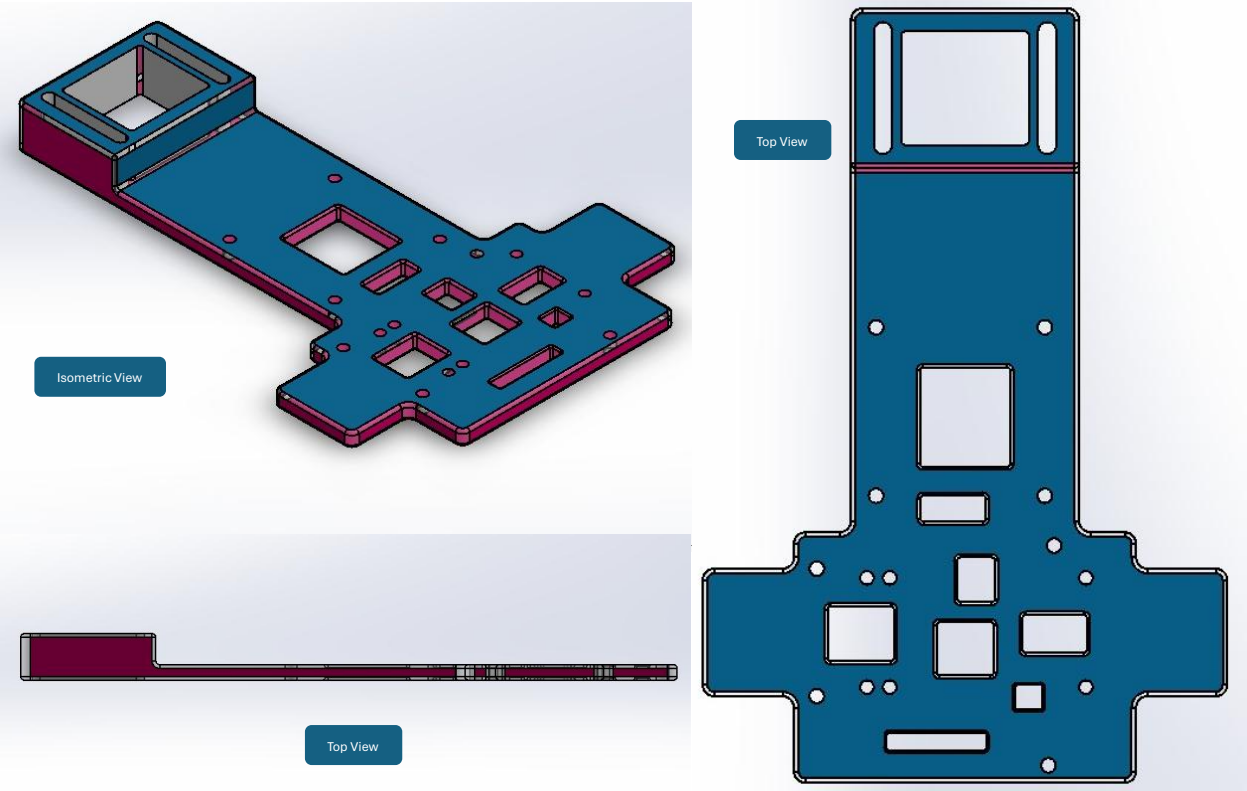
2. Line Following Robot – Chassis Design

Description:

Designed a custom chassis for an autonomous line following robot, focusing on lightweight structure, sensor integration, and manufacturability. While working as a team member on this project, I realized that being overweight and poor chassis design were the main causes of performance issues. To address this, I independently developed a manual chassis design in SolidWorks, creating a lightweight, well-structured frame that optimized component placement and overall functionality.

Steps:

1. Problem Identification – Analyzed limitations of existing LFR chassis.
2. Chassis Design – Created a lightweight and durable frame.
3. Optimization – Enhanced stability and motor placement.
4. CAD Modeling & Testing – Developed and tested in SolidWorks.
5. Prototyping & Validation – Fabricated and validated performance.



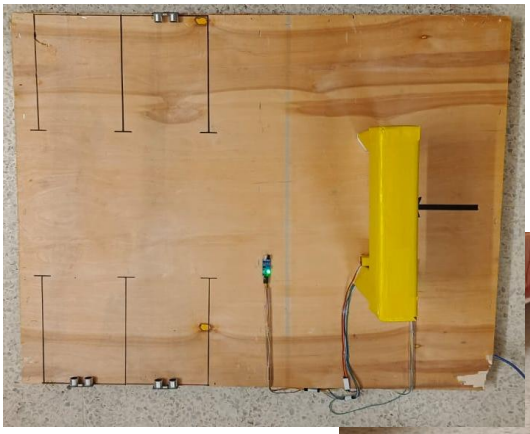
3. Autonomous Car Parking System

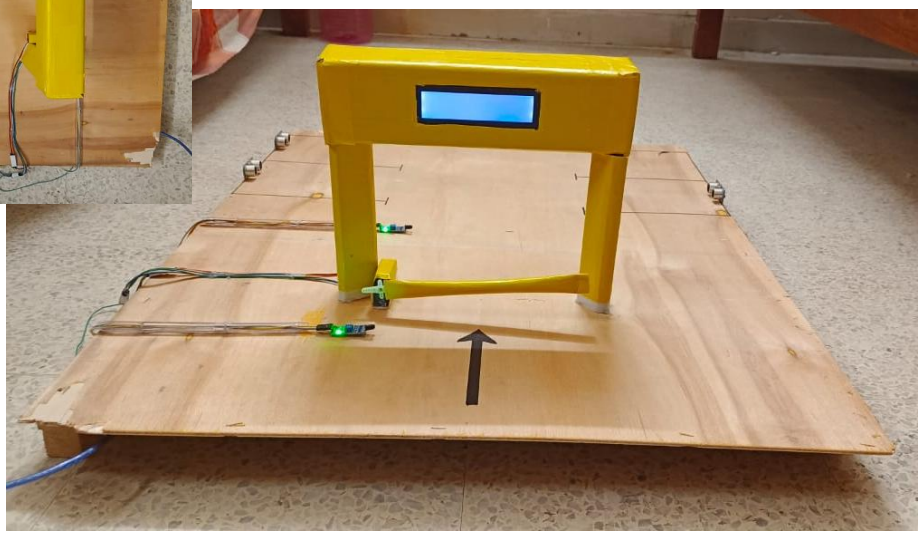
Description:

Developed an automated parking system using sensor-based obstacle detection and Arduino control to enhance autonomous vehicle parking capabilities. This was my semester project, where I collaborated with my team members to develop our first project using Arduino as a microcontroller along with various electronic components.

Steps:

1. Feasibility Study – Researched existing autonomous parking systems.
2. Mechanical Design – Designed chassis and steering systems.
3. Sensor & Control Integration – Implemented ultrasonic sensors.
4. Programming – Developed control logic for parking automation.
5. Testing & Refinement – Simulated and validated the final system.





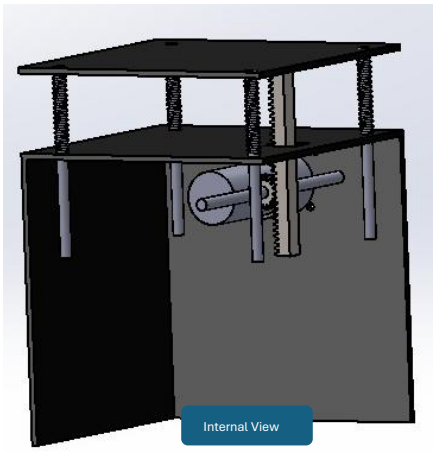
4. Footstep Power Generator – Mechanical System

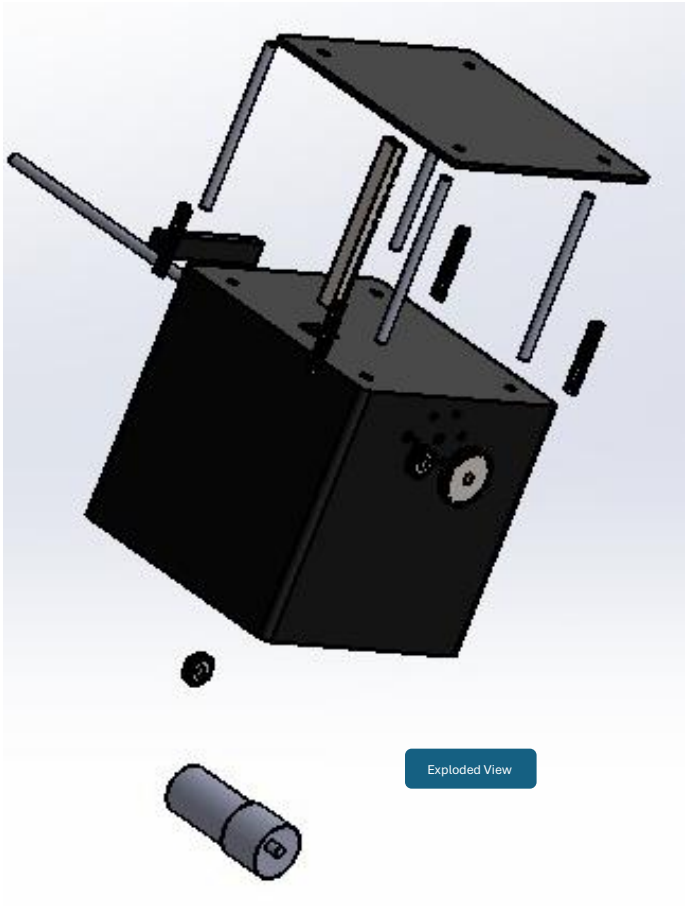
Description:

Designed a mechanical system to harness footstep energy using a rack & pinion mechanism with 1:10 gear reduction for renewable power generation. This was my Manufacturing Process course project, where I was assigned to create a full working model of the footstep power generator using gears, sheets, and other mechanical components in SolidWorks.

Steps:

1. Concept Development – Researched energy harvesting mechanisms.
2. Rack & Pinion System – Engineered motion conversion system.
3. Gear Reduction Design – Optimized power output efficiency.
4. CAD Modeling & Simulation – Designed and tested in SolidWorks.
5. Prototype Evaluation – Conducted force analysis and validation





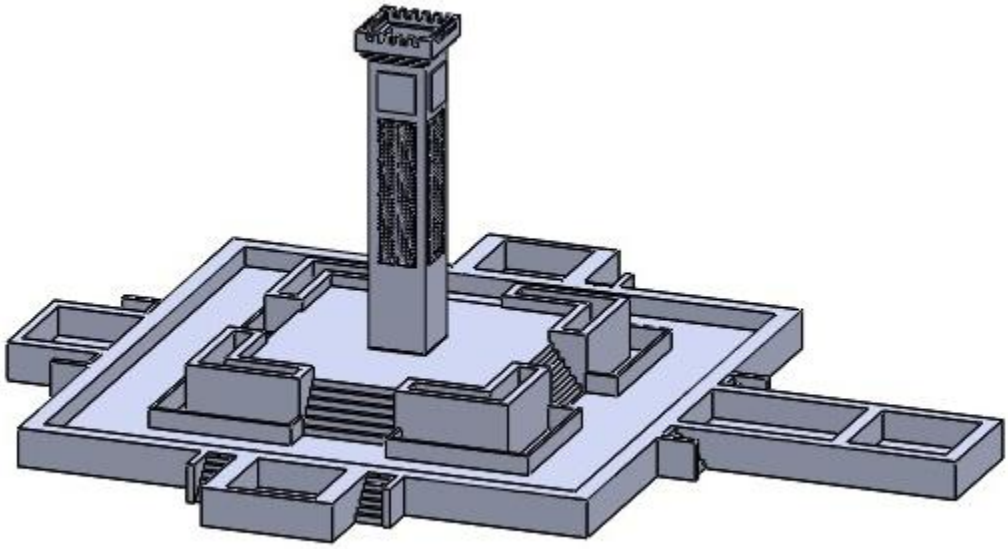
5. GIKI Clock Tower – SolidWorks Design

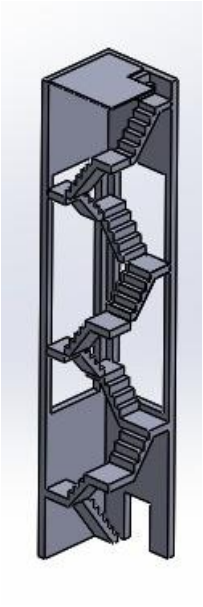
Description:

After completing my Engineering Graphics course, I decided to learn and master SolidWorks by taking on the GIKI Clock Tower Design as an individual project. I independently worked on this project to explore and apply advanced CAD modeling techniques. Throughout this project, I gained hands on experience with complex features in SolidWorks, enhancing my proficiency in 3D modeling and design implementation.

Steps:

1. Data Collection & Sketching – Measured and drafted architectural dimensions.
2. 3D Modeling & Detailing – Created detailed structures in SolidWorks.
3. Surface & Assembly Design – Used multipart modeling techniques.
4. Rendering & Visualization – Applied materials and realistic textures.
5. Analysis & Learning – Documented design improvements and key learnings.





7. Ball Balancing Robot (IN-Progress)

Description:

Ball Balancing Robot was one of my most interesting projects. Along with three colleagues, I decided to work on a robotic project to gain vital engineering skills. We developed an innovative solution using a webcam for real-time ball tracking instead of a traditional sensor plate. My role in this project was to design the SolidWorks model and working prototype, as well as conduct simulations in MATLAB Simulink to validate the system's performance.

Steps:

1. Mathematical Modeling – Implemented inverse kinematics equations.
2. Webcam Based Tracking – Replaced traditional sensors with image processing.
3. Control Algorithm Development – Designed logic in MATLAB.
4. Mechanical System Design – Engineered the servocontrolled balancing table.
5. Simulation & Testing – Validated stability and precision.