

Project Overview

Wiper Mechanism Project Report

Design Lab

ME205

**Course
Coordinators:**

Dr. Prabhat K Agnihotri, Dr. Satwinder Jit Singh, Dr. Manish Agrawal

Topic:

Wiper Mechanism

Members:

Group-Mo/B

Aditya Yadav 2022MEB1291

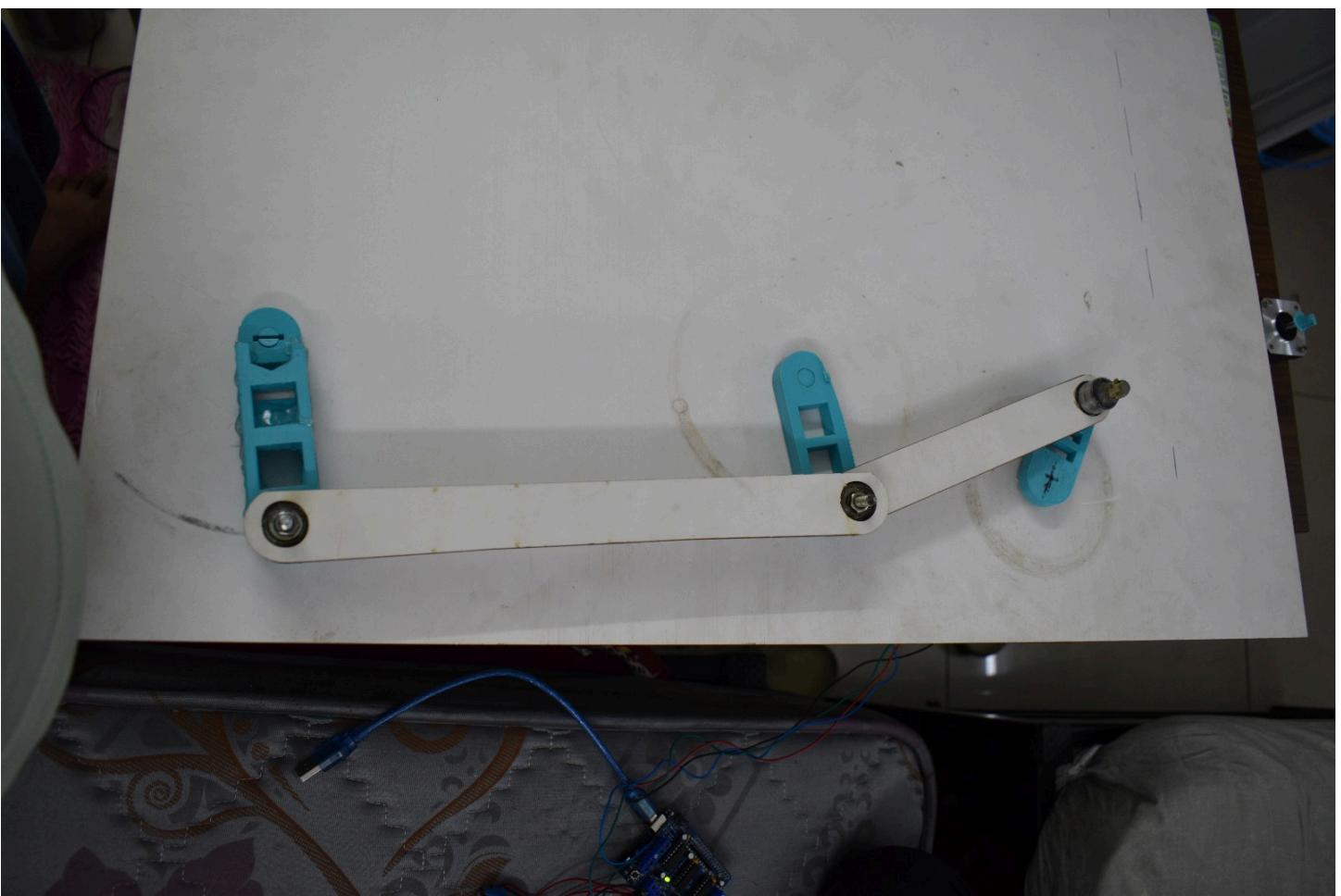
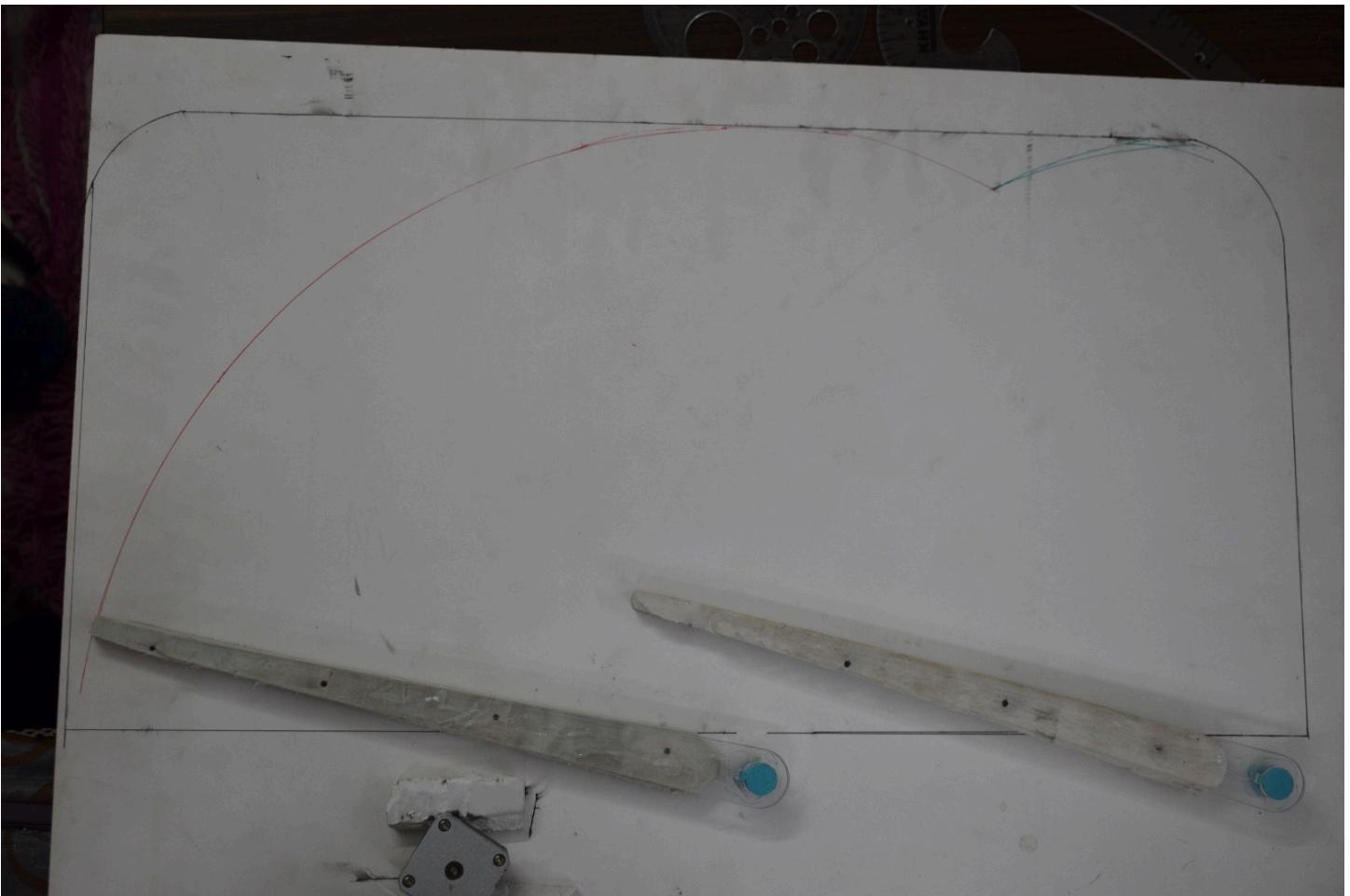
Akshat Srivastava 2022MEB1294

Ainala Kannaiah Guptha 2022MEB1292

Aditya Kumar 2022MEB1290

Timeline:

Mar 11, 2024 to Apr 26, 2024



Abstract

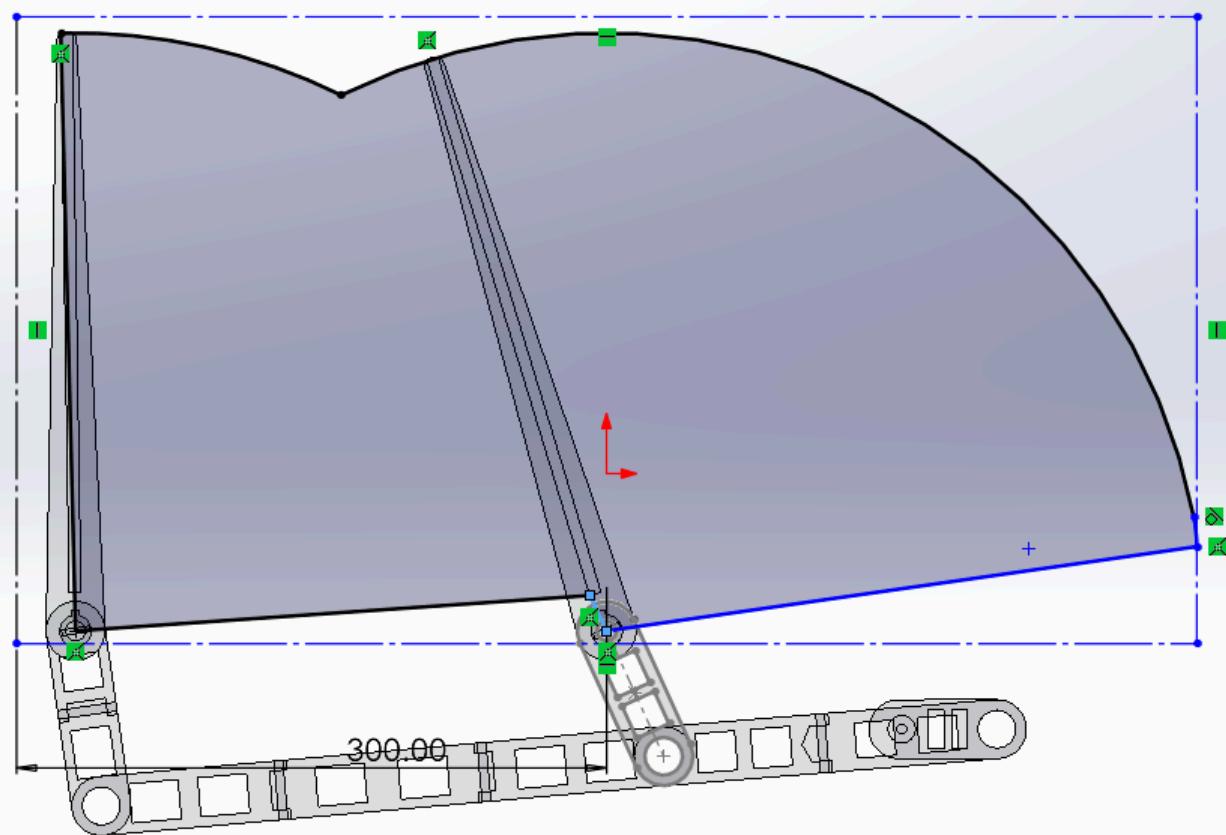
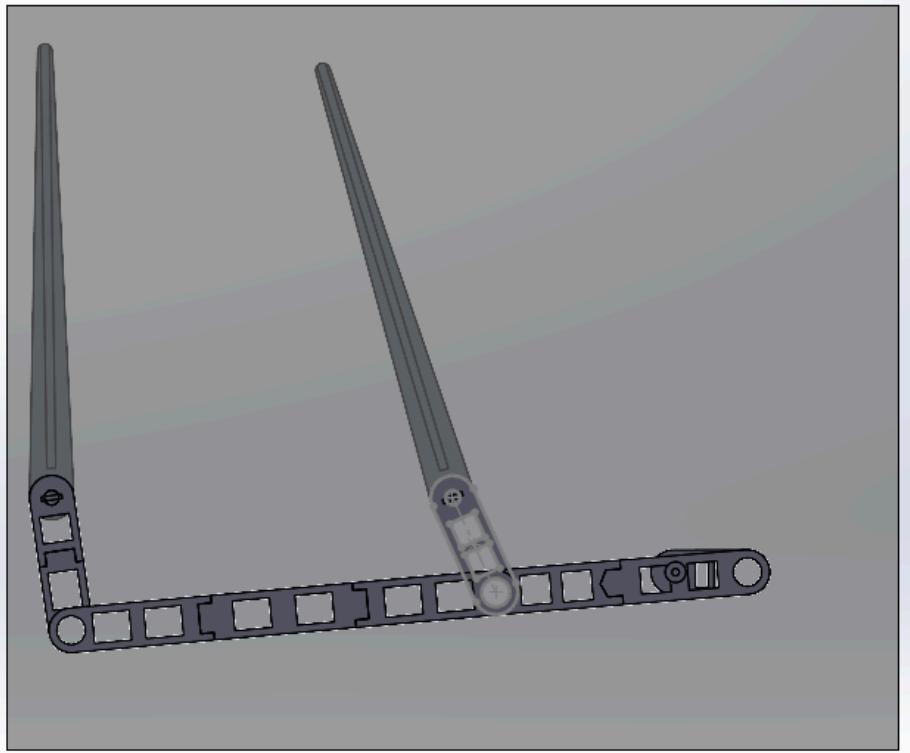
The windshield wiper project aimed to design and develop an efficient windshield wiper system for automobiles. Through simulations on SolidWorks, a mechanism was devised and manufactured using a WPC (Wood-Plastic Composite) board frame. The project utilized laser cutting and 3D printing techniques for the wiper arm and blade. A stepper motor controlled by an Arduino microcontroller was employed to drive the wiper mechanism. The project achieved an efficiency of 88%, ensuring effective and reliable performance in various weather conditions.

Introduction

Windshield wipers are essential components of vehicles, ensuring clear visibility during rain or snow. This project focused on improving the efficiency and reliability of windshield wipers by designing an innovative wiper mechanism using a 4-bar chain mechanism with a rocker-rocker mechanism. The project involved three main phases: simulation, design, and fabrication, and implementation, with a specific focus on the unique mechanism design.

Simulation

Simulation was conducted using SolidWorks to model the wiper mechanism and assess its performance under different conditions. The 4-bar chain mechanisms were analyzed to optimize the design for maximum efficiency and smooth motion.



Design

Based on the simulation results, a final design was developed. The wiper mechanism was constructed using a WPC board frame and 3D printed components for the wiper arm and blade. The unique 4-bar chain mechanism design ensured smooth and uniform motion of the wiper blade across the windshield.

- LENGTH OF WIPERS: 32mm
- LENGTH OF CRANK: 50mm
- LENGTH OF SHORT COUPLER: 170mm
- LENGTH OF LONG COUPLER: 270mm
- LENGTH OF ROCKER 1: 75mm
- LENGTH OF ROCKER 2: 90mm

Angular speed	TIME for 1 stroke
60 RPM	1s

Fabrication

The fabrication process involved laser cutting the WPC board for the frame and 3D printing the wiper arm and blade. The use of high-quality materials and precise manufacturing techniques ensured durability and performance of the mechanism.

Implementation/Problems Faced

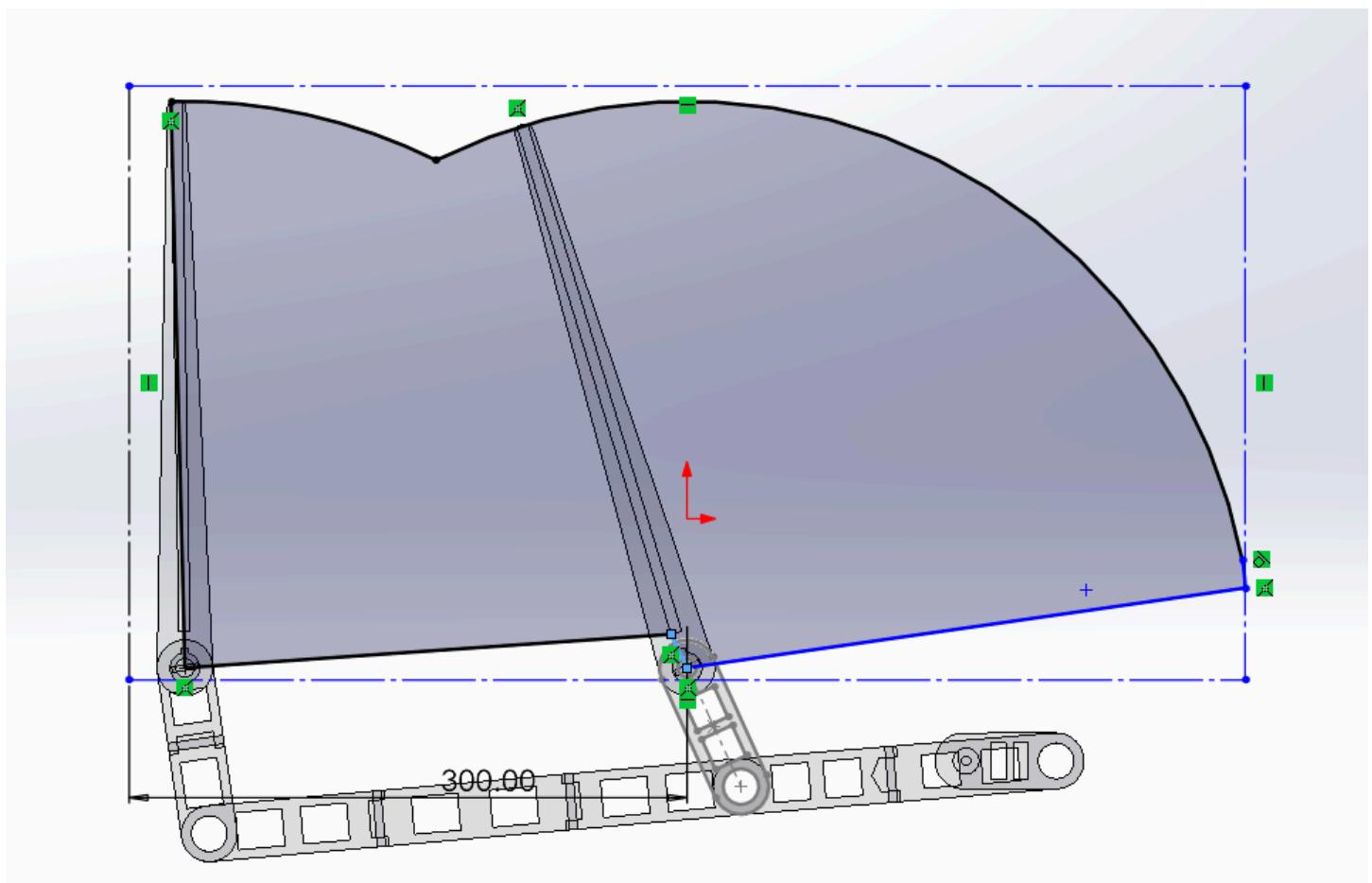
The wiper mechanism was integrated into a model vehicle using a stepper motor controlled by an Arduino microcontroller. The Arduino was programmed to adjust the wiper speed and angle based on the intensity of the rain or snowfall, demonstrating the versatility and adaptability of the mechanism. We faced problems with 3d print and lazer cutting. In 3D print the joints were too tight to fit and they were very week due to lack of density. In lazer cutting the material was weak thus it was extra cut due to high temp lazer cutting thus making difficult to fit bearings.

Results

The windshield wiper mechanism achieved an efficiency of 88%, as measured by its ability to effectively clear water or snow from the windshield. The use of the 4-bar chain mechanism demonstrated the potential for innovative design solutions in engineering projects.



Regular Wiper: efficiency 75%



our wiper: efficiency 87.72%

Contributions

SolidWorks Modelling: Akshat Srivastava, Aditya Yadav

Mechanism Optimization: Akshat Srivastava

Fabrication: Ainala Kannaiah Guptha, Aditya Kumar

Logistics: Ainala Kannaiah Guptha

Video Editing: Aditya Kumar

Report: Aditya Yadav, Akshat Srivastava

Conclusion

The windshield wiper mechanism project successfully developed an efficient and reliable wiper system for automobiles, focusing on the innovative use of a 4-bar crank-rocker mechanism modified with rocker rocker mechanism