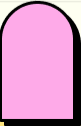13th September 2024

Revolutionizing Robotics: The RR Manipulator Journey

Integrating Advanced Control and Planning for Enhanced Performance

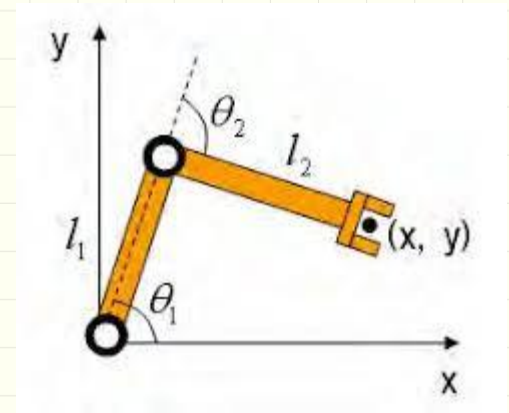# Table of Contents

Unveiling the Research Gap

1. Limited exploration of non-conventional methods for inverse kinematics in RR manipulators.

2. Need for integrated motion control, efficient path planning, and self-collision avoidance in a single system

2018: A Pioneering Year in Robotics

1. Smith et al. explored inverse kinematics solutions specifically for redundant manipulators.

2. This foundational study opened avenues for addressing complex robotic movements.

3. Their findings laid the groundwork for further innovations in subsequent years.

4. Understanding these solutions is key for developing advanced control mechanisms.

5. 2018 marked the beginning of a new era in robotic technology.

2019: Advancements in Path Planning

1. The study by Johnson & Lee introduced RRT* algorithms focused on robotic path planning.

2. This algorithm enhances the efficiency of robot navigation in complex environments.

3. Their work underscores the importance of effective path planning for robotic applications.

4. RRT* algorithms can be a game-changer when integrated with LL manipulators.

5. 2019 was a transformative year for path planning methodologies.

2020: Crafting Motion Control Strategies

1. Zhang et al. presented adaptive motion control strategies for robotic manipulators in 2020.

2. These strategies emphasize precision, a crucial aspect for effective robotic function.

3. Understanding motion control is vital for implementing successful robotic operations.

4. Their findings support the development of better-integrated control systems.

5. 2020 saw significant strides in robotic motion control.

2021: Enhancing Collision Detection

1. Brown et al. introduced Bounding Volume Hierarchies (BVH) for efficient collision detection in robotics.

2. BVH facilitates real-time self-collision checking, critical for safe robotic movements.

3. This innovation is especially important when working in cluttered environments.

4. Integrating BVH can prevent accidents and improve operational safety.

5. 2021 was pivotal for collision detection enhancements in robotics.

2022: Bridging Control and Planning

1. Garcia & Wong focused on the integration of advanced control and planning in robotic systems.

2. Their research emphasizes the importance of cohesive system functionality.

3. Integrating control with planning creates a seamless operational approach.

4. This integration is essential for the future of robotic applications.

5. 2022 highlighted the need for a unified approach in robotics.

Essential Components for Project Success

SN	Item Description	Quantity	Unit Price (INR)	Total Price (INR)
1	Raspberry Pi 5 4GB	1	5,799.00	5799
2	27W USB-C Charger	1	1,094.00	1094
3	64GB SD Card	1	599.00	599
4	M995 Servo	3	298.54	895.62
5	MG90S Servo	2	120.36	240.72
6	GT2 Belt - 610mm	4	114.00	456
7	GT2 Belt - 400mm	4	86.00	344
			Total	9428.34

Process Flow: A Strategic Overview
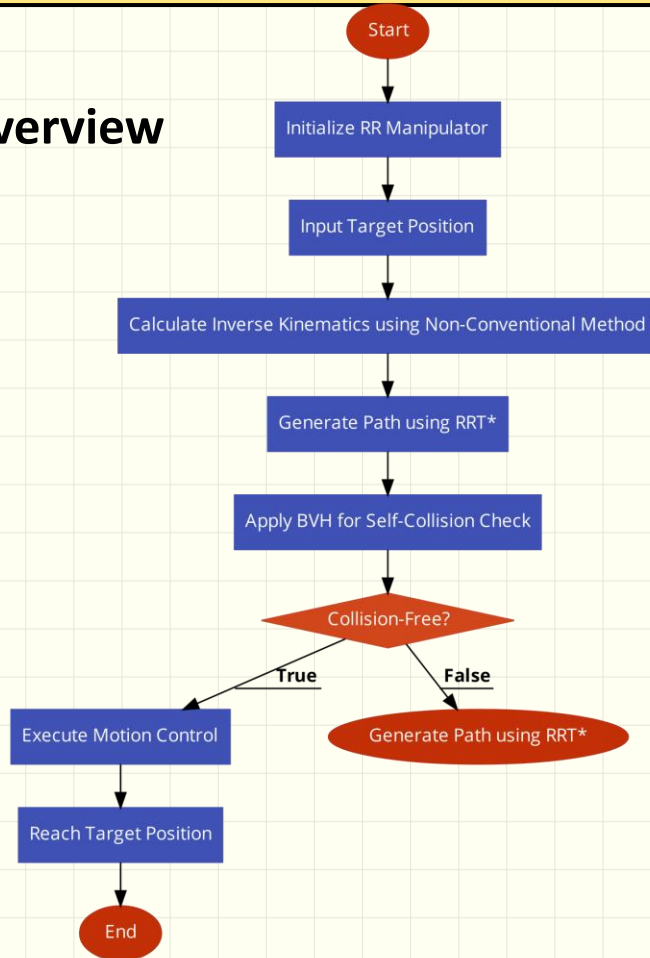
Bot CAD Model

Spur Gear

End Effector (Rack Pinion)

Bot Base

Suction Cup

Planetary Gear
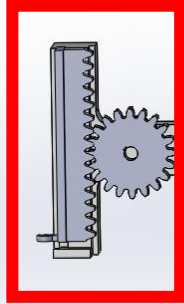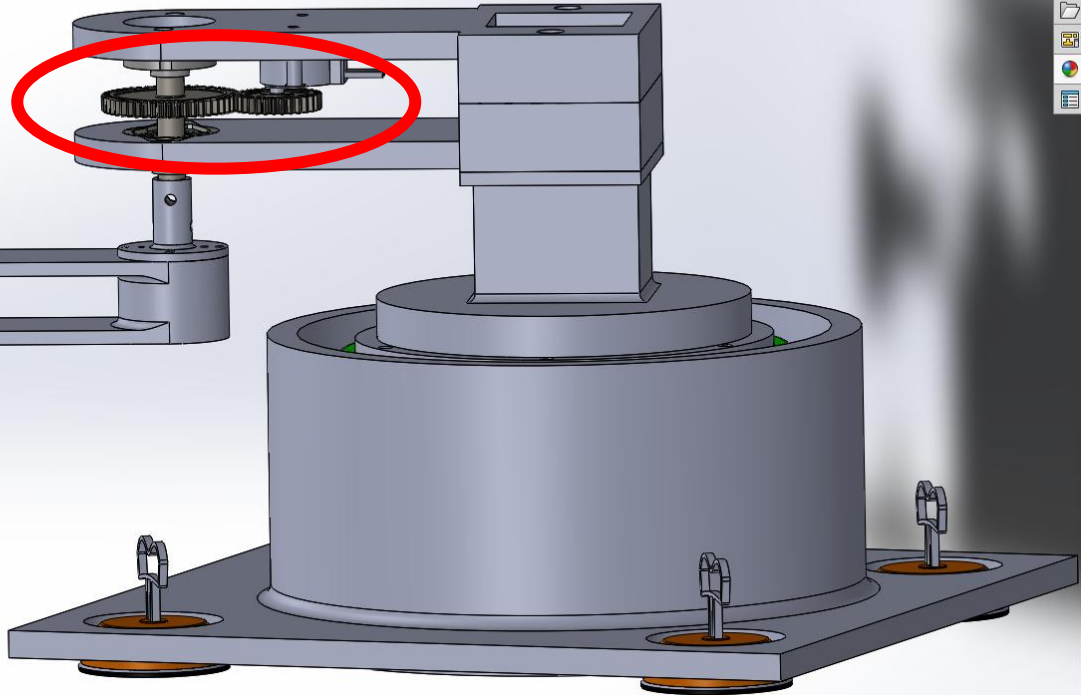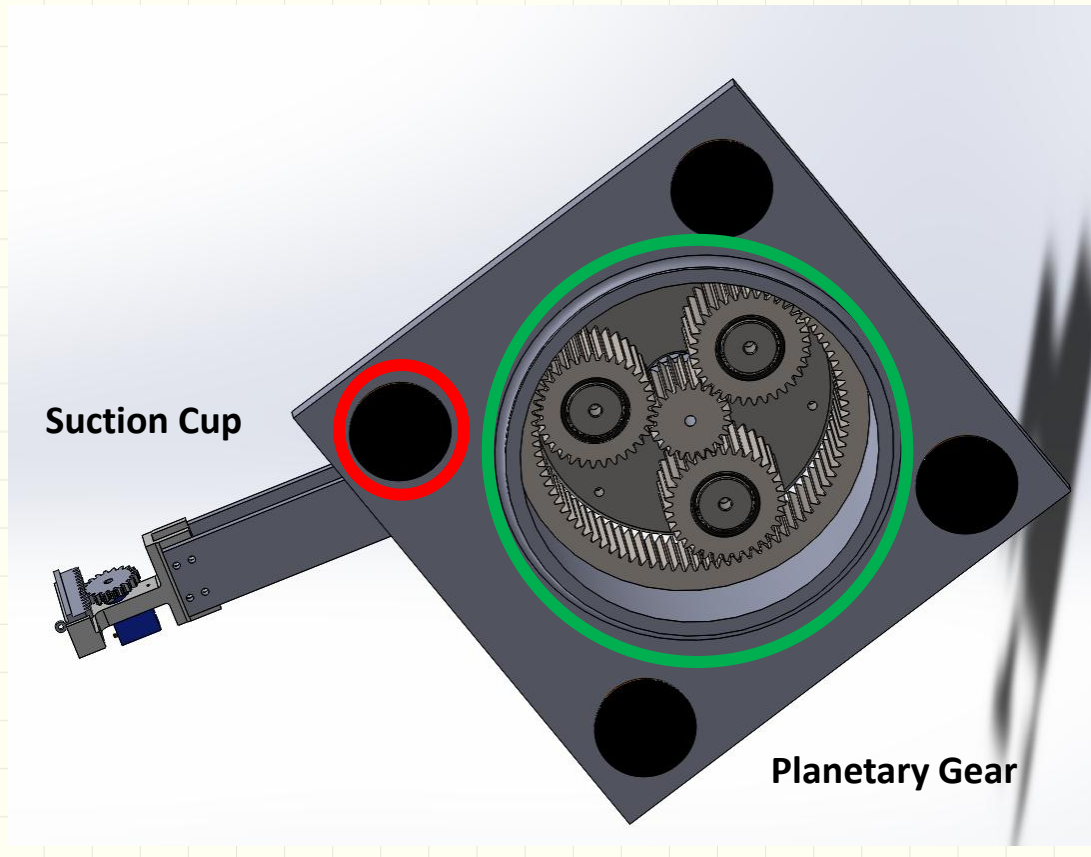
Thank You for Engaging with Our Presentation!

We appreciate your time and attention in exploring the RR manipulator journey.

THANK YOU