# CHAPTER 1
# INTRODUCTION

## 1.1 Motivation

The main motivation of this project is to help people with limited mobility and elderly people. These people who are immobilized have the zeal to be independent. So, our project helps them to be independent, which boosts their self-confidence and makes them feel better.

## 1.2 Scope

- Design and Development:

This includes conceptualization, prototyping, and iteration to create a functional and user-friendly robot.

- Dual Actuators and Wheels:

The actuators enable precise vertical and horizontal movements, while the wheels ensure smooth navigation

- Live Streaming Camera:

The camera facilitates real-time video streaming, enabling users to remotely monitor the robot's surroundings and interact with it effectively.

- Advanced Control Modules:

These modules enable seamless communication between components, data processing, and user interaction.

- Potential Impact:

The project also addresses the potential impact of the Mechanical Helper Hand on the lives of elderly and specially-abled individuals.

- Future Research and Development:

The project's scope extends to future research and development avenues. This includes exploring intelligent path planning, advanced human-robot interaction, energy optimization, and collaboration with healthcare professionals to further enhance the robot's capabilities.

## 1.3 Objectives

The main objective that drives our project is to provide help required for those who have limited mobility. Our project helps in mobilizing small objects. A mechanical helper hand is a robotic device that is designed to assist individuals who have limited mobility or strength in their hands and arms. It is typically composed of a series of joints and mechanisms that allow it to move and grasp objects.Some of our main objectives are:

- Providing help in mobilizing objects and required thing for bed-ridden and people with limited mobility and elderly people.
- Access to find and see objects in different rooms.
- Providing the project cost-effectively.

## 1.4 Need for Product Realization

There are individuals who've limited mobility or power of their fingers and palms, that could substantially impact their capacity to carry out day by day responsibilities independently.

A mechanical helper hand is a robot tool that is designed to assist individuals who have restricted mobility or electricity in their hands and palms. It is normally composed of a chain of joints and mechanisms that allow it to transport and draw close objects with an excessive diploma of precision and dexterity.

## 1.5 Product Realization Process

- Product developed needs to be in such a way that it should be useful and solves the problem of the people.
- 17 sustainable development goals by UN were the best source to identify the major problems faced by the people across the world.
- In which one of the basic and very important goal was chosen by our team i.e., GOOD HEALTH AND WELL BEING.
- Further study on problems inside it was to help the people with limited mobility and to make them feel better.

# CHAPTER 2

# PRODUCT REALIZATION PLANNING

## 2.1 Flow Chart

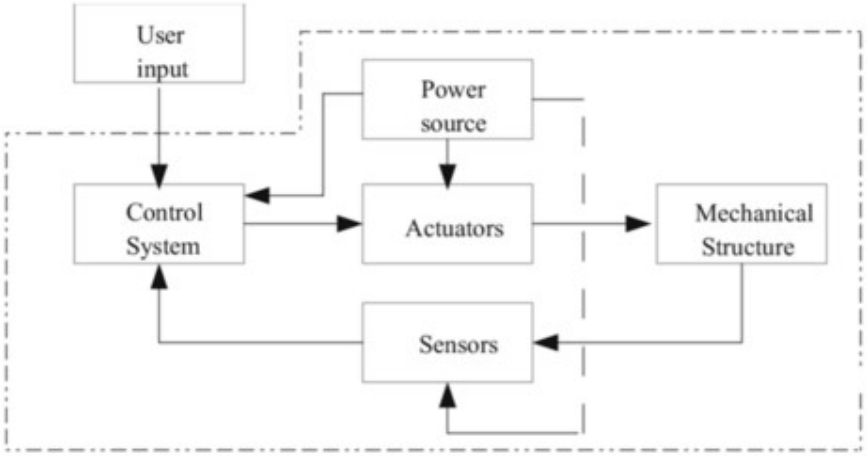



Fig 1. Flowchart

## 2.2 Steps involved for Product Realization

It involves several steps:

### 1.Conceptualization and Research:

Define the target audience i.e., elderly and specially abled people and understand their specific needs and challenges.

### 2.Preliminary Design

Create rough sketches and brainstorm different design concepts for the mechanical helper hand, considering user ergonomics, safety, and ease of use.

### 3.Detailed Engineering Design

- Select actuators capable of providing the required up, down, front, and back movements with sufficient force and precision.
- Design the mechanical structure that supports the actuators and ensures stability during operation.

**4.Prototyping**

Create a 3D CAD model of the mechanical helper hand using computer-aided design software.

**5.Testing and Refinement**

Conduct thorough testing of the prototype to assess its functionality, safety, and user-friendliness.

**6.Manufacturing and Assembly**

Finalize the design based on the testing phase and prepare the manufacturing drawings and specifications.

**7.Quality Assurance**

Implement rigorous quality control processes to ensure the mechanical helper hand meets safety standards and performance requirements.

**8.Documentation and User Manuals**

Prepare detailed documentation, including user manuals and assembly instructions, to guide users on proper operation, maintenance, and troubleshooting.

**9.Packaging and Marketing**

Design attractive and informative packaging for the mechanical helper hand. Develop a marketing strategy to promote the product through various channels, including online platforms, trade shows, and partnerships with relevant organizations.

**10.Distribution and Support**

Establish distribution channels to reach the target market effectively.

## 2.3 Gantt Chart

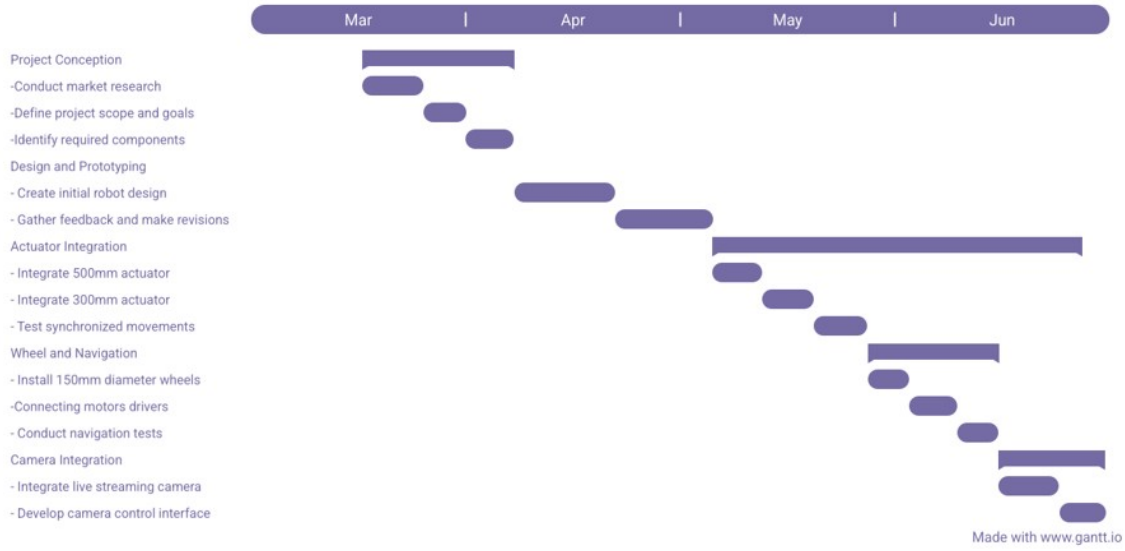



Fig 2. Gantt chart for first 4 months

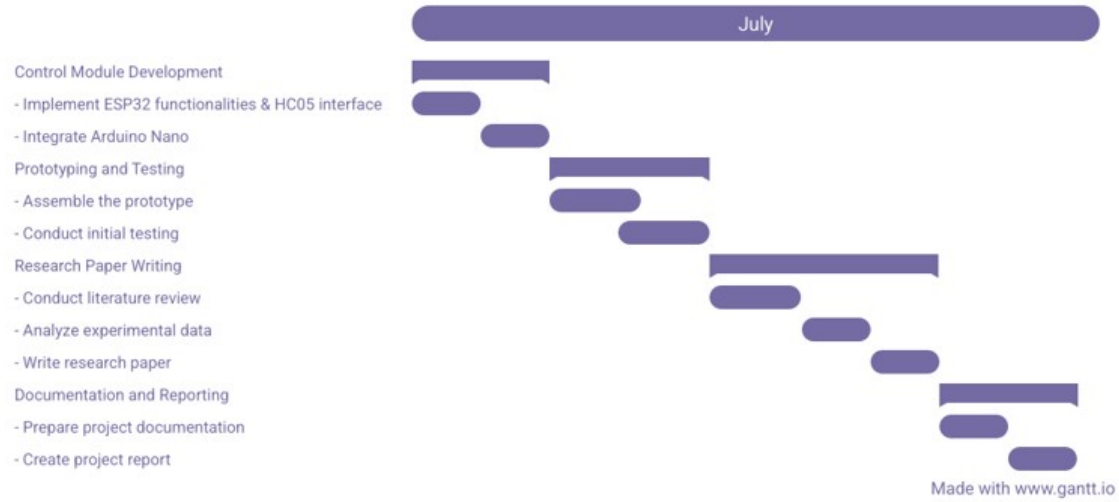



Fig 3. Gantt chart for last month

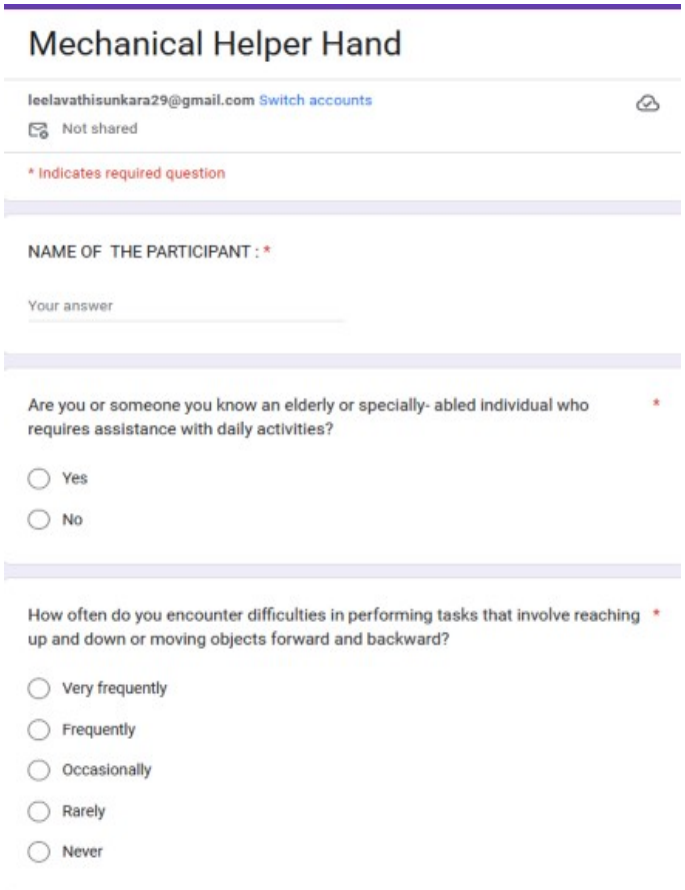
# CHAPTER 3

# Community partner-Related Processes

## 3.1 Details of Community partner

Name of Person: Karthikeyan
Age: 20
Occupation: Student (specially abled)
Location: Devarakonda
Mobile Number: 6303032822

## 3.2 A field survey form



Mechanical Helper Hand

leelavathisunkara29@gmail.com Switch accounts

Not shared

* Indicates required question

NAME OF THE PARTICIPANT : *

Your answer

Are you or someone you know an elderly or specially- abled individual who requires assistance with daily activities? *

- Yes
- No

How often do you encounter difficulties in performing tasks that involve reaching up and down or moving objects forward and backward? *

- Very frequently
- Frequently
- Occasionally
- Rarely
- Never

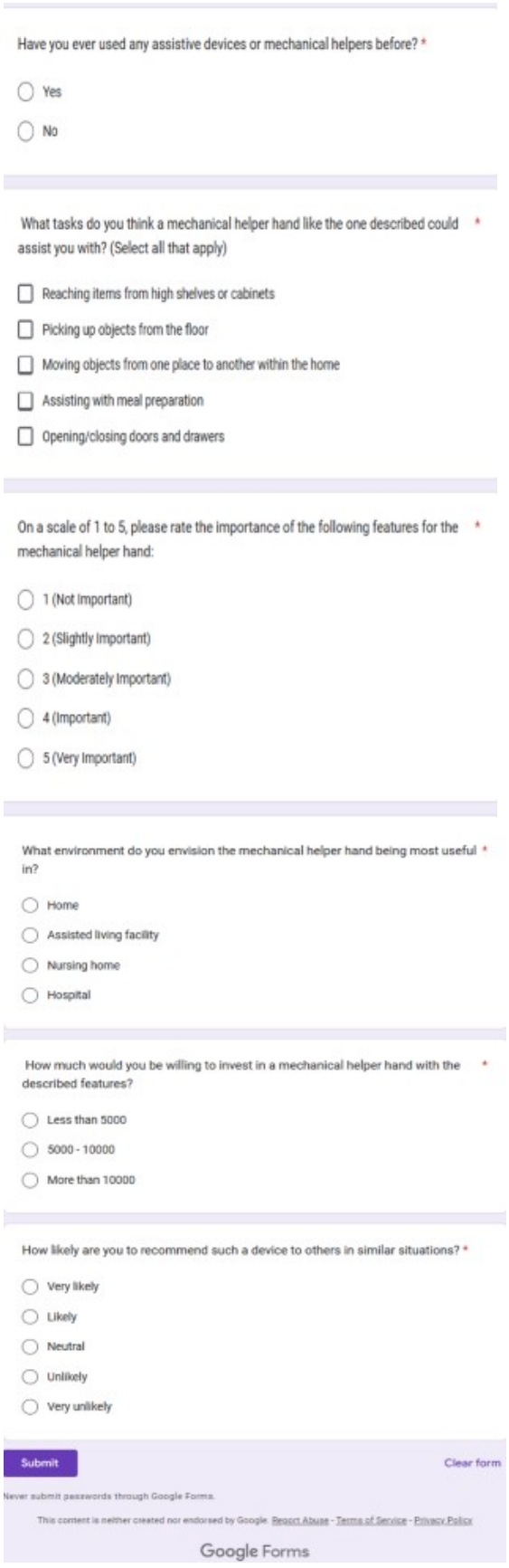



Fig 4. Survey form

### 3.3 Questioner with Community Partners responses

1. Name of the Community Partner: Karthikeyan

2. Contact Information: 6303032822

3. How familiar are you with the concept of a mechanical helper hand for elderly and specially abled people?

- Very familiar

4. Have you encountered any situations where a mechanical helper hand could have been beneficial for the elderly or specially abled individuals you support? Please provide specific examples if possible.

Yes, because I am specially abled and I cannot move around the house. Because of my disability I can't grab some objects. So, this device helps me to grab objects and makes my life easier.

5. How likely do you think a mechanical helper hand with the described features could address some of the challenges faced by the elderly and specially abled individuals in your community?

- Likely

6. In your experience, what are some key features that would make a mechanical helper hand more effective and user-friendly for elderly and specially abled individuals?

- Remote control
- Controlling using Smart phone
- Camera module

7. How willing are you to support the introduction and awareness of mechanical helper hands for elderly and specially abled individuals in your community?

- Willing

### 3.4 List the Community Partner Specifications

- **Accessibility and Inclusivity:** Ensure that the mechanical helper hand is designed to accommodate a wide range of users, including individuals with various physical abilities, sizes, and mobility restrictions.
- **Safety Features:** The mechanical helper hand should have robust safety mechanisms to prevent accidents and injuries during operation. This may include collision detection, obstacle avoidance, and emergency stop features.
- **Ease of Use:** The controls and user interface should be intuitive and easy to understand, allowing users to operate the mechanical helper hand independently with minimal effort.
- **Customizable Actuators:** The actuators for up and down movement, as well as front and back movement, should be adjustable and customizable to suit the specific needs and preferences of different users.
- **Stability and Durability:** The mechanical helper hand should be stable and sturdy to support its intended functions and withstand regular use without frequent maintenance or repairs.
- **Portability:** While the helper hand may be fixed to wheels for movement within the home, it should also be designed with consideration for portability, allowing for easy transport or storage when necessary.
- **Battery Life:** A reliable and long-lasting battery is essential to ensure that the mechanical helper hand can assist users throughout their daily activities without frequent recharging.
- **Affordability:** Keeping the cost reasonable and affordable is crucial to ensure accessibility for a broader range of elderly and specially abled individuals in the community.
- **Collaboration and Training:** Community partners may request support in terms of training materials or workshops to educate both users and caregivers on how to operate and maintain the mechanical helper hand effectively.
- **Feedback Mechanism:** Implement a system to collect feedback from users and community partners to continuously improve and refine the mechanical helper hand's design and functionality.
- **Sustainability:** Consider environmentally friendly materials and energy-efficient components in the construction of the mechanical helper hand.
- **Local Support and Maintenance:** Provide information on local service centers or support networks to assist users with any technical issues or repairs that may arise.

# CHAPTER 4

# Design and Development of Product

## 4.1 Design of Product

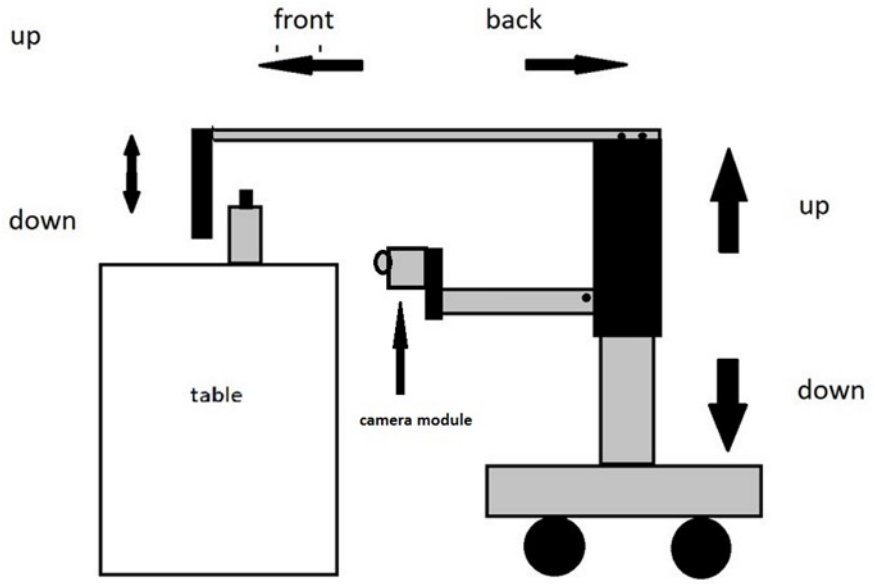



Fig 5. Conceptual design

## 4.2 Purchasing information

Below components are used for this project:

1. Actuators
2. Wheels and servo motors
3. Live Streaming Camera
4. Advanced Control Modules: ESP32, L293D, Arduino Nano and HC05

Modules:

a) ESP32 Module:

Fig 6. ESP32

b) Arduino Nano:

Fig 7. Arduino Nano

c) L293D Motor Driver:

Fig 8. L293D

d) HCO5 – Bluetooth Module:

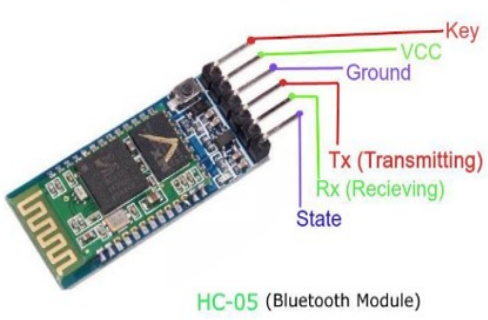



Fig 9. HC05

### 4.3 Development Process

- Market Research and User Needs Assessment
- Conceptualization and Design
- Prototyping
- Integration of Actuators and Wheels
- Control System Development
- Safety Mechanisms and Sensors
- Performance Testing
- User Trials and Feedback
- Regulatory Compliance and Certification
- Manufacturing and Production
- Marketing and Distribution
- Continuous Improvement

### 4.4 Final Product

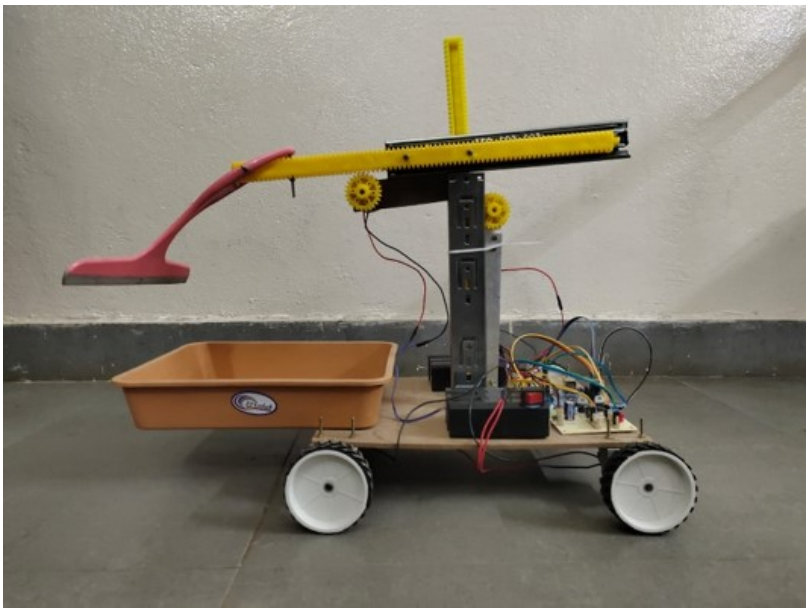


Fig 10. Prototype of the project

# CHAPTER 5

# Post Product Realization Activities

## 5.1 Delivery details (Date, Place, means etc,.)

Name of Person: Karthikeyan

Age: 20

Occupation: Student (specially abled)

Location: Devarakonda

Mobile Number: 6303032822

Means of Delivery: Road Transport

Delivery Schedule:

- Pickup from Manufacturer's Warehouse: November 21, 2022

- Transit Time: 2 days

- Estimated Arrival at Destination: November 23, 2022

Delivery Confirmation: The delivery will require a signature and acknowledgment from the authorized recipient upon receiving the product.

Packaging Details: The Mechanical Helper Hand will be securely packed in custom-designed packaging to ensure safe transportation.

Support: The manufacturer will provide installation support and technical assistance to ensure proper setup of the system.

User Manual and Documentation: The delivery will include a comprehensive user manual and documentation to guide the end-users on system operation, maintenance, and troubleshooting.

Compliance and Certification: The Mechanical Helper Hand complies with relevant regulatory standards and certifications, and the necessary documentation will be provided.

Contact Information: For any delivery-related queries or concerns, please contact:

Name: Vamshi

Email: Vamshi23@gmail.com

Phone: 6309736432

### 5.2 Feedback on delivered product

I hope this message finds you well. I want to express my sincere appreciation for sending me the Mechanical Helper Hand product. As someone with limited mobility, your thoughtful gesture in providing me with this device has left a profound impact.

First and foremost, I must commend the overall design and functionality of the Mechanical Helper Hand. The hand's movements are smooth and precise, allowing me to perform various tasks with ease. The incorporation of dual actuators with different lengths grants it impressive flexibility and range of motion, making it a versatile tool.

The addition of the live streaming camera is truly innovative and a significant enhancement to the device. It provides me with real-time visibility, ensuring that I can control the robot without worrying about potential collisions with objects around me. The camera feed greatly enhances the overall user experience.

I would like to commend the attention to detail and craftsmanship evident in the prototype. The device feels sturdy and well-built, instilling confidence in its durability and usability.

Using the Mechanical Helper Hand has already improved my independence and ability to perform everyday tasks. It has become an invaluable aid in my life, empowering me to accomplish activities that were previously challenging.

Once again, I am incredibly grateful for your commitment to developing assistive devices that positively impact the lives of individuals with limited mobility. Your dedication and compassion shine through in this remarkable product.

# CHAPTER 6

# Business Model/Paper/Patent information

# CHAPTER 7
# CONCLUSION

In conclusion, the Mechanical Helper Hand emerges as a groundbreaking assistive technology, tailored to empower elderly and specially-abled individuals, fostering independence and improving their overall well-being. The device's seamless integration of dual actuators enables precise and adaptable movements, facilitating the execution of diverse tasks. Supported by robust wheels and motor drivers, smooth navigation across various terrains is assured.

Moreover, the incorporation of advanced modules, such as the ESP32 with Wi-Fi and Bluetooth capabilities, enables real-time video streaming and remote control, enhancing user interaction and engagement. The Mechanical Helper Hand holds the promise to redefine the lives of its users, offering a reliable and intuitive companion to aid daily activities and elevate overall quality of life.

Future avenues of exploration encompass heightened environmental awareness through the implementation of obstacle avoidance algorithms and sensor data processing with additional sensors, personalized assistance via machine learning algorithms, and seamless integration with smart home systems, fostering inclusivity and accessibility for those with mobility challenges and enabling Emergency SOS feature.

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