

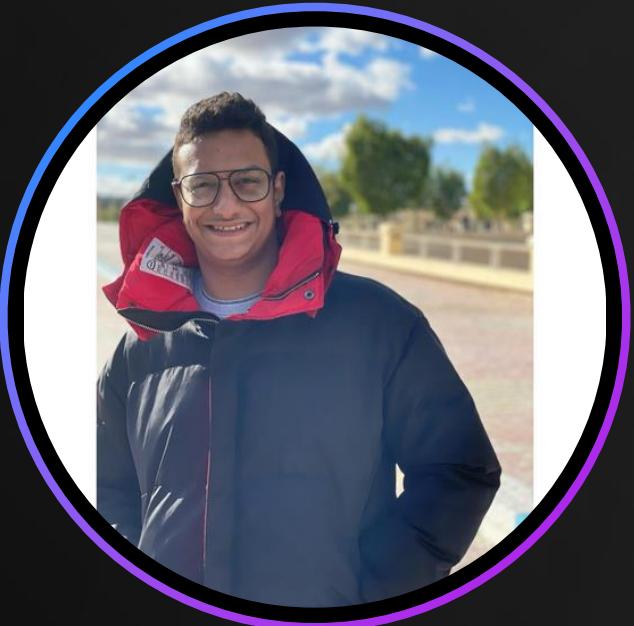
# **SMART IOT-BASED WHEELCHAIR SYSTEM**

**WITH REMOTE MONITORING AND  
CONTROL**

**SIC PROJECT GRADUATION**

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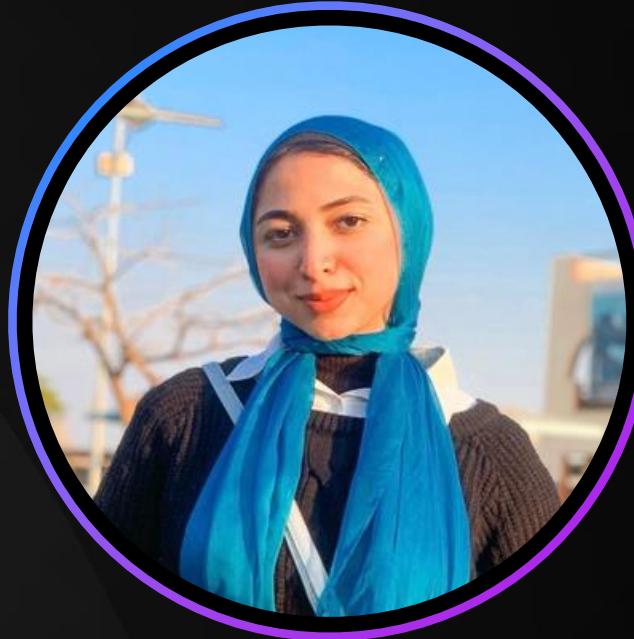
# OUR TEAM



MAHMOUD TAMER



MOHAMED SAMIR



SALMA YASSER



MARIAM MEDAHT



RANA HANY



ANTON SAMY

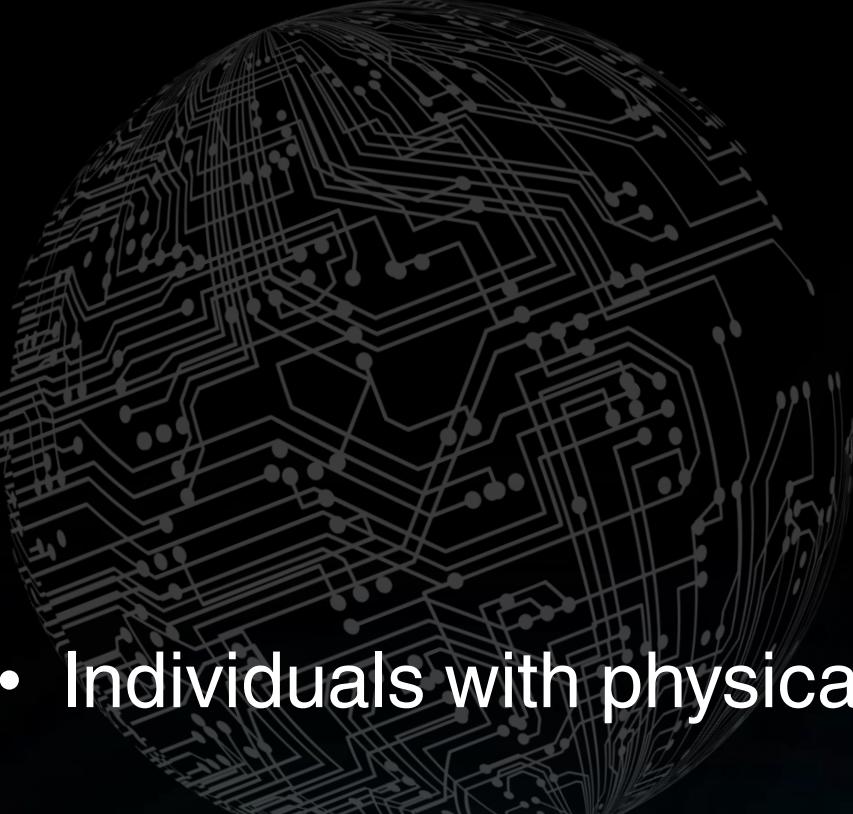
# STRAM TEAM:

We are a team of passionate students from the Samsung Innovation Campus, specializing in IoT technology. Our goal is to create innovative solutions that address real-world problems and improve everyday lives.

**STRAM TEAM**

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# PROBLEMS

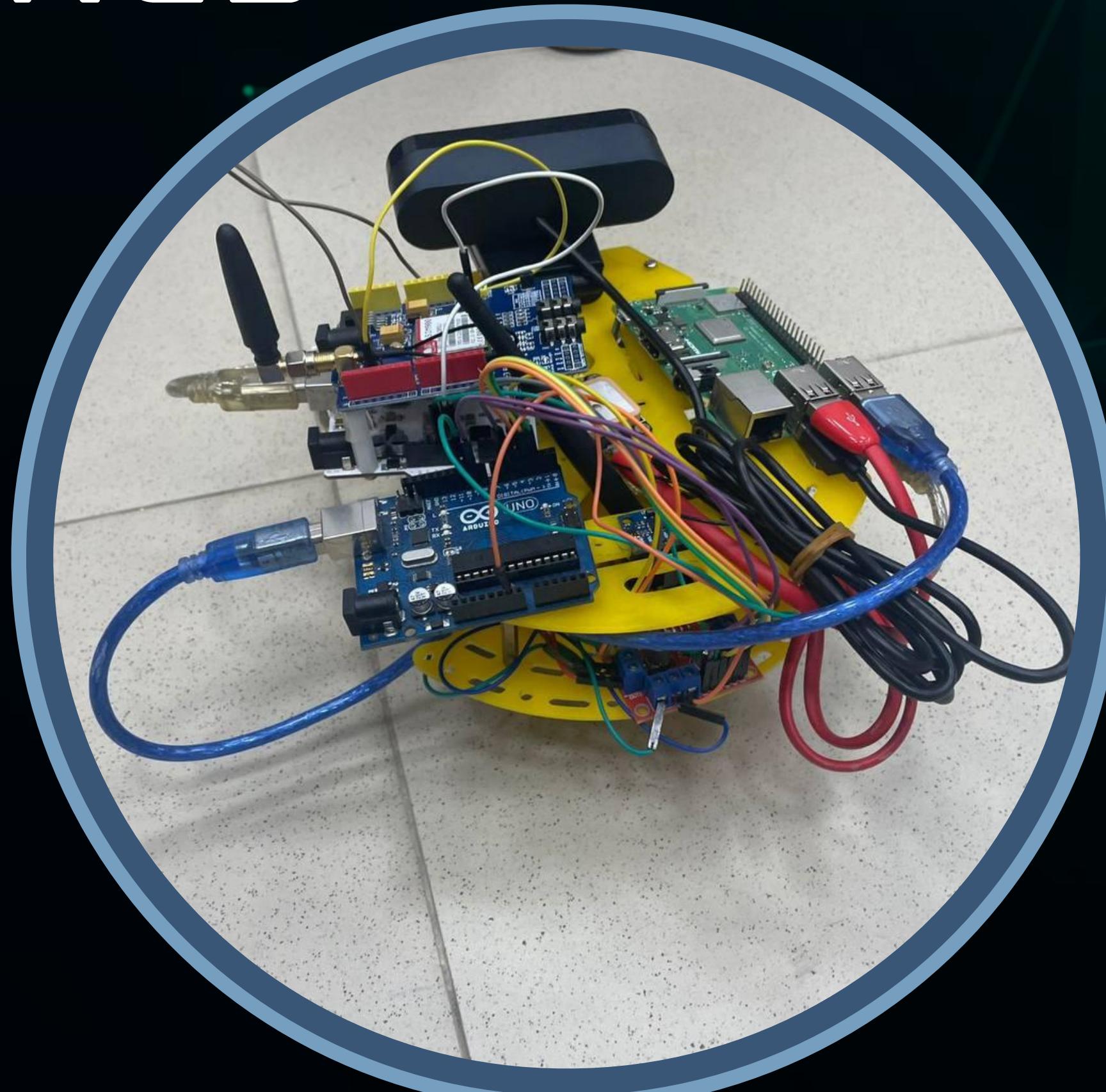
- Individuals with physical disabilities face mobility and safety challenges.
  - Traditional wheelchairs have limited functionalities.
  - Caregivers often remain unaware of critical situations (e.g., tipping over).
  - Current wheelchairs lack real-time monitoring features.
  - Improved monitoring could enhance user experience and caregiver efficiency.
- 

**Problems**

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# FEATURES

- PS4 Controller Integration: Intuitive control for users.
- Motor Driver Control: Precise movement of the wheelchair.
- Real-Time GPS Tracking: Location monitoring via a dashboard.
- Remote Monitoring: Caregiver access to wheelchair status.
- Tilt Detection: Alerts for potential tip-overs.
- Emergency SMS Alerts: Immediate notifications for caregivers.
- Live Streaming: Real-time video feed for monitoring.
- Node-RED Remote Control: Dashboard interface for user commands.
- Dual Arduino Setup: Efficient management of motor and communication systems.
- Scalable Design: Future-proof for upgrades and mass production.

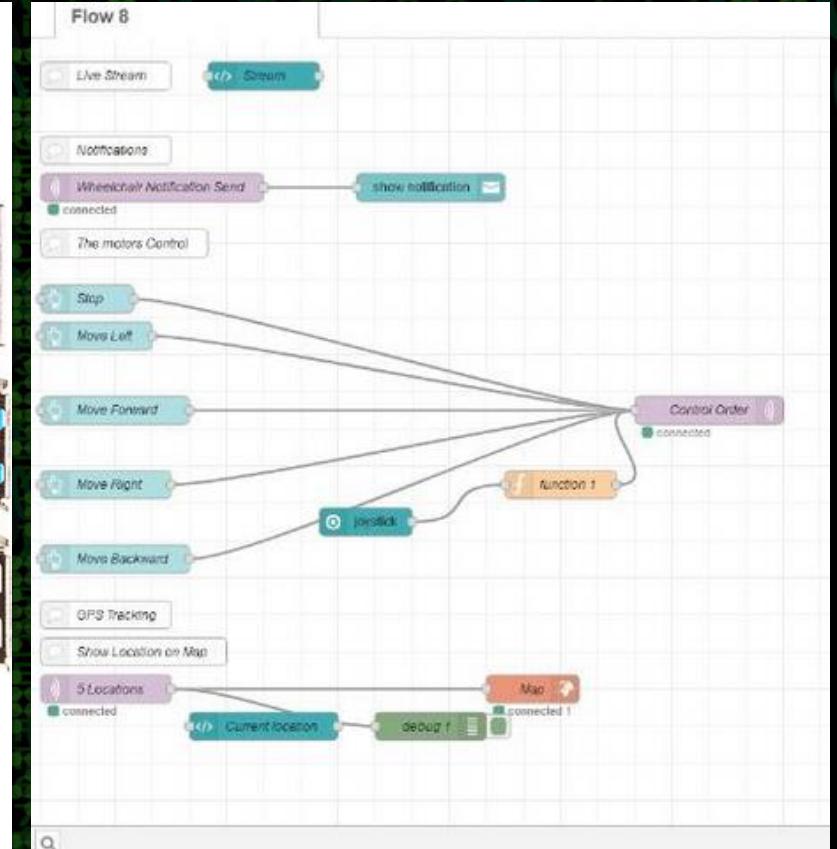


# LIST OF THE TECHNICAL ASPECTS:

1. Raspberry Pi: Acts as the main control unit, integrating all sensors and components.
2. Node-RED: A visual dashboard for remote control, data visualization, and live streaming.
3. MQTT Protocol: Enables efficient communication between devices and systems within the IoT framework.
4. GPS Module: Provides real-time tracking and location data for the wheelchair.

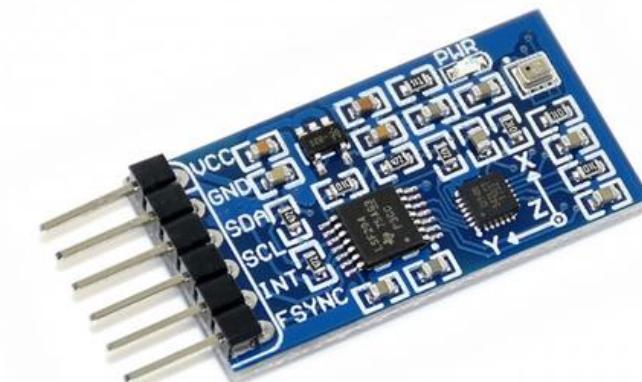
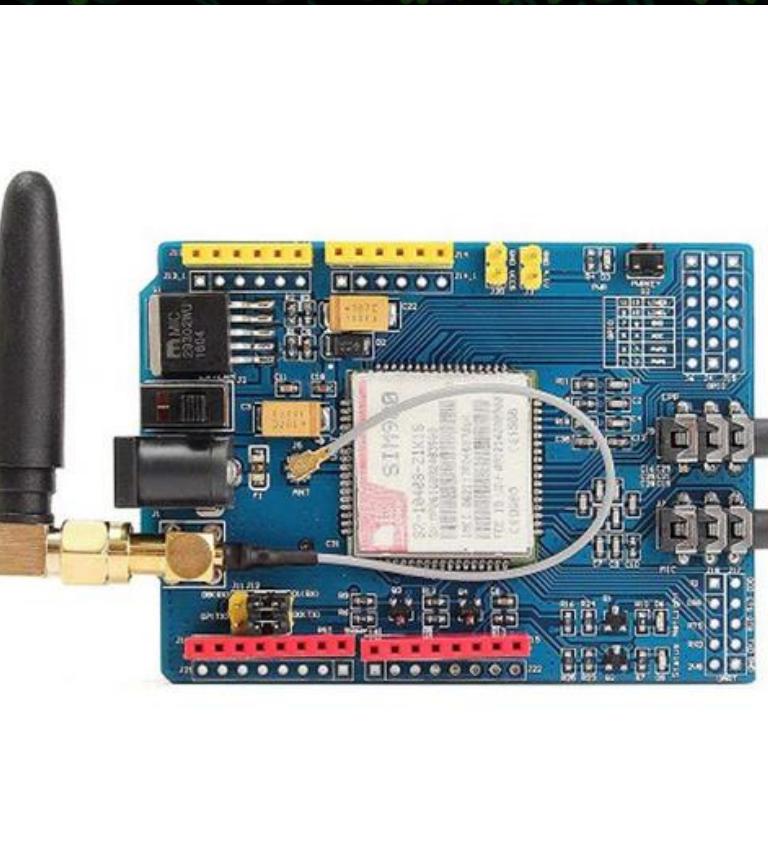


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Publish and Subscribe	Clients that authenticate with credentials that have this permission assigned are allowed to publish and subscribe with any topic. They have full access to all topics.
Control	control the robot
Location	Sending Location
notifications	notifications

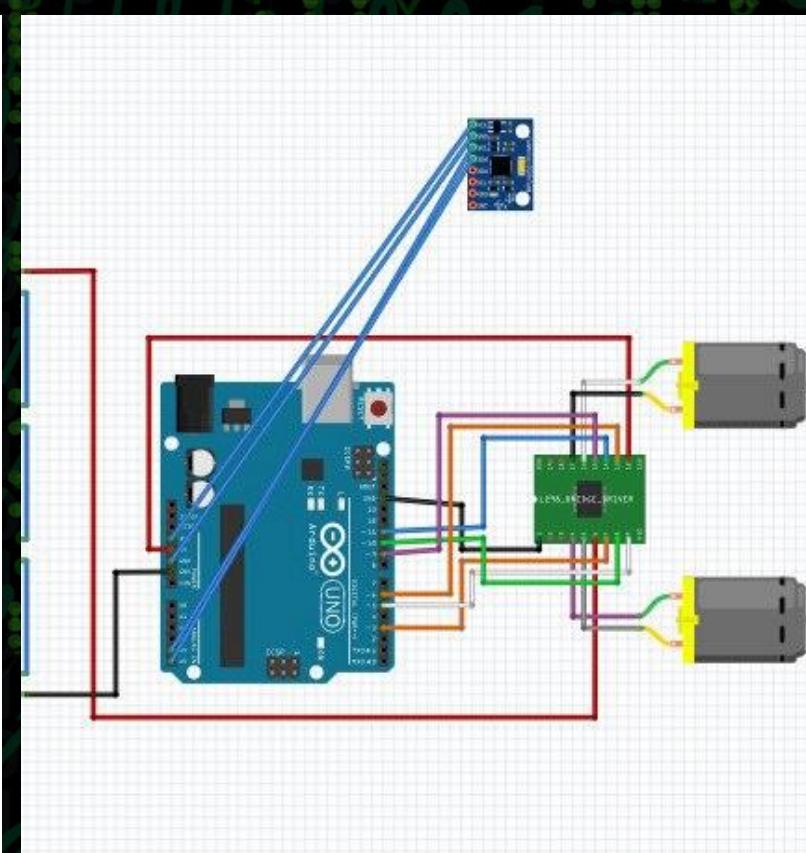


# LIST OF THE TECHNICAL ASPECTS:

5. GSM Module: Facilitates mobile network connectivity, enabling remote communication and SMS alerts.



6. IMU (Inertial Measurement Unit): Tracks tilt and motion to detect potential falls or sudden movements.



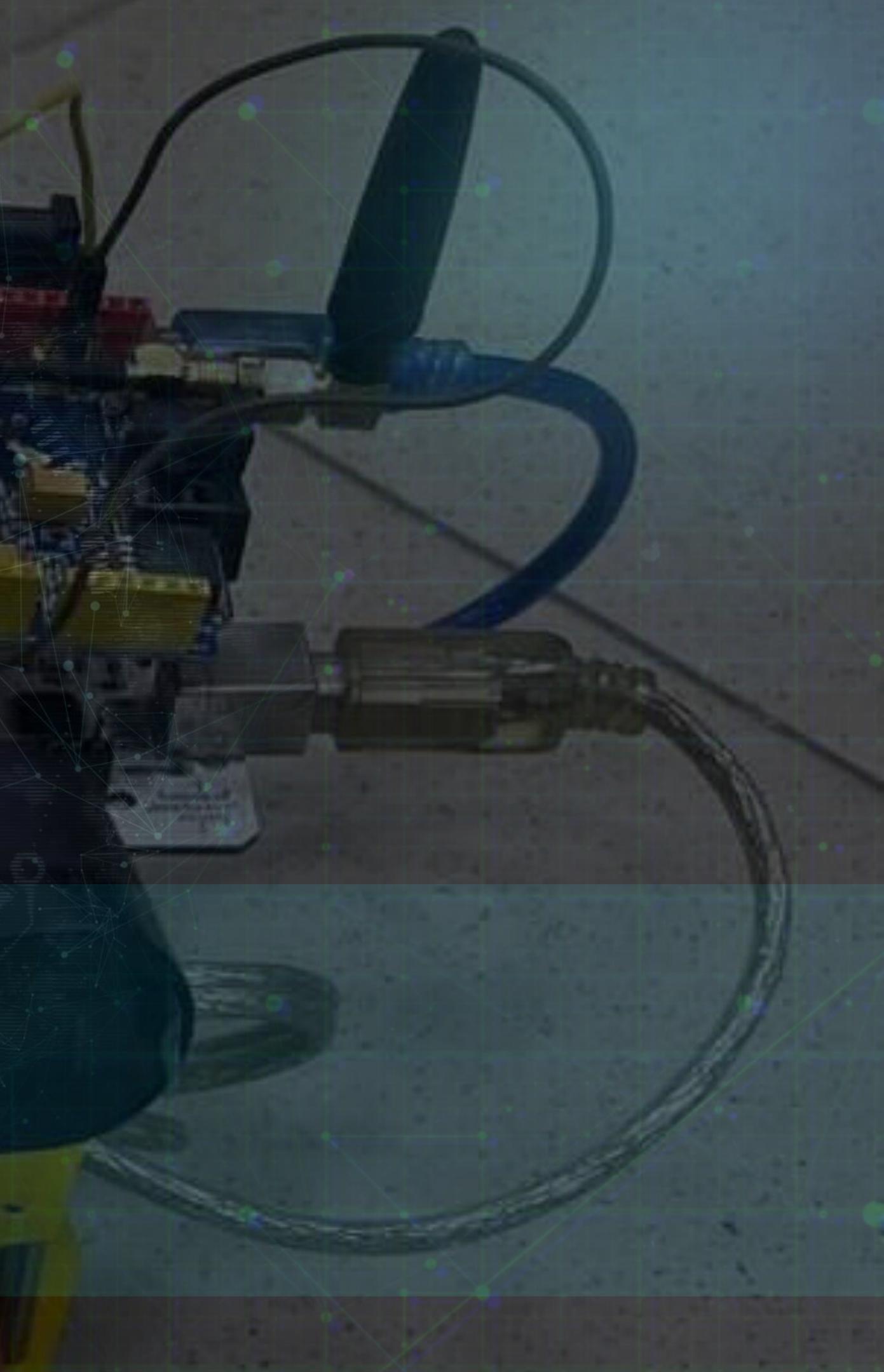
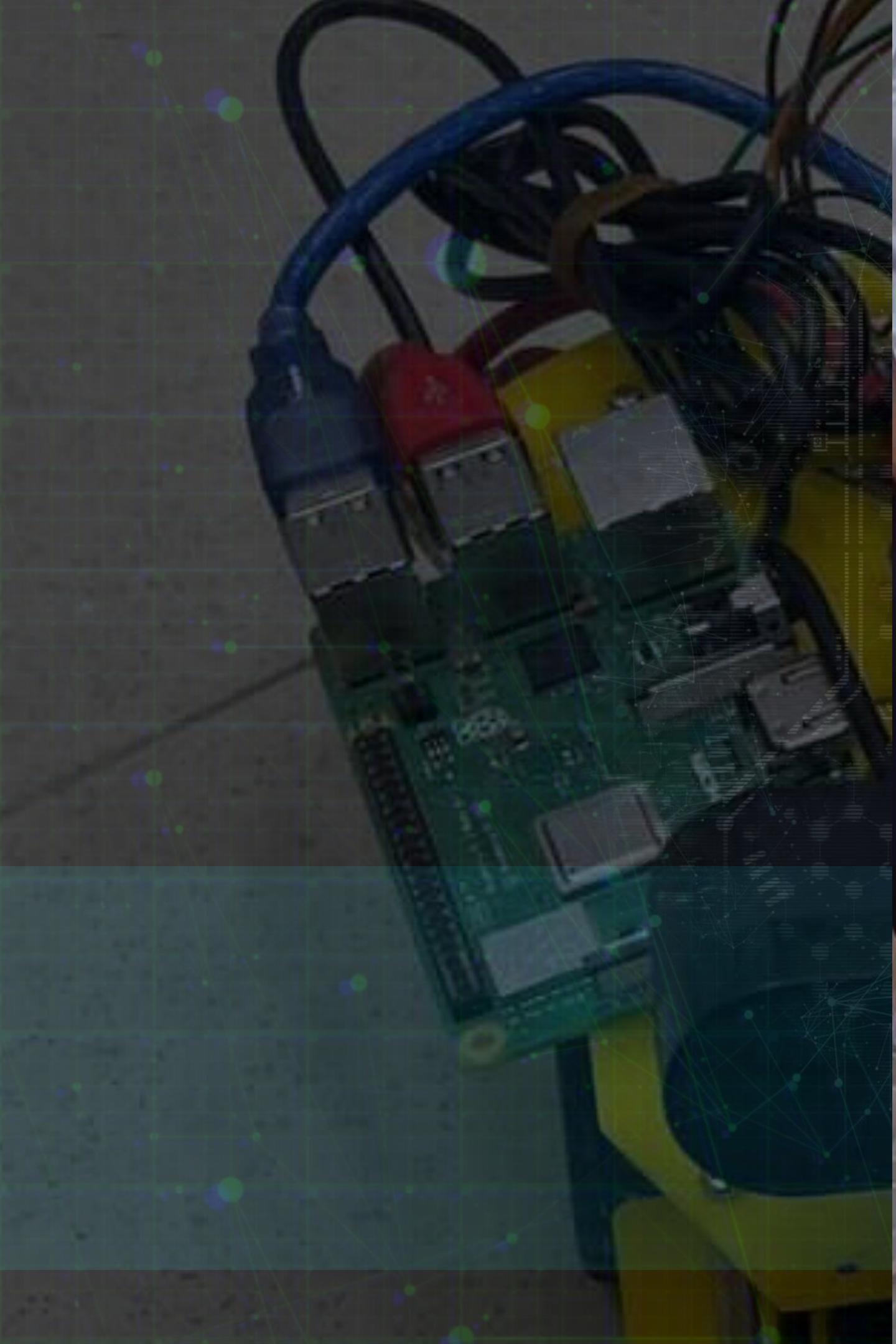
7. Arduino: Handles specific sensor data and controls hardware functions within the system.

# COMPARISON TABLES

PROJECT	FEATURES	Limitations	COST
<b>Our Smart Wheelchair Project</b>	Real-time GPS tracking <ul style="list-style-type: none"><li>- Live streaming</li><li>- MQTT remote control</li><li>- Emergency alerts via GSM</li></ul>	<ul style="list-style-type: none"><li>• Complex design</li><li>• Components availability</li></ul>	Cost-effective, enhances safety and monitoring capabilities
<b>Permobil F5 Corpus VS</b>	<ul style="list-style-type: none"><li>- Advanced standing functionality</li><li>- Basic smart features</li></ul>	<ul style="list-style-type: none"><li>- No real-time GPS tracking</li><li>- No live streaming</li><li>- No IoT-based remote control</li></ul>	High-end, often inaccessible
<b>WHILL Model C2</b>	<ul style="list-style-type: none"><li>- Mobile app connectivity</li><li>- Compact design</li></ul>	<ul style="list-style-type: none"><li>- Lacks live video streaming</li><li>- No MQTT remote control</li><li>- No emergency alerts via GSM</li></ul>	Pricey, incomplete monitoring
<b>SmartDrive MX2+</b>	Bluetooth control for power assist	<ul style="list-style-type: none"><li>- No remote control</li><li>- No real-time GPS</li><li>- No emergency tilt alerts</li></ul>	Expensive for features provided

# Smart Wheelchair System Business Model Canvas

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
<ul style="list-style-type: none"><li>Manufacturers: Strategic partnerships with manufacturing firms to produce the wheelchair at scale.</li><li>Healthcare Institutions: Collaborations with hospitals, elderly care homes, and rehabilitation centers for product distribution and feedback.</li><li>Technology Providers: Partner with GPS, GSM, and MQTT service providers for enhanced connectivity and scalability.</li><li>Government Agencies and NGOs: Collaboration to include the product in public healthcare initiatives or aid distribution programs.</li></ul>	<p>Product Development:</p> <ul style="list-style-type: none"><li>Continuous improvement and refinement of the hardware and software to enhance performance, lower costs, and integrate new features.</li></ul> <p>Manufacturing:</p> <ul style="list-style-type: none"><li>Scale production by partnering with manufacturers or establishing in-house production.</li></ul> <p>Partnership Management:</p> <ul style="list-style-type: none"><li>Build and maintain relationships with healthcare providers, NGOs, and governmental agencies to increase market reach.</li></ul> <p>Customer Support &amp; Service:</p> <ul style="list-style-type: none"><li>Establish a strong customer service team to assist users and caregivers with setup, technical issues, and product maintenance.</li></ul> <p>R&amp;D for Future Enhancements:</p> <ul style="list-style-type: none"><li>Invest in research and development to introduce new features like voice control, AI-powered navigation, or machine learning-based health monitoring.</li></ul>	<ul style="list-style-type: none"><li>GPS Tracking: Real-time location tracking for caregivers via a Node-RED dashboard.</li><li>Tilt Detection &amp; Emergency Alerts: Immediate alerts via SMS and MQTT messaging when the chair tips over, ensuring faster response times.</li><li>Remote Control: The ability to control the wheelchair remotely through MQTT, enhancing flexibility and convenience.</li><li>Live Video Streaming: Continuous live feed for remote monitoring.</li><li>Cost-Effectiveness: Using affordable IoT components while providing features that are comparable to or surpass higher-end products on the market.</li></ul>	<ul style="list-style-type: none"><li>Supportive Care: Build relationships by offering robust customer support, including technical assistance, product updates, and training programs for caregivers and healthcare institutions.</li><li>Feedback-Driven: Maintain continuous feedback loops with users and healthcare providers to improve the product based on real-world usage.</li><li>Educational Resources: Provide training and how-to guides on setting up and using the wheelchair system for caregivers and healthcare providers.</li></ul>	<p>Primary Segments:</p> <ul style="list-style-type: none"><li>Elderly &amp; Disabled Individuals: End users looking for a cost-effective, independent mobility solution with enhanced safety features.</li><li>Caregivers: Families or home-based caregivers seeking tools to monitor and ensure the safety of their loved ones remotely.</li><li>Healthcare Facilities: Hospitals, elderly care homes, and rehabilitation centers that need advanced, safe, and cost-effective mobility solutions for patients.</li></ul> <p>Secondary Segments:</p> <ul style="list-style-type: none"><li>Government Agencies: Partnerships with government bodies involved in public health programs for the elderly or disabled.</li><li>NGOs and Foundations: Non-profit organizations focused on disability and elderly care may be interested in purchasing or funding the product to aid underserved populations.</li></ul>
Key Resources			Channels	
<ul style="list-style-type: none"><li>Technical Team: Engineers and software developers for product development and IoT integration.</li><li>Manufacturing Partner: A reliable partner for hardware manufacturing and production scaling.</li><li>Sales &amp; Marketing Team: Team focused on partnerships, sales, and promoting the product through various channels.</li><li>Customer Support: Staff to handle technical issues, support, and customer queries.</li><li>Healthcare Advisors: Professionals who can guide product development and ensure that it meets industry standards</li></ul>			<p>Direct Channels:</p> <ul style="list-style-type: none"><li>Online Sales Platform: Selling directly through a dedicated e-commerce website, ensuring global access.</li><li>Partner Distribution: Selling through partnerships with medical device stores, assistive technology retailers, and healthcare organizations.</li></ul> <p>Indirect Channels:</p> <ul style="list-style-type: none"><li>B2B Partnerships: Collaborate with healthcare organizations to integrate the product into their services and support.</li><li>Government Programs: Work with governments to include the Smart Wheelchair in public healthcare initiatives or rehabilitation programs.</li></ul>	
Cost Structure			Revenue Streams	
<p>Fixed Costs:</p> <ul style="list-style-type: none"><li>R&amp;D: Initial and ongoing research and development costs for hardware and software improvements.</li><li>Manufacturing Setup: Costs associated with setting up production facilities or outsourcing to manufacturers.</li><li>Product Design &amp; Prototyping: Initial costs for designing and prototyping the wheelchair.</li></ul> <p>Variable Costs:</p> <ul style="list-style-type: none"><li>Hardware Components: Costs of components like GPS modules, Raspberry Pi, cameras, motor drivers, and batteries.</li><li>Software Maintenance: Ongoing costs of maintaining the MQTT server and software updates.</li><li>Logistics: Shipping and distribution costs.</li></ul>			<p>Product Sales:</p> <ul style="list-style-type: none"><li>Direct Sales: The wheelchair can be sold directly to customers through retail channels, partnerships with healthcare providers, and online platforms.</li><li>B2B Sales: Healthcare institutions such as hospitals, elderly care homes, and rehabilitation centers may purchase the product in bulk.</li></ul> <p>Subscription Model:</p> <ul style="list-style-type: none"><li>Monitoring Service Subscription: A monthly or yearly subscription plan for remote monitoring services using MQTT and GPS tracking features. Caregivers or institutions can subscribe to this service to receive real-time data on patient mobility and emergency alerts.</li><li>Extended Warranty Plans: Offering extended warranties or maintenance packages for hardware repair, firmware updates, and continuous support.</li></ul>	





**THANK YOU!**  
**WE APPRECIATE YOUR TIME AND HOPE**  
**YOU ENJOYED WITH US**