



PROBLEM STATEMENT ID –1594

SMART MULTI-MODAL SUPPLY CHAIN OPTIMIZATION FOR PERISHABLES

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**SMART INDIA
HACKATHON
2024**





COOL SYNC

QUICK PATHS AND FRESH PICKS

LOGISTICS AND PREDICTIVE ANALYSIS



ABOUT OUR COMPANY

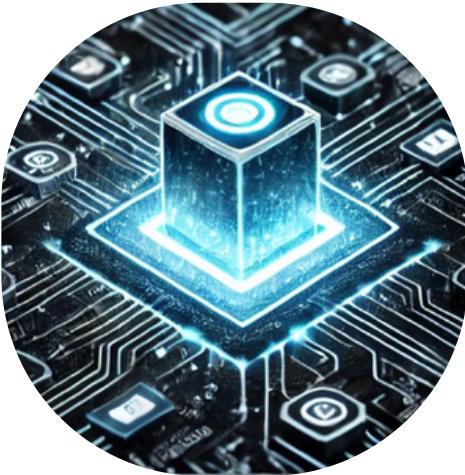
Introduction

An innovative solution for real-time monitoring, analytics, and sustainability in the logistics of perishable goods.





OUR SERVICE



Real-Time Monitoring and Machine Learning

- IoT Sensor Deployment: Track temperature, humidity, and other parameters for perishable goods.
- Cloud Integration: Centralized data storage for live updates and analytics.



Dynamic Route Optimization

- Real-time adjustment of transportation routes based on traffic, weather, and demand.
- Integration of Dijkstra's Algorithm.



Multi-Modal Logistics

- Integration of AI-driven tools for predictive analytics.
- End-to-end visibility across transportation modes.



Sustainability Tracking

- Monitor fuel efficiency and carbon emissions.
- Tools to ensure environmentally friendly operations



BUSINESS MODEL

Element	Description
Value Proposition	<ul style="list-style-type: none">- Real-time monitoring of temperature, humidity, CO2, ethylene, and pH.- Predictive analytics for shelf life and quality.- Alerts and notifications for anomalies during transportation.- Sustainability tracking for carbon emissions.
Customer Segments	<ul style="list-style-type: none">- Food and beverage industries (perishable goods).- Pharmaceutical companies (vaccine and drug logistics).- Cold chain logistics and transport providers.- E-commerce platforms (grocery delivery).- Warehousing and distribution centers.
Key Activities	<ul style="list-style-type: none">- IoT sensor integration and deployment.- Real-time monitoring and cloud storage solutions.- Customer support and maintenance of sensors.
Channels	<ul style="list-style-type: none">- Direct sales to logistics and transport companies.- Online platform for purchasing (website and mobile apps).- Strategic partnerships with IoT device manufacturers and logistics companies.- Integration with ERP or supply chain software for seamless monitoring.



REVENUE MODEL

1. SUBSCRIPTION PRICING

Plan	Monthly Cost	Features
Basic	FREE TRAIL	Real-time monitoring, live dashboard, and basic alerts.
Pro	\$150/device	Includes analytics, predictions, carbon tracking, and unlimited data history.
Enterprise	Custom	White-label solutions, advanced integrations, and 24/7 support.

2. PAY-PER-USE PRICING

- ROUTE OPTIMIZATION: \$0.01 PER KILOMETER OPTIMIZED.
- SHELF-LIFE PREDICTION: \$0.05 PER PREDICTION.



REVENUE MODEL

3. HARDWARE SALES

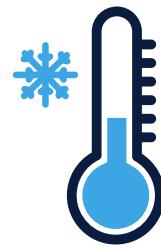
Component	Price per Unit
IoT Device Kit	\$100
Temperature Sensor	\$10
CO2 Sensor	\$25
Ethylene Sensor	\$30
pH Sensor	\$20

4. CUSTOMIZATION

- CUSTOM ANALYTICS DASHBOARDS OR PREDICTIVE FEATURES FOR LARGE ENTERPRISES: \$5,000/PROJECT.



MODULES IMPLEMENTED



Temperature
Monitoring and
Control



Logistics
Management



Bidding System
for Perishables



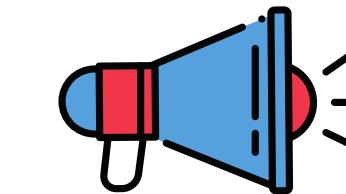
Inventory
Tracking



Quality
Prediction and
Rating



Driver
Reporting
System



Real-Time Alerts
and
Notifications



Geo-Tracking
and
Route
Optimization



OUR MILESTONES



USER ROLE SETUP



CUSTOMER FEATURES DEVELOPMENT



STAKEHOLDER FEATURES DEVELOPMENT



PRODUCT BIDDING



DRIVER FEATURES DEVELOPMENT



INVENTORY AND MARKET CONNECTIVITY



CORE FUNCTIONALITY INTEGRATION



OUR PRODUCT

INTEGRATION AND WORKFLOW

- DHT11 GATHERS ENVIRONMENTAL DATA AND SENDS IT TO THE ESP32.
- ESP32 PROCESSES THE DATA, UPLOADS IT TO THE CLOUD, AND SENDS ALERTS IF THRESHOLDS ARE BREACHED.
- OLED DISPLAYS LIVE DATA FOR IMMEDIATE INSIGHTS ON SHIPMENT CONDITIONS.

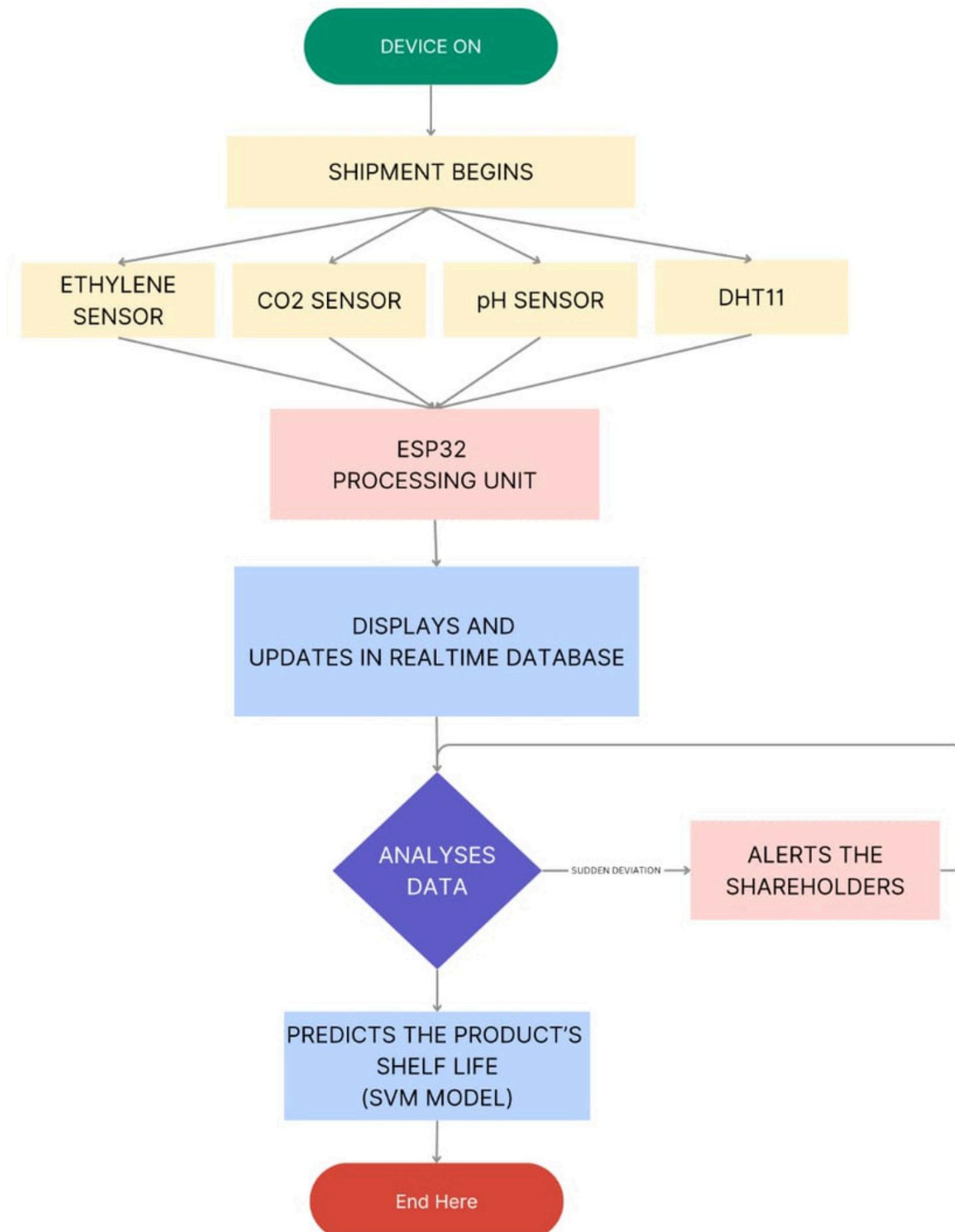
HARDWARE TOOLS OVERVIEW

1. DHT11 SENSOR
 - TO MONITOR ENVIRONMENTAL CONDITIONS CRUCIAL FOR THE PRESERVATION OF PERISHABLE GOODS.
2. ESP32 MICROCONTROLLER
 - SERVES AS THE CENTRAL PROCESSING AND COMMUNICATION UNIT.
3. OLED DISPLAY
 - PROVIDES A VISUAL INTERFACE FOR LOCAL DATA MONITORING.



COOLSYNC

BLOCK DIAGRAM



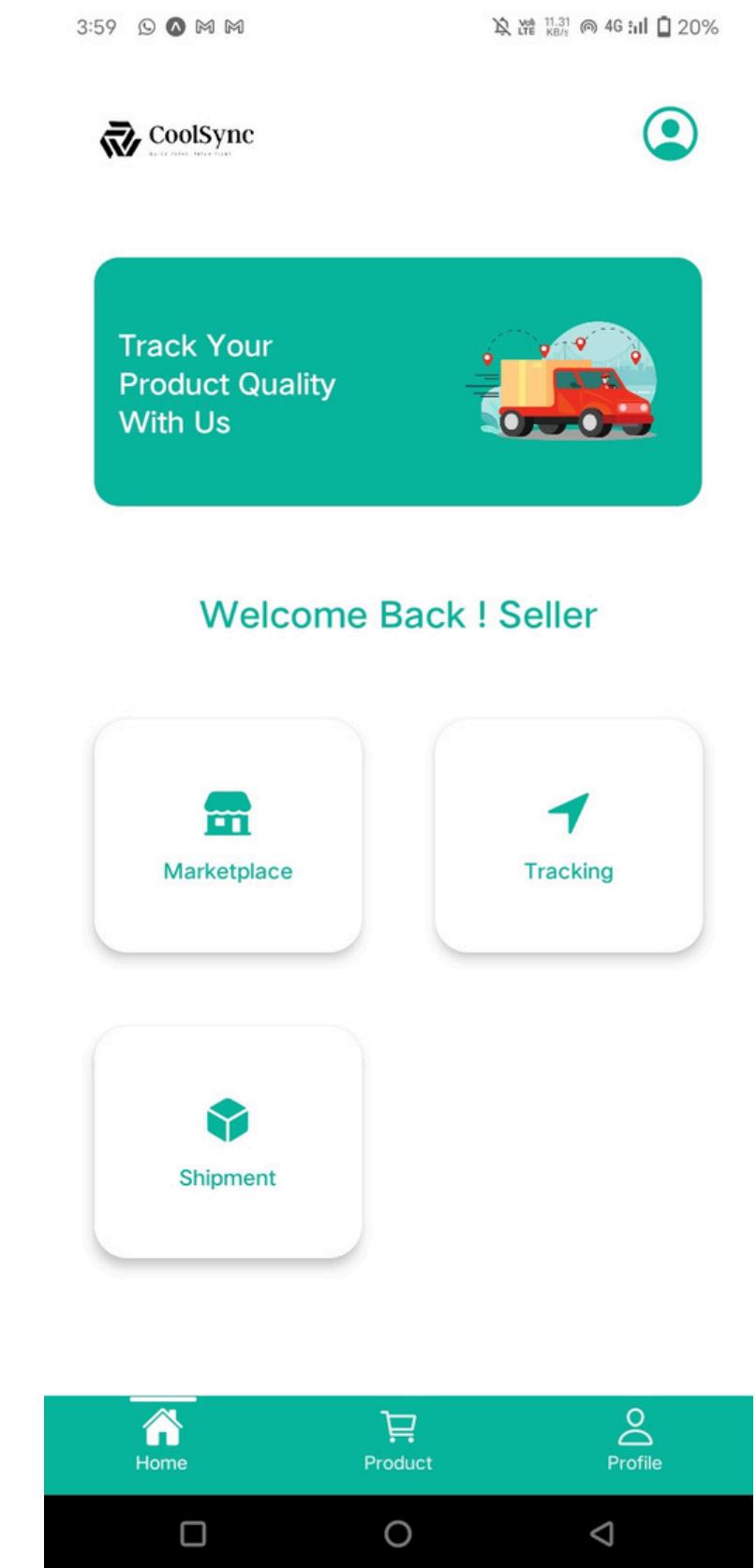
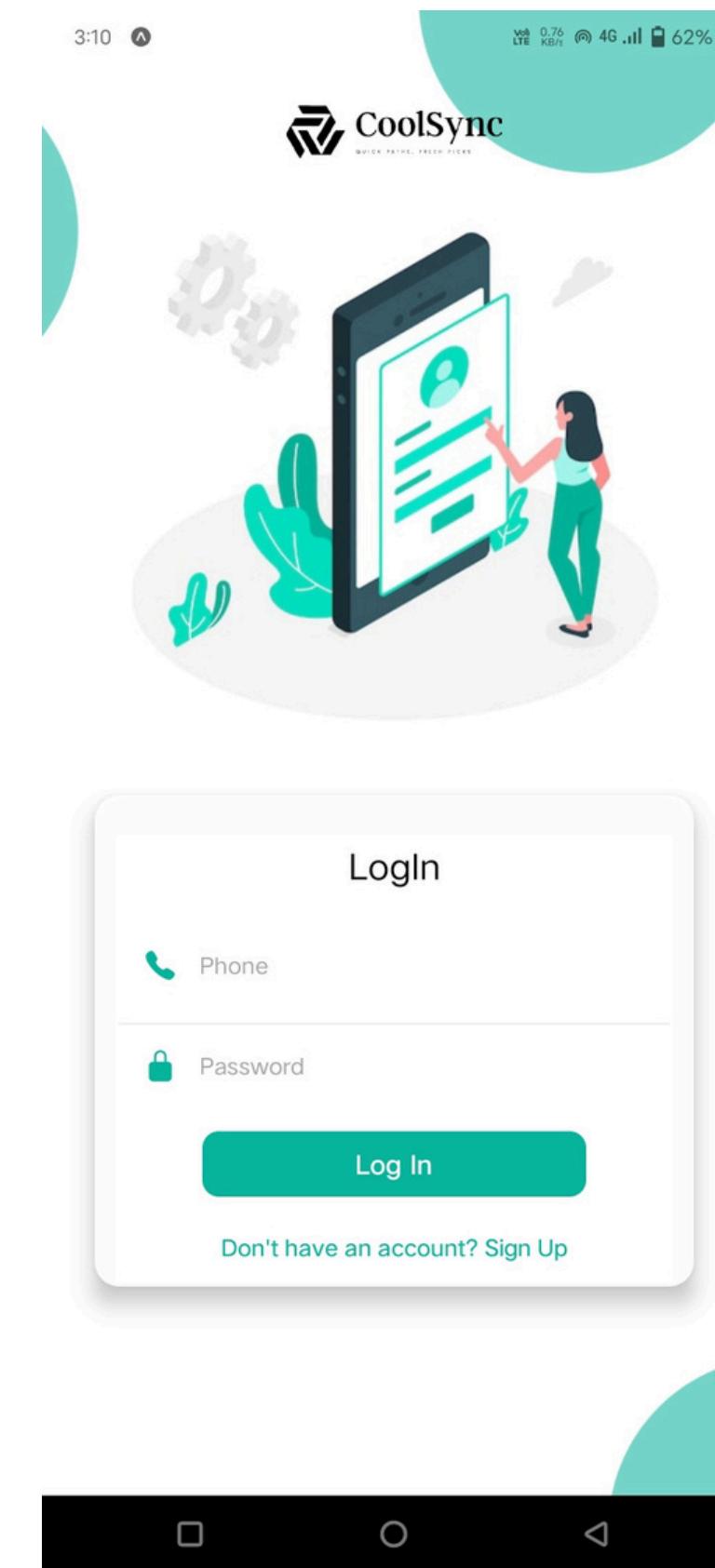
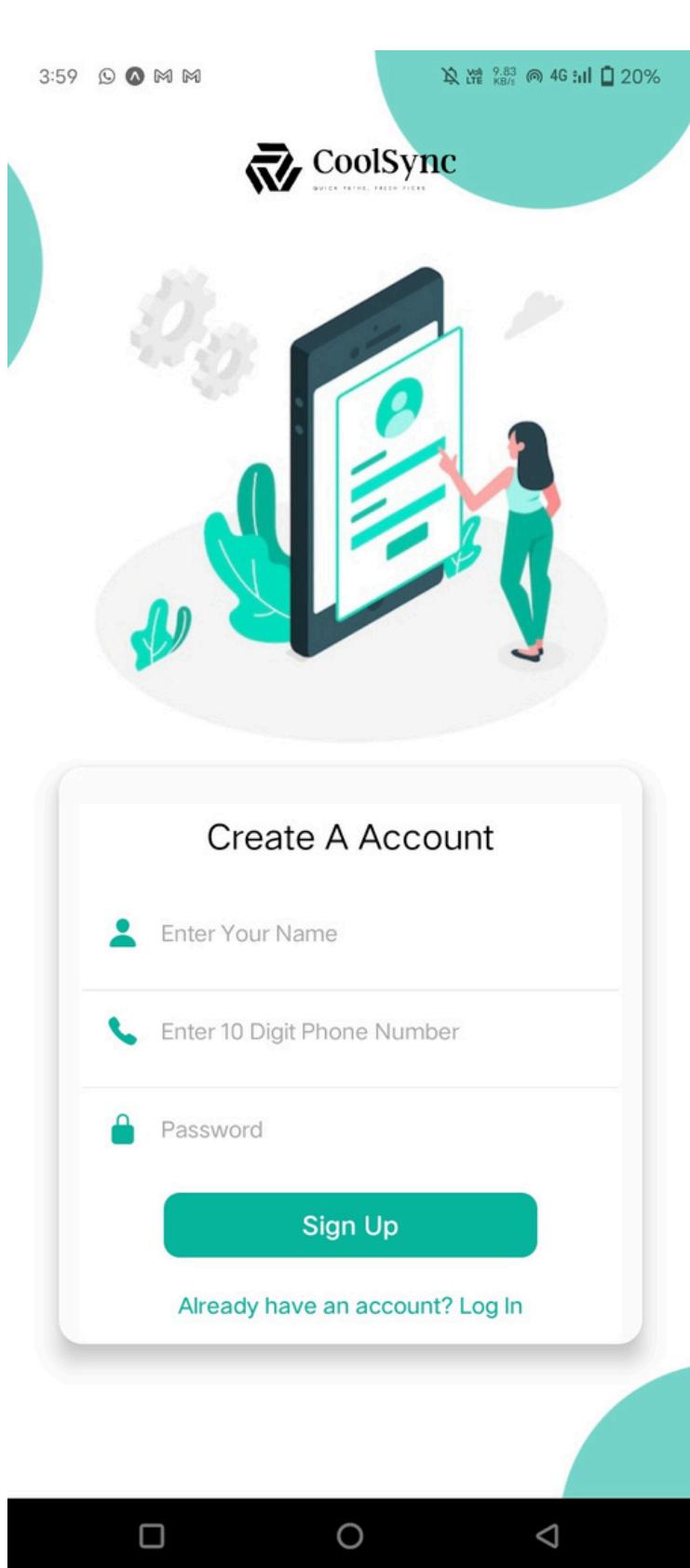
TECHNOLOGICAL STACK



- **Backend Technologies**-Django
- **Route Optimization**-Dijkstra's
(OpenRoute API)
- **Weather**- OpenWeather Map
- **Mobile App Frontend**-React Native
- **Machine Learning Models**
 - XG BOOST
- **API Technology**-REST API.
- **Cloud Technologies**-VPS (Virtual Private Server)
- **Monitoring Technology**-ESP32 with Sensors

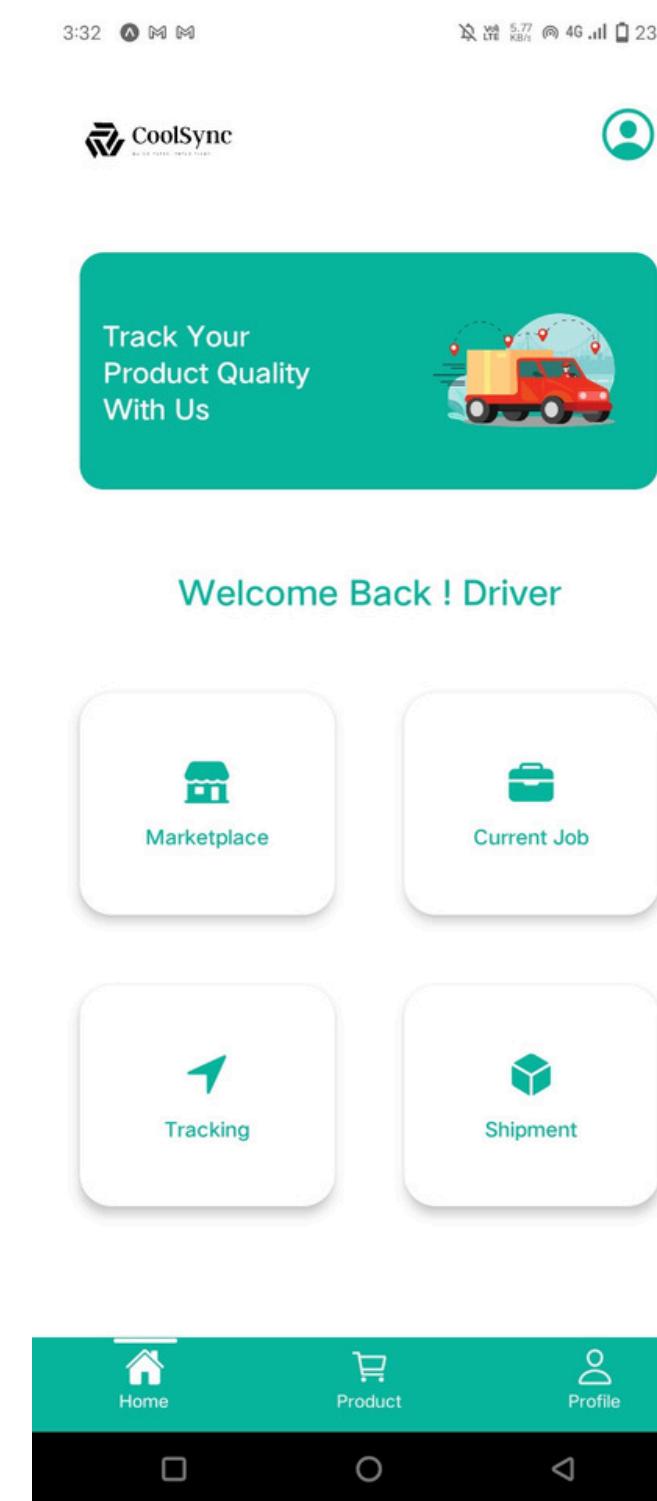
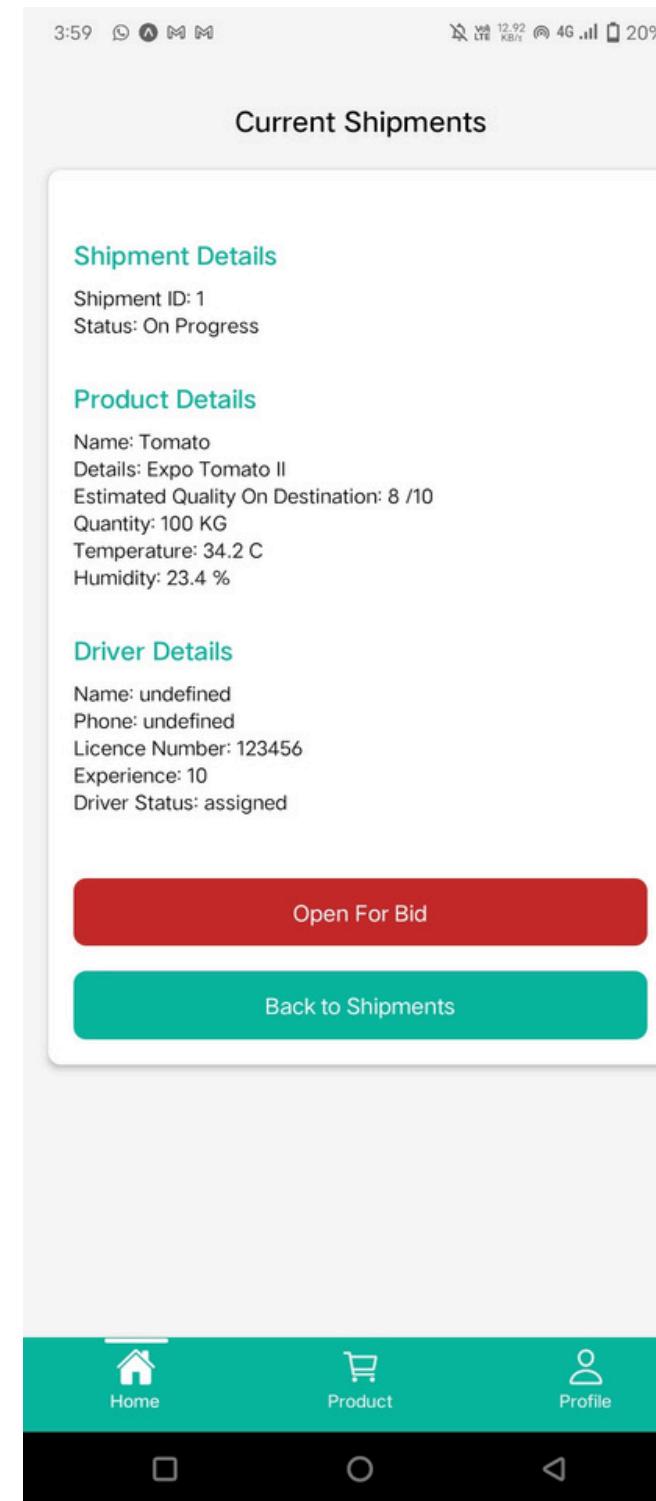
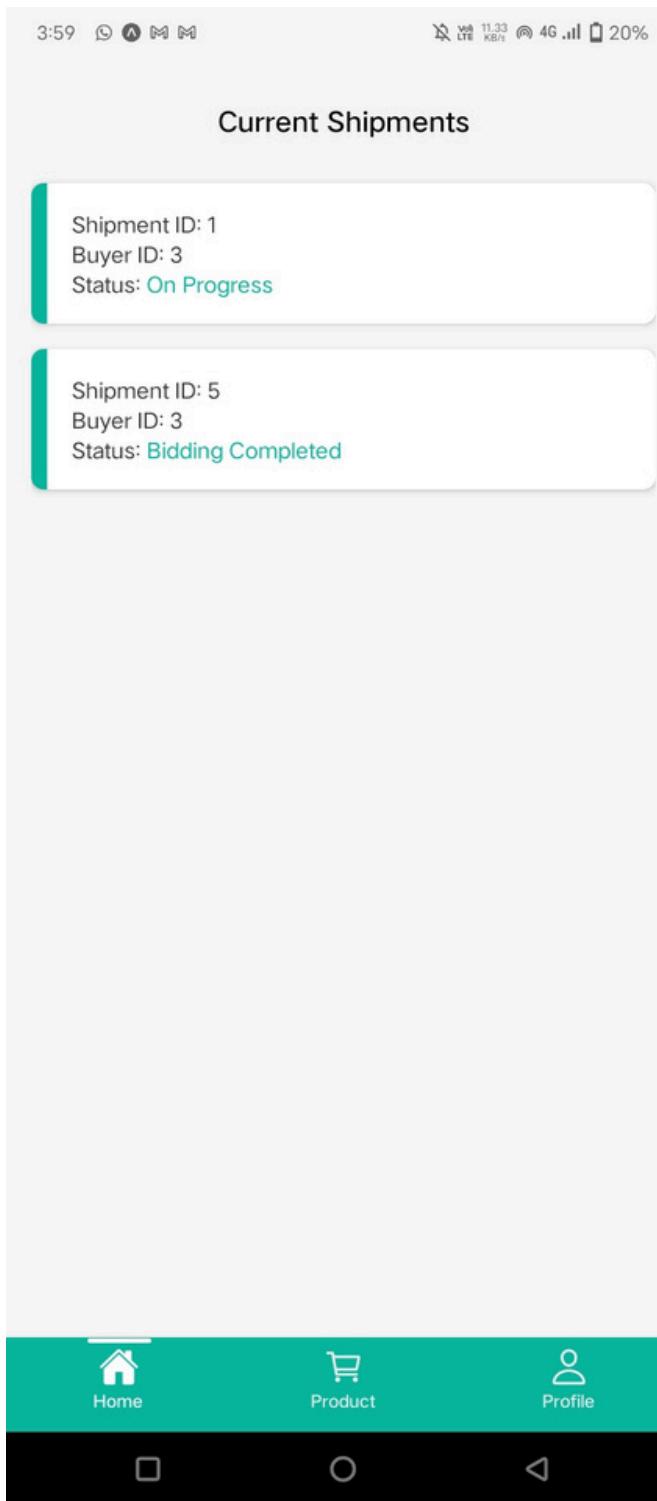


COOLSYNC SCREENSHOTS



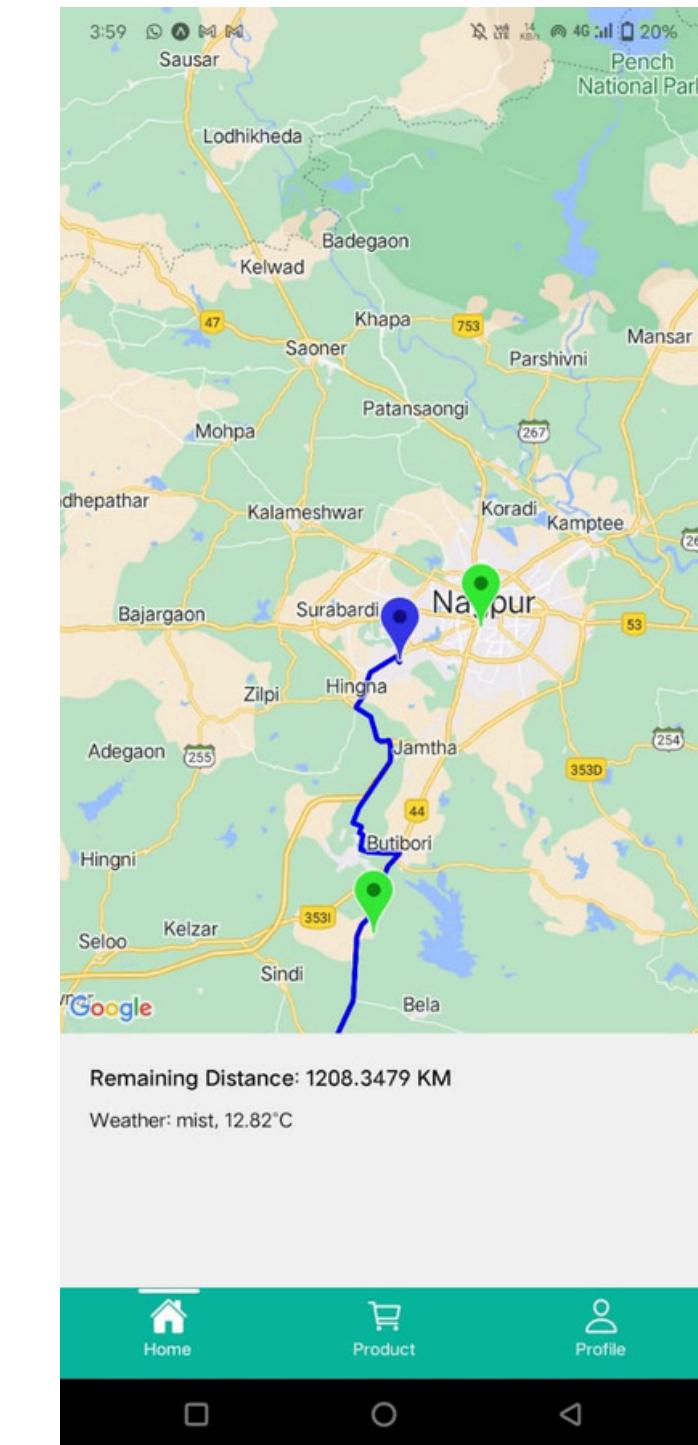
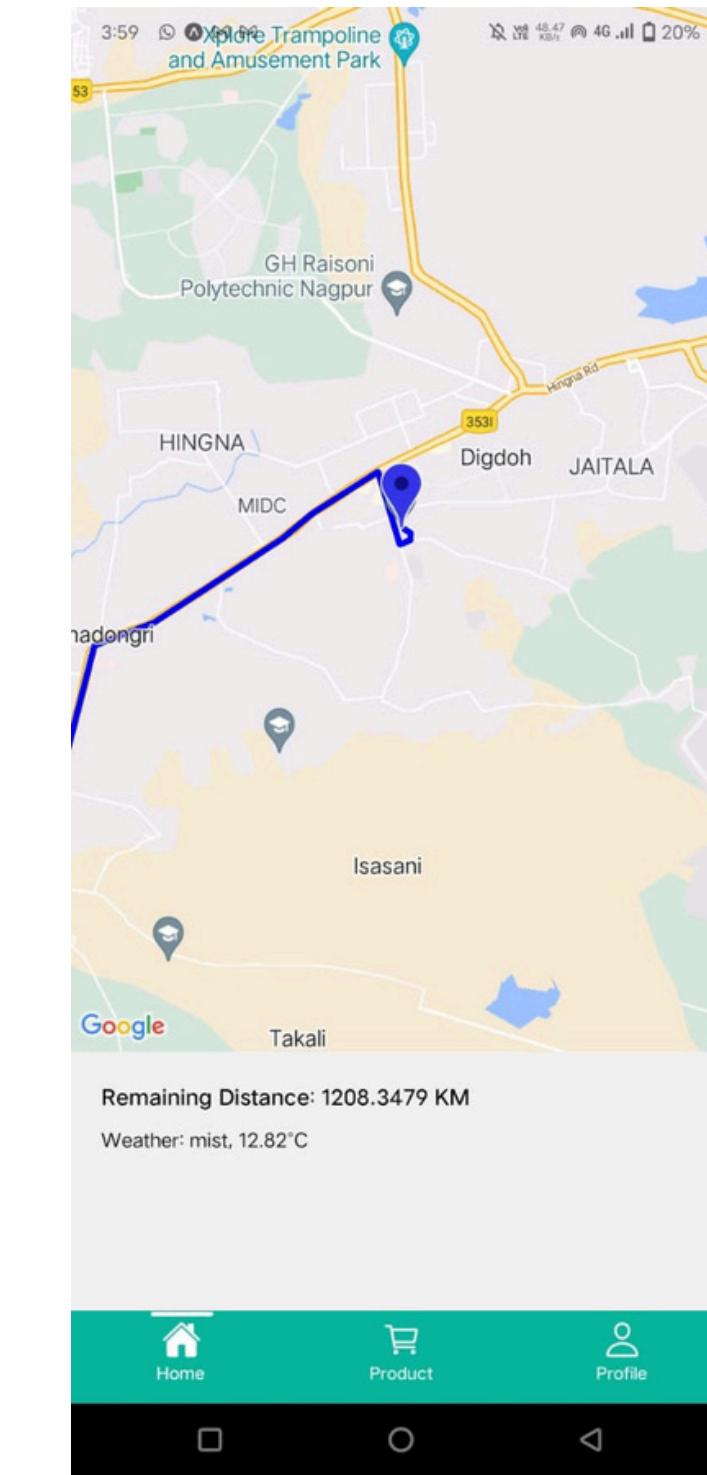
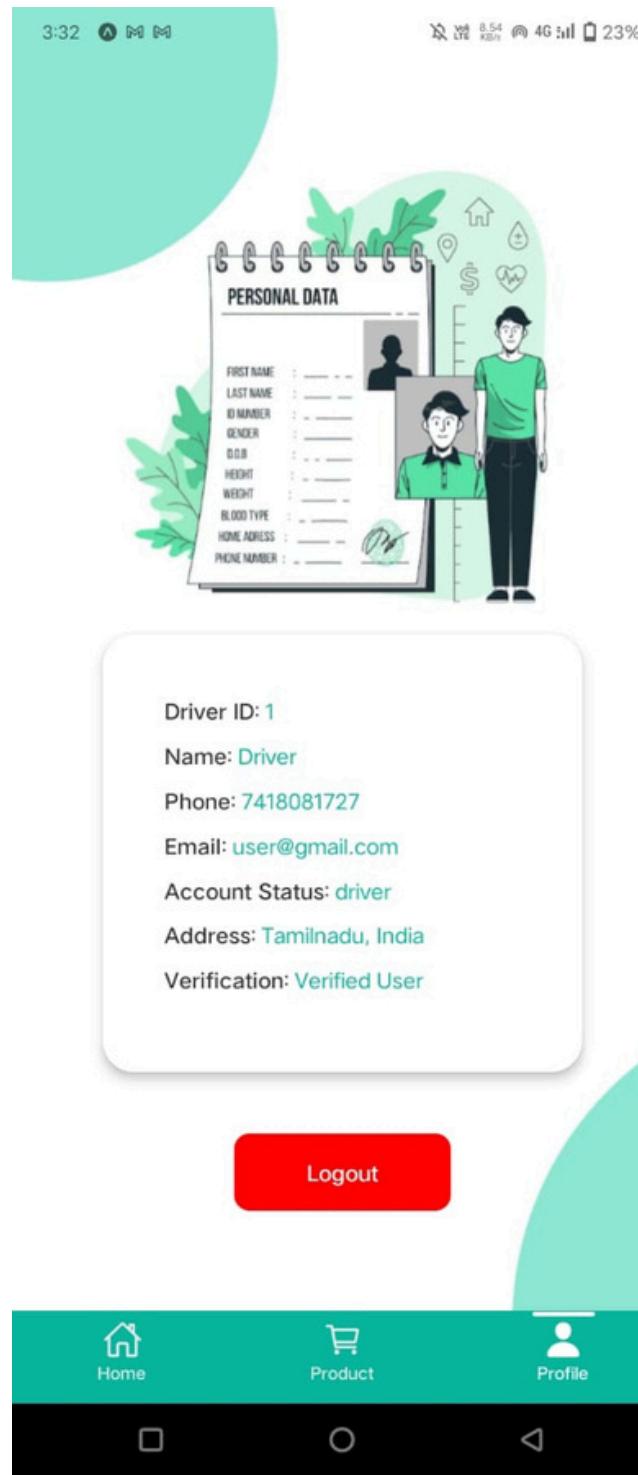
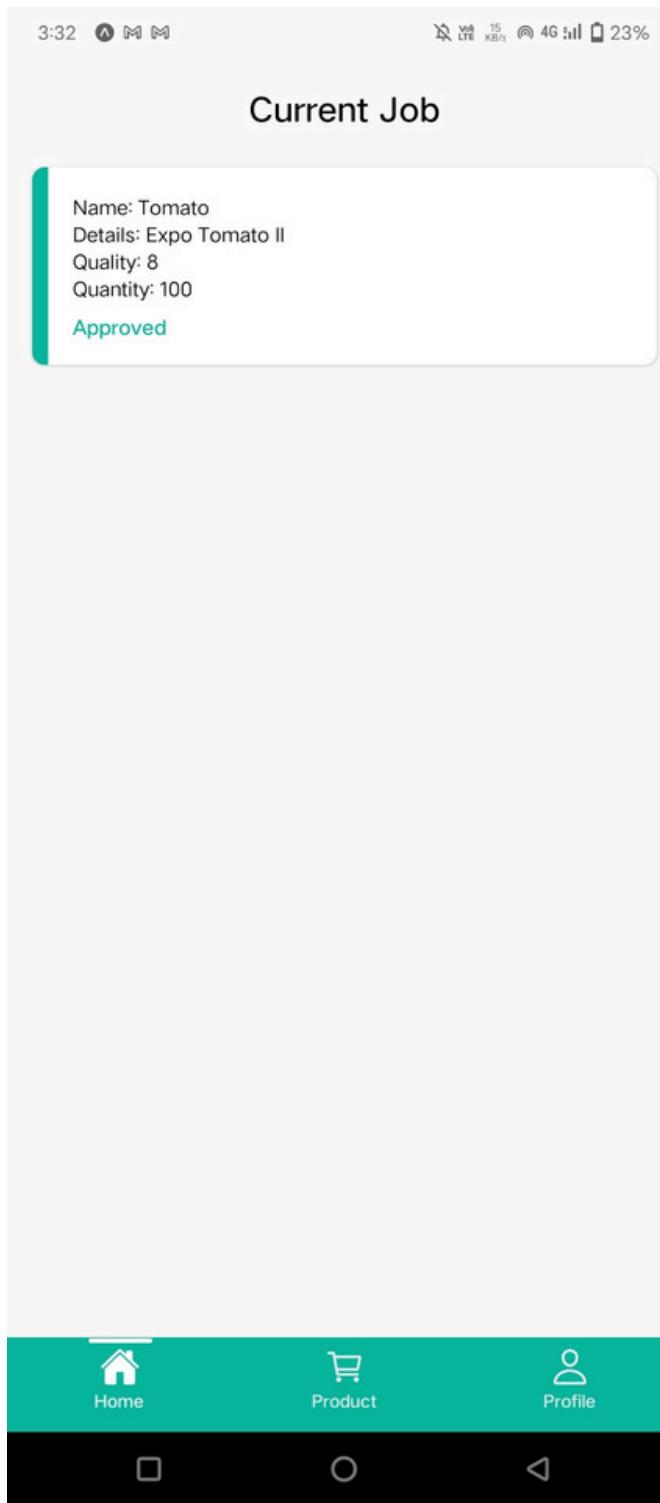


COOLSYNC SCREENSHOTS





COOLSYNC SCREENSHOTS





IMPACTS AND BENEFITS



SOCIAL

IMPROVES PERISHABLE GOODS SUPPLY CHAIN, ENSURING PRODUCT SAFETY AND AVAILABILITY.

ECONOMIC

REDUCES WASTE, OPERATIONAL COSTS, AND ENHANCES EFFICIENCY.

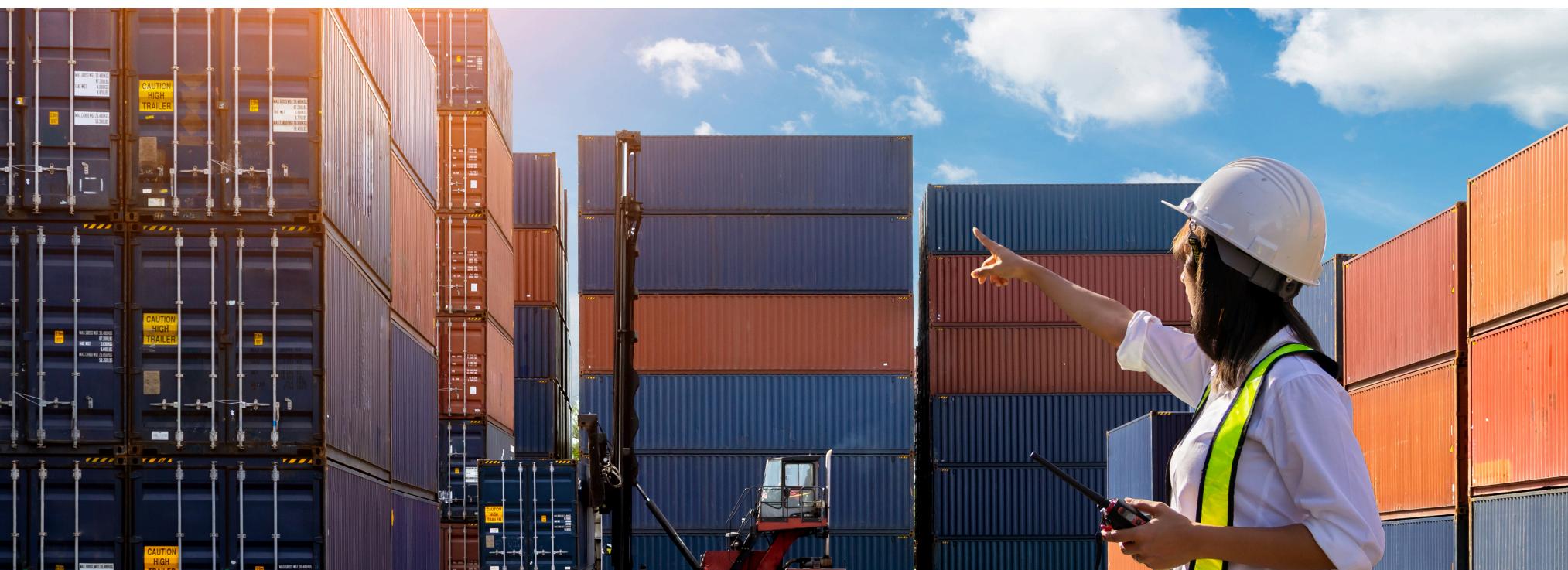
ENVIRONMENTAL

SUPPORTS SUSTAINABILITY THROUGH REDUCED EMISSIONS AND ECO-FRIENDLY PRACTICES.



FUTURE PLANS

- Integration of Multiple Transport Modes.
- Cross-Modal Data Analytics Automated Coordination Between Modes.
- Enhanced Customer and Stakeholder Features.





USER EXPERIENCE

**Intuitive dashboards for
real-time data visualization**



**Seamless alerts and
notifications for
stakeholders**



CONCLUSION

Our project is more than just logistics optimization—it's a smart solution tailored for the future. By combining real-time monitoring, dynamic route optimization, and sustainability tracking, we address critical industry challenges like perishable wastage, cost inefficiencies, and environmental impact. With an innovative, technology-driven approach, we aim to empower businesses with smarter, greener, and more reliable supply chain management. This is not just a project; it's a sustainable revolution in logistics.





CHANGES MADE IN THE COOLSYNC BASED ON YOUR SUGGESTIONS

1. SEGMENTATION OF THE COMPARTMENT



2. INTERNET DEPENDENCIES

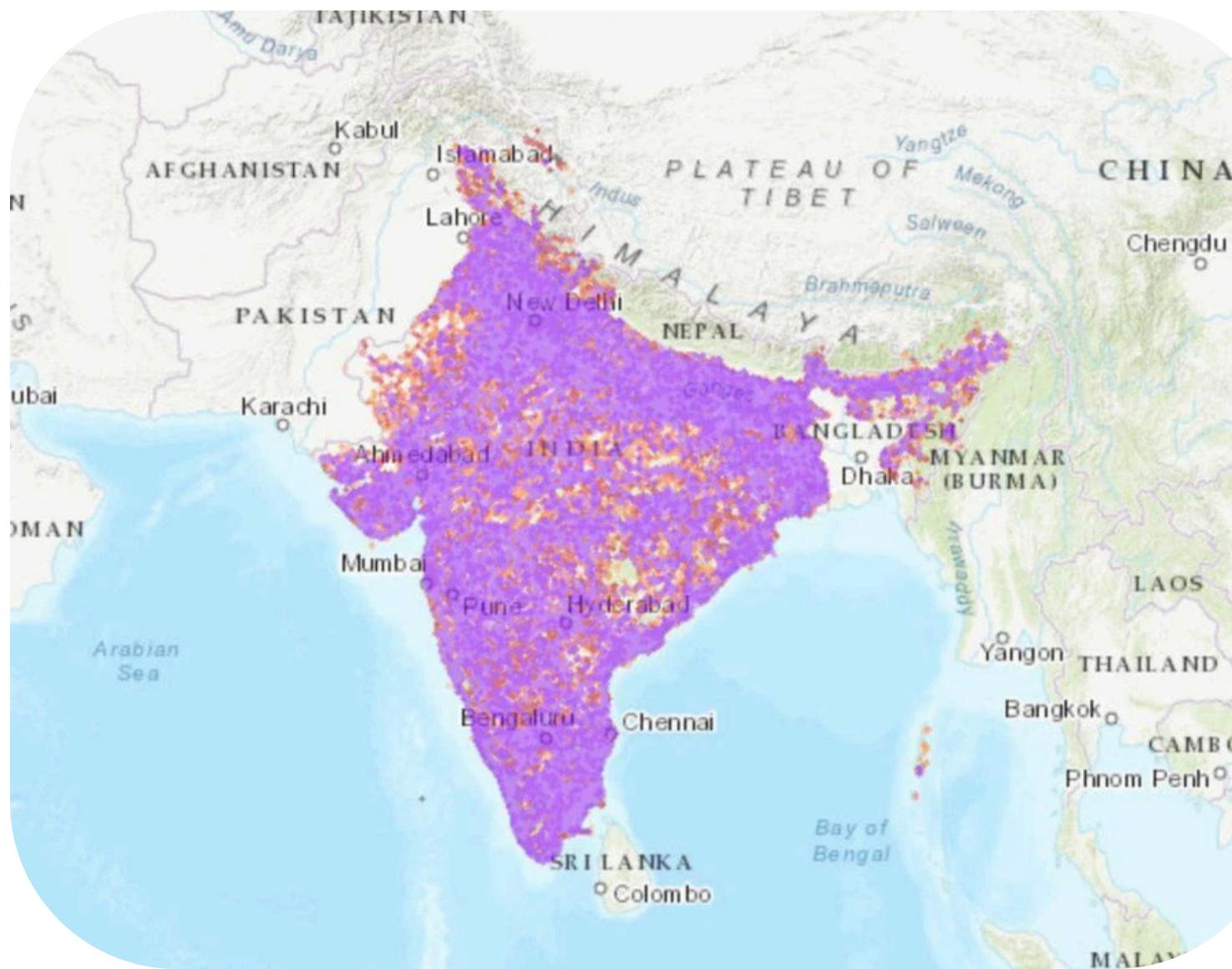
1. CALCULATION OF INTERNET BLINDSPOTS IN INDIA

Travel Type	Average Downtime (Minutes per Hour)	Average Downtime (Hours per Day)	Remarks
Urban Travel	1-3 minutes	0.5-1 hour	Minimal interruptions due to dense telecom infrastructure.
Rural Travel	10-20 minutes	4-6 hours	Limited telecom coverage and fewer towers lead to higher downtimes.
National Highways	5-10 minutes	2-4 hours	Generally stable, but remote stretches may face periodic signal loss.
Railways	10-15 minutes	3-5 hours	Interruptions occur in tunnels, remote areas, and regions with low towers.



FACTORS INFLUENCING DOWNTIME:

- TERRAIN: DENSE FORESTS, MOUNTAINOUS REGIONS, AND DESERTS AFFECT SIGNAL QUALITY.
- TELECOM PROVIDERS: JIO AND AIRTEL GENERALLY HAVE BETTER RURAL AND HIGHWAY COVERAGE THAN OTHER PROVIDERS.
- INFRASTRUCTURE: CONNECTIVITY IS BETTER IN STATES WITH ADVANCED TELECOM INFRASTRUCTURE, SUCH AS MAHARASHTRA, KARNATAKA, AND TAMIL NADU.

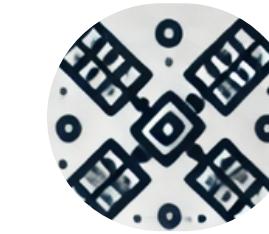




COOL SYNC



DIRECT SATELLITE CONNECTIVITY



HIGH AVAILABILITY



GLOBAL COVERAGE



NETWORK REDUNDANCY



RAPID DEPLOYMENT



LOW LATENCY AND HIGH SPEEDS



2 STARLINK



3. COMPETITIVE ANALYSIS

FEATURES	FOURKITES	PROJECT44	ZEBRA TECHNOLOGY	SENSITECH	SHIPWELL	COOLSYNC
AI/ML AND DATA ANALYTICS	✓	✓	✗	✓	✗	✓
CUSTOMER BASE/ LONGSTANDING REPUTATION	✓	✗	✓	✗	✓	✓
MULTI MODAL TRANSPORT	✗	✗	✓	✓	✓	✓
IOT SOLUTIONS	✗	✓	✗	✗	✓	✓
EASY TO USE PLATFORM	✗	✓	✓	✓	✗	✓

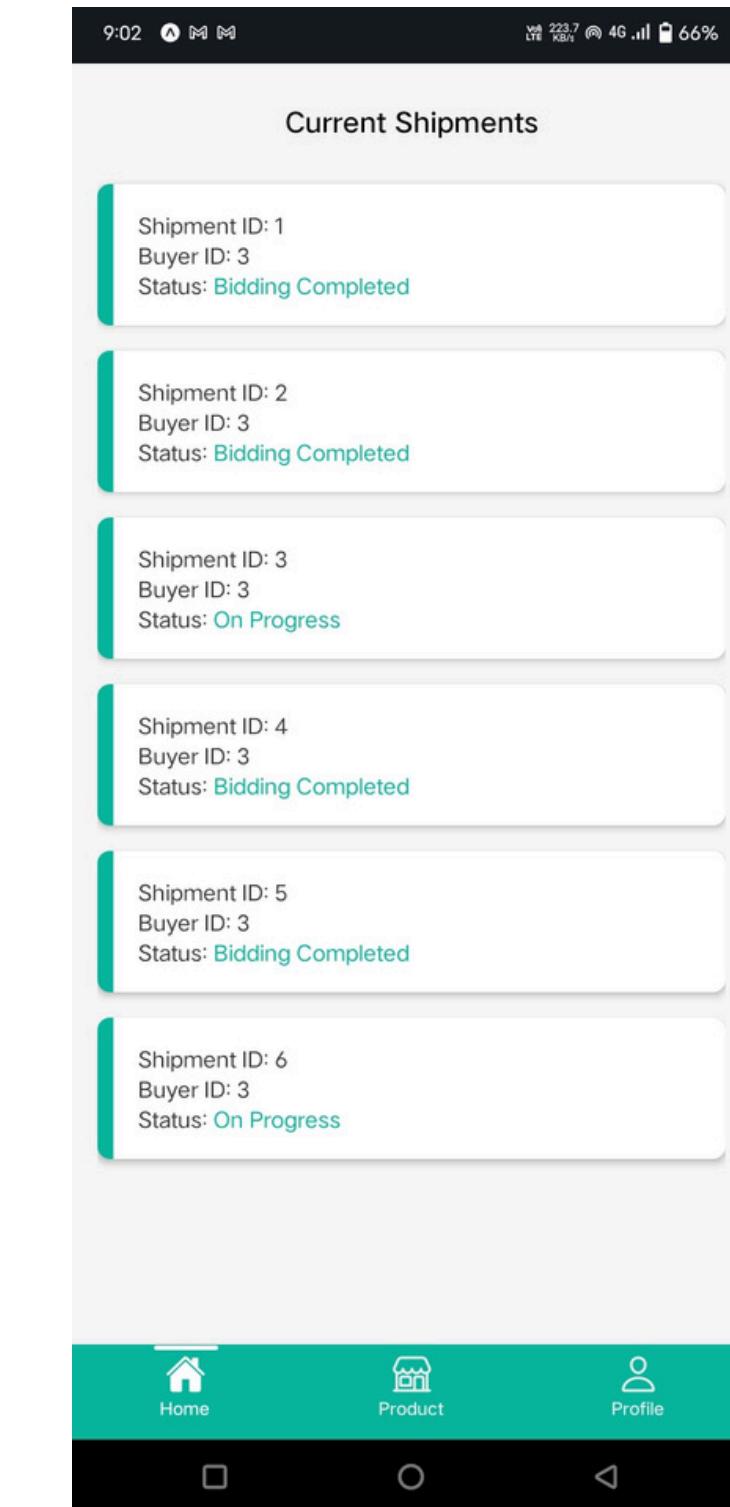
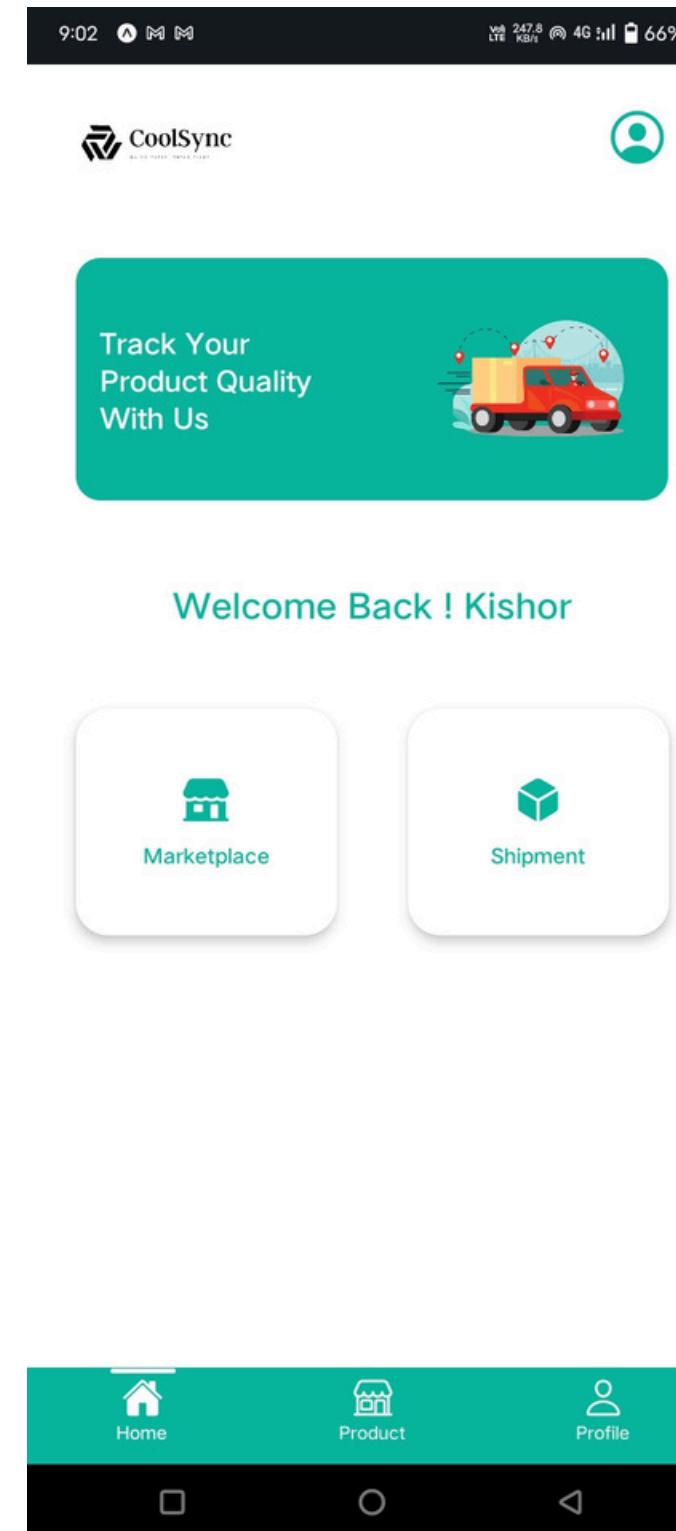


SUSTAINABILITY MONITORING	✓	✗	✓	✗	✓	✓
LOW COST	✓	✓	✗	✗	✗	✓
REAL TIME SUPPLY CHAIN	✗	✓	✓	✓	✓	✓
VISIBILITY AND TRACKING	✓	✗	✗	✓	✗	✓



4. CITY RESOURCES

HUB MANAGER



5. MULTI MODAL TRANSPORT

- COMBINES LAND, SEA, AND AIR TRANSPORT FOR EFFICIENCY.
- BENEFITS: COST-EFFECTIVE, REDUCES TRANSIT TIME, ECO-FRIENDLY.
- CHALLENGES: INFRASTRUCTURE, COORDINATION, AND LEGAL BARRIERS.



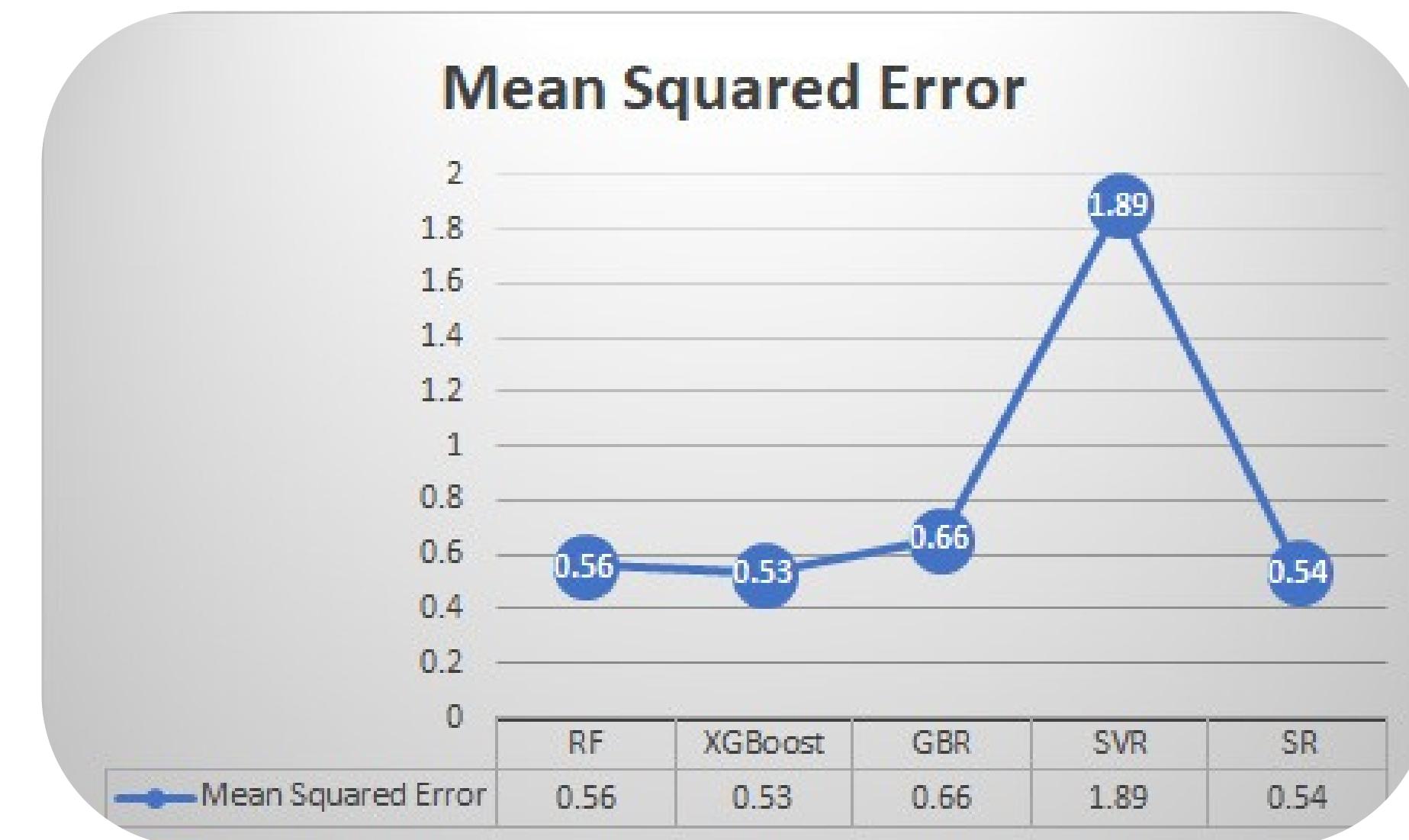


COOLSYNC

6. ALGORITHM EFFICIENCY ANALYSIS

ALGORITHMS USED

1. RANDOM FOREST
2. XGBOOST
3. GRADIENT BOOST REGRESSION
4. SUPPORT VECTOR REGRESSION
5. STACKING REGRESSION





COOL SYNC

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policybazaar
for Business

Commodity details: Edible vegetables or fruits and nuts or peel of c... Cover amount: ₹ 10,00,000 Cover type: Annual open Shipment: Inland (Domestic)

Recommended

Allianz BAJAJ Caringly yours All Risk Cover Covered amount ₹ 10,00,000 Get quote Add to basket

Top coverages: ✓ Theft/pilferage ✓ Loading and unloading ✓ Malicious damage +8 risks covered >

Allianz BAJAJ Caringly yours Basic Cover Covered amount ₹ 10,00,000 Get quote Add to basket

Top coverages: ✓ Collision ✓ Fire, lightning or explosion ✓ Breakage of bridge +3 risks covered >

Recommended

FUTURE GENERALI TOTAL INSURANCE SOLUTIONS All Risk Cover Covered amount ₹ 10,00,000 Get quote Add to basket

Top coverages: ✓ Theft/pilferage ✓ Loading and unloading ✓ Malicious damage +8 risks covered >

Plan name: All Risk Cover Covered amount: ₹ 10,00,000

What's covered What's not covered FAQs

Bulk cargo
Loss or damage to goods/cargo due to cargo being bulk (free flowing, liquid or dry form) and are being shipped loosely or without packaging.

Temperature sensitive goods/cargo
Loss or damage to goods/cargo which are temperature sensitive.

Weapon, radioactive or nuclear fission
Loss or damage to goods/cargo due to weapon, radioactive or nuclear fission.

Ordinary wear and tear
Loss or damage to goods/cargo due to normal wear and tear of the goods is not covered.

Get Quotes >

Break-Even Analysis

Net Revenue per Month

Net Revenue = Total Revenue – Variable Costs.

$$\text{Net Revenue} = (\text{₹}1,20,000 + \text{₹}31,500 + \text{₹}3,333) - \text{₹}1,89,000 = \text{₹}1,54,833 - \text{₹}1,89,000 = \text{₹}54,833.$$

Break-Even Time

$$\text{Break-Even Time (months)} = \frac{\text{Fixed Costs}}{\text{Net Revenue per Month}}.$$

$$\text{Break-Even Time} = \frac{15,50,000}{54,833} \approx 28.2 \text{ months.}$$

Break-Even Summary

1. Break-Even Time: Approximately 28 months (~2 years and 4 months).
2. Monthly Net Profit After Break-Even: ₹54,833.



BREAK-EVEN ANALYSIS

NET REVENUE PER MONTH:

NET REVENUE=TOTAL REVENUE-TOTAL VARIABLE COSTS.
 $\text{NET REVENUE} = \text{TOTAL REVENUE} - \text{TOTAL VARIABLE COSTS}$.
NET REVENUE=TOTAL REVENUE-TOTAL VARIABLE COSTS.NET REVENUE=₹2,49,167-₹1,89,000=₹60,167.
 $\text{NET REVENUE} = \text{TOTAL REVENUE} - \text{TOTAL VARIABLE COSTS}$.
 $\text{NET REVENUE} = ₹2,49,167 - ₹1,89,000 = ₹60,167.$
 $\text{NET REVENUE} = ₹2,49,167 - ₹1,89,000 = ₹60,167.$

BREAK-EVEN TIME:

BREAK-EVEN TIME (MONTHS)=FIXED COSTS/NET REVENUE PER MONTH.
 $\text{BREAK-EVEN TIME (MONTHS)} = \frac{\text{FIXED COSTS}}{\text{NET REVENUE PER MONTH}}$.
BREAK-EVEN TIME (MONTHS)=NET REVENUE PER MONTH/FIXED COSTS.
 $\text{BREAK-EVEN TIME} = \frac{15,50,000}{60,167} \approx 25.8 \text{ MONTHS.}$
 $\text{BREAK-EVEN TIME} = \frac{15,50,000}{60,167} \approx 25.8 \text{ MONTHS.}$
KEY INSIGHTS

1. BREAK-EVEN TIME: ~26 MONTHS (~2 YEARS AND 2 MONTHS).

2. LOWER COSTS:

- BY REDUCING FIXED AND VARIABLE COSTS, THE BREAK-EVEN PERIOD IS SHORTENED SIGNIFICANTLY.

3. SUSTAINABILITY:

- AFTER BREAK-EVEN, YOU GENERATE ₹60,167/MONTH IN NET PROFIT.