# Code Cubicle 4.0

# LOGISTICS AND SUPPLY CHAIN

SmartChain360

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# INVENTORY SPOTTER

**Optimizing Warehouse Picking** 

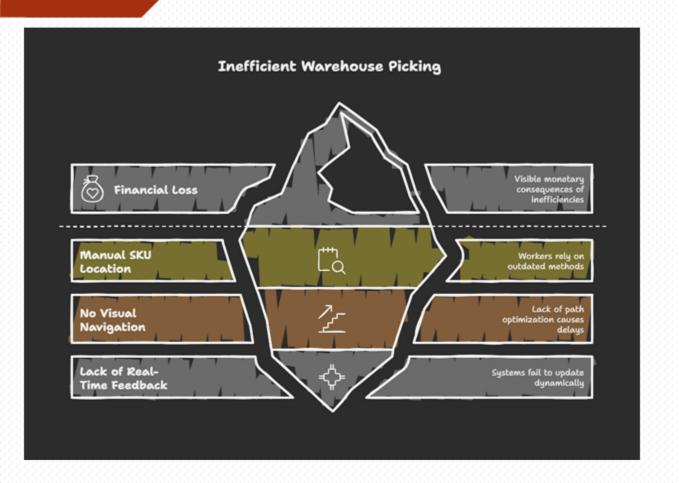








# Problem Statement – Inefficient Warehouse Picking



#### Manual SKU Location

Warehouse workers often rely on printed sheets, memory, or verbalinstructions to find items. This leads to:

- •Increased search time per order
- Higher cognitive load on workers

#### No Visual Navigation or Optimization

Workers take longer, non-optimal routes

•Aisle congestion and backtracking occur frequently

#### Lack of Real-Time System Feedback

- •Recalculate pick paths dynamically when stock or layout changes
- Integrate easily with barcode scanners

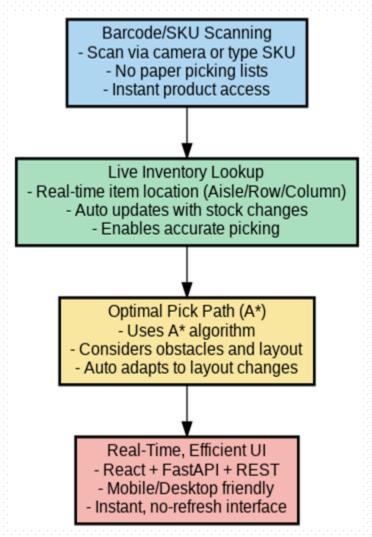
#### Operational Inefficiencies = Financial Loss

- •Delayed order fulfillment → poor customer experience
- Labor cost increases due to slower processing
- •Missed KPIs for picking speed and order accuracy

Modern warehouses need intelligent, responsive, and visual tools to guide pickers efficiently and minimize manual dependencies.

# Introducing SmartChain360: A Smart Web App for Pick Path Optimization

Inventory Spotter is a **lightweight**, **web-based solution** that digitizes and streamlines warehouse picking using live data and Al pathfinding.



## Impact & Benefits

- •30–40% faster picking times
- Less physical strain and aisle confusion
- Real-time visibility = improved decisionmaking
- Integrates easily with barcode scanners or future mobile extensions

SmartChain360 empowers warehouse workers to locate, retrieve, and pick SKUs faster and smarter, transforming everyday operations with minimal disruption.

# Key Features – Smarter, Faster and Visual Picking\_\_\_\_\_

## **Dock-Side Dispatcher**

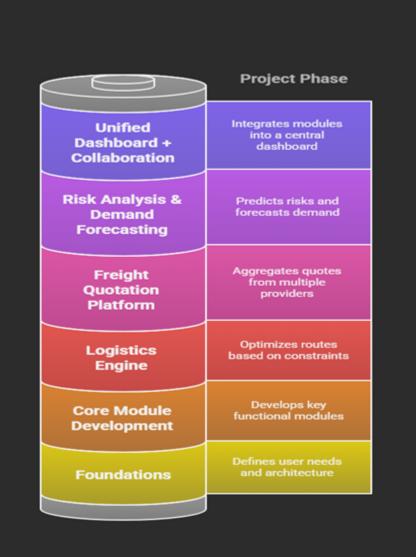
- Real-time dock and gate assignment.
- Text-to-speech for hands-free operation.
- •Impact: Speeds up vehicle turnaround time and reduces manual communication delays.

## **Inventory Spotter**

- •Barcode/SKU scanning, live inventory lookup.
- •A\* algorithm to show the optimal pick path.
- •Impact: Increases picking speed by 30–40%, reduces worker fatigue and errors.

## **Parcel Compliance Checker**

- •Validates item weight, type, and destination rules in realtime.
- •Flags and alerts non-compliant shipments.
- •Impact: Prevents shipment rejections and ensures regulatory adherence.



## Multi-Modal Route Optimizer

- •Takes shipment details and ranks best routes (air/sea/land/hybrid).
- Evaluates based on cost, delivery time, and environmental impact.
- •Impact: Enables smarter, greener, and faster shipping decisions.

## Freight Quote Aggregator

- Single interface to fetch and compare logistics provider quotes.
- Uses clustering logic to suggest best-fit providers.
- Impact: Reduces logistics costs and improves decision-making.

#### SmartChain360 Dashboard

- •Centralized view with shipment maps, alerts, route plans, and compliance status.
- Impact: Empowers managers with real-time visibility and decision support.
- Team Chat & Collaboration Panel
- Slack-like messaging with smart notifications.
- •Real-time updates on issues (e.g., stuck shipments).
- Impact: Enhances coordination and reduces downtime.

#### LIVE DEMO ARCHITECTURE - HOW INVENTORY SPOTTER WORKS BEHIND THE SCENES



#### 1 USER INTERACTION LAYER - REACT WEB UI

- Accepts rarcope/STKU input
- Component-Scanitam.jsx -> Triggers API cails for inventory row pathinding in ISON format
- per-based picking lists
- Eliminates the need for pa- & Buifttn CORS 8 asnyc I/O for sc allabe, concurrent



#### 2 BACKEND API LAYER - FASTAPI (PYTHON)

- · (aplistock((sku) Returns item meradata (quantity, row, column) in JSON format
- -> Endpoit 1- Corffs spu asory I/D for scalable, concurrent users
- Modular routes (stack.py.)



#### 4 DATA LAYER - POSTGRESQL OR IN-MEMORYMOCK

- · Current Demo (Uses inmemory mock database, with hardcoded SKU andM
- Production Ready: Docker support for corramnized deployment



#### **5 UTILITIES & CORE LOGIC**

- . A\* Algerithm Logic Housed in utils.Astar.py
- · Custom grid with obstacle-aware routing lo-
- -> Easily expandable into
- mosercorces for:
- · Compliance checking · Route tracking
- · Inventory syncking



#### O DEV ENVIRONMENT & SCALABILITY.

CONCLUSION: CLEAN, COMPONENT BASED ARCHITECTRE ABLES RAPID PROTOTYPING, REAL-TIME FEEDBACK, AND SCALABLE DEPLOYMENT-IDEAL FOR BOTH SMALL WAREHOUSES AND ENTERPRISE LOGISTICS SETUPS.

## Conclusion and Future

- Risk Dashboard
- •Real-time monitoring of risks (weather, delays, geopolitical).
- Suggests safer alternative routes or pre-booking.
- •Impact: Mitigates costly disruptions and improves delivery reliability.
- Demand Forecasting Engine
- Flags understock/overstock issues.
- •Impact: Optimizes inventory planning and reduces holding costs.

- AskSupplyBot Al Assistant
- •Voice/text-based assistant for routing and compliance queries.
- •Impact: Reduces manual lookup and training time.
- Parcel Snap Validator
- •Uses computer vision for label/size verification via camera.
- Impact: Prevents human error in packaging and labeling.

