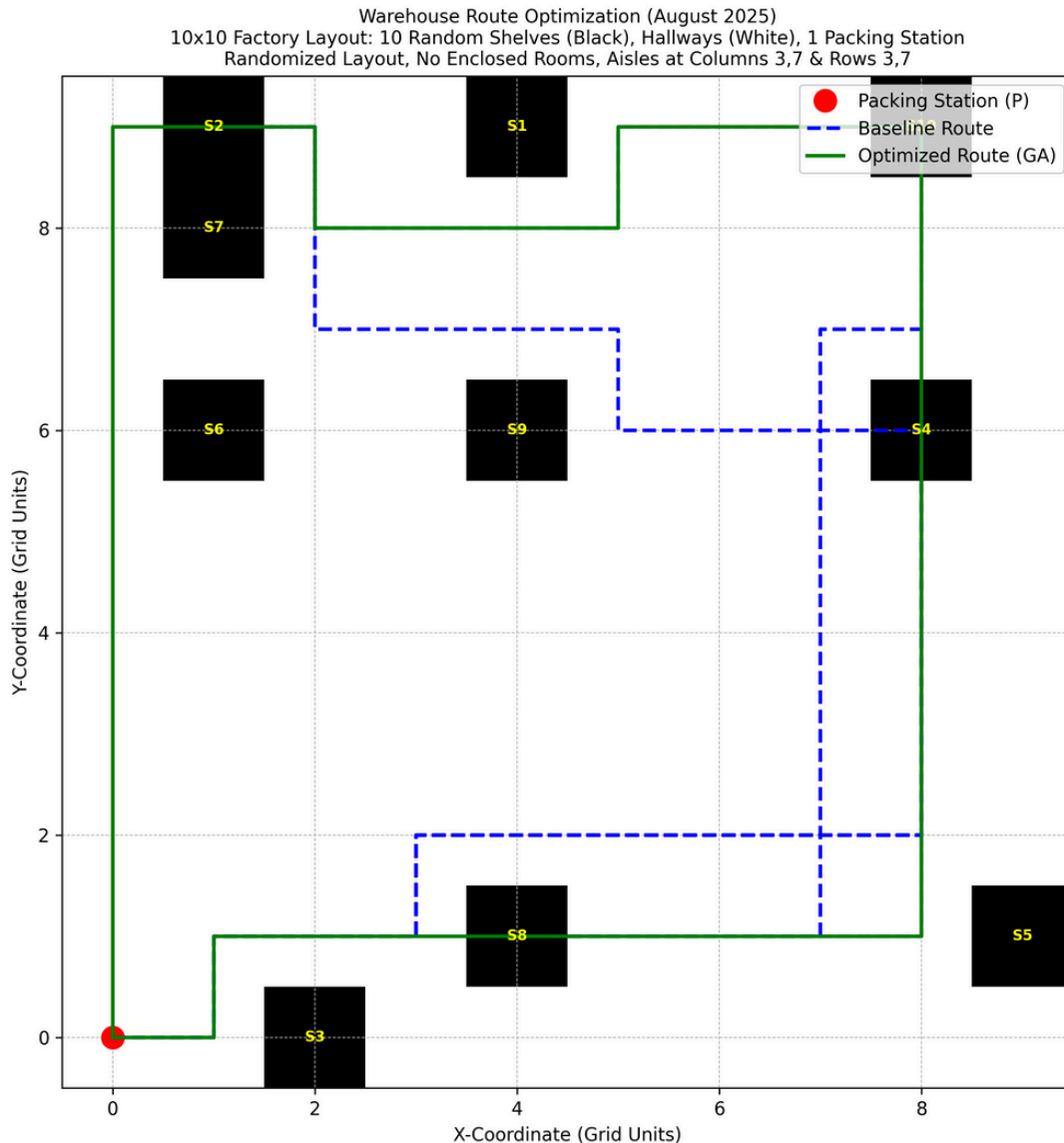




## AI - DRIVEN WAREHOUSE ROUTE OPTIMIZATION



### What

- Built a Python simulation (August 2025) to optimize warehouse routes in a 10x10 factory layout with 50 randomized shelves, cutting travel distance by 26.47% using a greedy algorithm (NumPy, Matplotlib, Pandas).
- Engineered a realistic warehouse model with labeled shelves (S1-S50) and cross-shaped aisles, analyzed with Pandas.

### Why

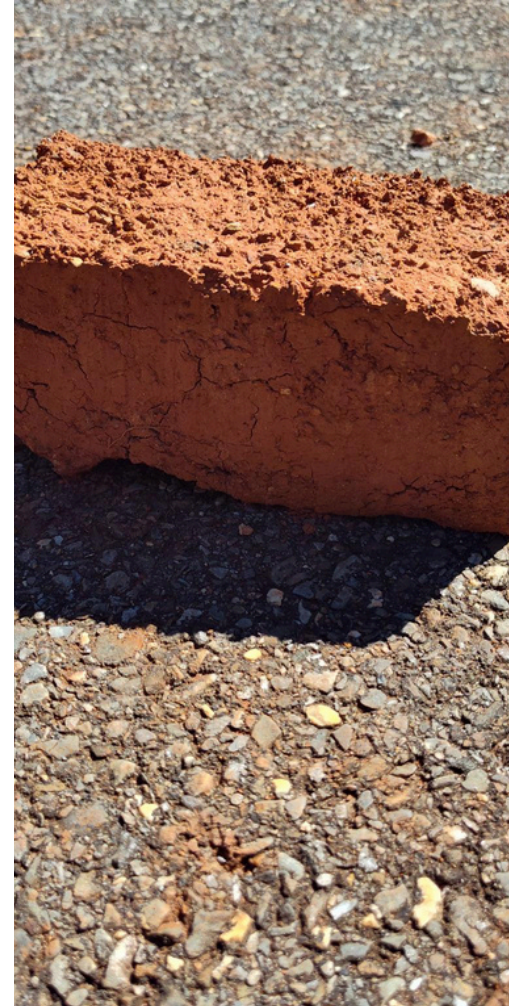
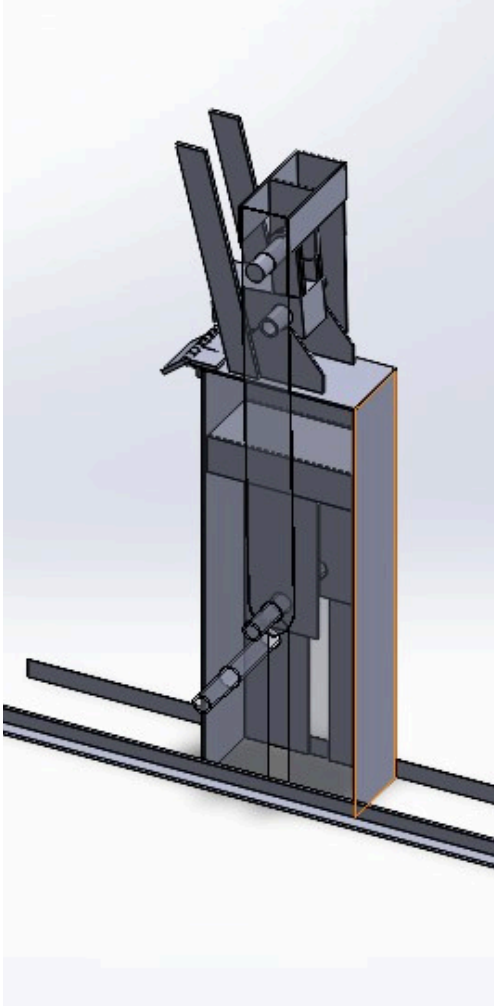
- Demonstrates ISE logistics optimization, delivering 26.47% efficiency gains in a simulated factory setting, relevant for e-commerce.
- Offers a data-driven approach applicable to manufacturing industries.

### Future

- Plan to integrate genetic algorithms by late 2025 to optimize shelf placement and routes, enhancing overall efficiency.
- Intend to expand to multi-picker scenarios and dynamic order batching with clustering techniques in 2026, enabling scalability for larger warehouses.



## EMRC ECHO BRICK PRESS



### Idea

- Designed a metal brick press for ECHO's West Africa request, enabling hand-made bricks for homes/buildings using local soils and compression instead of kilns.
- Incorporated clay + straw composition for strength, replacing traditional kneading/waiting with efficient pressing to create "rock-like" bricks.

### Prototype

- Built SolidWorks model to calculate compression force, arm length, and moment of inertia for stability, testing cinder block size and soil variability.
- Explored holes for faster drying without compromising strength, using air-dry process for clay blocks and trial/error for optimal dirt volume.

### Result

- Produced functional press prototype reducing drying time and force needs, with procedure for adjusting dirt based on local soils/weather for integrity.
- Recommended ECHO consultation on materials/adhesive, locations, and curing (kilns vs. drying), ensuring adaptable, cost-effective bricks for West Africa.