Future-Proofing Physical Retail with AI and IoT

SAM BROCKLEHURST

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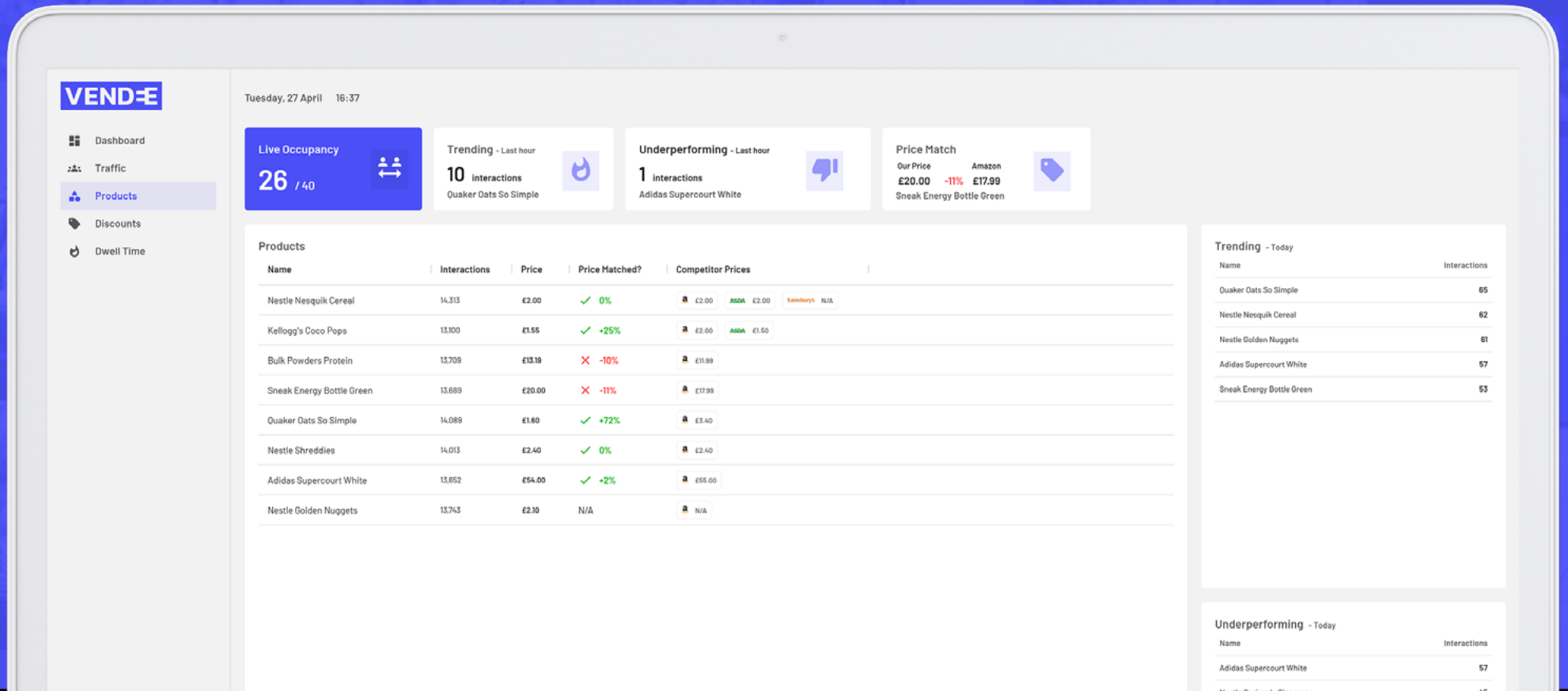

INTRODUCTION

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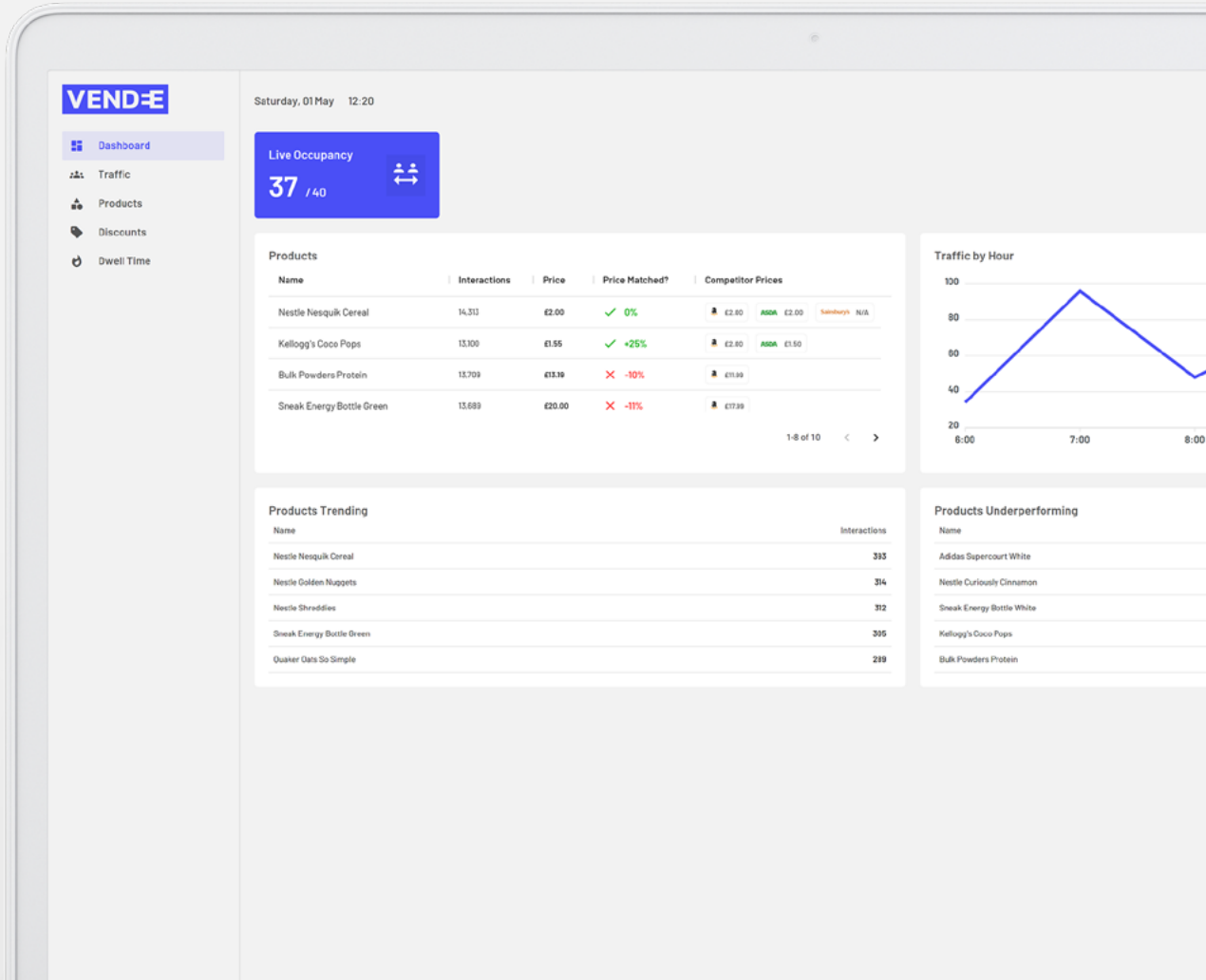
- Research
- Methodology
- Design
- Implementation + Testing
- VENDEE Demo
- Evaluation
- Conclusion



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Current Retail Landscape

32.4%

US E-Commerce Grown in 2020

E-COMMERCE 

63%

UK Retail E-Commerce Sales in 2020 from Smartphones

M-COMMERCE 

4/10

Consumers Switched to Online for Products They Would Have Bought Offline

COVID-19 

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The Role of Physical Retail

SHOWROOMING

When consumers inspect products offline, before making the purchase online.

EXPERIENCE

This product research is still valuable to retailers, providing customers with the chance to discover their products.

HOW TO MEASURE STORE PERFORMANCE?

Sales and profits are no longer suitable, as value is still being created through the pre-transaction stage of the customer experience. New metrics are needed:

- **Customer Behaviour**
- **Product Engagement**
- **Dwell Time**

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Omnichannel Retailing

A strategy that focusses on providing a seamless shopping experience, satisfying customers who increasingly want everything.

However, the are problems for retailers:

- **Data Integration**
- **Lack of Technology**

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Technologies

Capturing and utilising data in the physical space is essential for omnichannel retailers.

- Machine Learning Model
- Facial Recognition
- Object Detection

ARTIFICIAL INTELLIGENCE

- Cameras
- Digital Screens
- BLE Beacons

INTERNET OF THINGS

Product

AIM

To develop a system that enables retailers to fully integrate omnichannel strategies by capturing and utilising data in the physical retail space.

MUST

- Automatically capture customer behaviour and engagement in real-time.
- Utilise data across the store.
- A dashboard to provide retailers (managers) with an overview of store performance.

SHOULD

- Branding to make it more marketable to potential retailers.
- Enable personalised content to be sent to customers.
- Offer dynamic pricing on products.

COULD

- Perform automatic checkout when customers leave the store.
- Track when products in-store are out of stock.

WON'T

- A companion smartphone app to enhance customer experience in-store.

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Agile

A modern, iterative approach to project management and software development.

PRODUCT BACKLOG 

USER STORIES 

USER PERSONAS 

UNIT TESTING 

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Product Specification

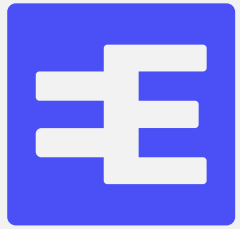
Produced to define the product requirements and design, including hardware and functions.

Branding

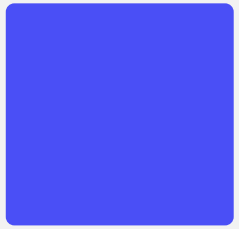
Modern and sleek brand assets to help the product distinguish the product from its competitors.

Logo

Icon



Colours



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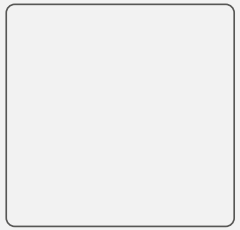

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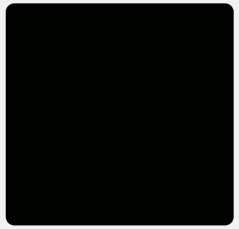

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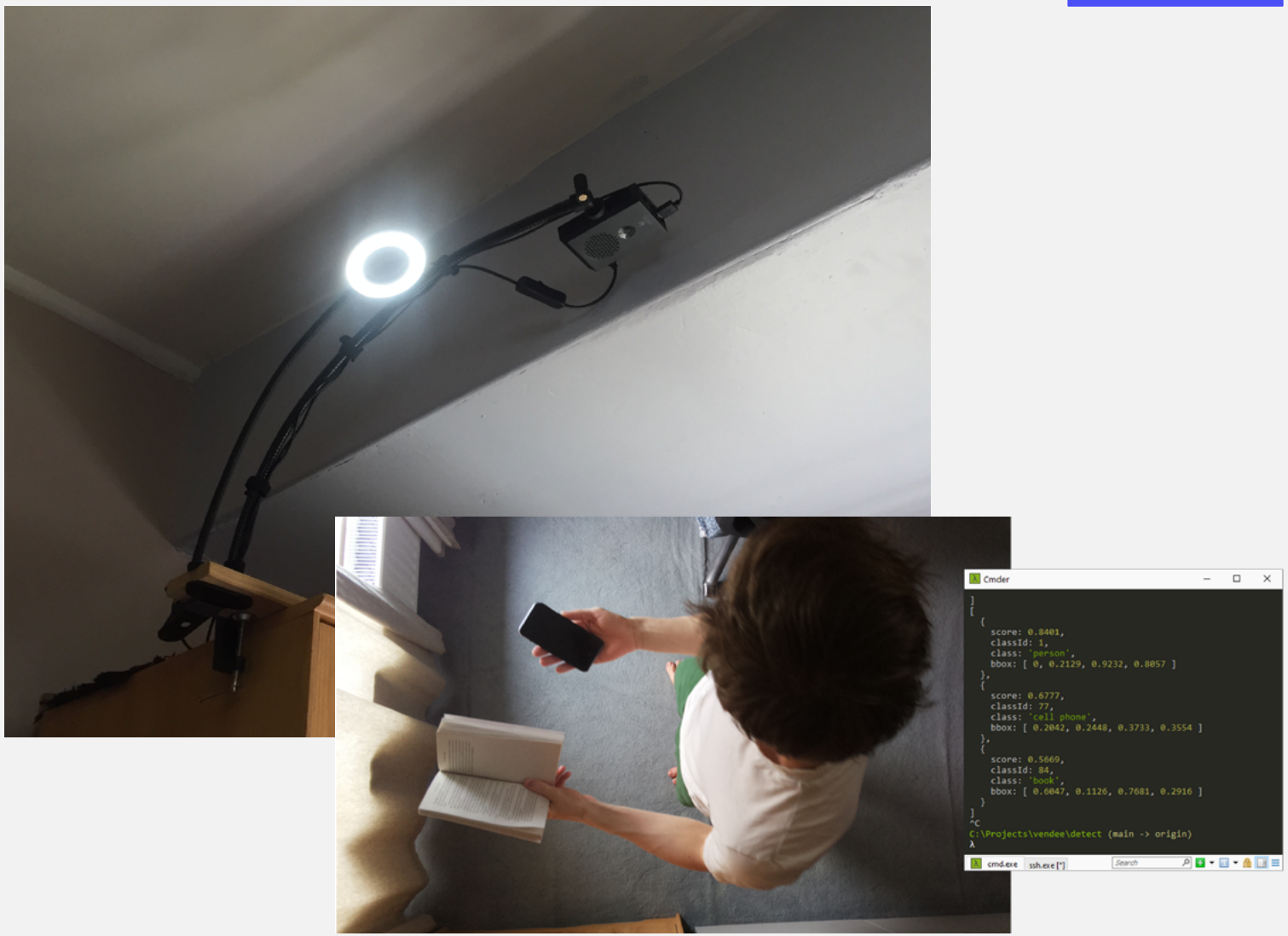
Initial Setup

HARDWARE

- Test Pi + Camera
- Access Pi from Local Machine
- Get Camera Feed

MACHINE LEARNING

- Integrate Pre-Trained Model
- Start Detecting Objects



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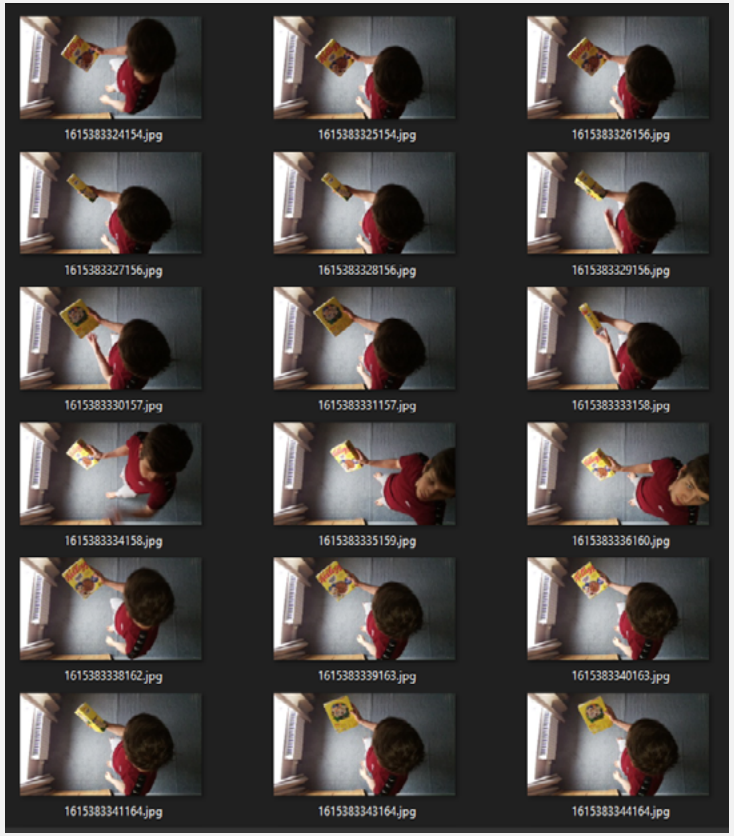
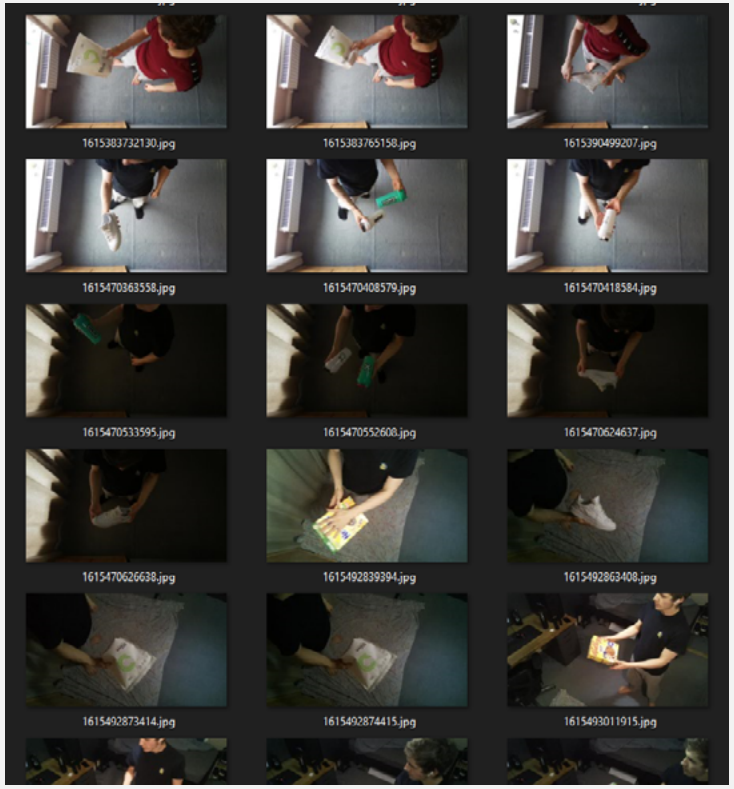
Custom Machine Learning Model

PREPARING DATASET

Various datasets were produced to train a robust model, capable of detecting people and retail items.



1st Dataset



2nd Dataset

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Custom Machine Learning Model

PREPARING DATASET

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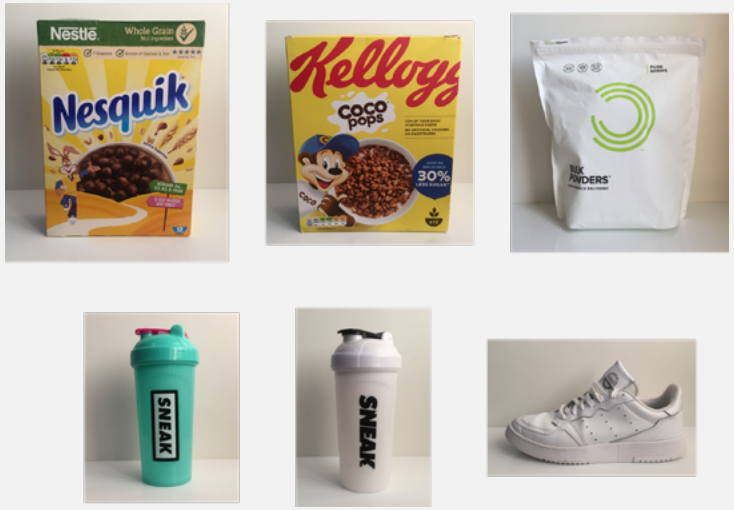

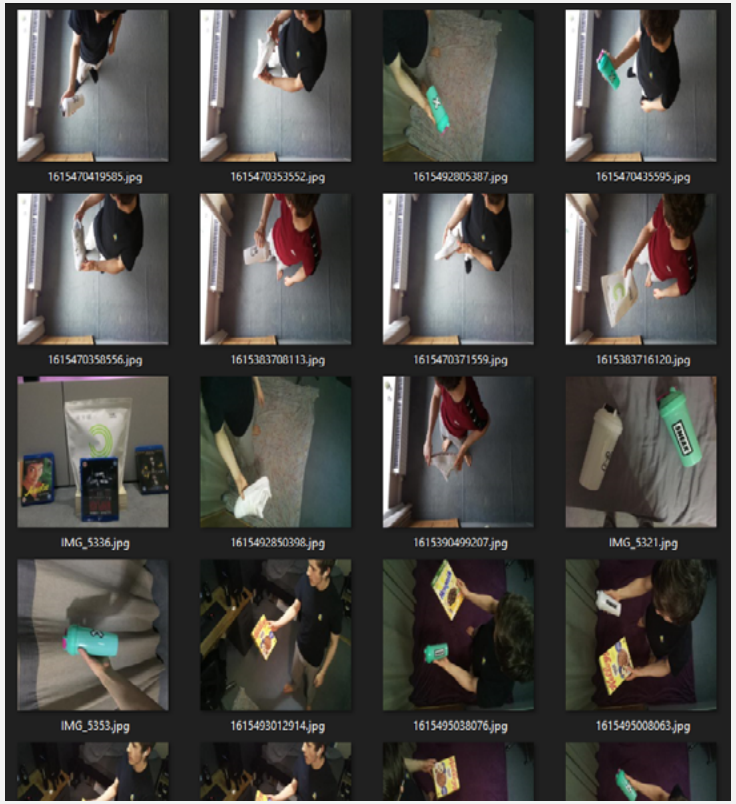

Final Dataset

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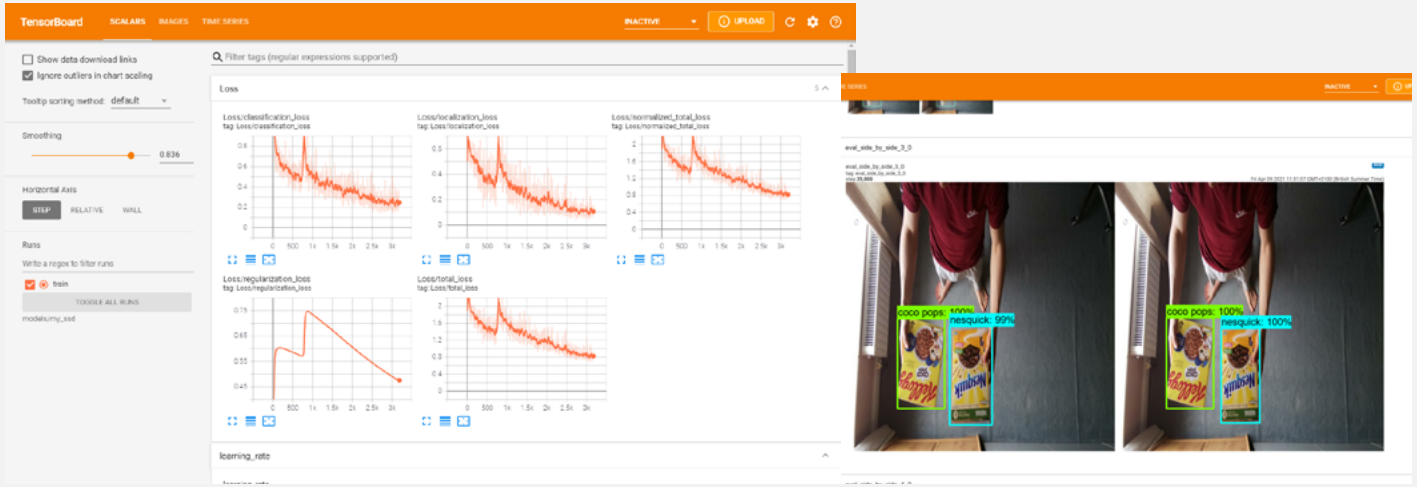
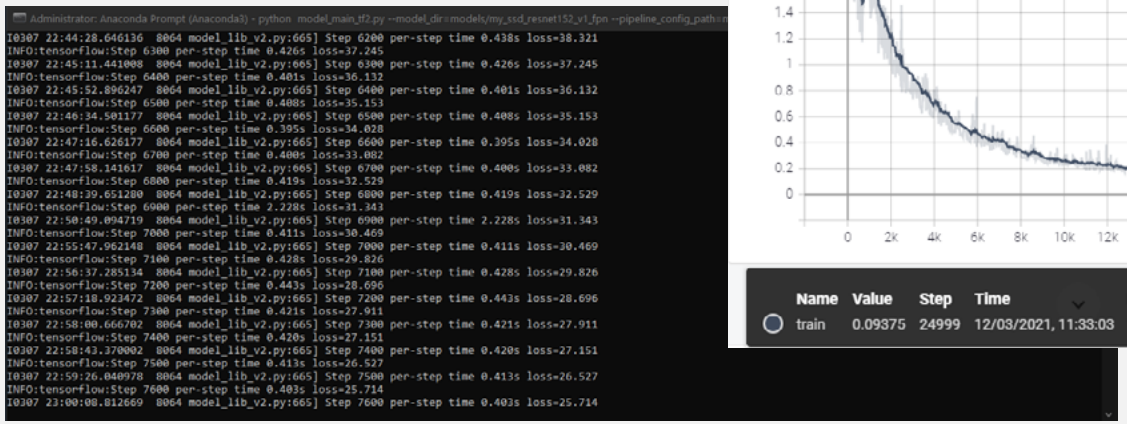
Custom Machine Learning Model

TRAINING

The dataset is used to train the model to accurately predict the retail products.





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Technologies In-Store

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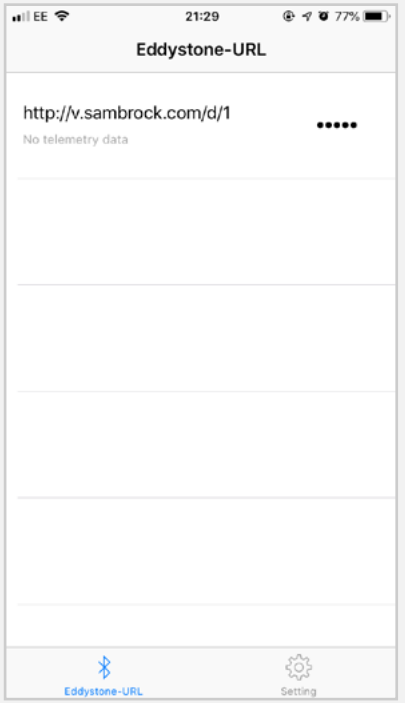
DYNAMIC PRICING

- LCD Screens Displaying Price
- Competitive Price Matching

DISCOUNTS

- Bluetooth Beacons
- Eddystone-URL



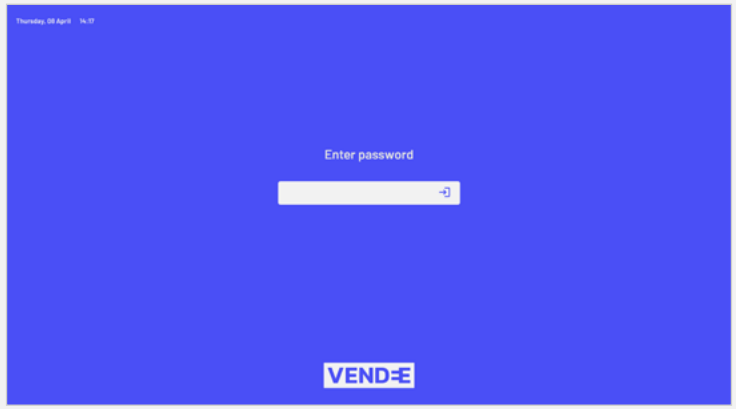
Web App

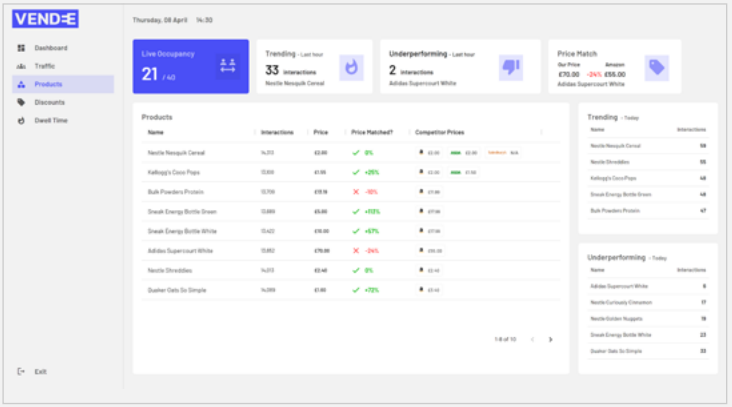
FRONT-END

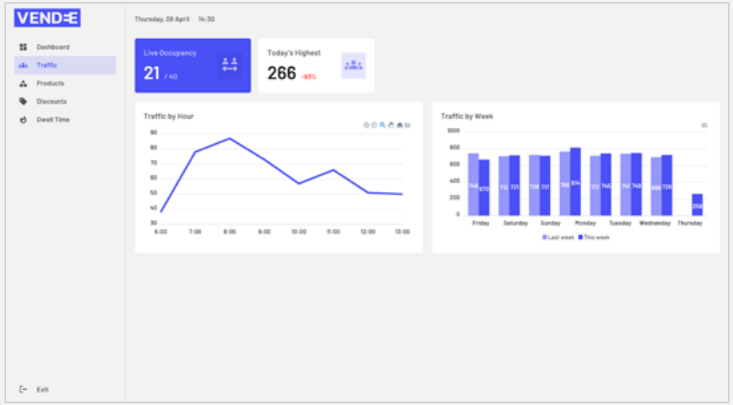
- React
- Jest

BACK-END

- Node.js
- Express
- MongoDB





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Demo

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Future Developments

Vendee has many opportunities for future development.

- Companion App
- Customer Facial Recognition
- Progressive Web App
- More Products in Dataset
- Custom Hardware
- Access Levels

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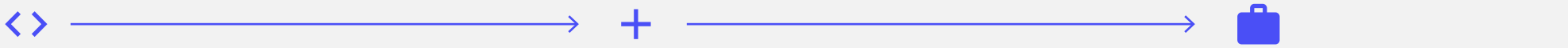
Learning and Self Development



DEVELOPED CORE SKILLS

- Front-End Dev
- Back-End Dev

ACQUIRED NEW SKILLS

- AI + Machine Learning
- Internet of Things

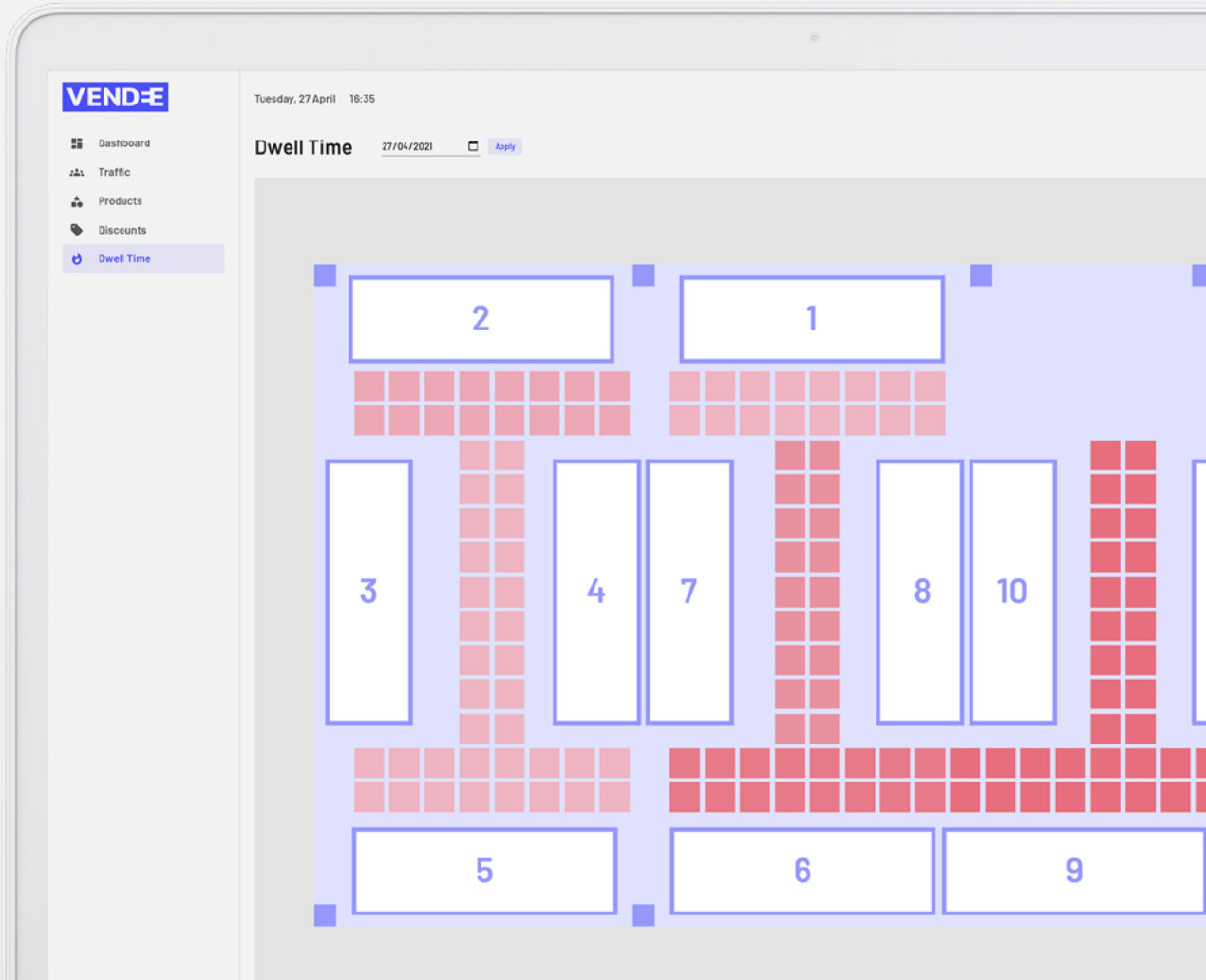
IMPROVED EMPLOYABILITY

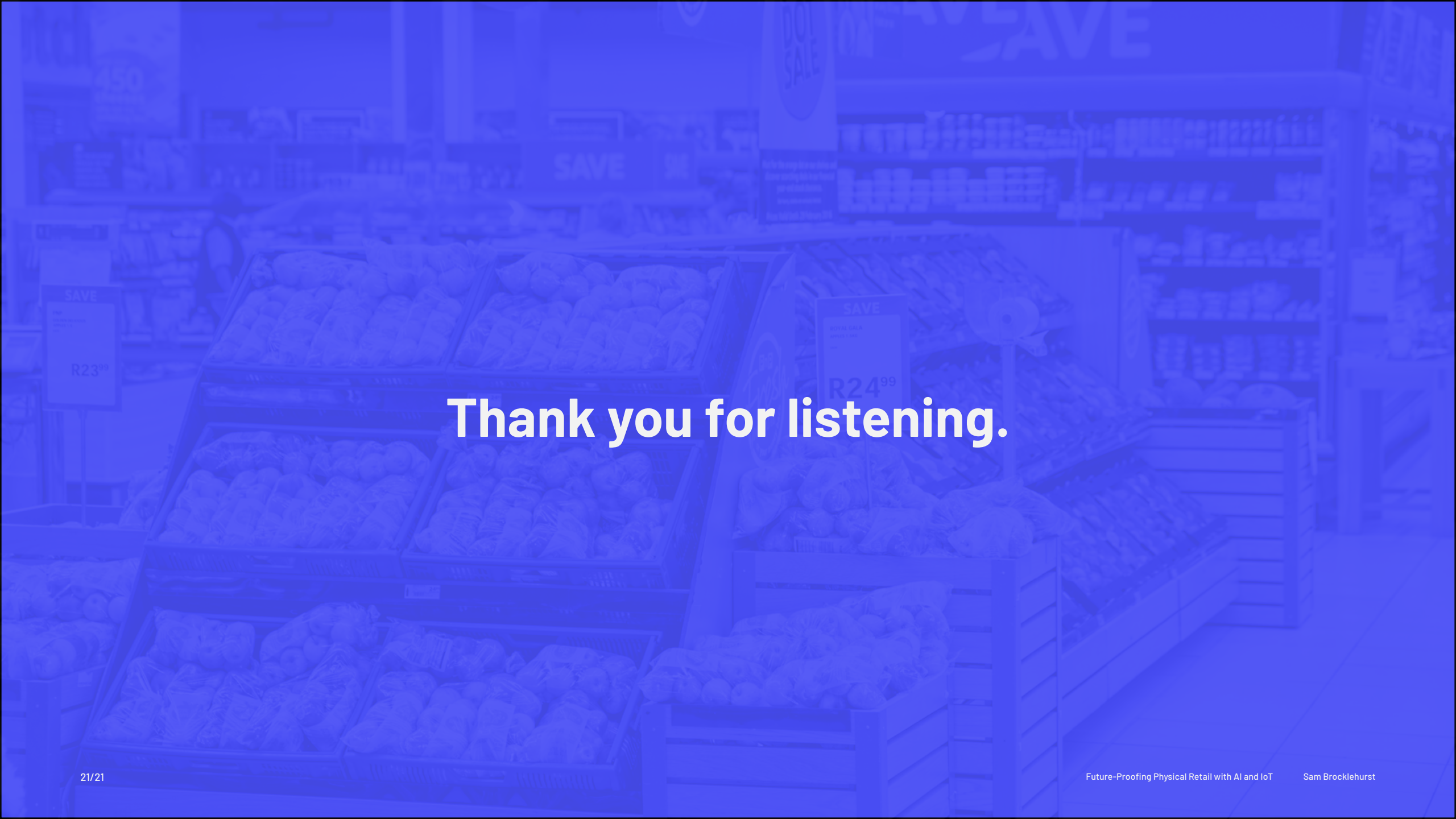
- Experience with Agile
- Unit Testing
- Writing Better Code

CONCLUSION

Future-Proofing Physical Retail with AI and IoT

- Post-Pandemic Retail Landscape ✓
- Omnichannel Strategy ✓
- AI + IoT ✓
- Viable Solution ✓





Thank you for listening.