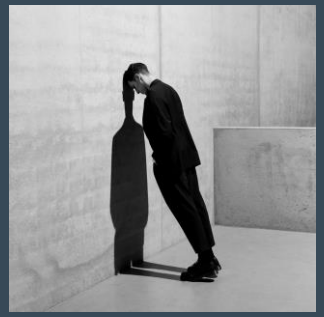
HAVE YOU EVER ....



City University of Hong Kong
Final Year Project 2020-2021

MOBILE - BASED LOGISTICS SYSTEM WITH SMART ROUTING AND TRACKING SERVICES

Wu Kai On (55216397)

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Project Background

ONLINE SHOPPING

E - COMMERCE

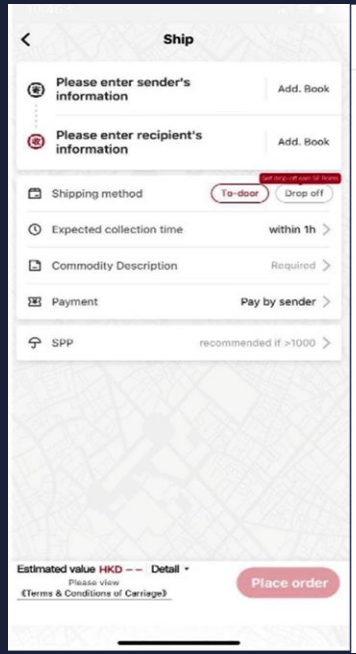
SERVICE QUALITY

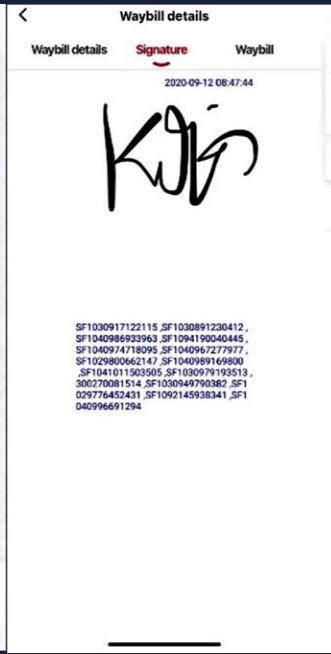
RELIABLE

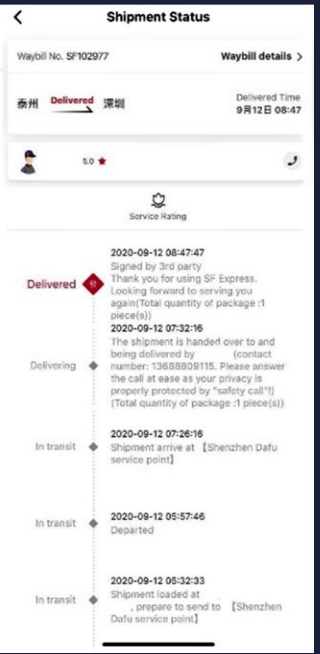
MANAGEABLE

Comparison

SF EXPRESS

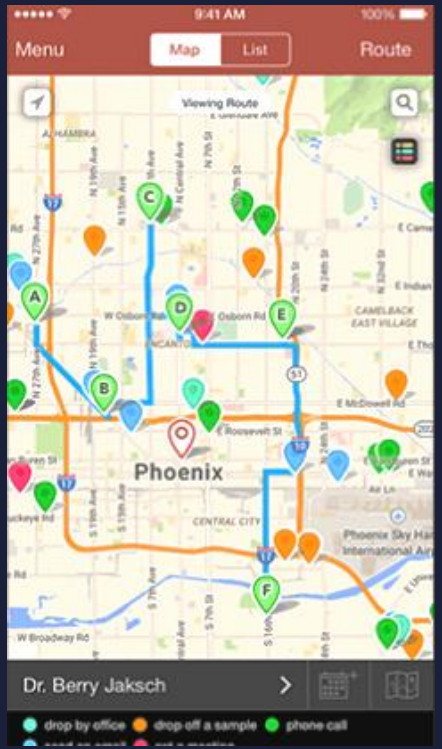


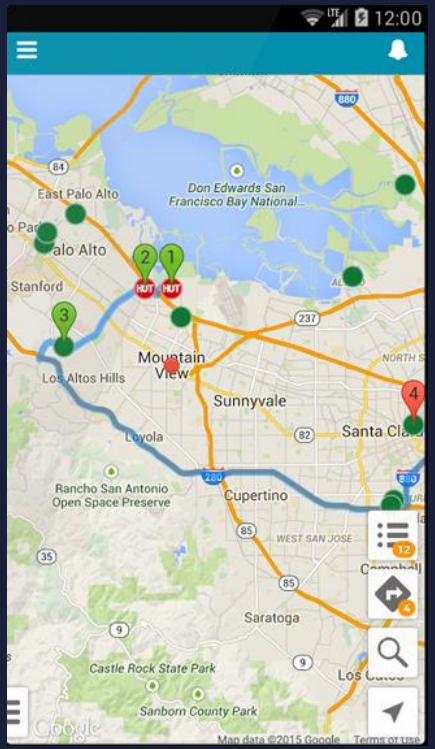




Comparison

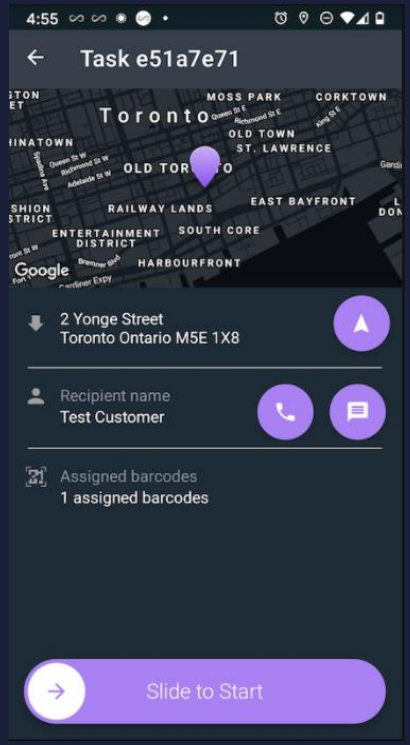
GEOPOINTE





Comparison

ONFLEET



Comparison

Features	Market Existing Products			Prosposd Product
	SF Express	Geopointe	Onfleet	Moblie-based Logistics System
App Interface	✔	✔	✔	✔
Items Check-in	✔			✔
Bill Tracking	✔		✔	✔
Live Location		✔	✔	✔
Proof of Delivery	✔		✔	✔
Route Planning		✔	✔	✔
Stocks Management				✔
Profit Calculation				✔
Bill History	✔			✔
Items QR Code				✔
Driver Identity Proof				✔
Smart Driver Dispatch			✔	✔
Users and Drivers Management				✔
Estimated Arrival Time				✔

LOGISTICS SYSTEM

- Predictable - Estimated Arrival Time
- User - friendly - Reactive and Clean Interface
- Trustworthy - Manageable and Functional
- Cost Efficient - For small - scale logistics businesses

BILL TRACKING

Live Location

Items Online Check-In

DISPATCHING

Smart Jobs Assignment

Optimal Routing

MANAGEMENT

Delivery Items

Drivers and Users

PROOF OF DELIVERY

E - signature

QR Code

User Check-in Item

Admin Assign Jobs

Driver Register Jobs

Optimal Routing

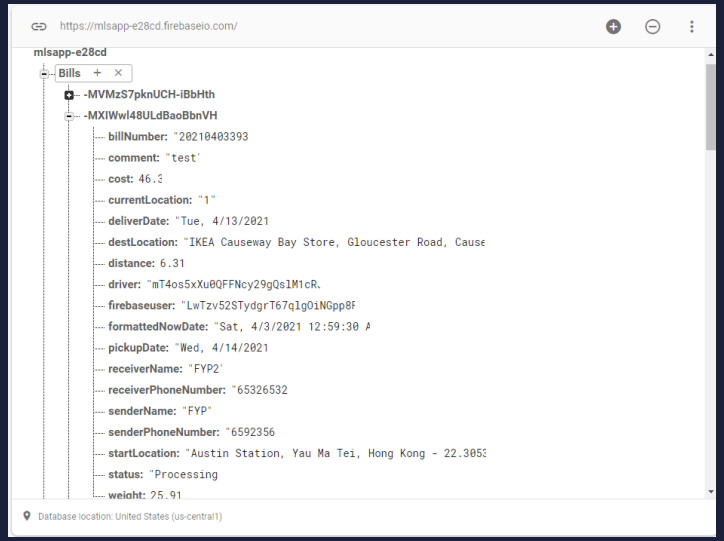
Item Tracking

Process Items

Methodology

Database and Application Structure

- Flutter, Android - 3 Interfaces
- Firebase Realtime Database
- Authentication



Real-time bill tracking

- Periodically Retrieve Driver's Location
- Real-time update
- Estimated Arrival Time

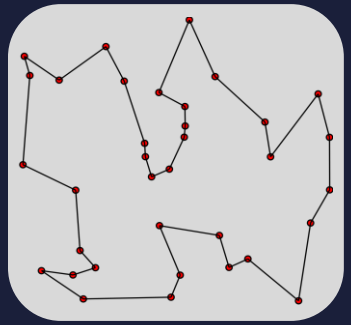
Smart Jobs Assignment

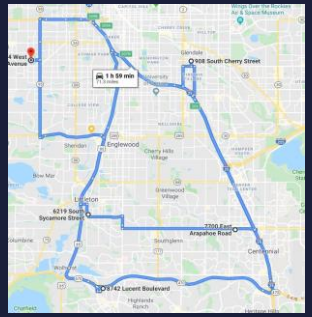
- Bin Packing Problem
- Modified First Fit Algorithms
- Check the status of the Bills

Driver ID	Driver03 (Capacity 5.5 tons = 5500kg)
Total Jobs	B1. 482.4kg (Status: Pending) B2. 9999.9kg (Status: Pending) B3. 28.6kg (Status: Assigned) B4. 76.9kg (Status: Pending)
Calculation	1. Sorting the Bill: B3, B4, B1, B2 2. Check the status: B3 has assigned - FAIL 3. Bill List available: B4, B1, B2 4. Assign B4 (Capacity = 5500-76.9 = 5423.1 kg) - SUCCESS 5. Assign B1 (Capacity = 5423.1-482.4 = 4940.7kg) - SUCCESS 6. Assign B2 (Capacity = 4940.7-9999.9 = -5059.2kg) - FAIL
Jobs Assigned	B4, B1
Jobs Fail to Assign	B3, B2

Optimal Routing

- Travel Salesman Problem
- Retrieve the Driver Location
- Keep finding the nearest destinations

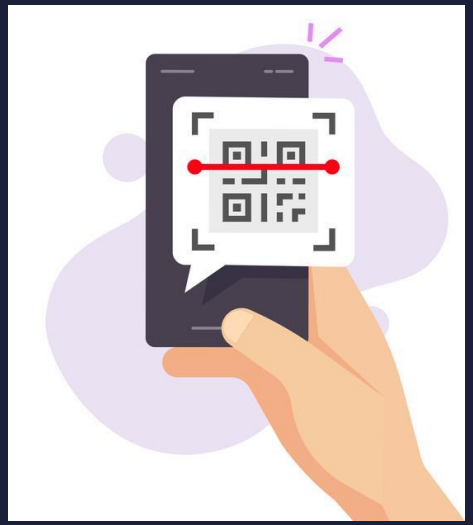




Driver ID	Driver03
Destinations	D1. Tiu Keng Leng Station, Tiu Keng Wan, Hong Kong - 22.3039051/114.2522843 D2. IKEA Causeway Bay Store, Gloucester Road, Causeway Bay, Hong Kong - 22.2811761/114.1864329 D3. One Island East, Westlands Road, Quarry Bay, Hong Kong - 22.2862479/114.2135458 D4. Pacific Place, Queensway, Admiralty, Hong Kong - 22.277152/114.1648871
Driver Coordinates	22.3314414/ 114.2025193
Calculation	**Step 1 :** Current location to D1: 12.2km Current location to D2: 10.9km Current location to D3: 14.0km Current location to D4: **9.7km** **Step 2 :** D4 to D1: 15.8km D4 to D2: **3.1km** D4 to D3: 7.6km **Step 3 :** D2 to D1: 13.6km D2 to D3: **5.4km** **Step 4 :** D3 to D1: **11.9km**
Optimal Path	**Current Location -> D4 -> D2 -> D3 -> D1**

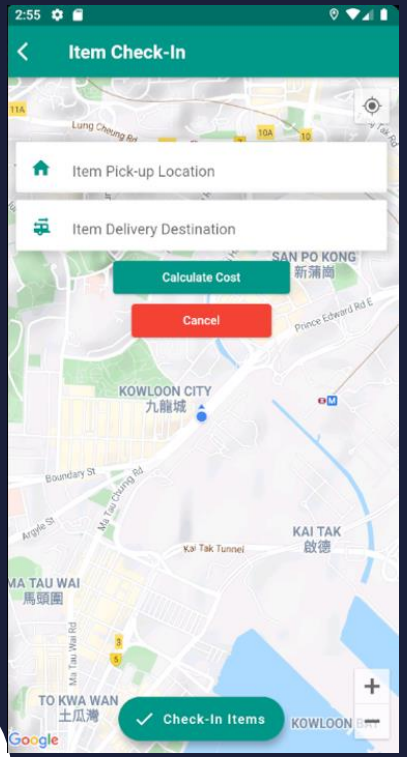
QR Code and Signature

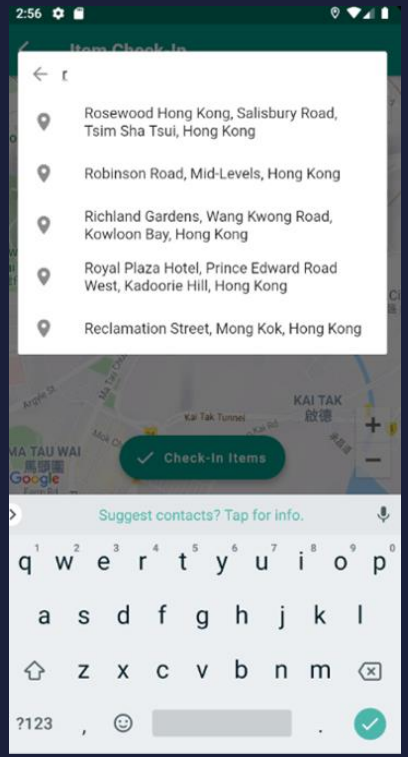
- Make use of Flutter packages
- Secure the item process
- Upload to Firebase Storage

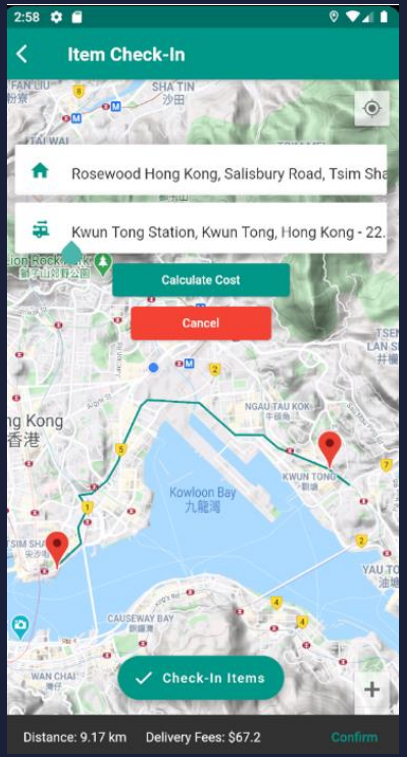


Results and Novel parts

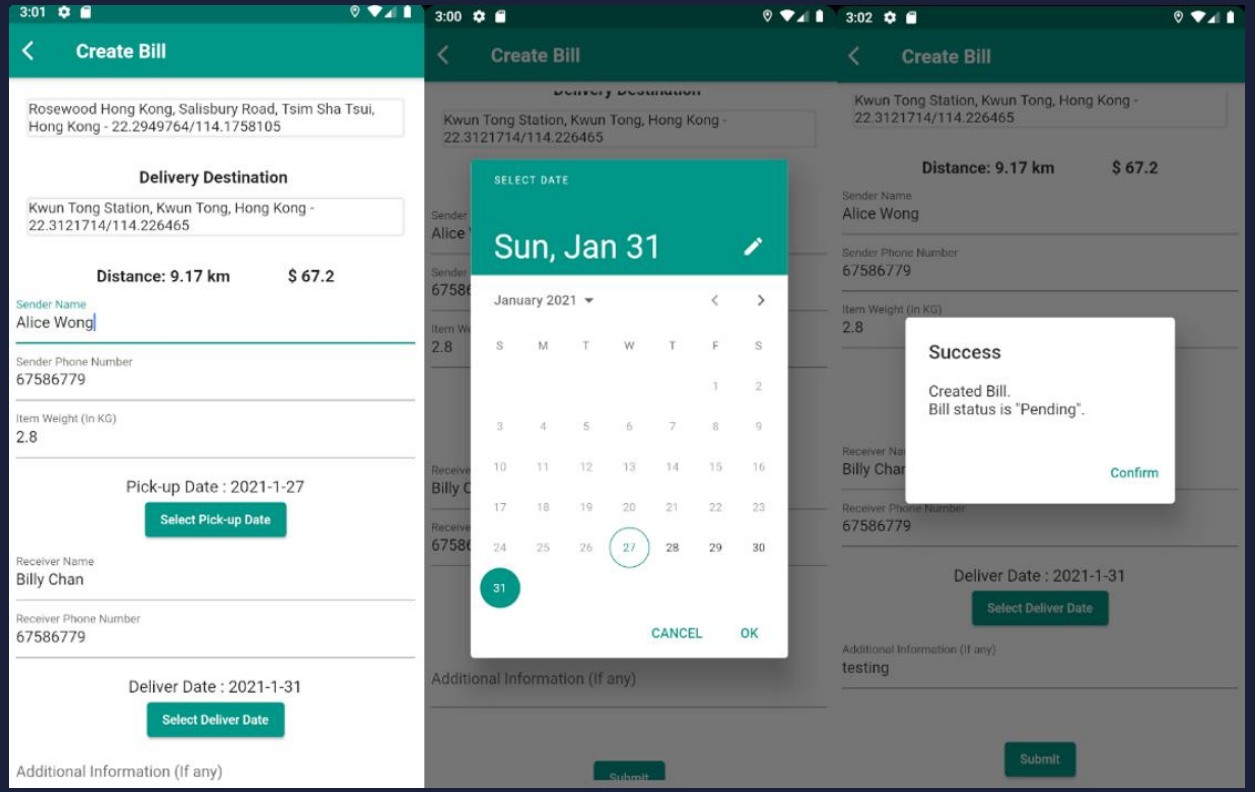
Items Check-in Function



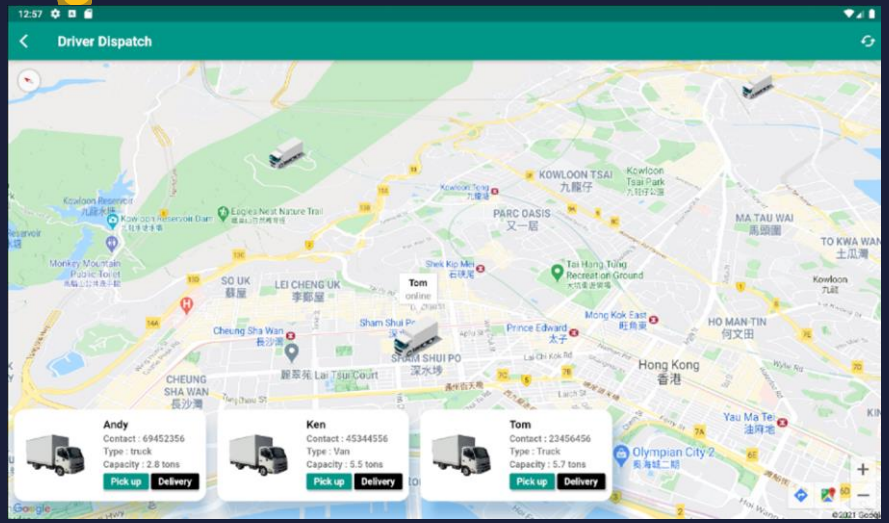


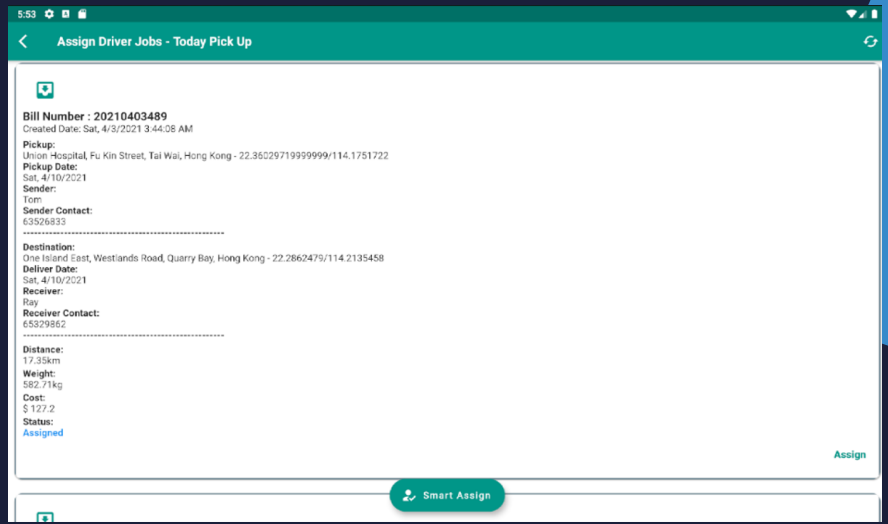


Items Check-in Function



Smart Jobs Assignment





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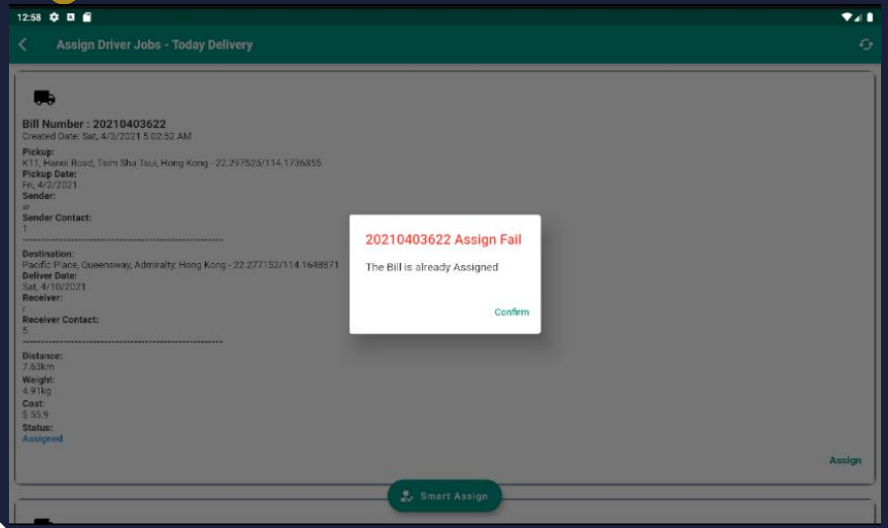
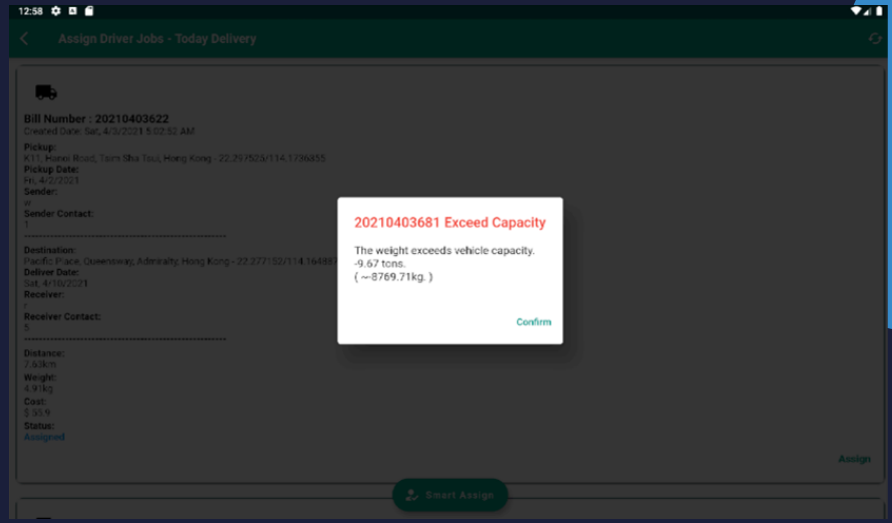
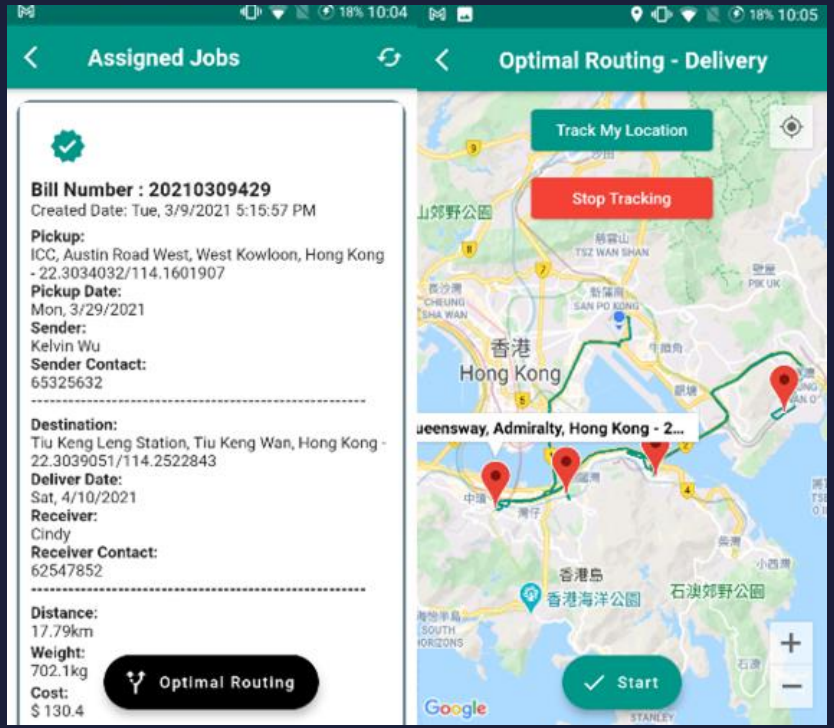
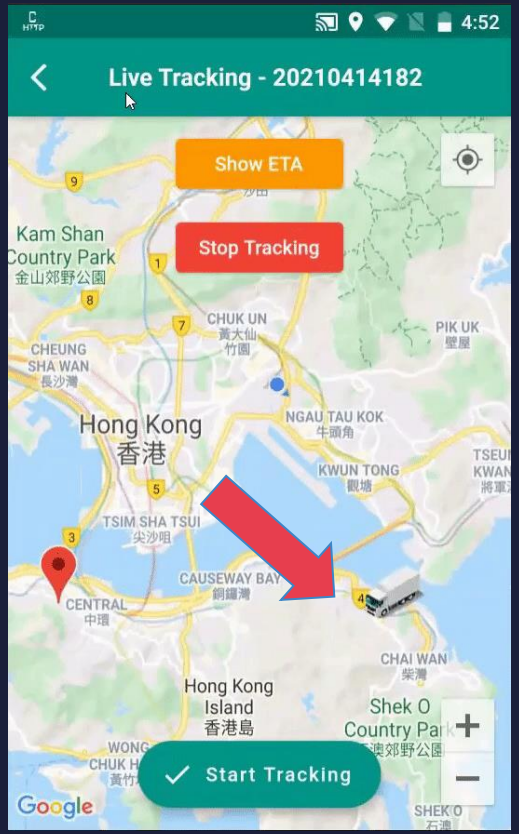


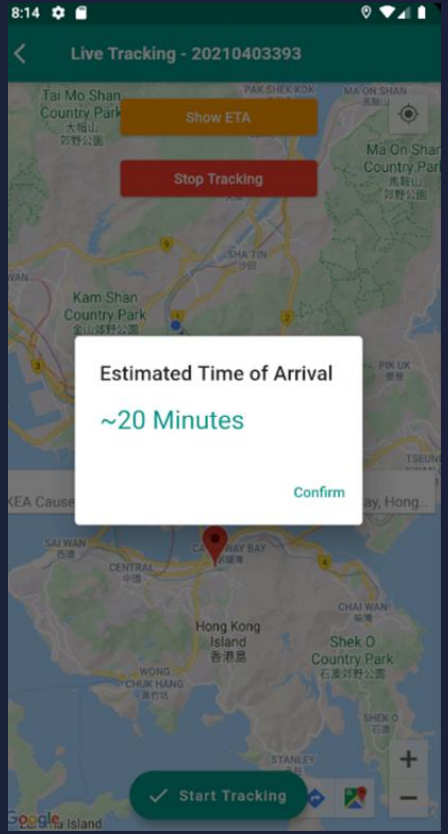


Optimal Routing

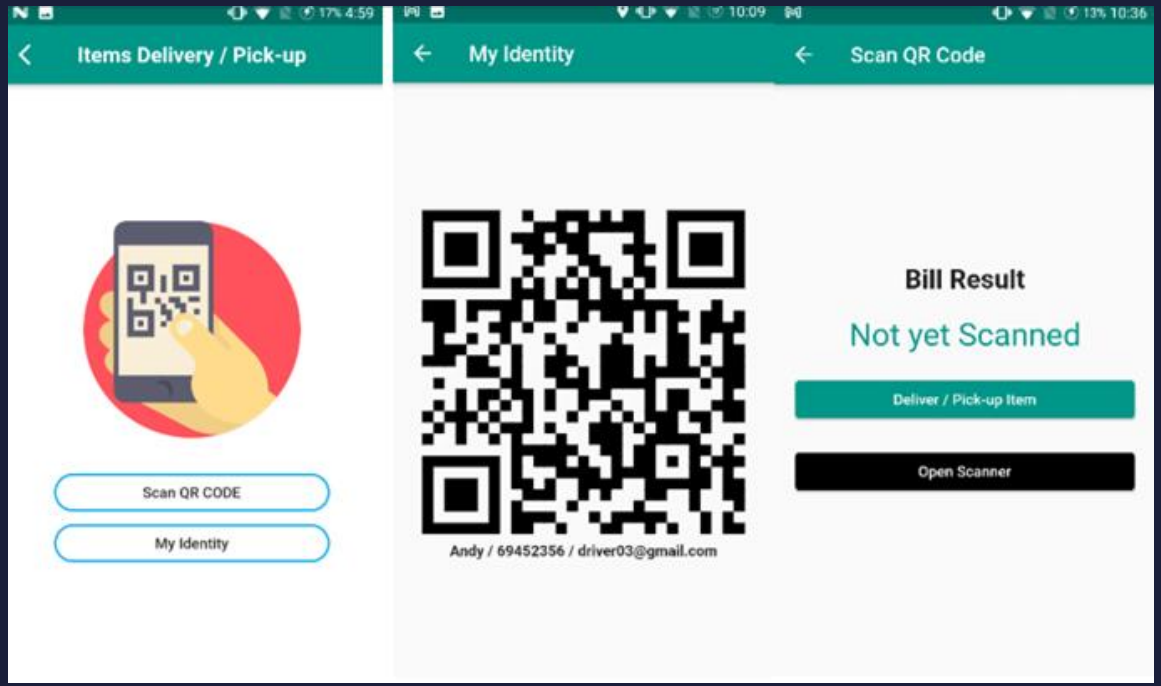


Bill Tracking





Proof of Delivery



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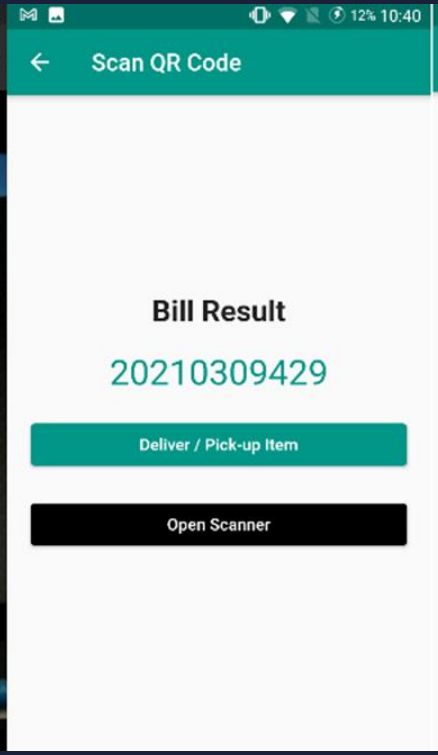
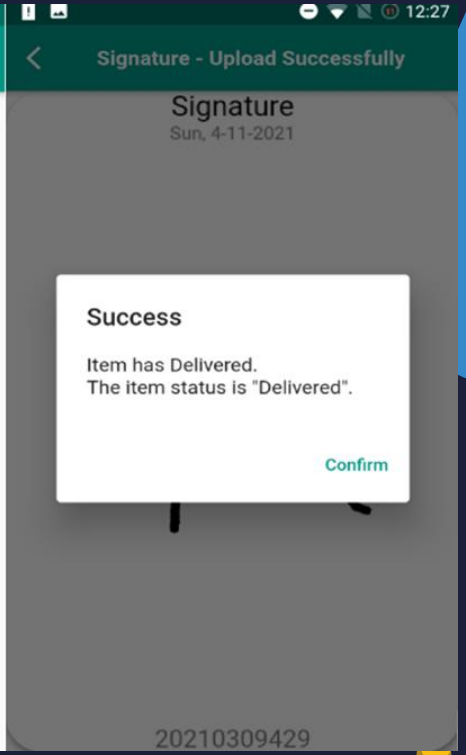
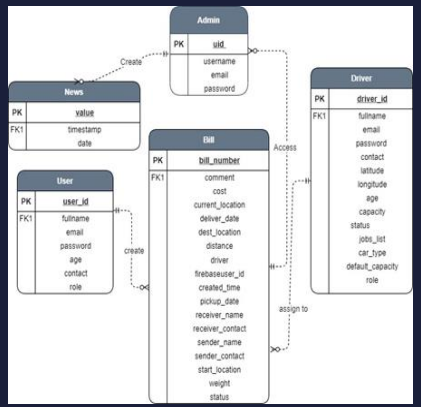


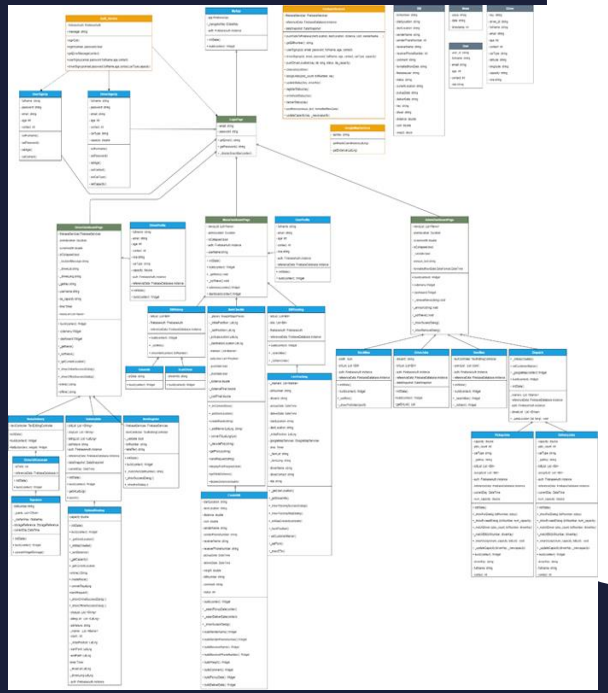


Complexity

Class and Interfaces

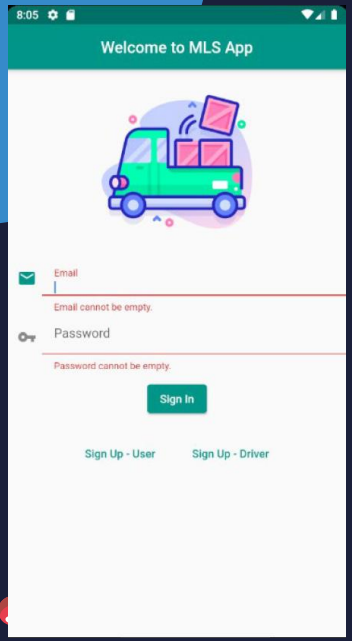
- More than 40 Classes
- API calls and Database references
- Handle Application State
- Attributes and Bills Status

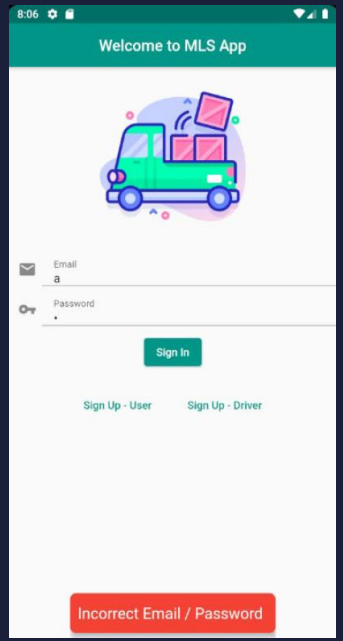


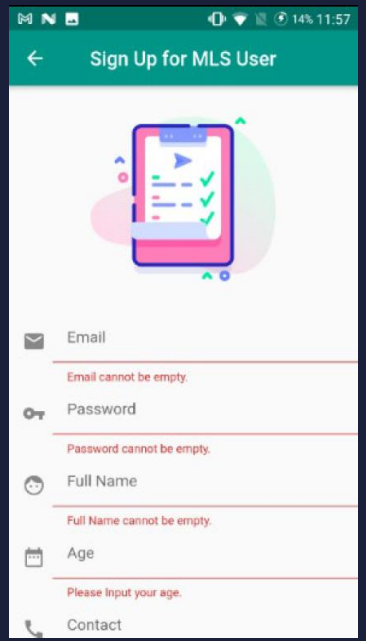


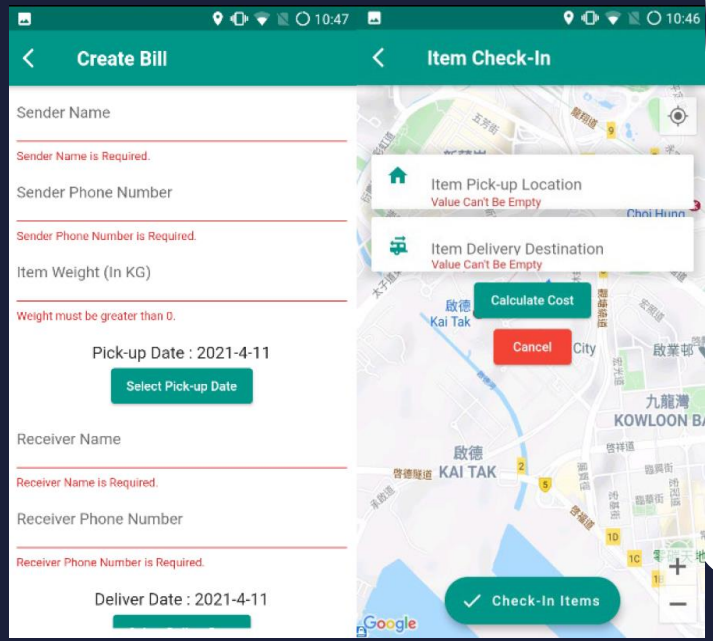
Complexity

Exceptions Handling









Complexity

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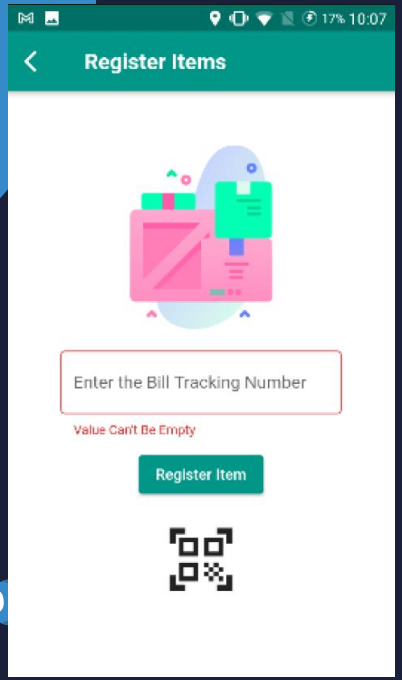
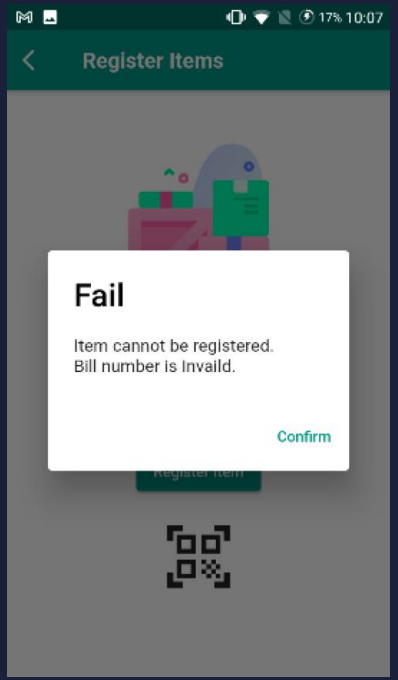
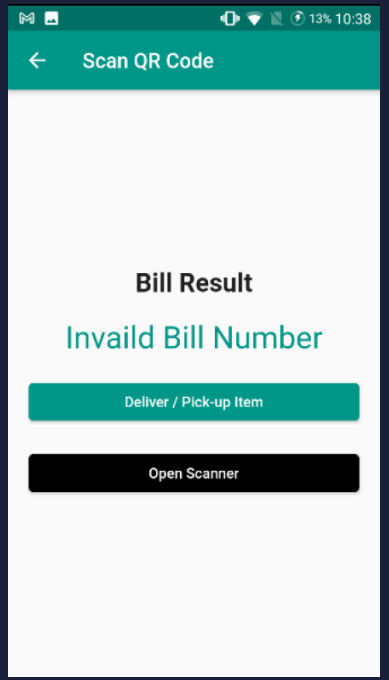
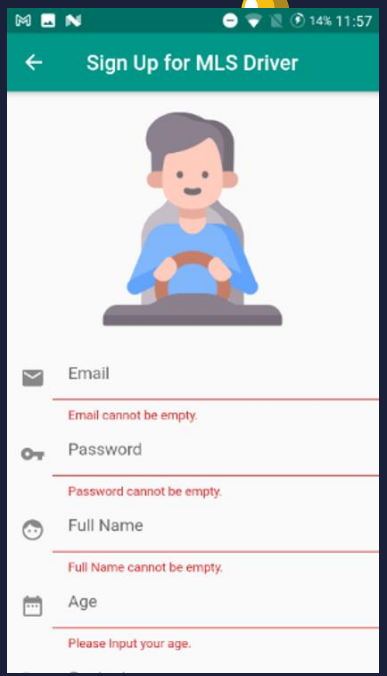




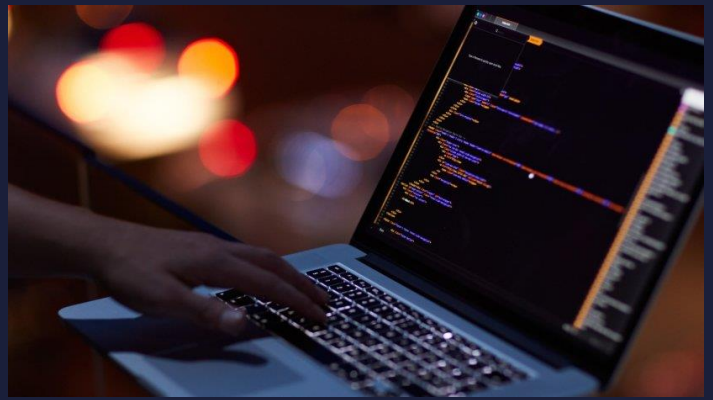




Complexity

Algorithms, Functions and Application Design

- Jobs Assignment
- Optimal Routing
- Real-time Checking
- Reactive and Responsive
- Time Management



Conclusion

- Mobile-based Logistics Management System
- Online Check-in and Bill Tracking
- Optimal Routing
- Smart Jobs Assignment
- Easy Proof of Delivery
- Transportation, Security, IoT

References

1. https://www.myanmore.com/2020/04/the-yangon-online-shopping-guide/
2. https://www.ignant.com/2018/12/12/the-art-of-waiting/
3. Christofids, Nicos. (1976) “Worst-case analysis of a new heuristic for the travelling salesman problem.” No. RR-388. Carnegie Mellon University Pittsburgh Pa Management Sciences Research Group

THANK YOU !