

Smart Unattended Delivery Box

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Problem Statement

The Smart Unattended Delivery Box project aims to revolutionize the efficiency and security of last-mile delivery processes by introducing an advanced, weather-resistant delivery box equipped with a one-time password (OTP) authentication system, multi-compartment design for concurrent deliveries, and integrated web platform for seamless operational control, addressing the critical needs for convenience, security, and operational efficiency in the e-commerce and logistics industries.

Constraints

Budget Constraints	Time Constraints
Material Constraints	Power Constraints

Specifications

Needs	Specifications	Constraints	Metric
Size	The box should be sized to carry multiple average sized packages, considering compartment for F&B and for Parcels	Dimensions	100 cm x 100 cm x 50 cm
Weatherproof	Withstand water & dust degradation	Corrosion resistant	1<x<5 mpy
Link between customer and box	Create an interface that is easy to use by the customer	-Online platform -Numpad	Error Rate< 5%
Having a reliable power source	Having a permanent power source from wall electricity	Power source	- 5 V - 12 V
Cost	Should be relatively cheap	Cost	1200 <x<1400 SAR
Ventilation	Install a fan	Rotational speed	600 RPM

Impact

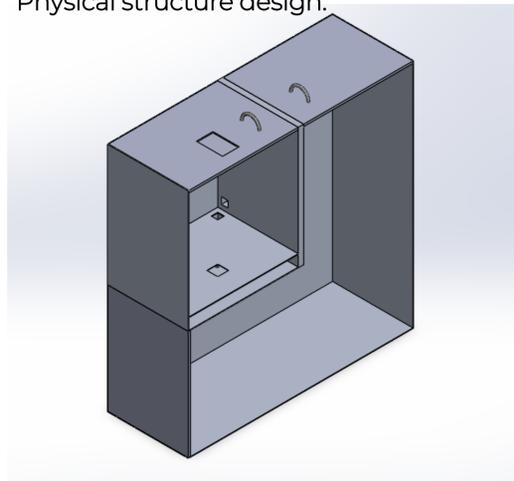
Economic Impact:
Boosts delivery business viability by reducing costs from missed deliveries and creating regional jobs.

Societal Impact:
Provides secure, contactless deliveries for online shoppers, reducing theft risks.

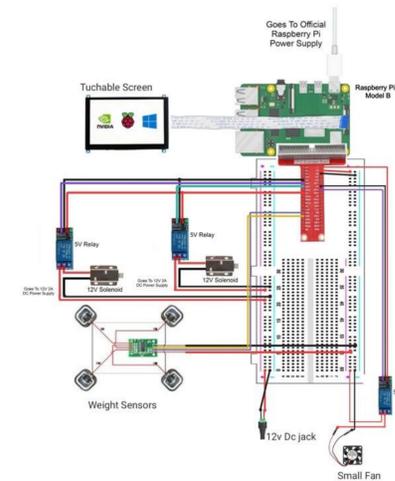
Environmental Impact:
Lowers carbon footprint through reduced delivery efforts and sustainable materials.

Prototype Design

Physical structure design:



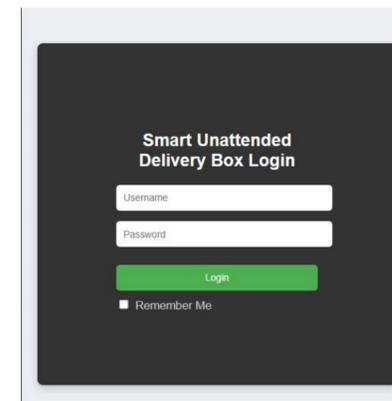
Electric circuit:



Web platform:

Two applications have been developed.

1. A standalone application has been developed to run on a Raspberry Pi, functioning as an OTP (One-Time Password) generator.
2. A web-based application has been created to operate on the customer's end, providing access to sensor data.



Validation

Material selection:

Carbon steel is exceptionally durable and robust, preventing any unauthorized tampering. The coating provides corrosion resistance, ensuring the box remains protected against rust and degradation.

Electrical components testing:

We have relied on Electromagnetic Lock which can be controlled by Microcontroller, all electrical systems in the box have been verified and tested separately and when they all together to make sure the box operate well.

Web platform testing:

We first developed the standalone application, ensuring it generates and sends OTPs to the customer's email address effectively, and then seamlessly linked sensors and facilitated data sharing in the second application.

Conclusion

The Smart Unattended Delivery Box enhances last-mile delivery with secure, weather-resistant, multi-compartment storage and an OTP authentication system. The standalone Raspberry Pi application generates and sends OTPs, while the web-based application provides access to sensor data. Durable carbon steel construction and tested electrical components ensure reliability. This innovative solution reduces missed deliveries, improves security, and minimizes environmental impact, meeting critical needs in e-commerce and logistics.