



# Smart Box Delivery System For Faster And Safer Delivery

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*Abstract:* Electronic locker systems for parcel delivery and collecting that are intelligent and safe. Allow inhabitants of your multi-family housing to pick up parcels at any time, from any delivery source. The smart locker is a flexible and extensible parcel collection system designed specifically for you. The functionality can be controlled on a local level. All data protection regulations are met. The enterprise-level cloud-based control system ensures that no resident data is stored locally. With the advent of e-commerce, there is a greater requirement to efficiently manage online order delivery. This is nowhere more evident than in apartment complexes around the country. Deliveries of parcels and packages can easily increase by a factor of five during busy holiday seasons. As a multi-family housing unit owner or operator, this puts more on your employees to manage these packages until they are picked up. You are also responsible for the package security, in addition to the time and effort it takes to handle this procedure.

*Index Terms* - Smart Locker, Enterprise Level, Cloud Based, Smart Deliveries, Packages, Package Security.

## I. INTRODUCTION

### 1.1 Main System Description

A smart courier box is the most recent and cutting-edge technology for collecting packages. It has the appearance of a human and has taken over the role of gathering stuff from humans. Smart courier box is a self-contained system that was created using IoT and Cloud ideas. The project's goal is to create a Smart Courier Box that will be able to authenticate, receive, and return the ordered cargo in a timely manner as well as appreciating customers and e-tailers. The Smart Courier Box was created with the goal of reducing human existence. Because the person may not be available to receive the packages at all times. Working in the realm of societal development is a secondary goal. Finally, a new idea for automating parcel delivery collecting has been offered in this project. This facilitates the delivery of the package. It has been suggested that parcel deliveries be collected. This makes parcel delivery easier and safer even when the consumer is not present.

### 1.2 Working of proposed system

The SCB is a courier/parcel collecting box that will be installed in our home like an air conditioner in a location where both outsiders and insiders may reach it to place and collect parcels. The customer visits any e-website retailer's and places an order. The e-retailer will notify the consumer the shipment information if the order is confirmed. The client can then enter this information into the cloud. The smart box then compares the information on the parcel to the details on the received parcel, and if both matches, the parcel is accepted into the box; otherwise, it is not.

### 1.3 Scope of the project

SMART courier/locker is the newest delivery alternative for clients whose appetite for online shopping is expanding in tandem with their increased requirement for mobility. It's a convenient option for customers who don't want or can't wait for the courier to arrive. They can plan their day without taking their route or schedule into consideration. Because the lockers are in their own residences, the parcel can be picked up at any time for a period of seven days. It is also a delivery solution for us, as it eliminates the need for our couriers to return to a location multiple times to deliver if the consumer is not present at the initial touch.

## II. OBJECTIVES

- Key management using electronic means
- Customer satisfaction
- Customers can customize box sizes and models to match their needs.
- Because to the dynamic allocation, a greater number of residents are using the courier boxes. Security and discretion: Secure and discrete parcel storage by mean of an electronic lock.
- Receive and return: Conveniently receive and return parcel from home at any time.

- Environmentally-friendly: Conserves the environment as parcel deliveries can be delivered directly to the SCB which is present in their home.
- Notification: Information about delivery can be notified by SMS (text), Messenger or push message (with returns).
- Data security: IoT-security verified

### III. MOTIVATION

Because the corporate world moves at such a breakneck pace, having a dependable, delivery service that is worry-free Whether you need something delivered quickly or need to send a box to someone, it's vital. In the Dallas, Fort Worth, and Houston areas, Pronto-Delivery is a top same-day courier service. Our professionals are well-informed delivery that is professional Because that is what a courier service is all about, drivers are committed to making all deliveries on time. In comparison to traditional solutions, courier services are well-known for their quick delivery. A courier service assures that you receive your delivery as soon as possible— it will never be held in a warehouse awaiting shipment. The only time there is a change of hands is when the package is delivered to the final receiver. Courier services provide online management solutions that allow you to handle all of your shipping needs from your computer. When you can quickly automate the procedure and use your time more productively, there's no need to waste time on the phone or in long queues. When you utilize a postal office or a national delivery service, you can expect to pay expensive shipping and delivery fees. Courier services might charge a flat rate or charge per mile.

### IV. LITERATURE REVIEW

Paper [1], the dynamic occurring on the market of logistics services determine the implementation of change and the search for optimal solutions. Modern logistics centers that are adjusted to the needs, while also supported by modern technology are the answer to the declared demand from courier firms that place an emphasis on the speed of delivery and quality of service. The application of RFID technologies in logistics centers is the fulfillment of the expectations of courier firms, which in turn enables them to effectively compete on the market of logistics services. RFID technologies have attracted a great deal of interest primarily due to the fact that this technology is between 10 and 20 times faster than the barcode technology. RFID is an automatic system of identification that may identify facilities within range by means of radio waves without interference

Paper [2], the main advantage of conveyor belts that we usually use is that we can avoid material spillage to a considerable extent. This is noticeable when powdered materials like sand, cement, cement concrete, coal, etc. are transferred with their help. Other applications in food processing units, bottling plants, and wood log processing companies also make the study on economization of conveyor belt transfer as an important one. This paper presents a study of the development of an economical digital control method to control the movement and the stop of a continuously running conveyor belt. Different types of conveyor belt systems implemented in the industries are also studied in this paper. Simple electronics devices are used in this study. A control strategy for sensing the arrival of the material conveyed on the conveyor belt is done in the study. This method saves times and energy by avoiding multiple runs of the belt with same material. The study presented here is done on a rubber belt.

Paper [3], there are numerous courier services available locally or worldwide. However, the most services only applicable at their respective company's whereby the pricing information is often hidden and customers usually need to call the company or visit their respective website or application to get quote, then make a price comparison with other company's courier services quotes for them to get their preferable quotation. This could be very time consuming mainly due to the inflexibility services whilst with certain terms and conditions apply only customers able to enjoy the door-to-door delivery service. Hence, the main objective of this project is to integrate a few of the courier services price and information in one stop whilst providing a low-cost peer-to-peer service to assist customer in delivering their parcel. The application will be able to generate the quotes of all the selected courier services in one application to ease the customer and enable a price comparison for each of the selected courier services company. The usability study was conducted and analysis of respondents' feedbacks shows positive interest of having this application and would opt to use the low-cost peer-to-peer services. With Parcel2Go Mobile Application, the problem of inconveniency of the customer and the inflexibility of services that have in the current courier services will be solved as this application will ease the people who wants to deliver their parcels.

## V. BLOCK DIAGRAM

The proposed block diagram is as shown in Fig.1

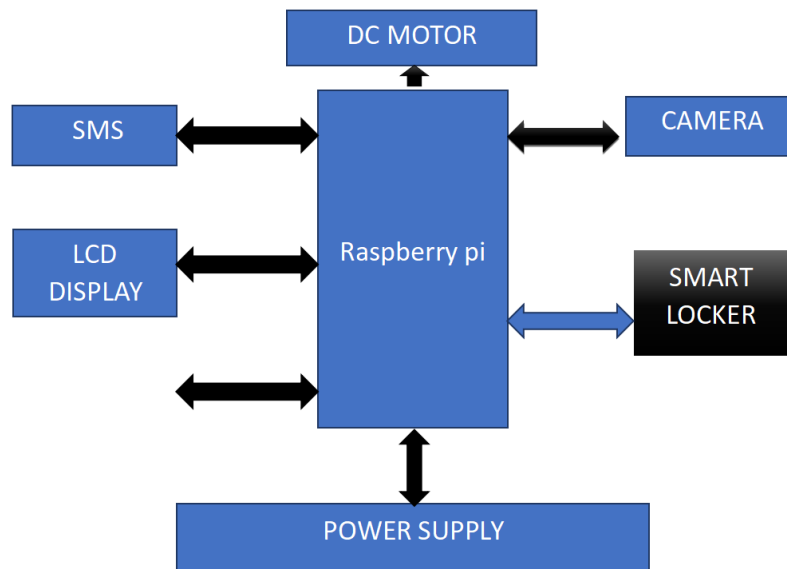


Figure 1: Block Diagram of proposed project

## VI. METHODOLOGY

### 6.1 Proposed system

The concept of the Internet of Things is much broader in those everyday objects that did not appear to be electronic before are now connected to the internet via sensors. For the automation process, the proposed system integrates IoT, cloud, and a facial recognition application. The concept is to establish a Smart Courier Box (SCB), which would be capable of verifying and accepting the ordered item.

### 6.2 Methodology of the Proposed System

- Scanning:** Bar code uses electromagnetic fields to automatically identify and read tags.
- Authentication:** Bar code is used to get the information of the customer to whom it wants to deliver so that the human error can be avoided. User authentication using facial recognition.
- Storage:** Microcontrollers used for storing and retrieving data.
- Smart Courier Box is interconnected using IOT technology.

A bar code scanner is employed for authentication and scanning in this proposed work. When a bar code is scanned, the user must proceed to the second level of authentication. When the delivery boy arrives at the house, he must scan the merchandise before delivering it in a package. If the product information is correct, the concerned person's face recognition matches. If the courier's face matches the person booked, the outside door will be opened, and he must keep the product on the conveyer belt. The conveyer belt moves to the inside door and comes to a complete stop. The user must then press the key to open the inside door, after which the merchandise will be delivered to the proprietor.

## VII. SYSTEM ANALYSIS

### 7.1 Functional requirements

- System should scan the product kept on conveyer belt automatically.
- System should automatically match the face with user's face
- Automatic generation of OTP.
- Door should open only if the user enters right OTP
- System should identify and accept only the correct products

### 7.2 Non-Functional requirements

There are some nonfunctional requirements such as:

- Performance:** Should not take excessive time for generating the OTP and should not take excess time in matching the face
- Availability:** The lockers should be placed in their places, so the parcel can be lifted at any time for 7 days
- Reliability**
  - Theft Avoidance
  - Easy use
- Usability:** Easy Interface for accepting the product and generating information to owner.
- Flexibility:** After verification of the parcel, it will be shifted inner ward so that the parcel will reside in a place safely until the customer is able to collect it

7.3 Hardware Requirements

- Micro controller – Raspberry Pi
- DC motor
- Keypad
- H-bridge
- LCD 2\*16 display

7.4 Software Requirements

- Python Open CV
- Raspbian OS

VIII. FLOW CHART

8.1 Delivery Agent

The flow chart of the delivery agent is as shown in Fig.2

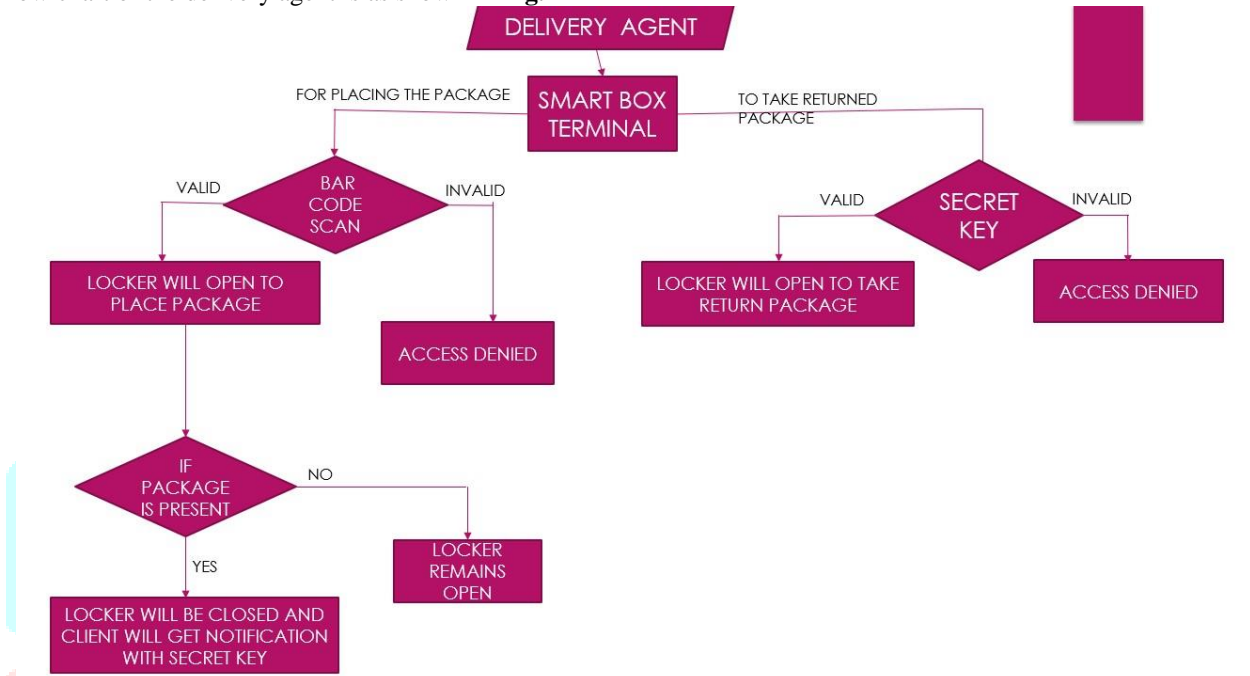


Figure 2

8.2 Client / User

The flow chart of the client/user is as shown in Fig.3

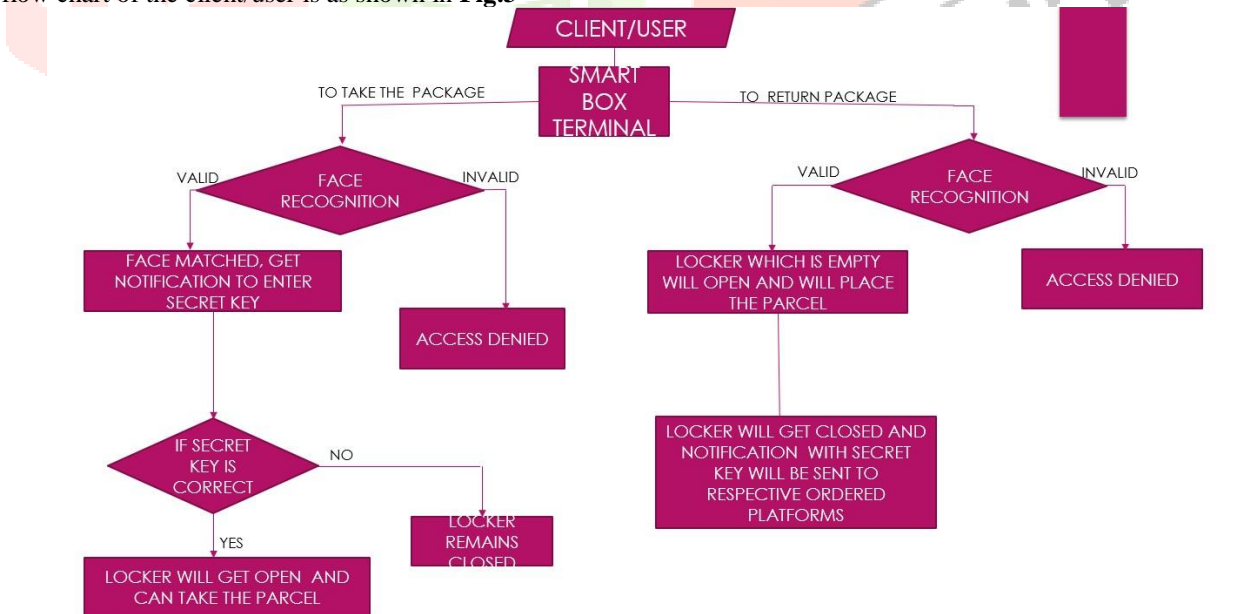


Figure 3



## IX. IMPLEMENTATION

- The proposed paper's main objective is for delivery between courier service and customer
- When customer order any products through online, the delivery guy will go to his place in which there will be a smart locker, the delivery guy will scan the barcode of the parcel and place the package inside the locker
- After placing the package inside the locker, the customer will get notification after placing the package
- The customer can access the locker through his face recognition Using that face match, customer collects parcel from the terminal
- After collecting the parcel both the customer and delivery company should get message that the parcel has been taken
- While taking the return/damage parcel, the delivery guy will access the smart box by entering the secret key
- In case of theft or when someone tries to open the box forcefully, alarm should get on and using camera the photo of that person must be captured and alert message should be sent to both delivery company and customer

## X. RESULT ANALYSIS

### 10.1 Face Data set Training

First, we have to train the images, after training it generates the yml file with different values of face Data. Then that yml file will be used for face verification purpose. The training of Face Data Set is as shown in **Fig.4**



Figure 4: Training Face Data Set

### 10.2 Working of Smart Box

The Smart Box's entire operation is broken into five stages, namely

1. Valid Bar Code Scan by Delivery agent and Sending Notification with Secret key to client
2. Taking Out the Parcel By client by verifying his face and if face matched then he has to enter secret Key to open the smart box locker
3. Returning the parcel by Client if he not Satisfied with the courier
4. Taking out the returned parcel by delivery agent by entering Secret key
5. In Case of theft emergency camera has to capture the images and notifies to Courier Service company and agent through mail and SMS respectively

#### Step 1: Barcode Scan

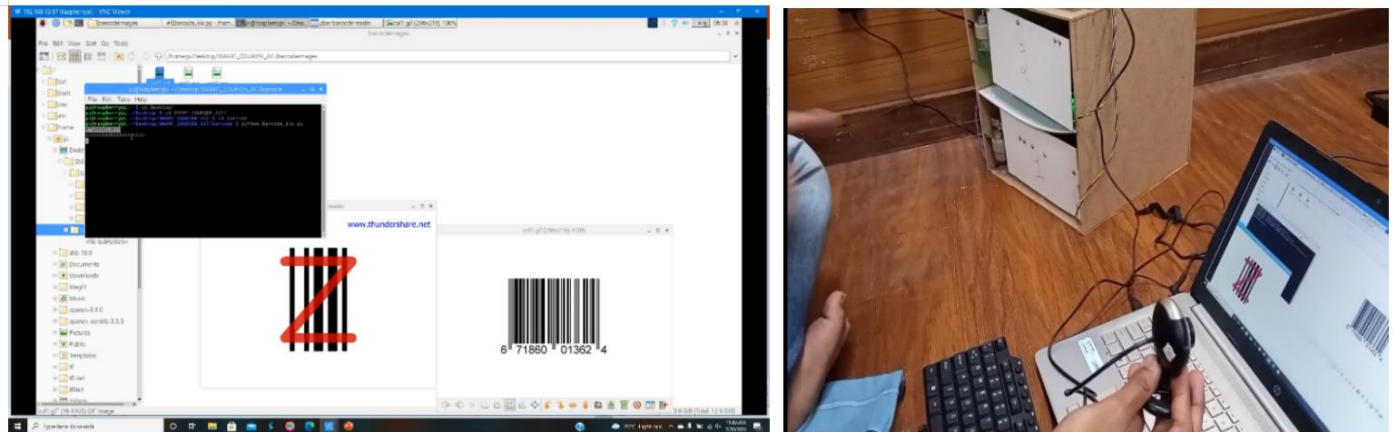


Figure 5: Barcode Scanning

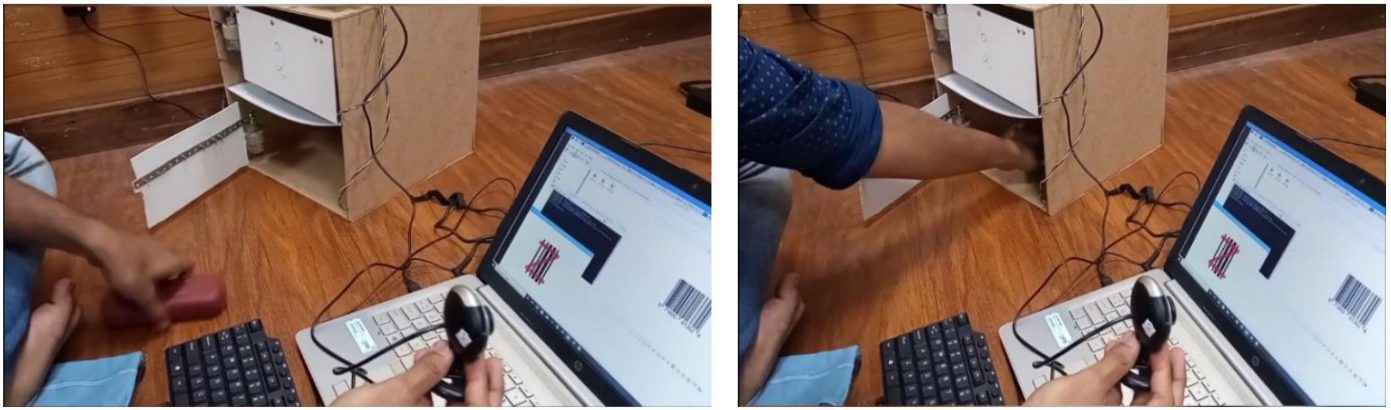


Figure 6: Opening and Placing Package in Smart Box

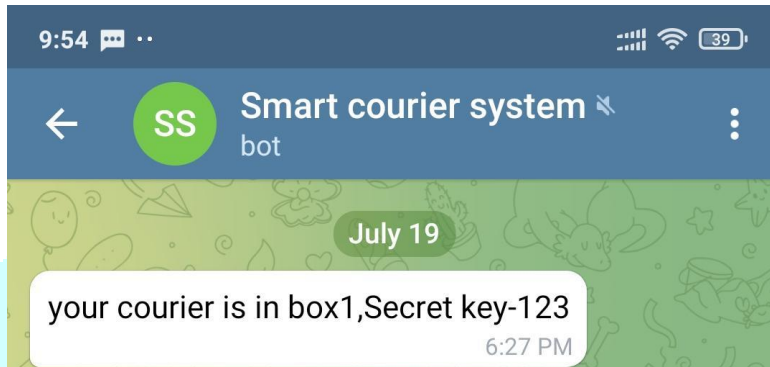


Figure 7: Client Receiving Notification about Parcel with Secret key

Step 2: Receiving Parcel

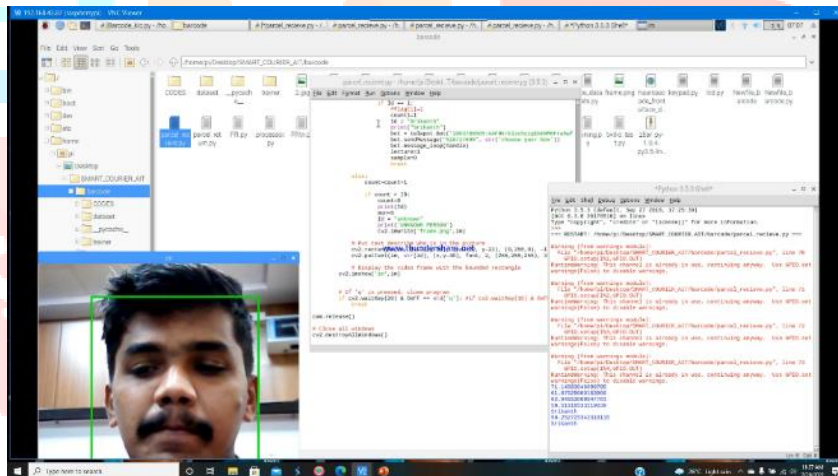


Figure 8: Face Verification



Figure 9: Client Entering Valid Secret Key

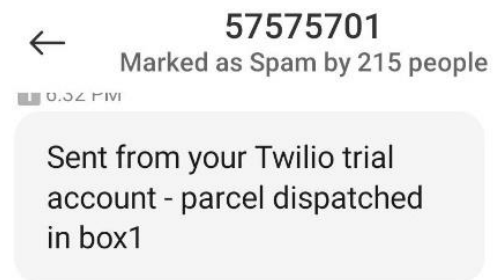


Figure 10: Delivery Agent Receiving Dispatched message



### Step 3: Returning Parcel

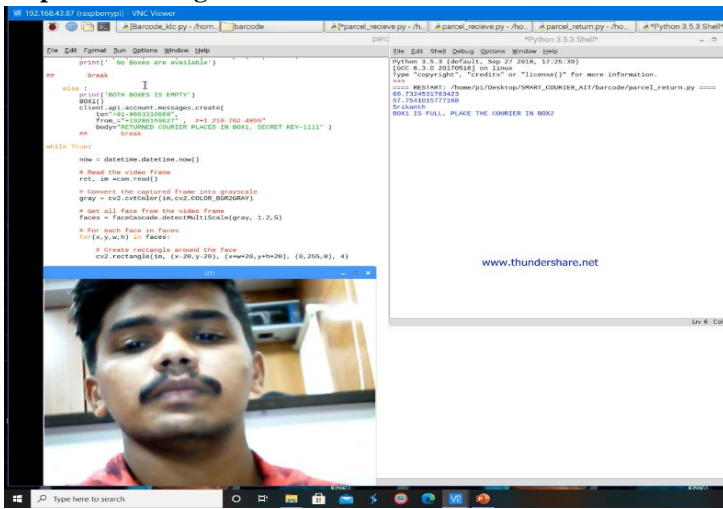


Figure 11: Verifying Face of client



Figure 12: Placing Package in smart box

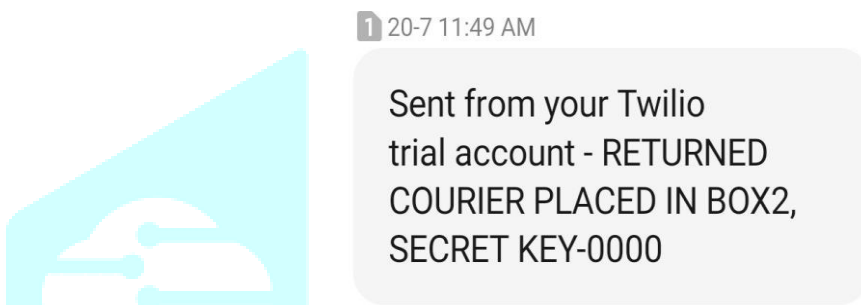


Figure 13: Secret key Sent to Delivery agent

### Step 4: Taking out returned parcel by Delivery agent

When the delivery agent enters the secret key (received when client had kept the return parcel in box), the box where the return parcel is present will open.

### Step 5: Theft Emergency

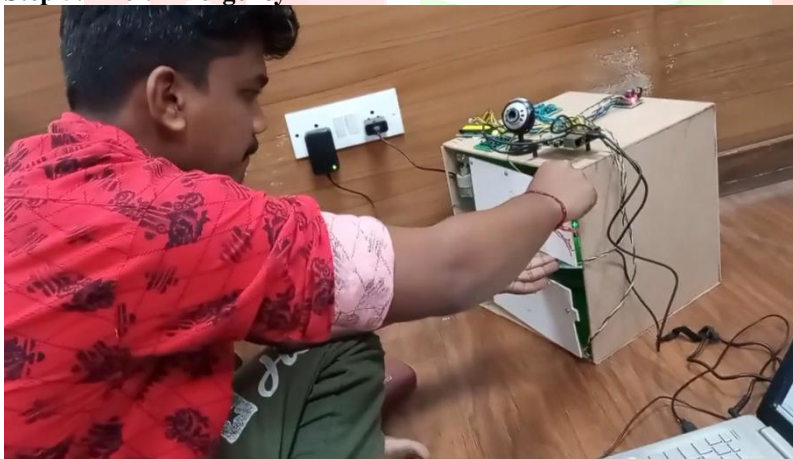


Figure 14: Someone trying to open smart box Forcefully

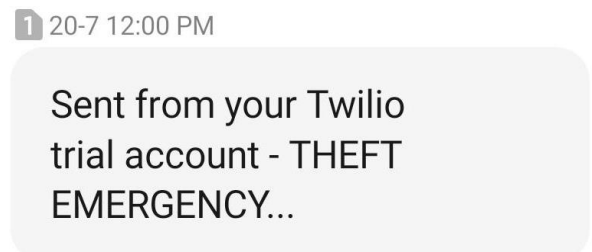
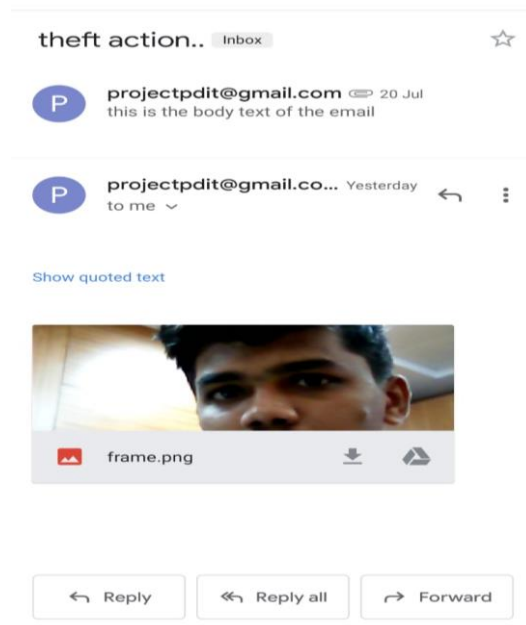


Figure 15: SMS sent to Delivery Agent



**Figure 16: Mail attached with Snapshot during the theft**

### XI. ADVANTAGES

- Pickup and deliveries are available 7 days a week, 24 hours a day.
- Simple to use
- Safe
- Nighttime deliveries can be made and picked up in the morning
- Identification and tracking without physical contact Less of a human
- Less human mistake due to real-time delivery status
- A real-time, up-to-date database contains all of the information required for sorting and efficient delivery of the mail.
- Could use passive and very cheap tags since range is not a concern
- Re-usability of the tags
- Enhanced security and safety
- Less money and time spent on tracking and handling of the packages

### XII. APPLICATIONS

- Same application with modifications can be used in industries for helmet and other belongings safety
- Logistics companies
- In hospitals for keeping belongings of doctors and patients safely

### XIII. CONCLUSION AND FUTURE SCOPE

In our proposed solution, the noted flaw in the existing system can be addressed. This implementation has the potential to be extremely effective in terms of providing security for the parcel/item as well as ensuring the safety and delivery of items to the appropriate individual. A new idea for automating parcel delivery collecting is offered in this study. This makes parcel delivery easier and safer, especially in inclement weather the customer is not present. Customizing the Smart Courier Box to improve Security and Scalability can be the subject of future study. Whatever we have investigated up to this point has revealed deficiencies, which we hope to address in our suggested system. This implementation has the potential to be very effective in terms of providing protection for commodities as well as ensuring the safety and delivery of items to respective businesses. GPS and GSM technology will be used to properly track the vehicle. This displays a vehicle's exact location in real time, whether it's moving or stationary. For courier tracking, a server and a smart phone are utilized in the car. From the black box, a vehicle's geographic coordinates and unique ID will be captured. The system can be used to track a vehicle's whereabouts and a courier's location at any time and from any location. This system improves car safety features while also bringing innovation to existing vehicle technology.



**XIV. REFERENCES**

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