

Smart Parcel Receiving System

M.L. Keote, Indrayani Rewatkar, Samiksha Shankarpure, Sayma Shete, Mrunal Bhuskade



Abstract: *The proliferation of online shopping has introduced a number of problems for the customer not present in what we might call the traditional shopping experience. One of the challenging issue is how to handle the receiving of a parcel when not at home. This paper introduces the Smart parcel receiving System by introducing technology into common man's life by exploiting the advancements in GSM technology which will solve the problem of missed deliveries, providing a smart and secure parcel delivery solution that we can monitor and control from our smartphone. The idea is to introduce a Smart Parcel Receiving System which will be able to verify and accept the ordered parcel as well as acknowledging the customer and the e-retailers of parcel.*

Keywords : CCTV, e-commerce, GSM, IoT, IR Sensor, LCD.

I. INTRODUCTION

The growth of e-commerce and online shopping expanded use of Internet, and the increased efficiency of distribution and delivery systems, among other things, have led to an increase in parcel deliveries. Even in situations where products are not ordered using e-commerce or online methods, products are increasingly shipped from more centralized locations rather than being stocked at a larger number of widely distributed stores or warehouses. Customers order an increasing number of products and types of products for delivery to their home or business rather than visiting a local business in person to purchase the product.

Delivery of parcels can be problematic, particularly to residential locations, for a number of reasons including the recipient is not home or available to receive the parcel, parcels left unattended may be subject to theft or environmental damage, parcel re-delivery is time consuming and costly, parcel return is costly, and returned or undelivered parcels often lead to dissatisfied customers.

Hence automation of parcel/product receiving will certainly lead to an easy and safe fulfilment for an online ordering. This is the motive behind the proposal of an approach for automation of parcel receiving.

Smart Parcel Receiving System is the electronic delivery box which includes an advanced locking system. Your packages will be safe and secure inside intelligent parcel drop box. Smart box is specially designed to simplify the delivery and collection of parcel. The major advantage of this system is the presence of the GSM modem enables the device to communicate with the receiver no matter wherever he was present on the globe. The system is designed in such a way that it can also provide the Proof of Delivery to the delivery/courier driver or e-retailer website as it is designed by taking into consideration the new feature that has come recently in some e-retailer website.

II. LITERATURE SURVEY

In paper [1], a simple parcel receiving box without proper locking system has been proposed. Anyone could retrieve the parcel from the box easily. But here in this System, we have provided the locking system which is under the control of customer which ensures the security of the box and parcel inside it.

Paper [2] has proposed a box which has the barcode sticker on the inside of the box, which the courier driver is requested to scan as proof that he has made the delivery. But of course this really is not a proof as it is the same barcode time and time again. Courier driver may often refuse to leave parcels in these exiting boxes as they do not offer true proof of delivery. Our smart parcel receiving System has the ability to issue the multiple OTPs or PIN numbers every time the delivery driver arrives to attempt the delivery. This can provide the proper proof of delivery to the driver.

III. PROPOSED SYSTEM

The heart of the project is the design of the system. The Smart Parcel Receiving System/box contains the two compartments. The upper compartment is called the receiving compartment in which the delivery driver will drop the parcel. The main components used in the receiving compartment are:

- **Arduino Uno:** This is the main controller of the system.
- **Push to ON switch:** This is the request key and will provide trigger to the delivery driver.
- **LCD 16x2 character display:** This is used to display the message for the delivery driver.
- **GSM module sim 300:** This is used for sending and receiving the required messages.
- **Electromagnet:** This is used as a locking system for the box.

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- Motor driver and Voltage Regulator
- Power supply

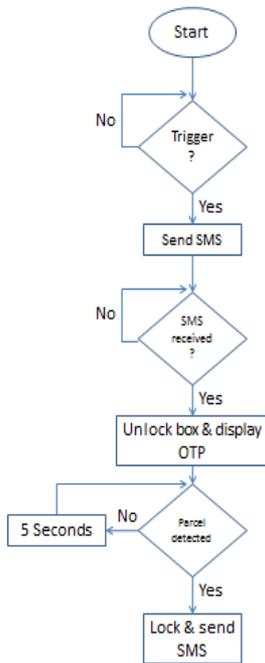


Fig. 1. Flow Chart of the Receiving Compartment

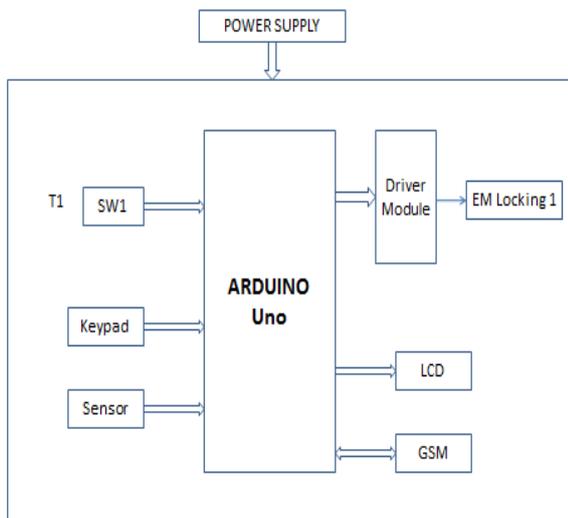


Fig. 2. Block Diagram of the Receiving Compartment

The following diagram shows the flow chart and block diagram of the receiving compartment- customer for setting the password for the safety compartment.

- Electromagnet: This is used as a locking system for the box.
- Motor driver and Voltage Regulator
- Power supply

The following diagram shows the flow chart and block diagram of the safety compartment:

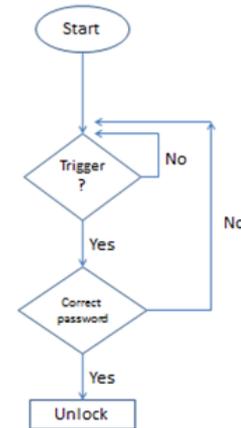


Fig. 3. Flow Chart of the Safety Compartment

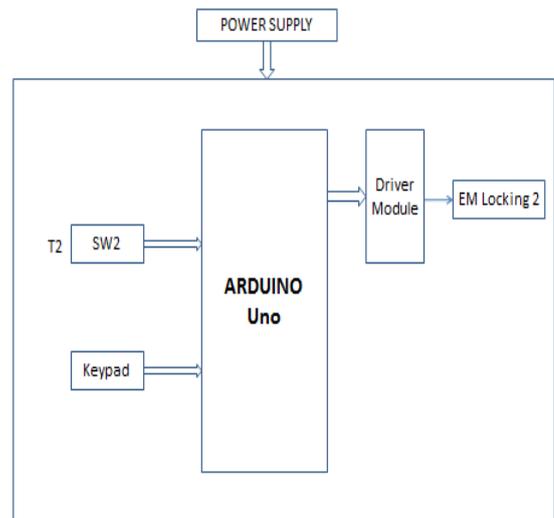


Fig. 4. Block Diagram of the Safety Compartment

The lower compartment is called the safety compartment. As shown in the Fig. 5, the slanting portion will provide the slope for the parcel to slide from the receiving compartment into the safety compartment. The parcel will be safe in safety compartment and can only be retrieve by the customer as this compartment is only visible to the customer. Customer can retrieve the parcel whenever required.

The main components used in the safety compartment are:

- Arduino Uno: This is the main controller of the system.
- Push to ON switches: The keypad of push to ON switches is used to provide the facility to the

IV. WORKING

The customer places an order in any e-retailer website. If the order is confirmed the e-retailer e.g. Amazon will send the One Time Password (OTP) for the order confirmation. This OTP will be checked by the courier driver at the time of parcel delivery. The same OTP will be used by the customer as a key to unlock the parcel receiving box and will be displayed on the LCD screen for the confirmation of the delivery driver when he/she receives the request for parcel delivery If the e-retailer does not have the OTP system,

then customer can either incorporate his/her own selected OTP/PIN number into the address field or enter it in the additional information field e.g. "Please leave the parcel in my parcel receiving box.

The OTP/PIN number for the confirmation is 6758." The same number now will be used by the customer to unlock the box and will be displayed on the screen. In this way customer can make sure that the delivery driver will be able to read the number on the parcel or delivery note and match the number with the displayed number on the LCD screen. The delivery driver records this by simply copying the code into the data field on his hand held terminal or hard copy delivery document where normally customer would be required to sign. The delivery driver can now safely leave the goods in parcel receiving box and would get the proof of delivery also.

Referring to the Fig.1 and Fig.3, the below list give the sequence of actions that take place for delivery of a package to customer premises.

- A Box will be having a request key which will provide trigger to delivery driver.
- The delivery driver simply presses the key on the box.
- System is having GSM module which send the notification of new parcel to the owner's smartphone.
- Owner will send the OTP in response to the notification message which will be received by the system in the parcel box.
- System will display the OTP for delivery person for confirmation.
- Further on validation the upper lid is opened and package is to be kept by the delivery person within stipulated time after which the lid is closed.
- Once the upper lid is closed another confirmation is made whether the package is placed by output of IR sensor placed inside compartment.
- After ensuring all the above events are correctly handled the package is transferred into bottom compartment and the second lid is retracted.
- A confirmation message is sent to the owner and now the upper compartment is empty and ready to receive next package in the same manner.
- Depending on the courier company and retailer's system and practices, customer may receive a text message or email confirmation informing them that delivery was made successfully.
- When the owner gets back at home, will retrieve the parcel from the receiving compartment using the password which he/she has set for the safety compartment

V. SYSTEM DESIGN

The heart of the project is the design of the system in such a way that once installed it should be error free. The system/box consists of two compartments namely receiving and safety compartment as show in Fig.5 The design is in such a way that it not only receives the package but also ensures the safety of the package by sprucely placing the package into safety compartment which is visible only to the customer that too after unlocking the box.

The schematic representation of the system is shown in Fig. 5 which gives the cross-sectional view. The upper lid is

for the receiving compartment and the lower slanted one provides the slope for the parcel to slide from the receiving compartment into the safety compartment. Further another door is provided at the bottom of the box which will be under the control of the customer so that he collects the package from the safety compartment when required. Fig. 10 shows the two doors of the box.

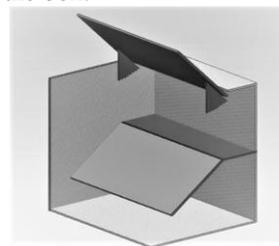


Fig. 5. Cross sectional view of the box

The following figures show the box from all the view with the attached components.



Fig. 6. Smart Parcel Receiving Box

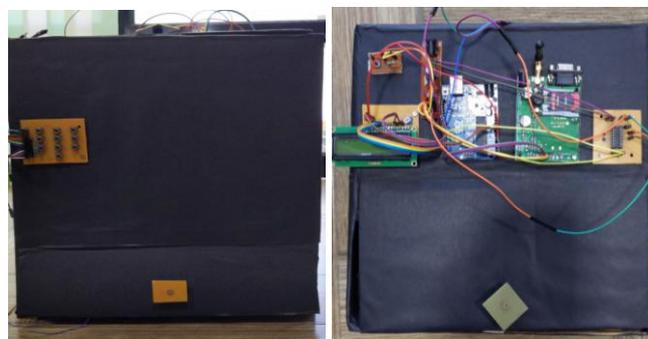


Fig. 7. Front View

Fig. 8. Top View

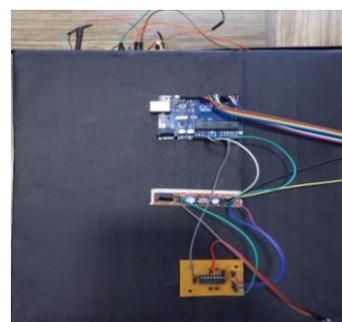


Fig. 9. Side View

The following figure shows the openings of the receiving compartment and the safety compartment of the box.

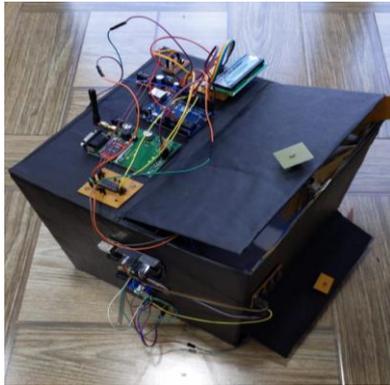


Fig. 10. Box showing the two openings of the box

VI. RESULT AND DISCUSSION

The below list of images give the sequence of actions that take place for delivery of a package to customer premises.



Fig. 11. Displayed message on the LCD screen

As soon as the delivery driver arrives for making the delivery, will see the message displayed on the LCD screen and will press the key which will send the notification to the customer's smartphone.

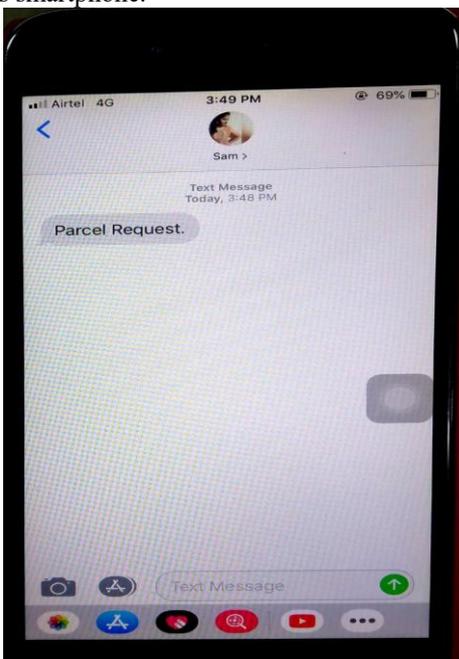


Fig. 12. Message received on the customer's smartphone

When the customer receives the notification for the parcel request, he/she will send the OTP in response to the notification.

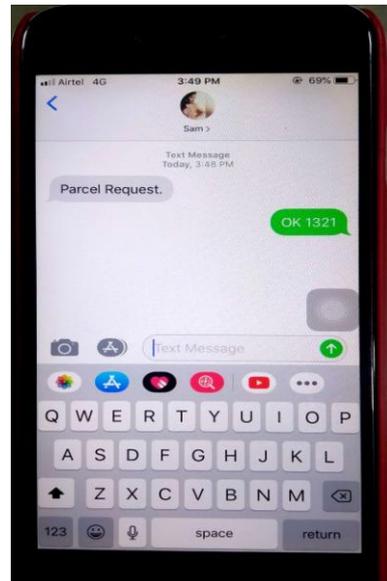


Fig. 13. OTP send by the customer

This OTP will unlock the box and the same OTP will be displayed on the LCD screen for the confirmation of the delivery driver and to provide him the proof of delivery.



Fig. 14. OTP displayed on the LCD screen

When the parcel is placed by the delivery driver in the box, it will be detected by the sensor. As soon as the parcel is detected, customer will receive the confirmation message.



Fig. 15. Confirmation Message received by the smartphone

When the package is received, the customer will send an acknowledgement to the courier driver that the parcel has been received successfully. This can be done by displaying the “Thank you!” message on the LCD screen.



Fig. 16. Acknowledgement message displayed on the LCD screen for the courier driver

When the package is delivered, the package delivery driver is required to send an acknowledgement to the e-retailer that the parcel has been delivered to the customer. The customer receives a delivery link from the e-retailer where he/she has to confirm whether the parcel is received and it is the same ordered parcel. With the last step of verification the e-retailer can finally conclude that the parcel has been delivered to the customer.

However, challenges faced while designing the system and in the hardware synchronization. Initially we were planning to design system with two different boxes but was facing issues while detecting parcel in the box and combining both the boxes. So, finally we designed one single box. Also, we tried to make the locking system using DC geared motor but it was not working perfectly so finally we used the electromagnet. One more challenge we faced while activating the electromagnet using transistor but transistor got damaged, so we used the L293D in the final design.

VII. FUTURE SCOPE

Future work can be focused on customizing the smart parcel receiving box which improves security and scalability. With the blooming of IoT (Internet of Things) tracking of packages becomes easier. Using internet instead of GSM services also reduces the cost for communication.

The mechanical part of the system could be improvised for smoother handling of the packages. Also by installing the compatible CCTV or Webcam the owner can keep eye on parcel from anywhere on the globe. A software application can be designed to handle all these activity. The system requires just one time investment and easy to handle thereby making it affordable for common man.

VIII. CONCLUSION

The aim of studying engineering is to increase the quality of living by constant innovation and research. Introducing technology into common man’s life by exploiting the advancements in GSM technology an effort has been made to simplify the delivery procedure which usually involves lot of human effort and time. Currently the delivery of the package at the customer premises is a major concern specially when the customer is not at place. This has provided a platform for us to act and resolve the problem by making the best use of technology. An attempt has been made to resolve the

problems occurring at the time of delivery of parcels and the system is made which can be installed at the customer’s premises.

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