

An abstract graphic consisting of several parallel teal lines of varying lengths and orientations, creating a sense of depth and movement. The lines are primarily located on the left and bottom edges of the slide, framing the central text area.

# IERG 4230 Mini Project

## Smart Mailing System

# Background

- The Post Office handles 1.4 billion pieces of mail each year
- Many mails were not successfully delivered to the recipient due to the unknown or incorrect delivery address written by the sender
- Mail is lost because the recipient's mailbox is damaged or human mistakes made from delivering
- No detailed delivery records for unregistered mail



# Impact

- Lower living standard and increase the unnecessary administrative cost due to the unsuccessful mail delivery
- Increase the chance of the mail being stolen due to the quality of the mailbox
- Personal information leakage problem
- Unable to chase the delivery record of the unregistered mail leads to the human sense of insecurity and difficulties of tracking down the missing locations
- Not eco-friendly for burning scrapped mails

## Government Reaction

- People are urged to buy mailboxes that have larger space and can be locked
- Try their best to clean up the accumulated letters on a regular basis
- Promote the importance and method of writing addresses correctly





# Our idea

SMART MAILING SYSTEM WITH RFID TECHNOLOGY

# Smart Mailing System with RFID Technology

- Apply the RFID technology into stamps and the whole system to provide automatic real-time data about the letter delivery
- Target People: Postman, Hong Kong Citizen
- Target Place: Public and private housing estate, Hong Kong Post

## Routine Operation



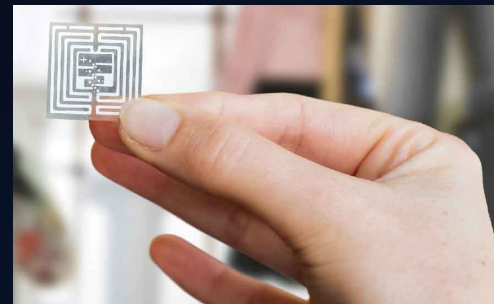


# RFID stamp

- Normal stamp
- With different value and design



- RFID stamp
- The cover with different value and design, inside is the mini-RFID chip
- It can store data
- It can be read by RFID reader





## Special feature of RFID stamp

- RFID stamp can store different data:
- Unique serial number (for distinguishing true stamp)
- Face value, remaining value(will be updated by passing every post office)
- Sender address, Sender name
- Recipient address, Recipient name

## Insufficient postage

- Normal stamp
  - Stick more stamps in the envelope or buy larger face value stamp
  - If forget to do so, penalty required
- RFID stamp
  - No need to worry
  - The post box gives you a warning
  - The sender can add value via the "smart post" app (offered by the post office)
  - If forget to do so, penalty required (paid by app)

# Functional Requirement

- The location of the letters can be tracked by post office, senders and receivers
- The letters can be filtered and sorted by the regions
- The address sticker and smart stamp should be generated from a workstation
- Address correctness prompts should be given

## Non-functional Requirement

- The system can be run on mobile, tablet and laptop
- Any web browser is allowed for monitoring
- The system is in 24/7 and maintenance is operated in mid-night
- Aluminum foil is needed for the making material of the post box

# Assumptions and Constraints

- Server-side
  - Airmail and Surface mail are using two separated database servers
  - Post office staff are authorized to monitor the mails sending status
  - Postbag id carried by specific postman is recorded
- Client-side
  - Pre-written address in mobile is needed for the input in the workstation

## Communication and Protocols

- Since the RFID stamp cannot connect to the network directly and the RFID reader station is fixed, the communication method is recommended as wired network to connect the server.

# Topology

- For buildings, an array of mailbox share a RFID reader
- For independent user, each RFID reader per house



# Power Consumption

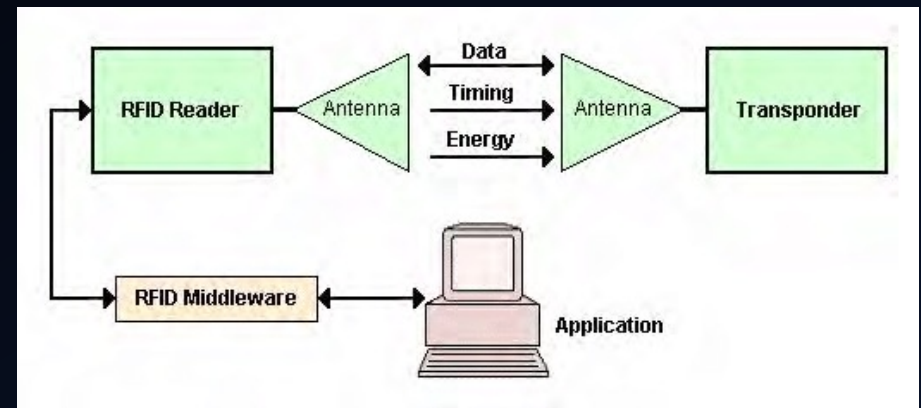
Using utility power for sustaining 24/7 service.

Power saving mode, once the post man activate the system, the smart mail system starts to read the RFID and send message to the host.

# Security Measure

The data in the stamp is encrypted

The RFID stamp can be read by any device, but only the authorized machine can decode the data inside the stamp



# Cost

Post office: RFID stamp system,  
RFID stamp reader

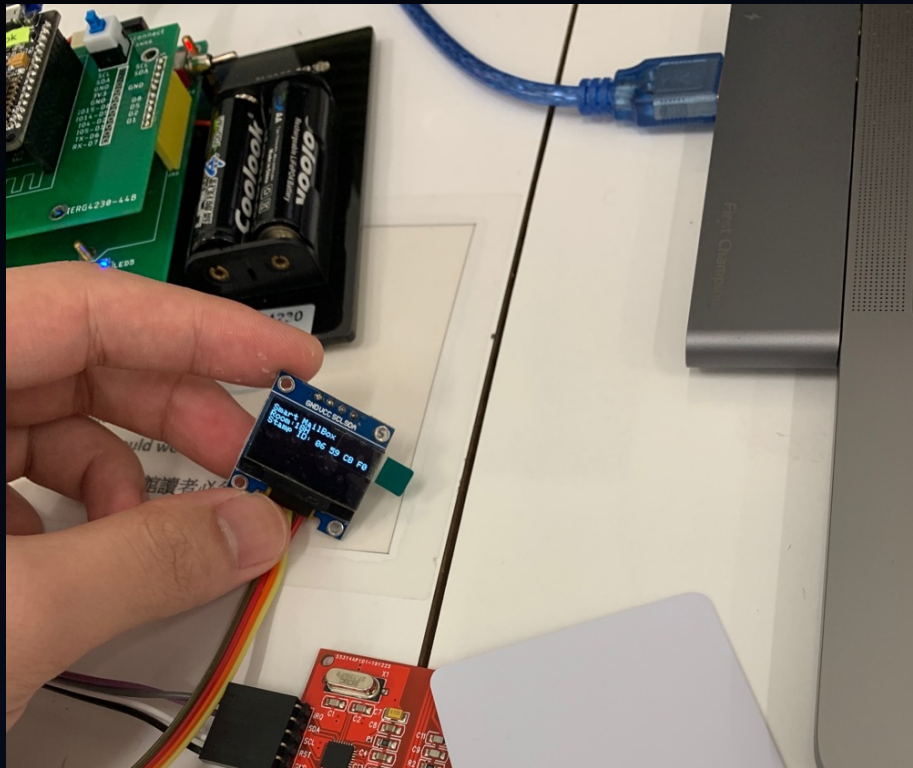
- Each buildings install a smart mail system, including RFID reader, and server for sending mail data for the host.



## Benefits

- Sender and the post office can trace the mail(current position, estimated arrival time) via the smart mail system
- The smart stamp can be recycled it can reduce the cost of publishing the stamp
- The efficiency of delivering the mail enhanced, not only the time and also the correctness

## Our Mailbox demo



- The little screen installed in the mailbox, the address and the detected stamp ID will be shown.

## Our Mailbox demo



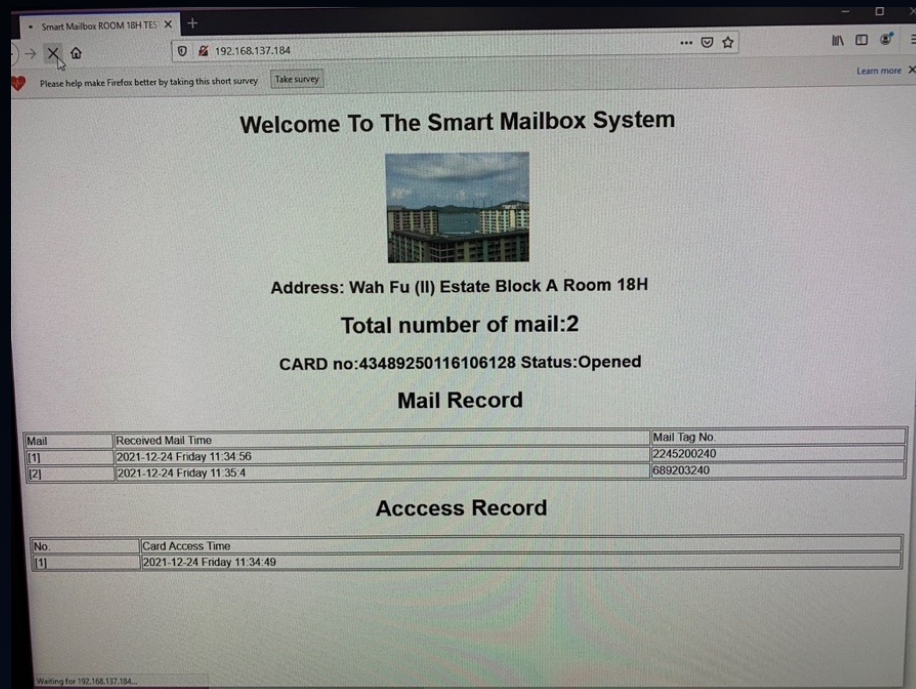
- By default, the smart mailbox is closed. The user can unlock the mailbox by tapping the host card for the mailbox which support RFID function.

## Our Mailbox demo



- The smart mail box with RFID function can be unlocked by tapping hostcard.





- The user can see the mailbox status for checking the mail arrival time and the access record

## Future Plan

- Embed the blockchain technology to improve data transparency and security
- Cryptocurrency will be a new payment method for the postage
- Smart Stamp will be beneficial from a systematic management of housing in the space

## Reference

- <https://www.youtube.com/watch?v=ArcKYWzSI58&list=PLdL54zjvpHtfW1ozcH0tCdIJYjMLgXF-3&index=2>