



Airline



Team B6 - MyTagMyBag

 By:

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BOARDING PASS

- FLIGHT
ECE500
- GATE
B6
- SEAT
S23





Use Case

01 | Problem

There is a **lack of luggage security** at the baggage claim from both **malicious** action and **accidental** mishandling.

02 | Solution

A **system that checks you are leaving the airport with your own bag**, using paired tags (one PCB w/ RFID, one RFID). A scanner will read the RFID info as it exits the airport, and send the passenger a notification if the suitcase does not have a pair, sounding alarms and allowing the user to locate their luggage.

03 | Areas

Software Systems, Analog **Circuits**, **Hardware** Systems (Embedded Devices)



Use Case Requirements (1)

Scanner Range	3 ft	Necessary range for most widths of single doors Too short -> false alarms
Scanner Duration	5 seconds	Too long -> culprits slip through
Bluetooth Range	100 meters	Ability to talk to RPi from any point in the airport
Scanner Accuracy	100% Hit on Thefts 20 % False Hits	Always catch mispairings, at the cost of false positives.



Use Case Requirements (2)

Notification speed

20ms

Time between stolen bag or ripped tag and the owner receiving a notification

Battery Life

2 Years

Industry standard coin batteries have this length of life

PCB Tag Size

4x4x0.3cm

5-25 mm in diameter and 1-6 mm tall for coin battery, 6x6mm for STM32



Technical Challenges (1)

01 | TSA Approved Tag

TSA regulations and restrictions places significant design constraints on our product, such as batteries.

02 | Durability of RFID Tag

When you check-in a luggage, not only do the workers throw it on the conveyor belt, but you can bet your luggage experiences as much of a rough jet-lag as you.

03 | Compact Design

Our design and fabrication should look sleek and professional, and be small to minimize added weight and costs.



Technical Challenges (2)

04 | Parts Ordering

During a recession, the turnaround time for ordering PCB or other parts could be long - start off with breadboard

05 | Bluetooth pairing

Navigating permissions so that Bluetooth tags are secure and can only transmit to the RPi, and understanding phone Bluetooth restrictions.

06 | Communication within airport

People aren't always connected to Wifi in airports-is Bluetooth range enough to notify their stolen bags?



Solution Approach (1)



| Luggage Tag

Will be a small PCB that includes an STM32 + RAK4600 Bluetooth module, accelerometer for motion, break beam sensor, passive HF RFID with Bag ID.



| Passenger Tag

Programmed PCB tag to read in from RFID Scanner and RPi, containing Destination + all registered Bag IDs.



| Scanner

RCE22 into a RPi to read RFID information in real time linux. Communicates alerts over wifi if bag passes through with no/wrong passenger. Sets off a buzzer alarm.



Solution Approach (2)



| App

Interfaces with RPi module to notify user of alerts. Database of passengers, destinations, registered IDs, and when bags passed through scanners. Users can log in for their flights.



| Alarm

Scanner will be able to sound an alarm if it doesn't scan two matching IDs. Bag alarm will sound if tag is taken off before going through scanner.



Testing Verification and Metrics (1)



| Scanner Timing

Testing for scanner speed and timing for 5sec



| Scanner Range

Testing for range of the scanner to detect RFID tags within 3ft



| Scanner Accuracy

Performance testing for 100% true positives on thefts and 20% on false positives



| Alert Timing

Testing for notification speeds of within 20ms through bluetooth and wifi communication, if alert is triggered



Testing Verification and Metrics (2)



| Motion Sensor

Testing for motion sensor functionality and ability to wake up from sleep



| App

Testing for app functionality and connectivity between user and alert notifications



Airline



Tasks and Division of Labor

Nish:

Backend App + Bluetooth communication

Caroline:

PCB/person tag + frontend app

Lee:

RFID Scanner + Raspberry Pi communication

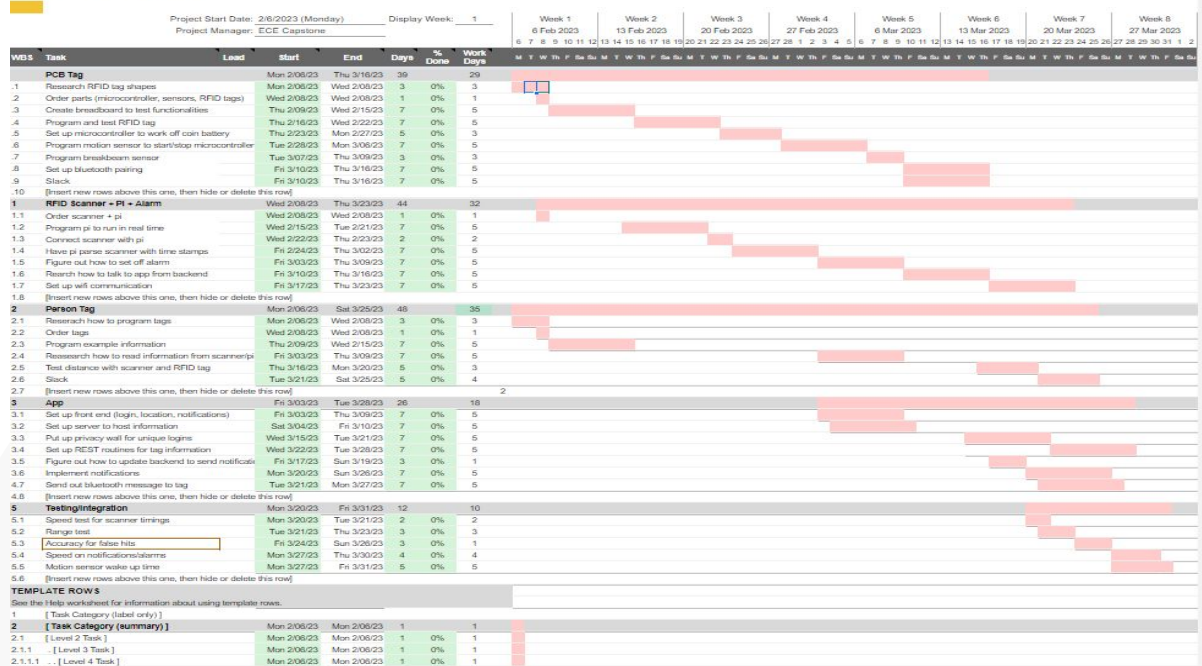
All:

Testing + integration

Schedule

MyTagMyBag Project Schedule

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Thievery Flow

Passengers A checks-in; receives set of paired tags

01

Thief steals A's bag, goes through scanner.

03

Security stops Thief and verifies A is the owner before returning luggage.

05

02

Bags go on flights (motion sensor conserves battery), arrive at baggage claim

04

Scanner sees A's bag without seeing A within 5s; set off alarm, identifies A as the owner of the bag using the Bag ID and notifies A via app.