PRCO204HK Integrated Project

STUDENT NAMES: WONG TSZ-FUNG, STUDENT ID: 20152658
WONG CHUN-KIT, STUDENT ID: 20136820
YAU CHAK-MAN, STUDENT ID: 10072329

RFID

(Radio-frequency identification detective system) for old age home

Background

- Medical technology improved
- Life span of people increase
- Aging population increase
- Increase the burden of medical system
  - Shortage of health care worker
  - Quality of care deteriorated
  - Increase the medical risks
  - Lack of security and safety guard for high risk aging people
- Technology to improve the quality of life

User Story (1) – Resident of OAH

- monitor the activities and vital signs of the residents living in an old age home
  - Monitor the heart rate of the resident
  - Alert health care worker if any abnormal reading
  - Data save in the database for health record

RFID

User Story (2) – Health care assistant

- reminding the daily schedules of the elderly people
  - time to have meals
  - time to take individual's medications
  - time to have medical treatments (e.g. Physiotherapy, Occupational Therapy)
  - time to have shower/bed bath
- Aim: minimized the medical risk by human error
- Automatic reminder of the important treatment

RFID

User Story (3) – security guard of OAH

- locate and track the locations of the residents by security guard
  - toileting concerns with Aging people
  - provide security by alert system if dementia elderly leave the home without insight

User Story (4) – Manager of OAH

- Master control of the RFID system
- the storage of the personal data and clinical records of residents by a secured database.
  - Privacy issue and consent may need to count into consideration
  - May be use for evidence for court purpose (Coroner's Court)

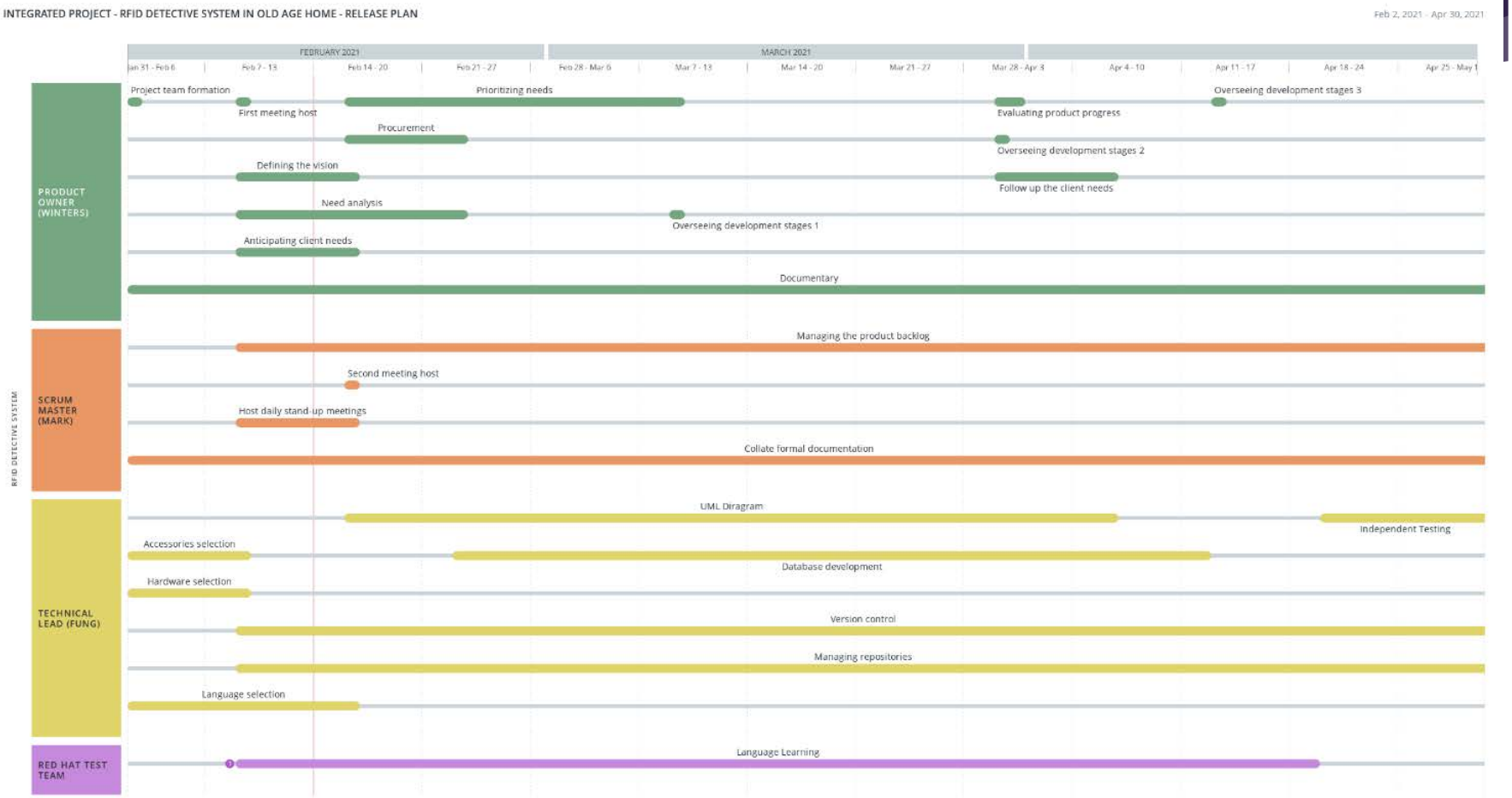
Vision

- In order to make elderly people live in a more convenient environment with high quality of care and optimized of the health care workers, a smart old age home with AI support may be the result to solve the problems.

Role allocation of the project

- Product Owner: Winters YAU
- Scrum Master: Mark WONG
- Technical Lead: Fung WONG
- Independent Tester: Winters, Mark and Fung
- Supervisor: Dr. Ivy WONG

Roadmap & release plan



Risk Assessment

- Time for debug of the software vulnerabilities
- Incompatible of the hard and software
- Covid-19 impact to cessation of the project
- Insufficient knowledge towards software language
- Demanding of the work tasks of every groupmate

THE END

Interim Review

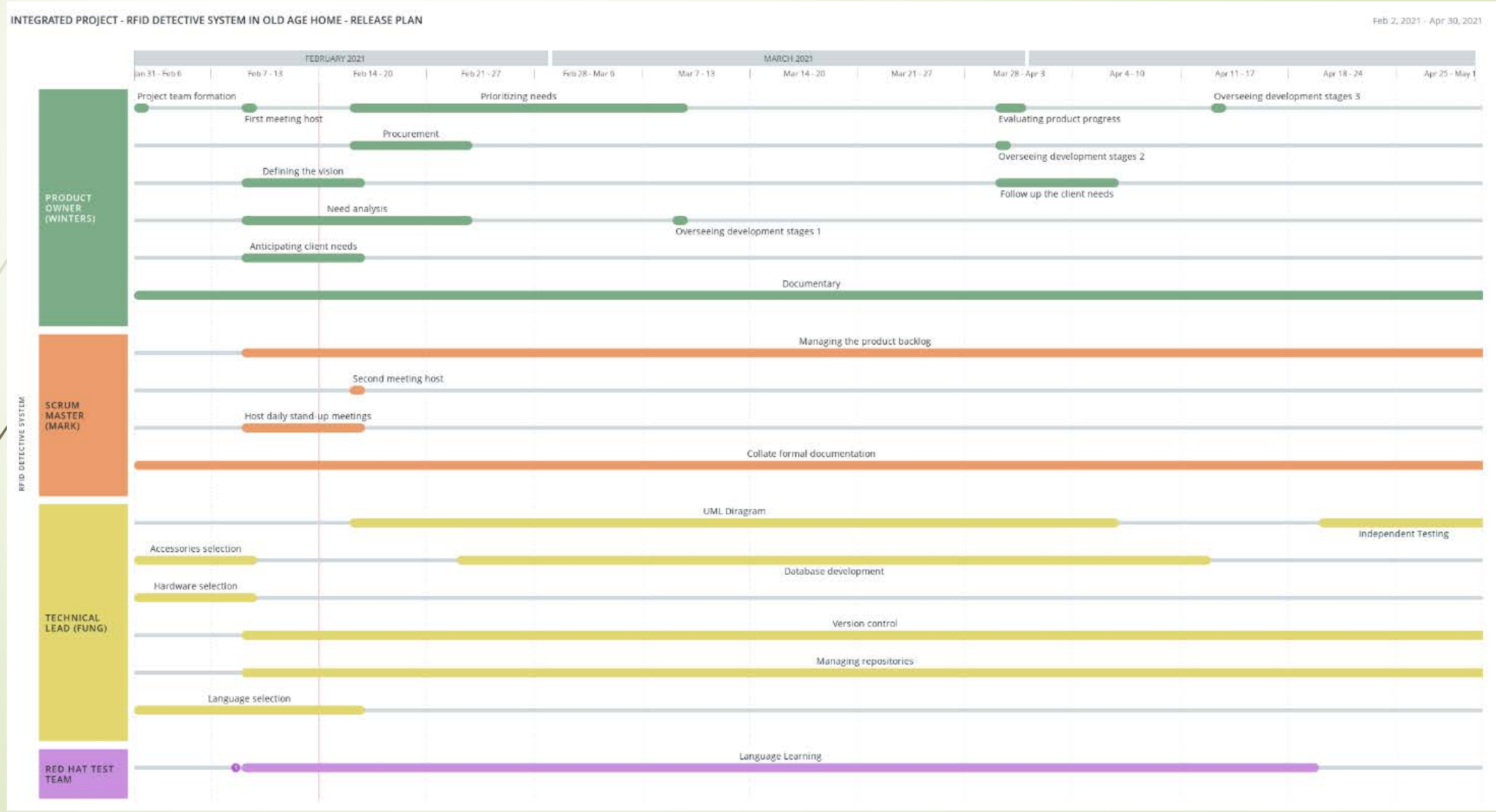
Wong Tsz Fung, Wong Chun Kit, Yau Chak Man

9 March 2021

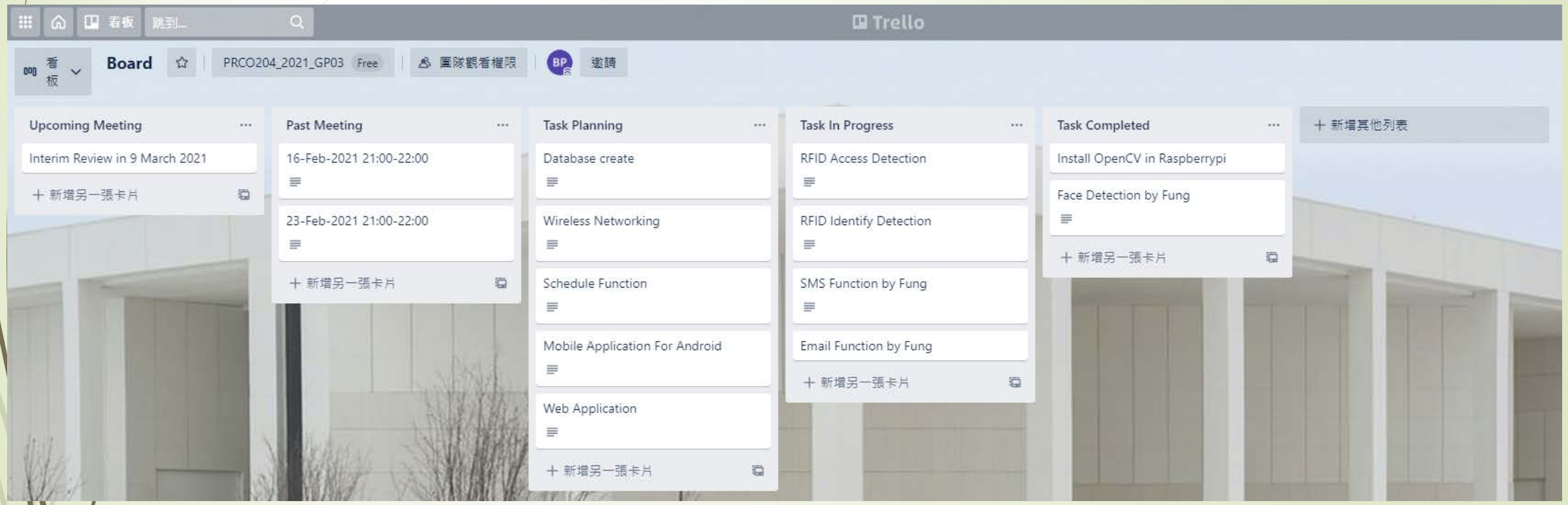
Product Goal

- Provide work assist to elder care centre worker
- Make a safety, convenient living environment for elder

Product Backlog

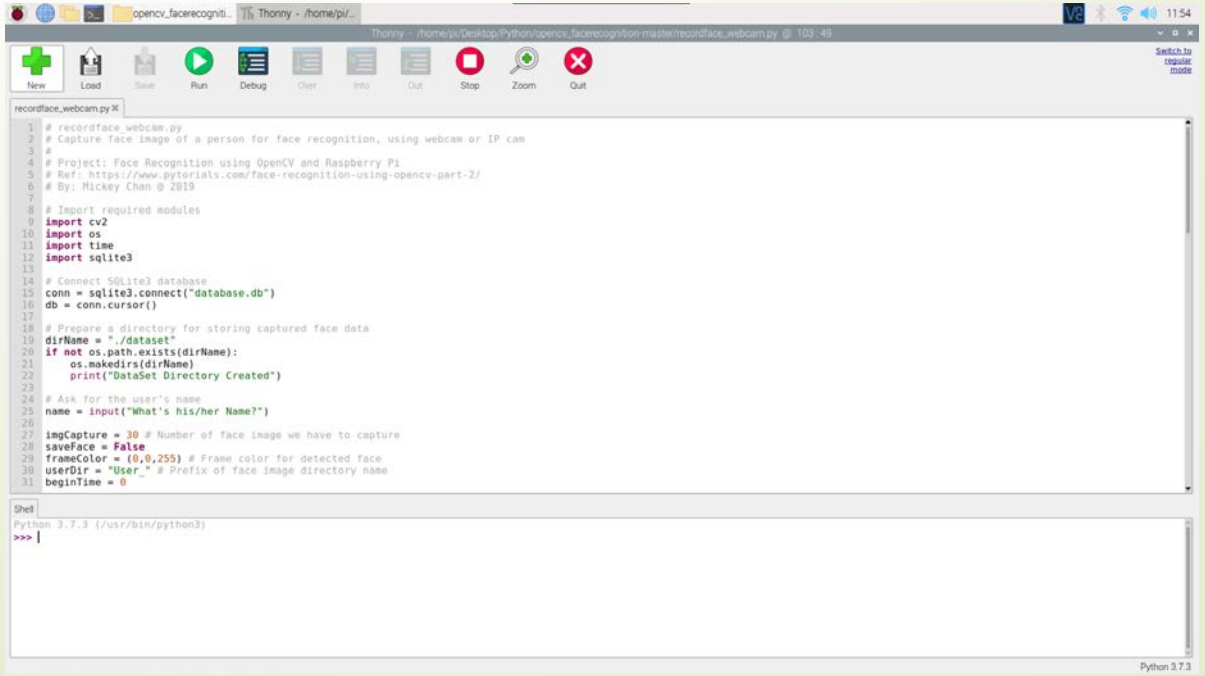


Product Backlog



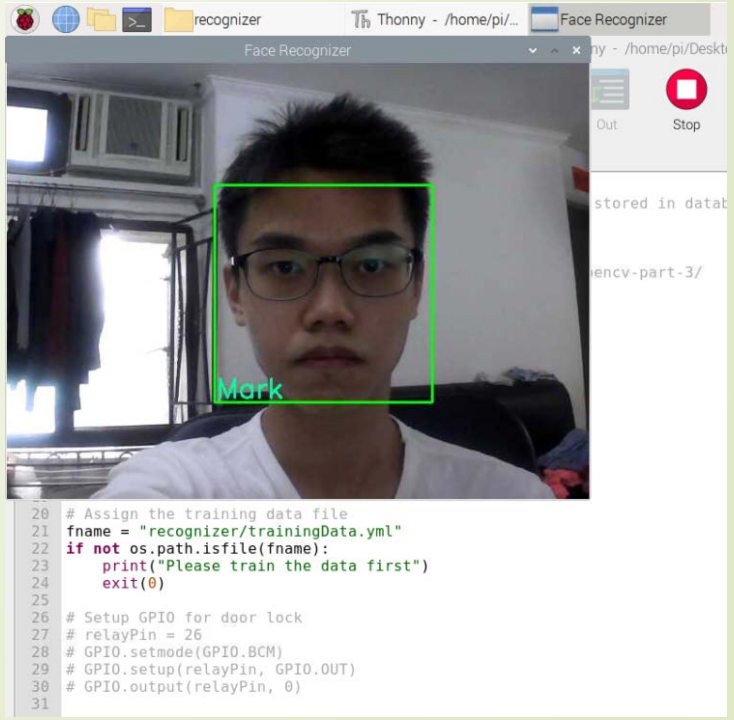
Achieved Sprints

- **Install OS, Python 3 & OpenCV in Raspberry Pi**
- Development goal: Provide the basic platform and tool for developing different function
- Learning goal: Experiment with Raspberry Pi computer to implement the platform



Achieved Sprints

- **Face Detection**
- Development goal: Identify the elder face by using web cam
- Learning goal: Experiment with collect human face and training model to identify face

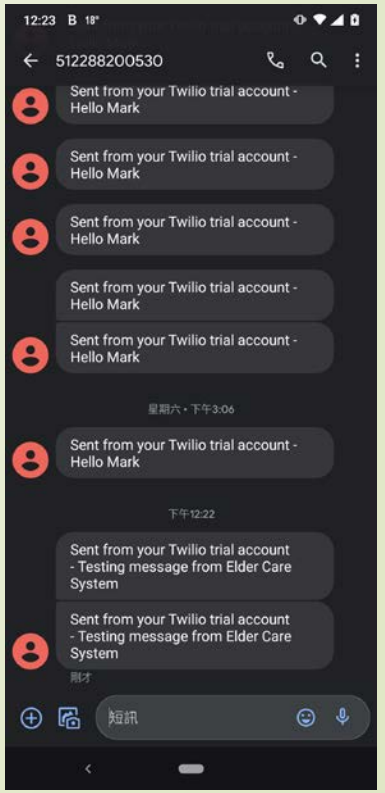


Planned Sprints

- **SMS Function**
- Development goal: Provide SMS alert and schedule to health care worker
- Learning goal: Experiment with the Twilio SMS API to understand how to implement the SMS function

Alarm Clock.py | Alarm Clock 2.py

```
1  import time
2  import pymysql
3
4  from twilio.rest import Client
5
6  def sleeptime(hour,min,sec):
7      return hour*3600 + min*60 + sec;
8  second = sleeptime(0,0,20);
9
10 while 1==1:
11     # Set your account ID and authentication token.
12     account_sid = "[redacted]"
13     auth_token = "[redacted]"
14
15     from_number = "+16036050936"  # With trial account, texts can only be sent from your Twilio number.
16     to_number = "+852[redacted]"
17     message = "Testing message from Elder Care System"
18
19     # Initialize the Twilio client.
20     client = Client(account_sid, auth_token)
21
22     time.sleep(second);
23     print ('do action')
24     # Send the SMS message.
25     message = client.messages.create(to=to_number,
26             from_=from_number,
27             body=message)
```



Planned Sprints

- **Email Function**
- Development goal: Provide email schedule to worker
- Learning goal: Experiment with the Gmail STMP server to understand how to implement the email function

In [9]:
```
import smtplib
```

In [10]:
```
#Email Variables
SMTP_SERVER = 'smtp.gmail.com' #Email Server (don't change!)
SMTP_PORT = 587 #Server Port (don't change!)
GMAIL_USERNAME = '[redacted]' #change this to match your gmail account
GMAIL_PASSWORD = '[redacted]'  #change this to match your gmail password
```

In [11]:
```
class Emailer:
    def sendmail(self, recipient, subject, content):

        #Create Headers
        headers = ["From: " + GMAIL_USERNAME, "Subject: " + subject, "To: " + recipient,
                   "MIME-Version: 1.0", "Content-Type: text/html"]
        headers = "\r\n".join(headers)

        #Connect to Gmail Server
        session = smtplib.SMTP(SMTP_SERVER, SMTP_PORT)
        session.ehlo()
        session.starttls()
        session.ehlo()

        #Login to Gmail
        session.login(GMAIL_USERNAME, GMAIL_PASSWORD)

        #Send Email & Exit
        session.sendmail(GMAIL_USERNAME, recipient, headers + "\r\n\r\n" + content)
        session.quit

sender = Emailer()
```

In [12]:
```
sendTo = '[redacted]'
emailSubject = "Testing"
emailContent = "This is a test of Elder Care System"
```

In [13]:
```
#Sends an email to the "sendTo" address with the specified "emailSubject" as the subject and "emailContent" as the email content.
sender.sendmail(sendTo, emailSubject, emailContent)
```

Planned Sprints

- **Build up database**
- Development goal: Develop and implement the encrypted database to store health record and time schedule
- Learning goal: Experiment with MySQL and MyPHPAdmin to understand how to implement database

Planned Sprints

- **RFID Detection & Identify**
- Development goal: Develop and implement the RFID detection to detect elder location and identify elder
- Learning goal: Experiment with RFID reader and RFID label to understand how to implement the RFID detection

Planned Sprints

- **Mobile Application**
- Development goal: Develop and implement the Android application for different user to use simple function

  e.g Elder and their family view health record
- Learning goal: Experiment with Kivy and Android Studio to implement the application

Planned Sprints

- **Web Application**
- Development goal: Develop and implement the web interface to provide completed function for different user

  e.g Admin create user account
- Learning goal: Experiment with Kivy and html5 to implement the web interface

Planned Sprints

- **Wireless Networking**
- Development goal: Develop and implement the encrypted network connection for all device including smart phone, Raspberrypi
- Learning goal: Experiment with the WiFi router to implement wireless network

End

Interim Review

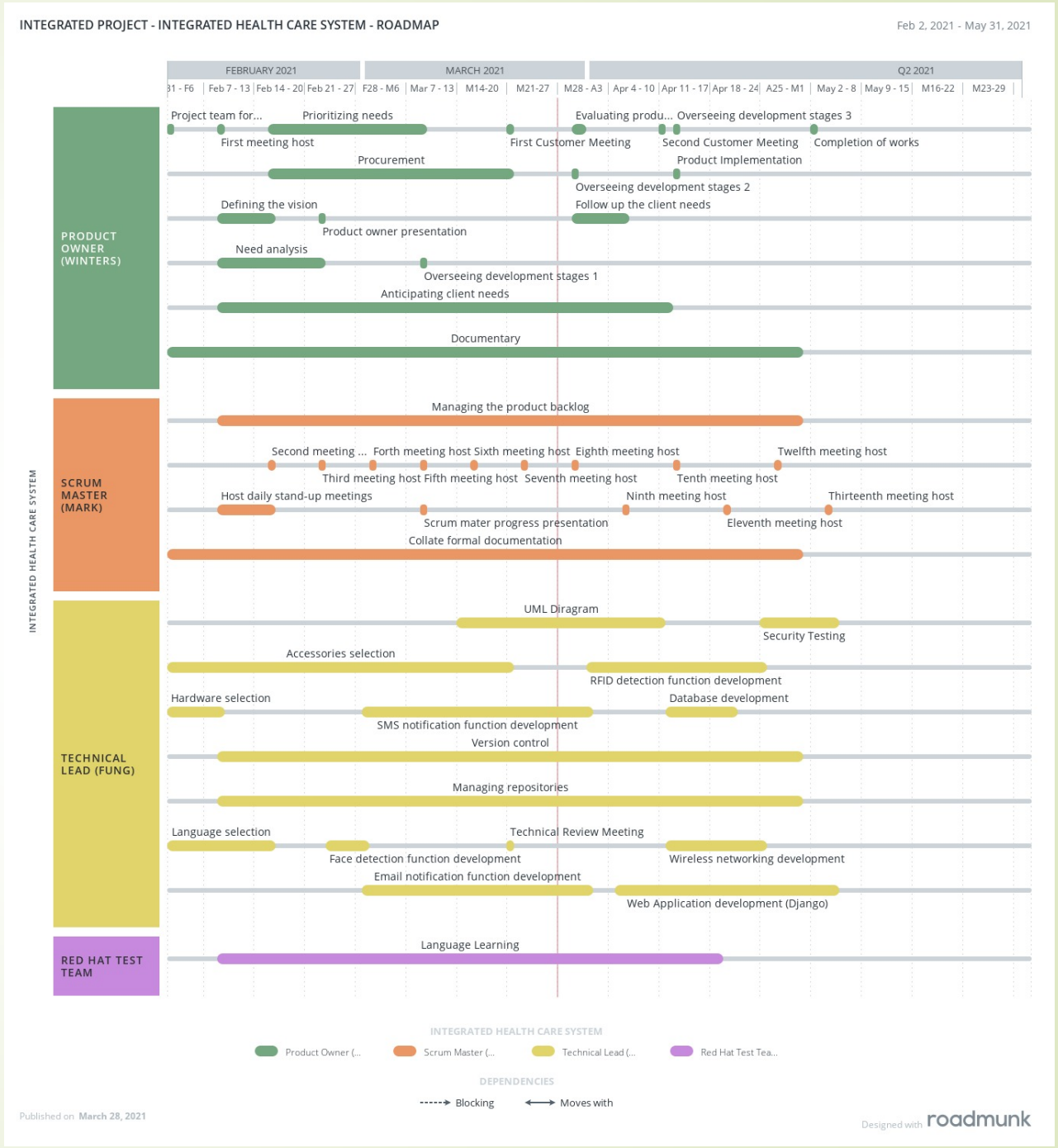
Wong Chun Kit, Wong Tsz Fung, Yau Chak Man

30 March 2021

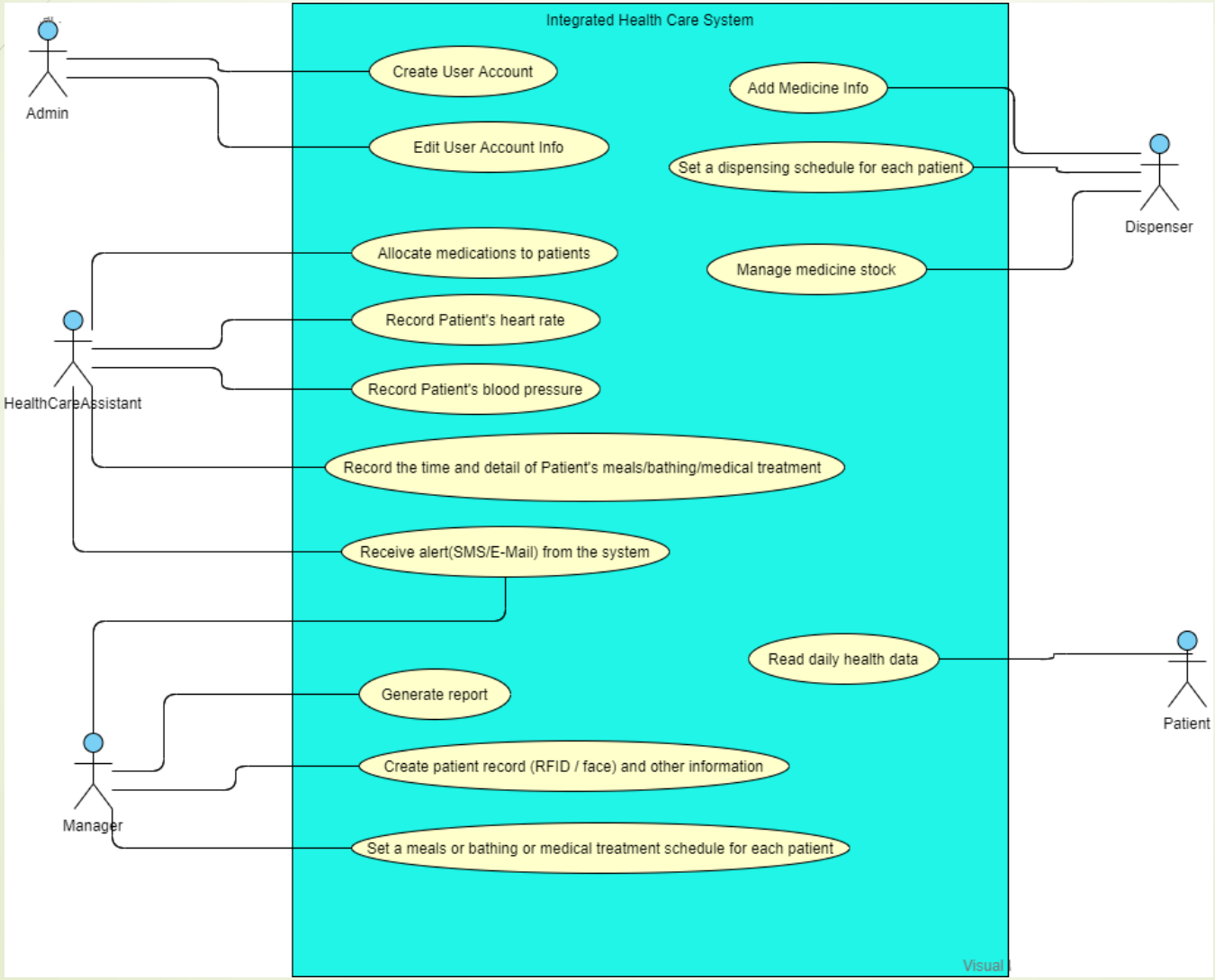
Product Goal

- **Integrated Health Care System**
- Make a safety, convenient living environment for elder
  - A secure system
  - A health care system
- Provide work assist to elder care centre worker
  - An integrated computer control system to manage the operations and the daily care activities
  - The creation of the different users accounts
  - The database support for recording the medical records for elderly people
  - Allow to amend and entering the records for different daily care activities
  - Provide security system to monitor the elderly home’ s entrances

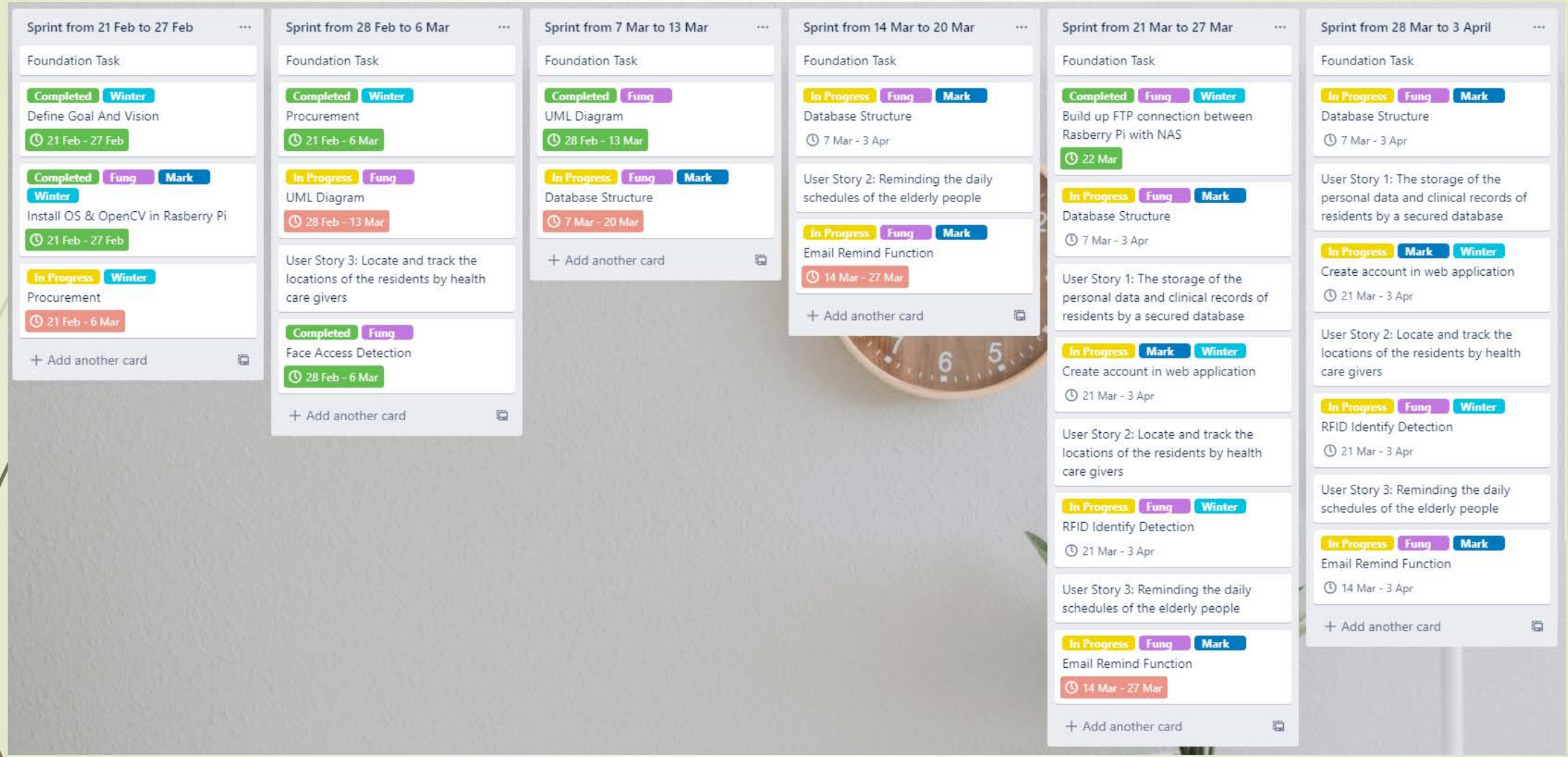
Product Roadmap



System Function



Sprint Backlog



Sprint from 21 Feb to 27 Feb

Foundation Task

Completed Winter
Define Goal And Vision
21 Feb - 27 Feb

Completed Fung Mark Winter
Install OS & OpenCV in Rasberry Pi
21 Feb - 27 Feb

In Progress Winter
Procurement
21 Feb - 6 Mar

+ Add another card

Sprint from 28 Feb to 6 Mar

Foundation Task

Completed Winter
Procurement
21 Feb - 6 Mar

In Progress Fung
UML Diagram
28 Feb - 13 Mar

User Story 3: Locate and track the locations of the residents by health care givers

Completed Fung
Face Access Detection
28 Feb - 6 Mar

+ Add another card

Sprint from 7 Mar to 13 Mar

Foundation Task

Completed Fung
UML Diagram
28 Feb - 13 Mar

In Progress Fung Mark
Database Structure
7 Mar - 20 Mar

+ Add another card

Sprint from 14 Mar to 20 Mar

Foundation Task

In Progress Fung Mark
Database Structure
7 Mar - 3 Apr

User Story 2: Reminding the daily schedules of the elderly people

In Progress Fung Mark
Email Remind Function
14 Mar - 27 Mar

+ Add another card

Sprint from 21 Mar to 27 Mar

Foundation Task

Completed Fung Winter
Build up FTP connection between Rasberry Pi with NAS
22 Mar

In Progress Fung Mark
Database Structure
7 Mar - 3 Apr

User Story 1: The storage of the personal data and clinical records of residents by a secured database

In Progress Mark Winter
Create account in web application
21 Mar - 3 Apr

User Story 2: Locate and track the locations of the residents by health care givers

In Progress Fung Winter
RFID Identify Detection
21 Mar - 3 Apr

User Story 3: Reminding the daily schedules of the elderly people

In Progress Fung Mark
Email Remind Function
14 Mar - 27 Mar

+ Add another card

Sprint from 28 Mar to 3 April

Foundation Task

In Progress Fung Mark
Database Structure
7 Mar - 3 Apr

User Story 1: The storage of the personal data and clinical records of residents by a secured database

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Create account in web application
21 Mar - 3 Apr

User Story 2: Locate and track the locations of the residents by health care givers

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RFID Identify Detection
21 Mar - 3 Apr

User Story 3: Reminding the daily schedules of the elderly people

In Progress Fung Mark
Email Remind Function
14 Mar - 3 Apr

+ Add another card

Achieved Sprints

- **Build up FTP connection between Raspberry Pi with NAS**
- Development goal: NAS will become the data backup server
- Raspberry Pi will be used as front-end server
- FTP will provide the data transmission between Raspberry Pi and NAS
- Why choose Raspberry pi ?

  Arduino vs Raspberry pi
- Why choose Raspberry pi 4B ?

  Raspberry pi 4 Model B vs Raspberry pi 3 Model B+
- Why choose Raspberry pi official OS(Raspbian) ?

  Raspbian OS vs other OS

Planning Sprint

- **Build up database structure**
- Development goal: Build up database to store the health record and schedule table
- Learning goal: Experiment with the Adminer to understand how to build up database
- Why choose Adminer ?

  Adminer vs MyPHPAdmin

Planning Sprint

- **User Story 1: The storage of the personal data and clinical records of residents by a secured database**
- **Create account in web application**
- Development goal: Administrator can create different users accounts for the staff based on their role, in order to provide different function for different staff
- Learning goal: Experiment with the Django to understand how to make register function in web

Planning Sprint

- **User Story 2: Locate and track the locations of the residents by health care givers**
- **RFID Identify Detection**
- Development goal: Develop and implement RFID Identify elder for following daily care schedule
- Learning goal: Experiment with the RFID reader to understand how to make identify function
- Why choose RFID?

  RFID vs Barcode

Planning Sprint

- **User Story 3: Reminding the daily schedules of the elderly people**
- Development goal: Provide email schedule to worker
- Learning goal: Experiment with the Gmail SMTP server to understand how to implement the email function

End

Interim Review

Wong Chun Kit, Wong Tsz Fung, Yau Chak Man

27 April, 2021

Product Goal

- **Integrated Health Care System**
- Make a safety, convenient living environment for elderly
  - A secure system
  - A health care system
- Provide work assistance to elderly home’ s health care worker
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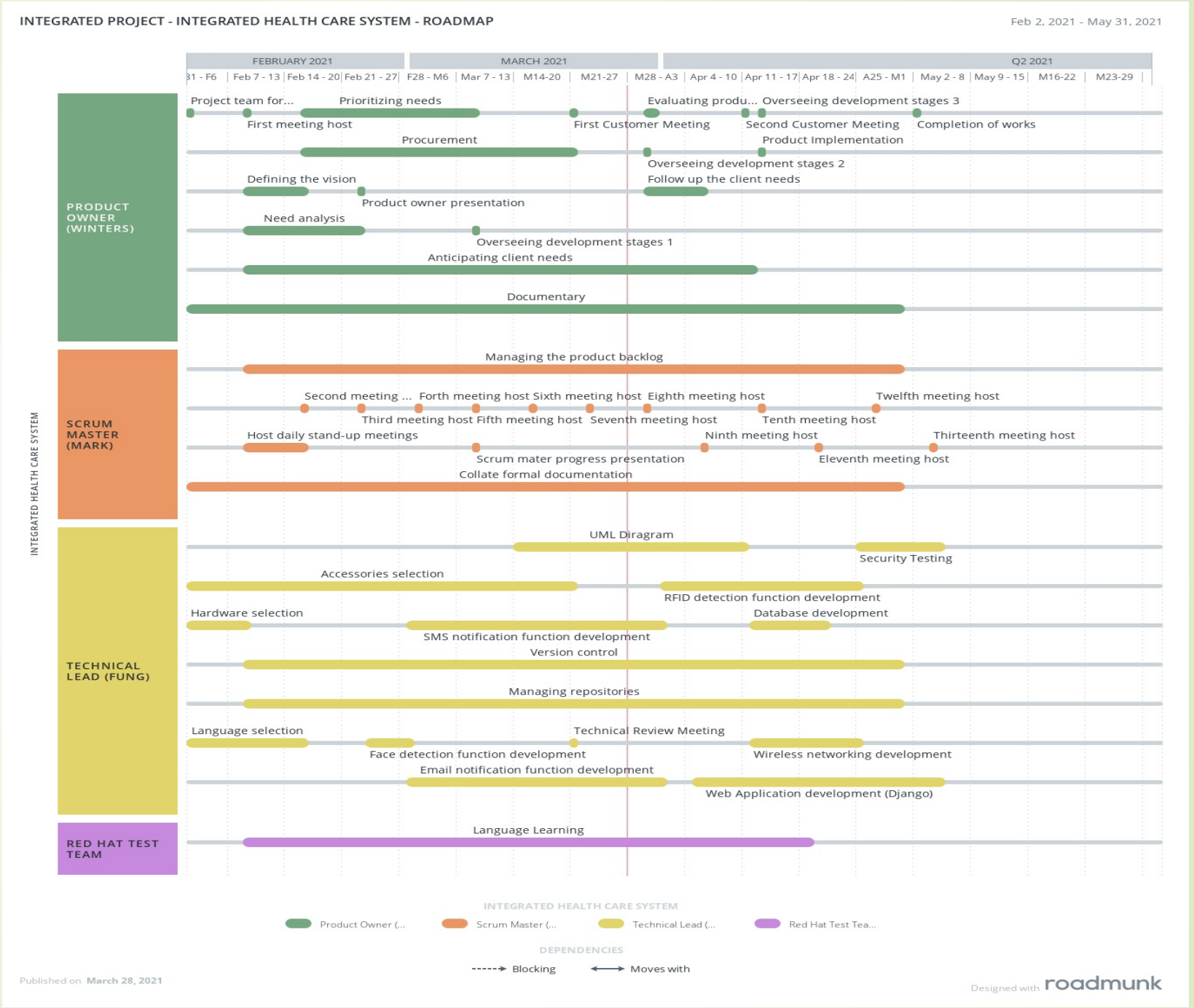
  - The creation of the different users accounts
  - The database support for recording the medical records for elderly people
  - Amend and enter the records for different daily care activities
  - Provide security system to monitor the elderly home’ s entrances

Product Roadmap

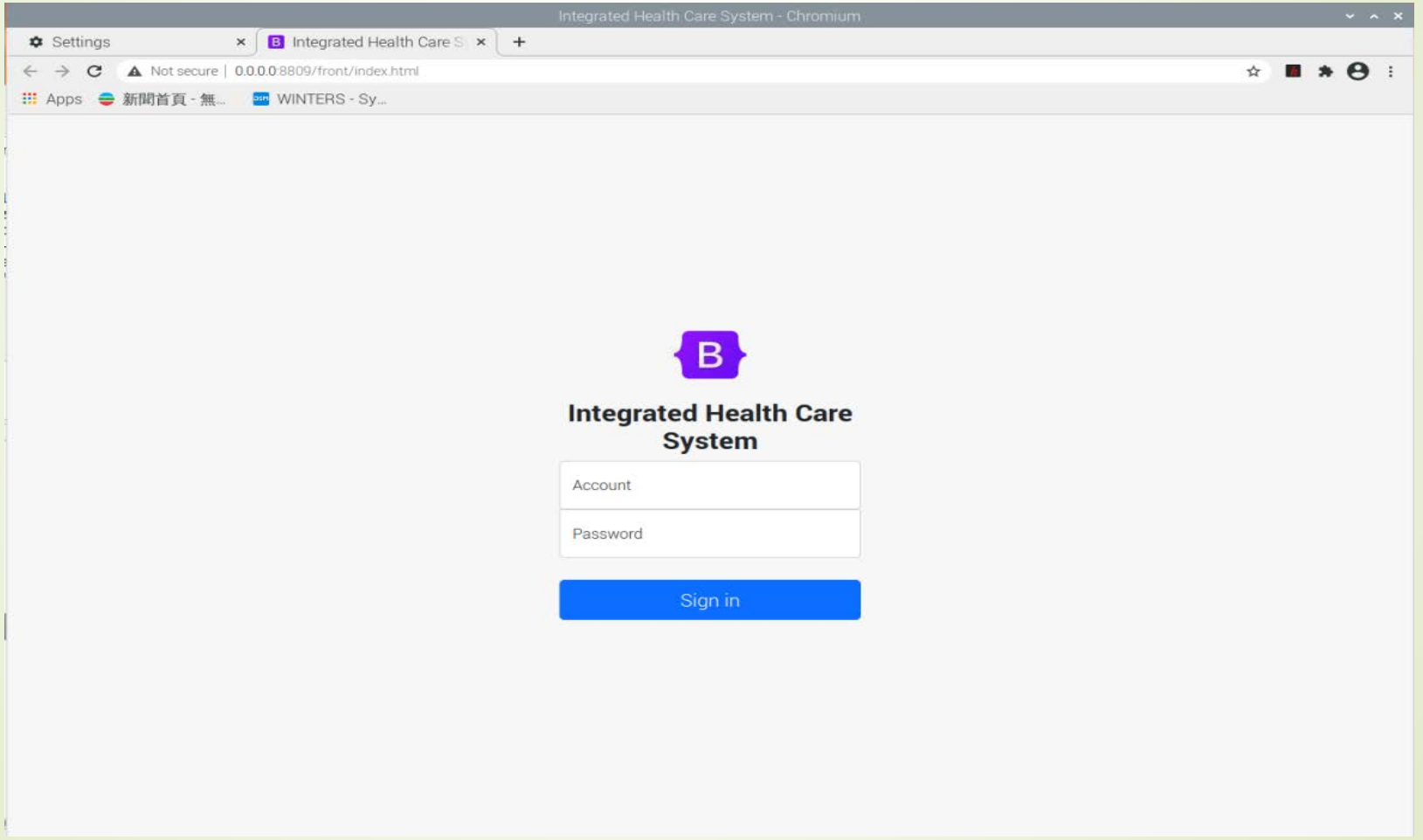


Product development progress

- Develop the Graphic User Interface (GUI) of the product, including items:
  - User story 1→ Resident of Elderly Home
  - User story 2 → Health care assistant
  - User story 3 → Manager of Elderly Home

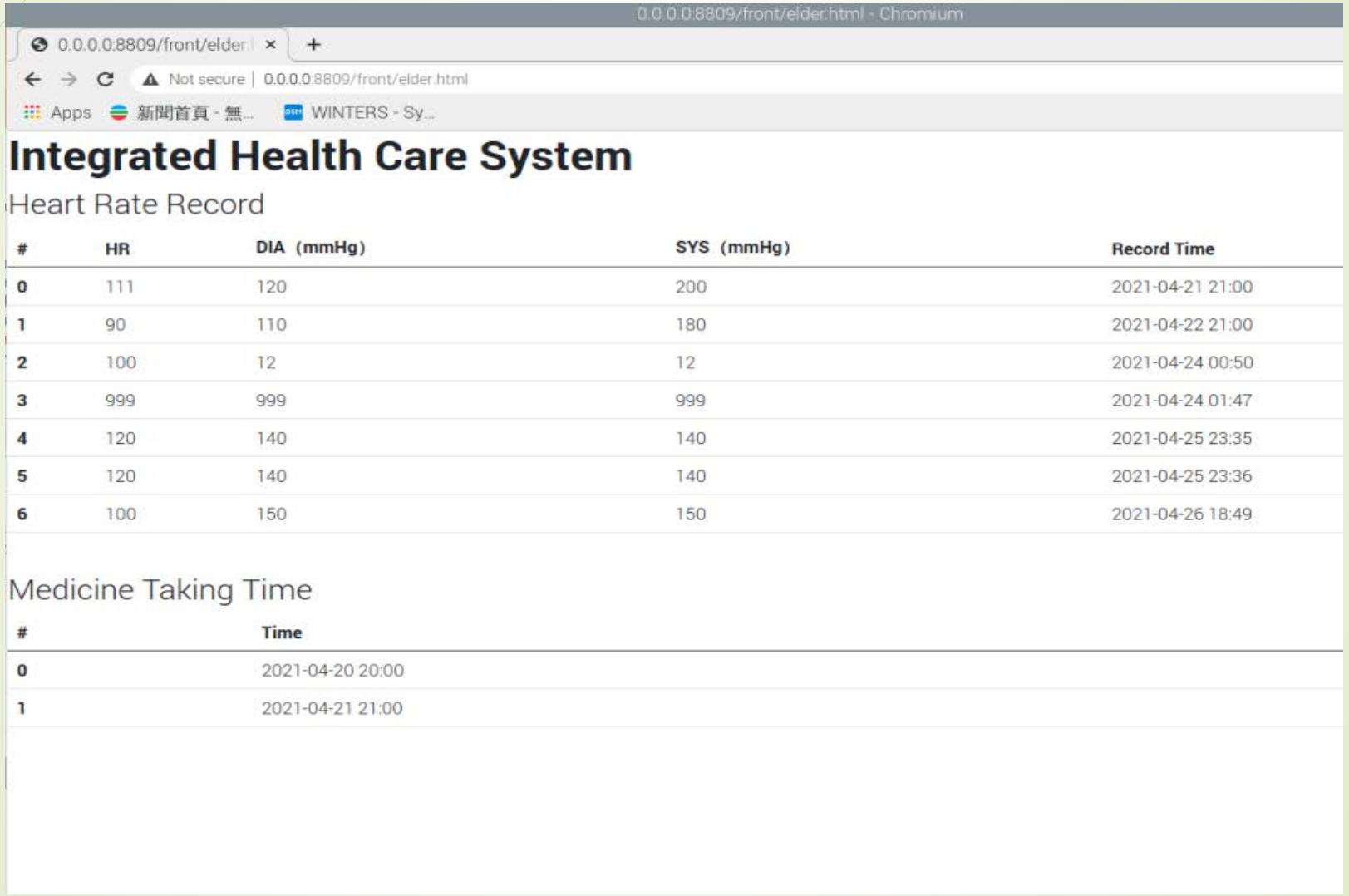
Some Achievements of the GUI

- The LOGIN Page of the Graphic User Interface (GUI) of the product



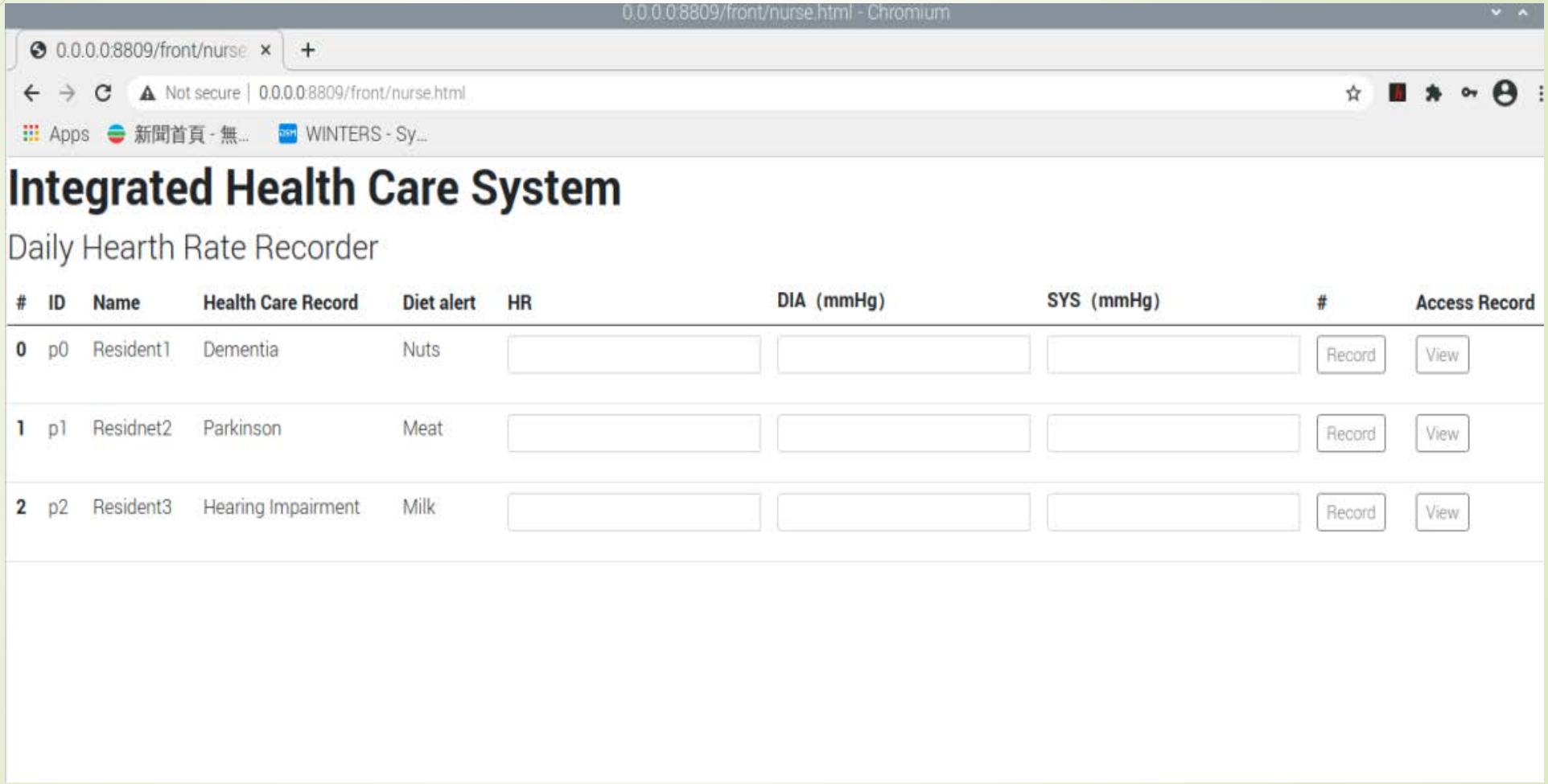
Some Achievements of the GUI

- The USER STORY 1 –Residents of Elderly Home



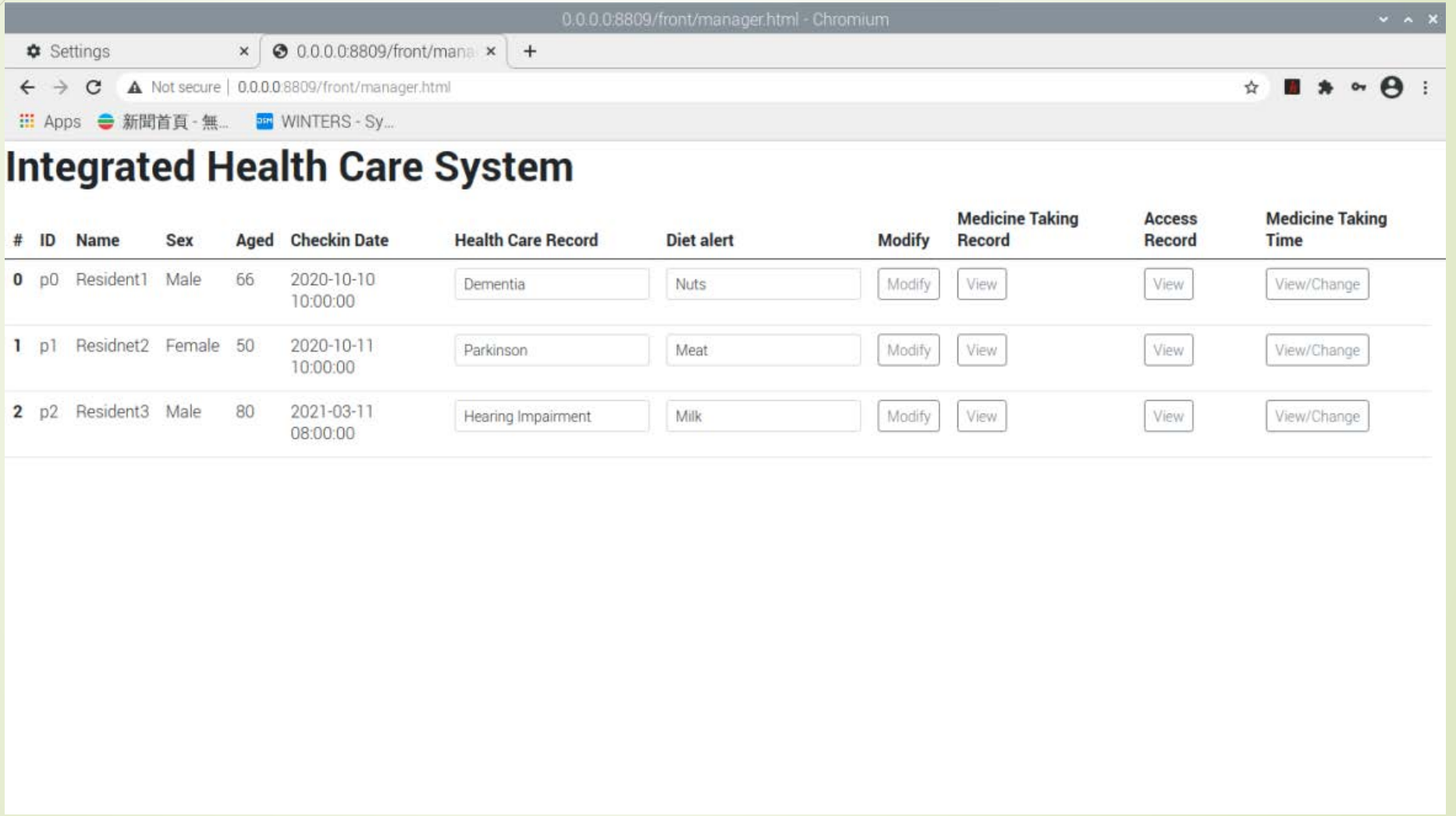
Some Achievements of the GUI

- The USER STORY 2 – Health Care Assistant



Some Achievements of the GUI

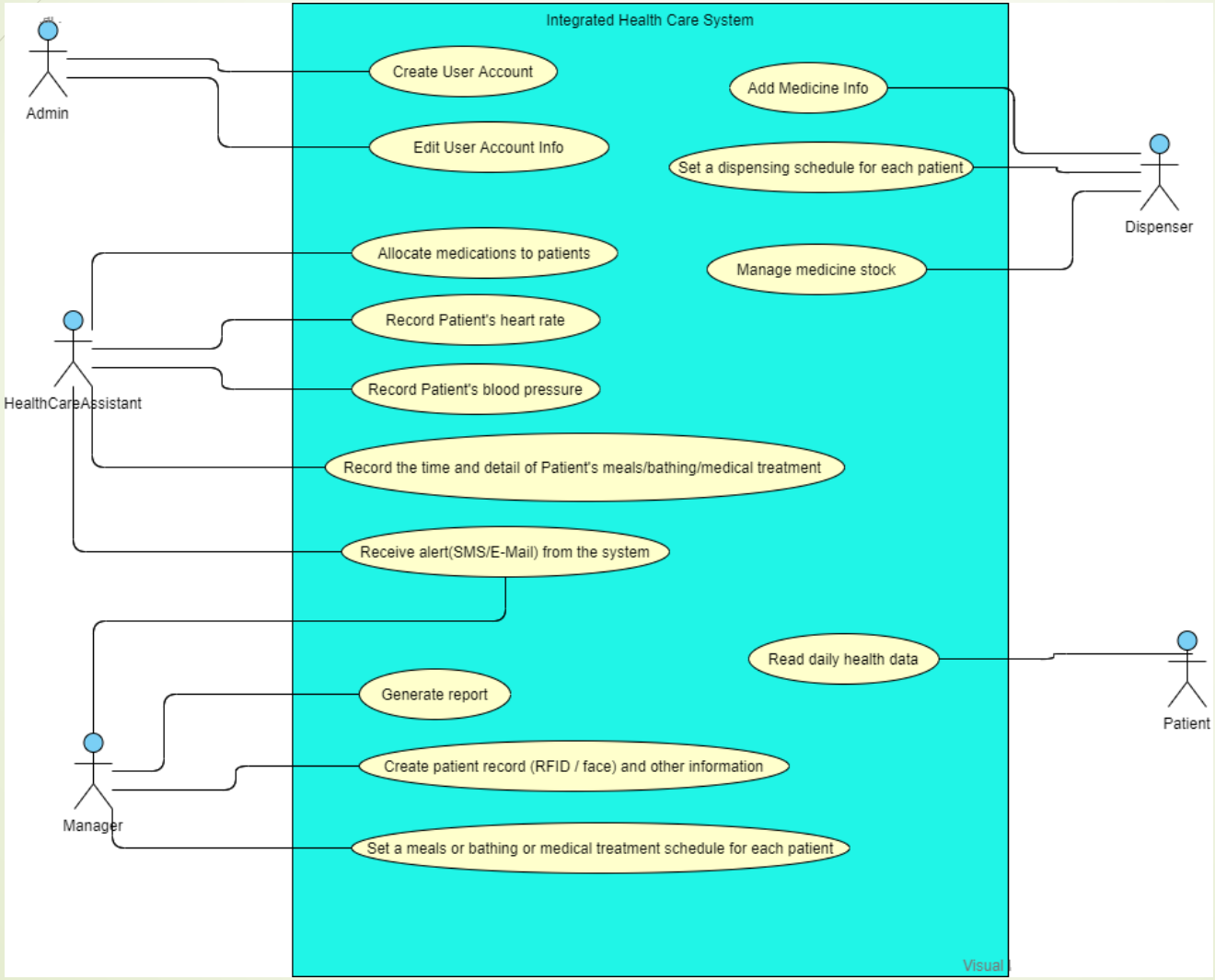
- The USER STORY 3 – Manager of Elderly Home



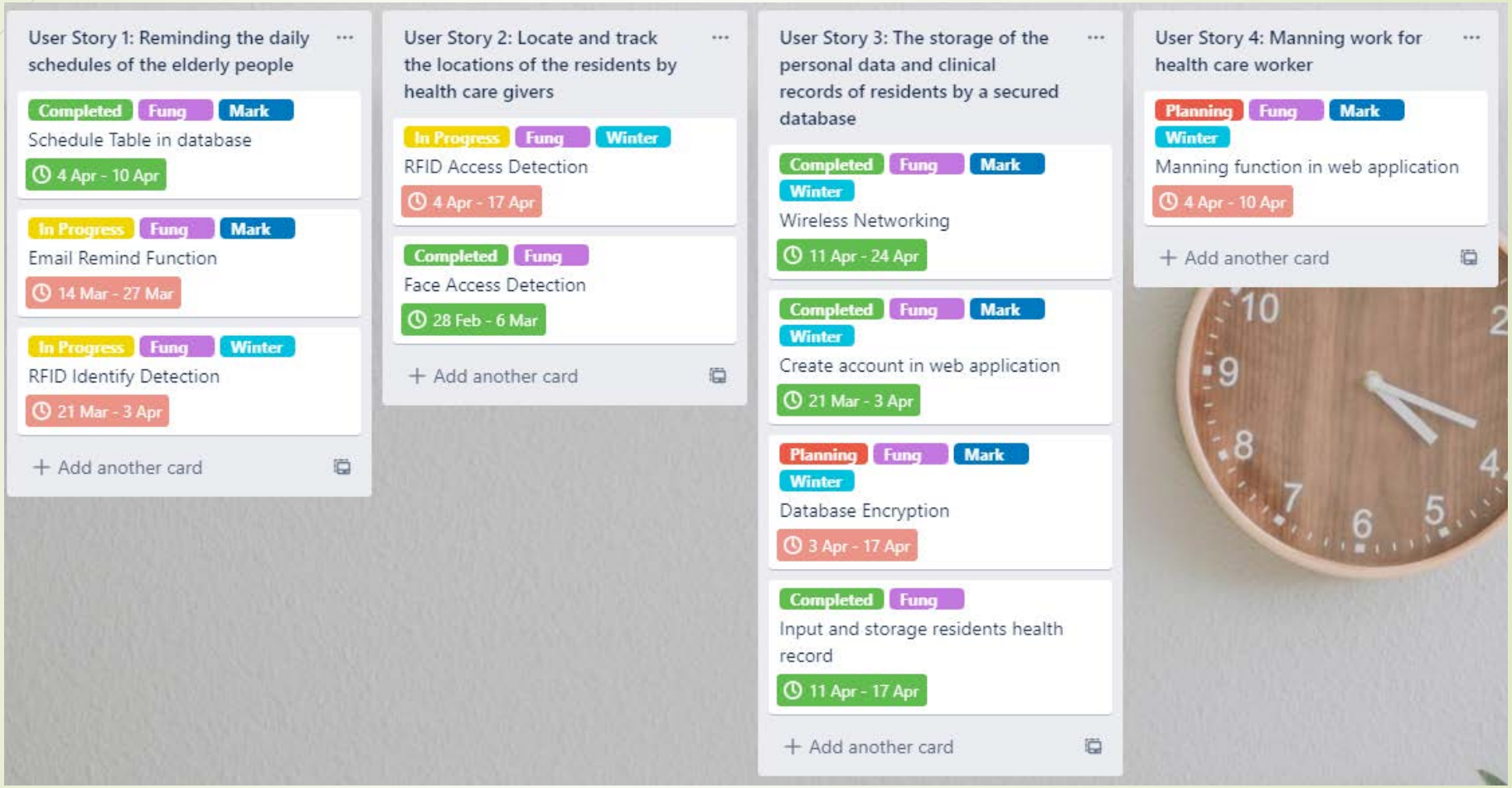
Procurements Expenditure

Items	Price in HKD	Contributed by
Raspberry Pi 3B x 2	HKD 640	Winters
Raspberry Pi 3B x 1	HKD 320	Fung
Raspberry Pi 4B x 2	HKD 1020	Winters
Raspberry Pi 4B x 1	HKD 510	Fung
NFC Waist watch x 3	HKD 850	Winters
RFID R2000 USB reader	HKD 780	Winters
NFC scanner	HKD 140	Winters
Raspberry RFID extension board Model:PN532 x 3	HKD 300	Winters
Raspberry V2 Cam x 2	HKD 380	Winters
Roadmuk 3 months	HKD 450	Winters
Total:	**HKD 5390**	

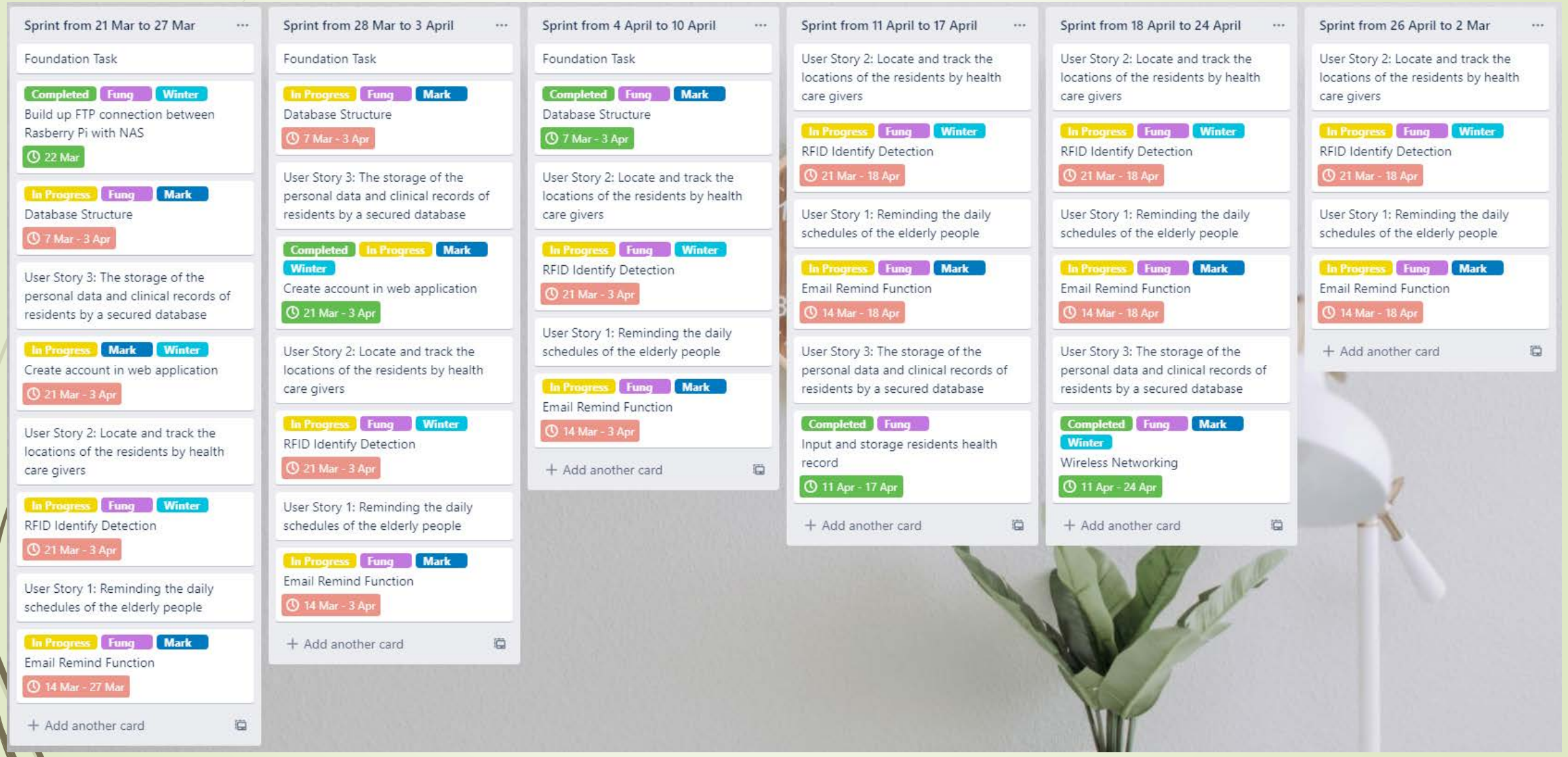
System Function



Sprint Backlog



Sprint Backlog



Sprint from 21 Mar to 27 Mar

Foundation Task

Completed · Fung · Winter
Build up FTP connection between Rasberry Pi with NAS
22 Mar

In Progress · Fung · Mark
Database Structure
7 Mar - 3 Apr

User Story 3: The storage of the personal data and clinical records of residents by a secured database

In Progress · Mark · Winter
Create account in web application
21 Mar - 3 Apr

User Story 2: Locate and track the locations of the residents by health care givers

In Progress · Fung · Winter
RFID Identify Detection
21 Mar - 3 Apr

User Story 1: Reminding the daily schedules of the elderly people

In Progress · Fung · Mark
Email Remind Function
14 Mar - 27 Mar

+ Add another card

Sprint from 28 Mar to 3 April

Foundation Task

In Progress · Fung · Mark
Database Structure
7 Mar - 3 Apr

User Story 3: The storage of the personal data and clinical records of residents by a secured database

Completed · In Progress · Mark · Winter
Create account in web application
21 Mar - 3 Apr

User Story 2: Locate and track the locations of the residents by health care givers

In Progress · Fung · Winter
RFID Identify Detection
21 Mar - 3 Apr

User Story 1: Reminding the daily schedules of the elderly people

In Progress · Fung · Mark
Email Remind Function
14 Mar - 3 Apr

+ Add another card

Sprint from 4 April to 10 April

Foundation Task

Completed · Fung · Mark
Database Structure
7 Mar - 3 Apr

User Story 2: Locate and track the locations of the residents by health care givers

In Progress · Fung · Winter
RFID Identify Detection
21 Mar - 3 Apr

User Story 1: Reminding the daily schedules of the elderly people

In Progress · Fung · Mark
Email Remind Function
14 Mar - 3 Apr

+ Add another card

Sprint from 11 April to 17 April

User Story 2: Locate and track the locations of the residents by health care givers

In Progress · Fung · Winter
RFID Identify Detection
21 Mar - 18 Apr

User Story 1: Reminding the daily schedules of the elderly people

In Progress · Fung · Mark
Email Remind Function
14 Mar - 18 Apr

User Story 3: The storage of the personal data and clinical records of residents by a secured database

Completed · Fung
Input and storage residents health record
11 Apr - 17 Apr

+ Add another card

Sprint from 18 April to 24 April

User Story 2: Locate and track the locations of the residents by health care givers

In Progress · Fung · Winter
RFID Identify Detection
21 Mar - 18 Apr

User Story 1: Reminding the daily schedules of the elderly people

In Progress · Fung · Mark
Email Remind Function
14 Mar - 18 Apr

User Story 3: The storage of the personal data and clinical records of residents by a secured database

Completed · Fung · Mark · Winter
Wireless Networking
11 Apr - 24 Apr

+ Add another card

Sprint from 26 April to 2 Mar

User Story 2: Locate and track the locations of the residents by health care givers

In Progress · Fung · Winter
RFID Identify Detection
21 Mar - 18 Apr

User Story 1: Reminding the daily schedules of the elderly people

In Progress · Fung · Mark
Email Remind Function
14 Mar - 18 Apr

+ Add another card

Achieved Sprints

- **User Story 1: Reminding the daily schedules of the elderly people**
- **Schedule Table in database**
- Development goal: Provide the interface for health worker and resident to view , edit and follow schedule
- Learning goal: Experiment with Django to understand how to create schedule table
- Why choose Django?

Achieved Sprints

- **User Story 2: Locate and track the locations of the residents by health care givers**
- **Face Access Detection**
- Development goal: To avoid the unauthorized person to entry the elder centre
- Learning goal: Experiment with OpenCV to know how to implement

Achieved Sprints

- **User Story 3: The storage of the personal data and clinical records of residents by a secured database**
- **Wireless Networking**
- Development goal: Wireless Networking will provide the data transmission between the client side and server
- Learning goal: Experiment with Wi-Fi router to implement
- Why Wi-Fi?

Achieved Sprints

- **User Story 3: The storage of the personal data and clinical records of residents by a secured database**
- **Create account function in web application**
- Development goal: The creation account function provide different user role with different permission for each staff and resident
- Learning goal: Experiment with Django to implement

Achieved Sprints

- **User Story 3: The storage of the personal data and clinical records of residents by a secured database**
- **Input and storage residents health record**
- Development goal: Provide the interface for staff to input the health record, and the database will store it
- Learning goal: Experiment with Django to implement

Planning Sprint

- **User Story 2: Locate and track the locations of the residents by health care givers**
- **RFID Identify Detection**
- Development goal: Develop and implement RFID Identify elder for following daily care schedule
- Learning goal: Experiment with the RFID reader to understand how to make identify function
- Why choose RFID?

  RFID vs Barcode

Planning Sprint

- **User Story 1: Reminding the daily schedules of the elderly people**
- **Email Remind Function**
- Development goal: Provide email schedule to worker
- Learning goal: Experiment with the SMTP server to understand how to implement the email function

End