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STUDENT NAMES:

# 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



# 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





# 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

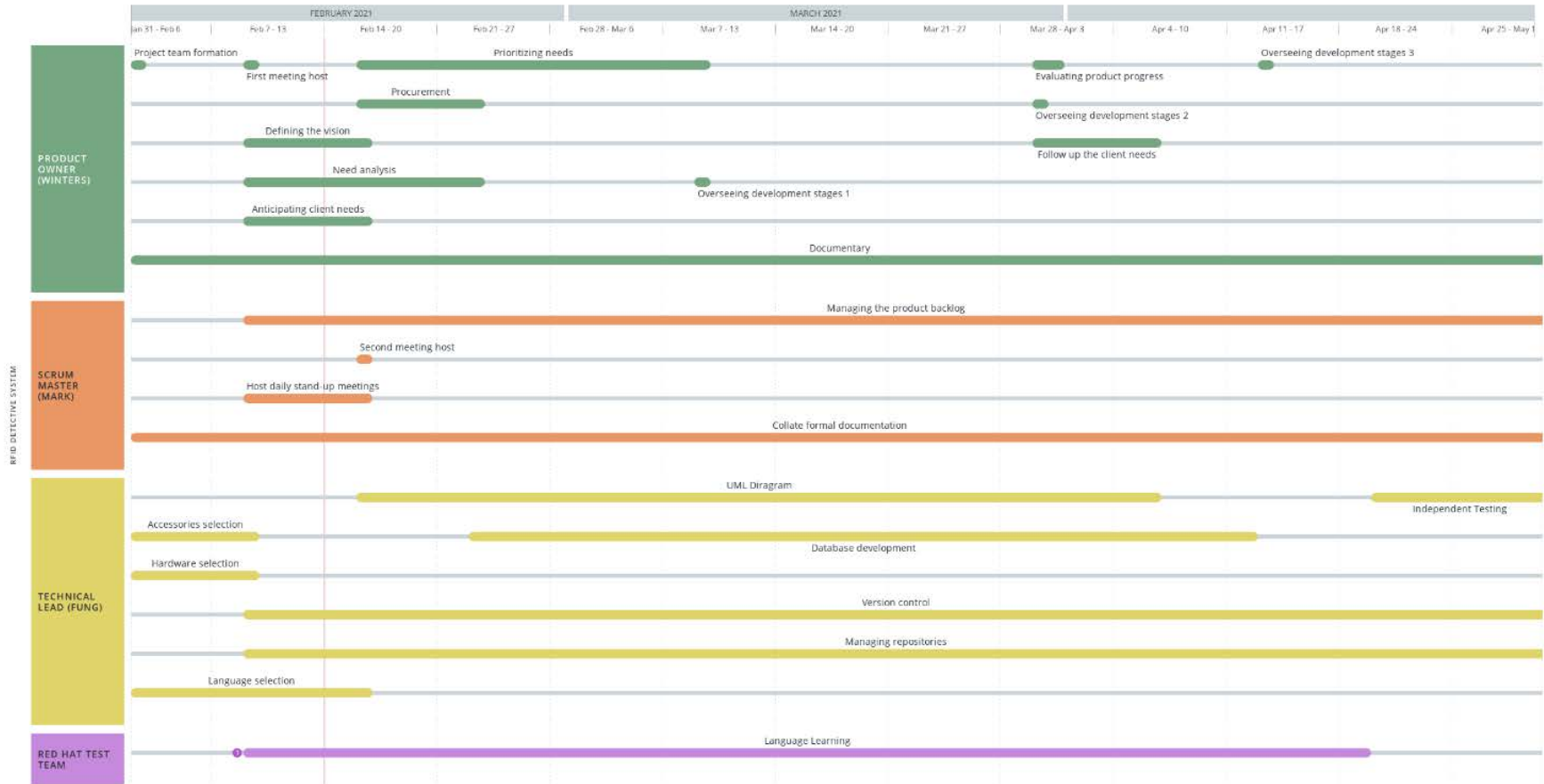
- ▶ Product Owner: Winters YAU
- ▶ Scrum Master: Mark WONG
- ▶ Technical Lead: Fung WONG
- ▶ Independent Tester: Winters, Mark and Fung
- ▶ Supervisor: Dr. Ivy WONG



# Roadmap & release plan

INTEGRATED PROJECT - RFID DETECTIVE SYSTEM IN OLD AGE HOME - RELEASE PLAN

Feb 2, 2021 - Apr 30, 2021



# 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





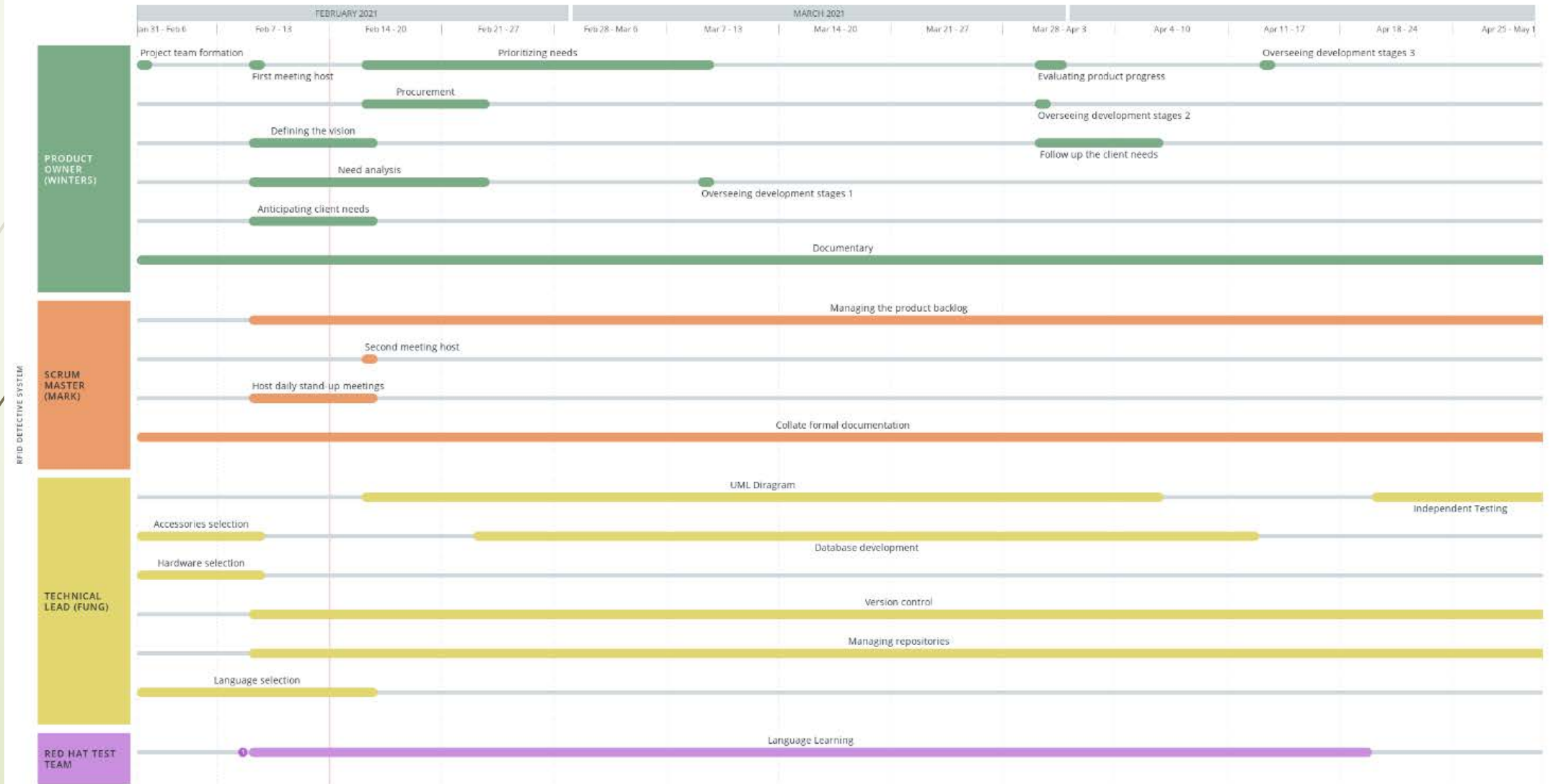
# Product Goal

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

# Product Backlog

INTEGRATED PROJECT - RFID DETECTIVE SYSTEM IN OLD AGE HOME - RELEASE PLAN

Feb 2, 2021 - Apr 30, 2021



# Product Backlog

The screenshot displays a Trello board interface with a header bar containing navigation icons, a search bar, and the Trello logo. Below the header, the board is titled 'Board' and includes a star icon, a link to 'PRCO204\_2021\_GP03', a 'Free' label, a '團隊觀看權限' (Team View Permission) icon, and a 'BP' icon with a '邀請' (Invite) button.

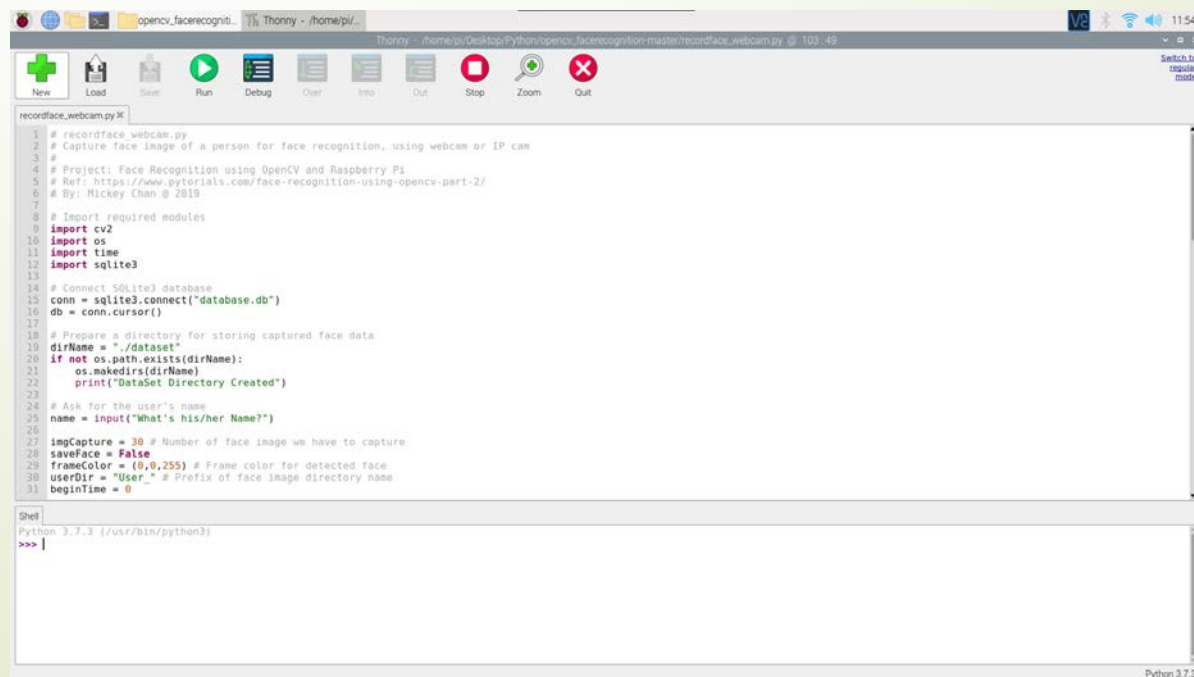
The board is organized into five columns, each with a title and a list of tasks or events:

- Upcoming Meeting**:
  - Interim Review in 9 March 2021
  - + 新增另一張卡片
- Past Meeting**:
  - 16-Feb-2021 21:00-22:00
  - 23-Feb-2021 21:00-22:00
  - + 新增另一張卡片
- Task Planning**:
  - Database create
  - Wireless Networking
  - Schedule Function
  - Mobile Application For Android
  - Web Application
  - + 新增另一張卡片
- Task In Progress**:
  - RFID Access Detection
  - RFID Identify Detection
  - SMS Function by Fung
  - Email Function by Fung
  - + 新增另一張卡片
- Task Completed**:
  - Install OpenCV in Raspberrypi
  - Face Detection by Fung
  - + 新增另一張卡片

On the far right, there is a button labeled '+ 新增其他列表' (Add other list).

# Achieved Sprints

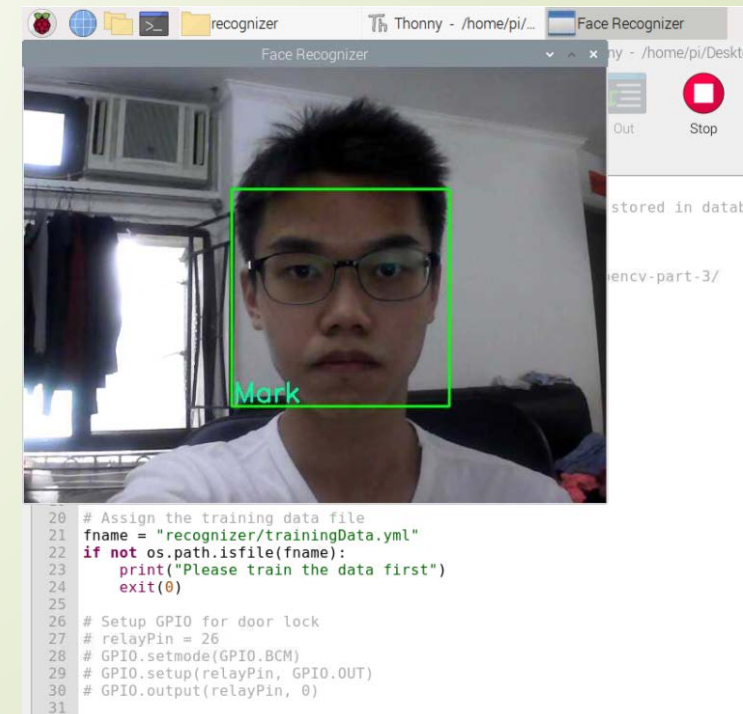
- **Install OS, Python 3 & OpenCV in Raspberry Pi**
- Development goal: Provide the basic platform and tool for developing different function
- Learning goal: Experiment with Raspberry Pi computer to implement the platform



```
recordface_webcam.pyX
1 # recordface_webcam.py
2 # Capture face image of a person for face recognition, using webcam or IP cam
3 #
4 # Project: Face Recognition using OpenCV and Raspberry Pi
5 # Ref: https://www.pytutorials.com/face-recognition-using-openpy-part-2/
6 # By: Mickey Chan @ 2019
7
8 # Import required modules
9 import cv2
10 import os
11 import time
12 import sqlite3
13
14 # Connect SQLite3 database
15 conn = sqlite3.connect("database.db")
16 db = conn.cursor()
17
18 # Prepare a directory for storing captured face data
19 dirName = "/dataset"
20 if not os.path.exists(dirName):
21     os.makedirs(dirName)
22     print("DataSet Directory Created")
23
24 # Ask for the user's name
25 name = input("What's his/her Name?")
26
27 imgCapture = 30 # Number of face image we have to capture
28 saveFace = False
29 frameColor = (0,0,255) # Frame color for detected face
30 userDir = "User." # Prefix of face image directory name
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# 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

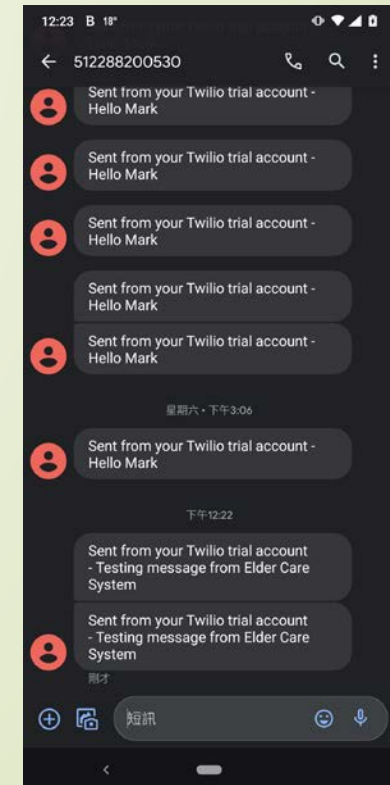




# Planned Sprints

- **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 SMTP 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

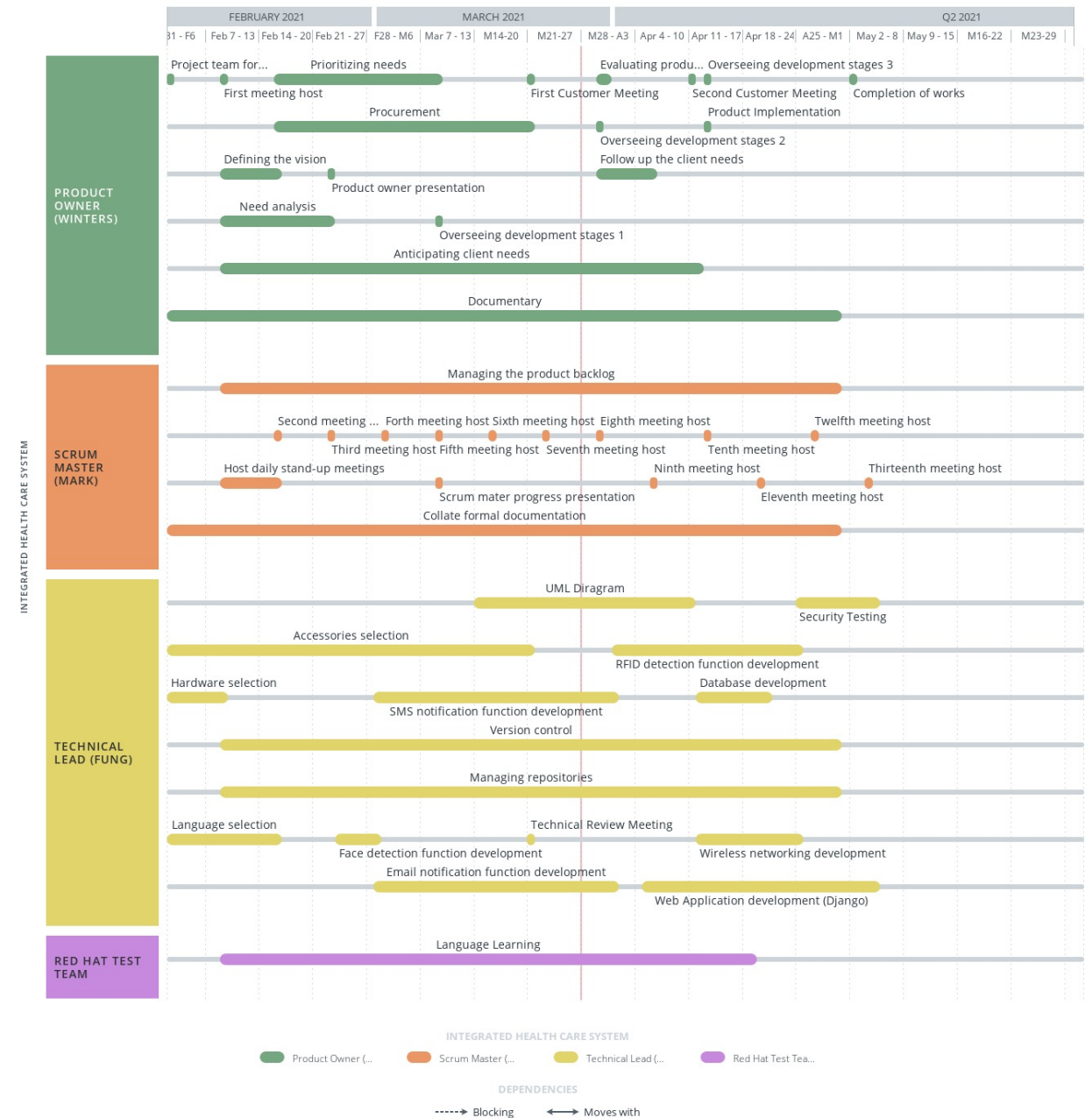
- Integrated Health Care System
- Make a safety, convenient living environment for elder
  - A secure system
  - A health care system
- Provide work assist to elder care centre worker
  - An integrated computer control system to manage the operations and the daily care activities
  - The creation of 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

## INTEGRATED PROJECT - INTEGRATED HEALTH CARE SYSTEM - ROADMAP

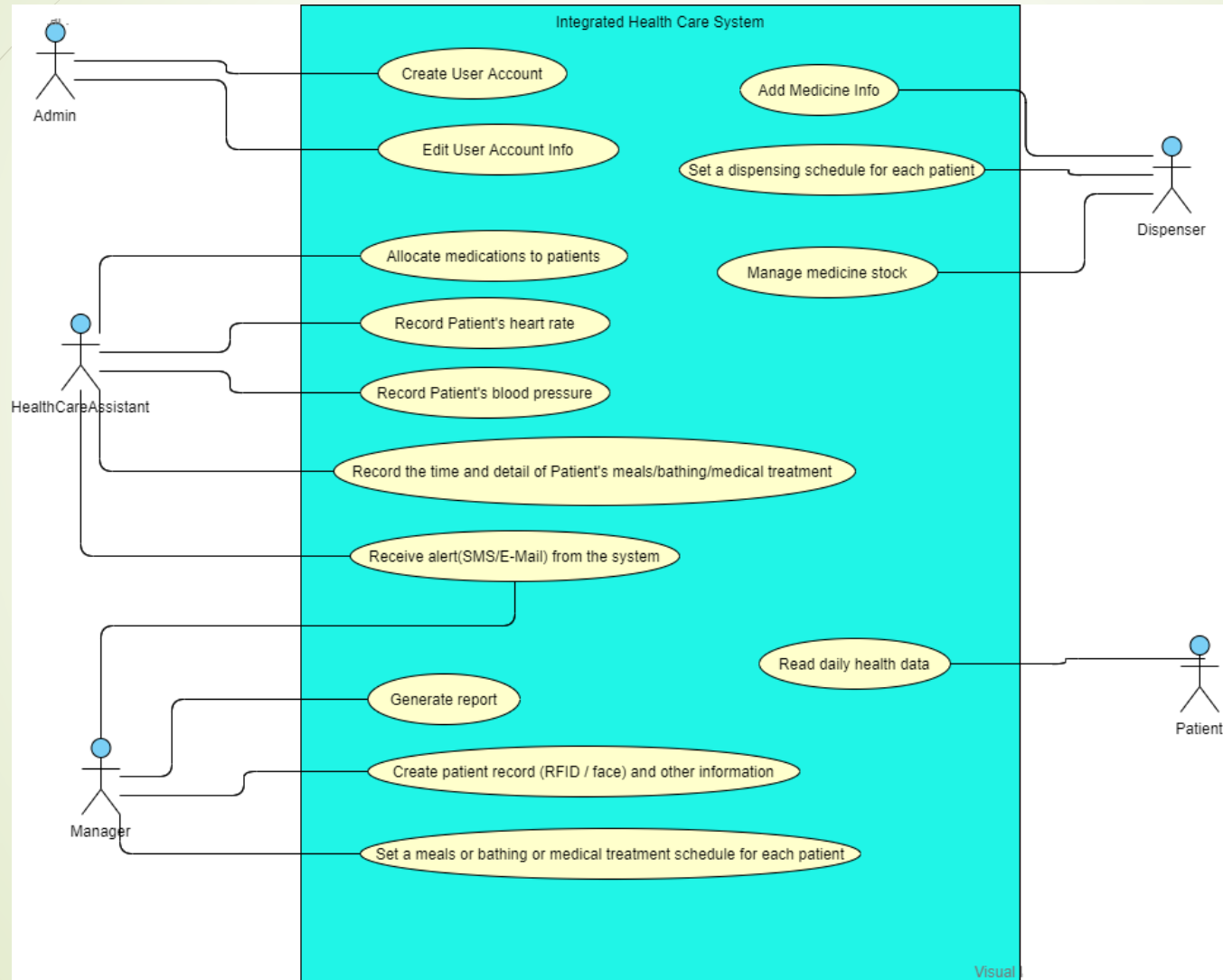
Feb 2, 2021 - May 31, 2021



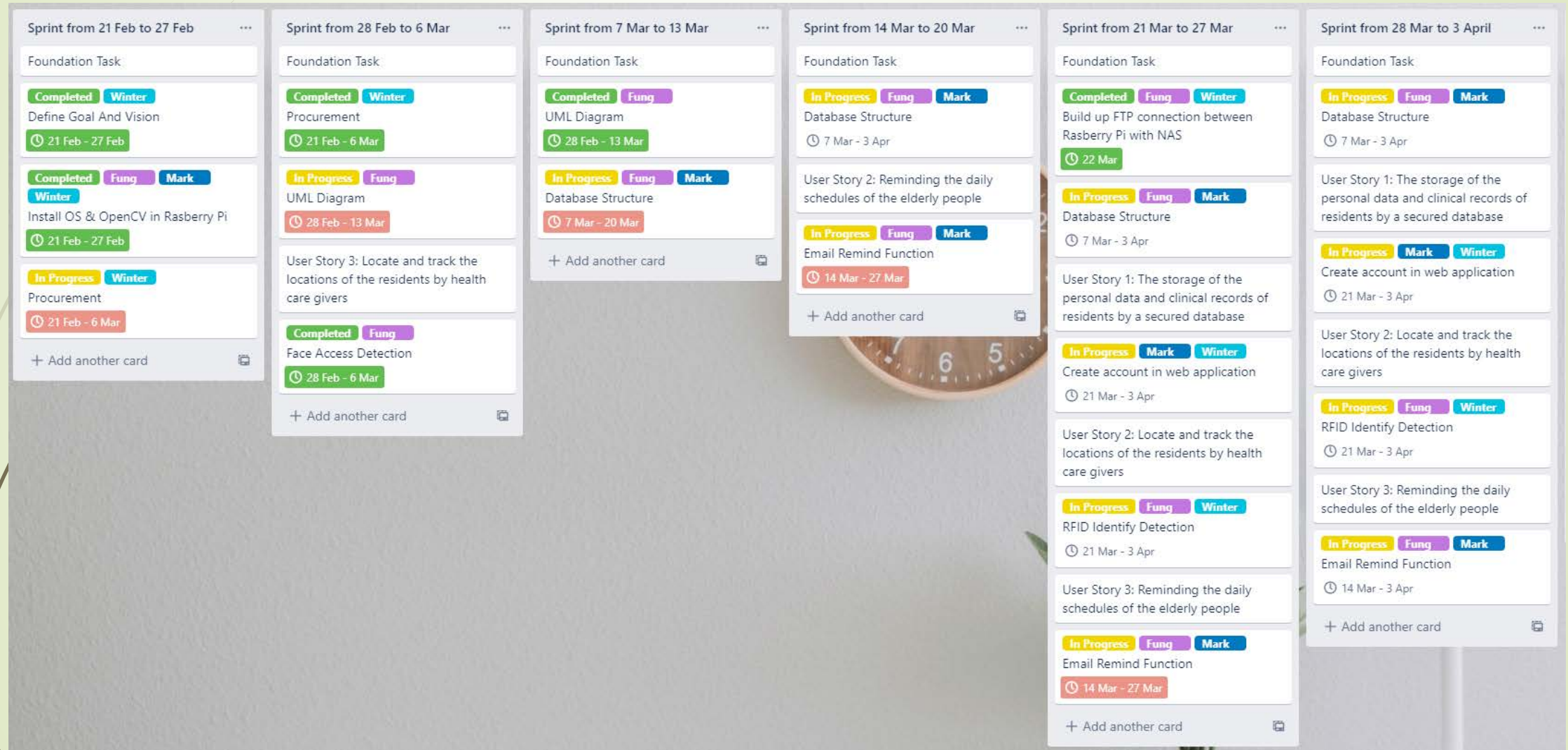
Published on March 28, 2021

Designed with **roadmunk**

# System Function



# Sprint Backlog





# 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



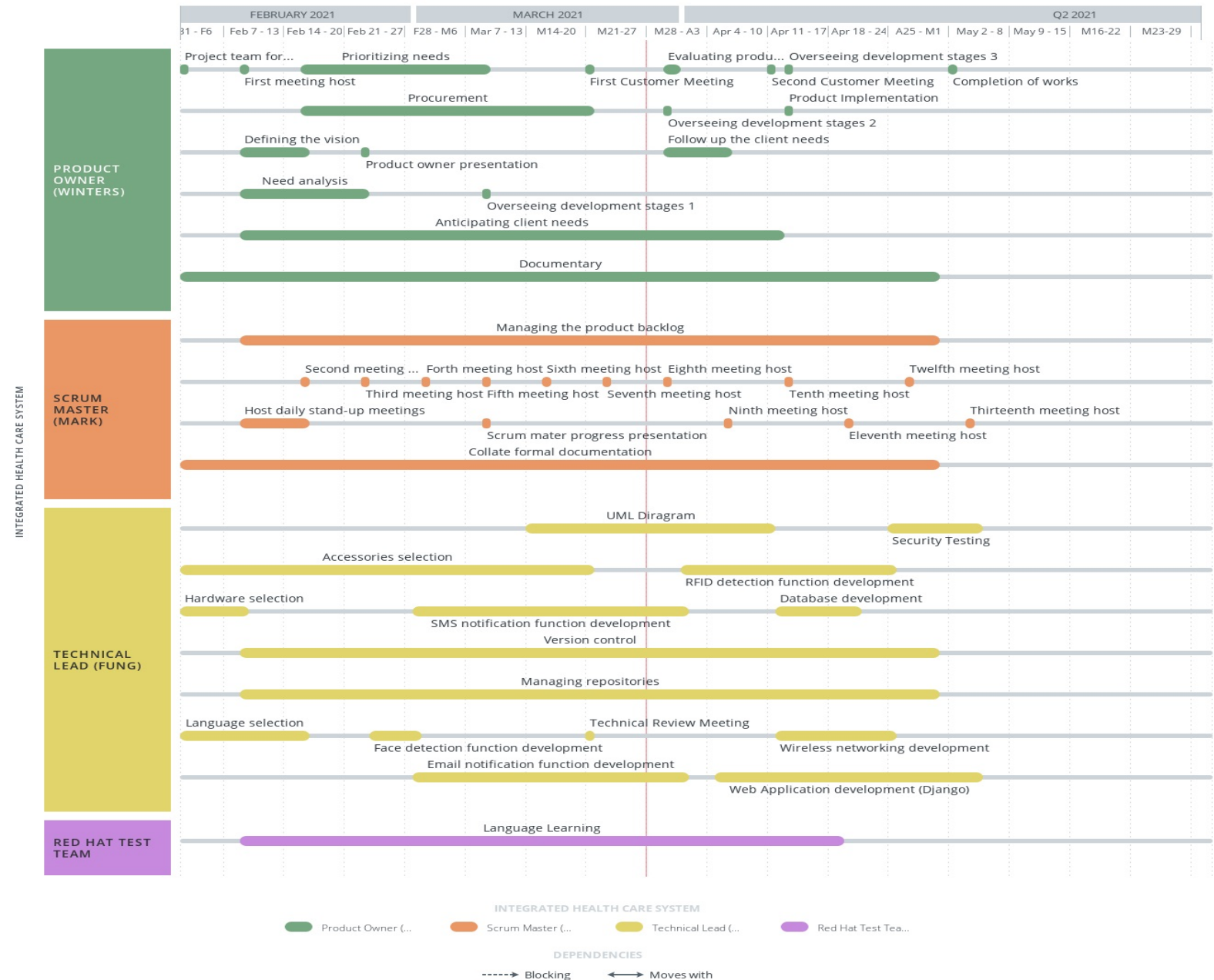
# Product Goal

- 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
  - 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
  - Amend and enter the records for different daily care activities
  - Provide security system to monitor the elderly home' s entrances

# Product Roadmap

## INTEGRATED PROJECT - INTEGRATED HEALTH CARE SYSTEM - ROADMAP

Feb 2, 2021 - May 31, 2021



Published on March 28, 2021

Designed with **roadmunk**



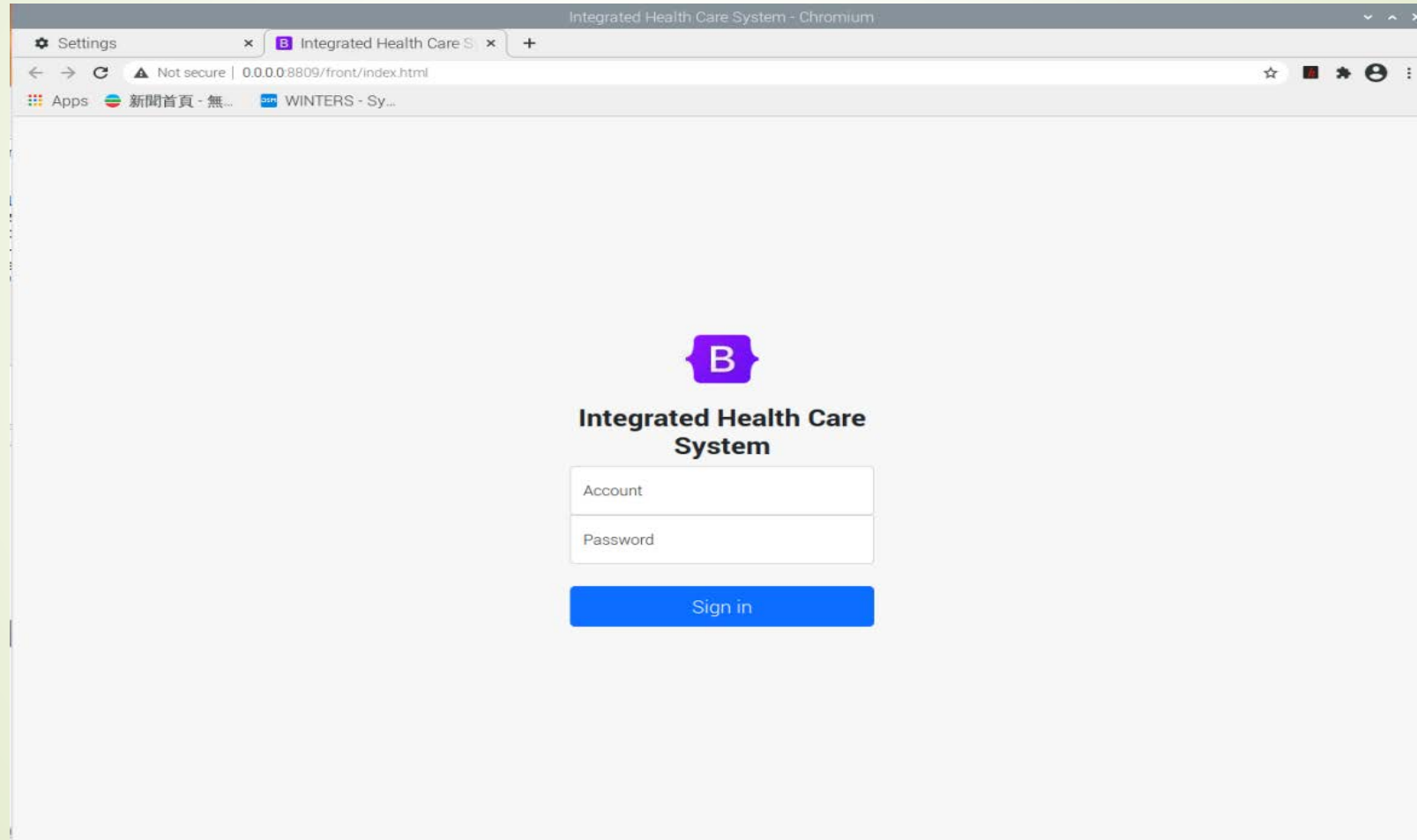


# Product development progress

- 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

0.0.0.0:8809/front/elder.html - Chromium

0.0.0.0:8809/front/elder.html

Apps 新聞首頁 - 無... WINTERS - Sy...

### Integrated Health Care System

#### Heart Rate Record

#	HR	DIA (mmHg)	SYS (mmHg)	Record Time
0	111	120	200	2021-04-21 21:00
1	90	110	180	2021-04-22 21:00
2	100	12	12	2021-04-24 00:50
3	999	999	999	2021-04-24 01:47
4	120	140	140	2021-04-25 23:35
5	120	140	140	2021-04-25 23:36
6	100	150	150	2021-04-26 18:49

#### Medicine Taking Time

#	Time
0	2021-04-20 20:00
1	2021-04-21 21:00

# Some Achievements of the GUI

## ➤ The USER STORY 2 – Health Care Assistant

0.0.0.0:8809/front/nurse.html - Chromium

0.0.0.0:8809/front/nurse x +

Not secure | 0.0.0.0:8809/front/nurse.html

Apps 新聞首頁 - 無... WINTERS - Sy...

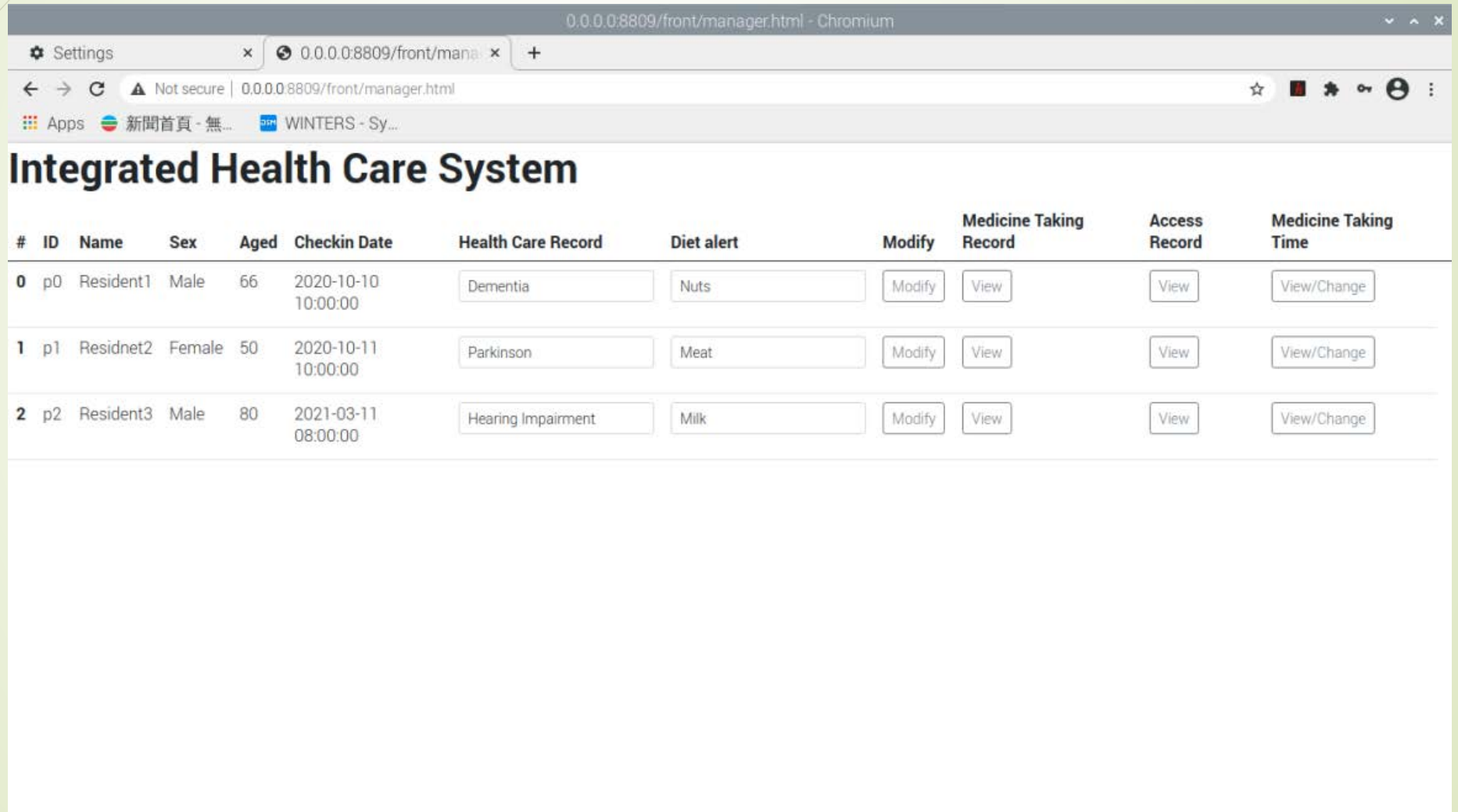
## Integrated Health Care System

### Daily Hearth Rate Recorder

#	ID	Name	Health Care Record	Diet alert	HR	DIA (mmHg)	SYS (mmHg)	#	Access Record
0	p0	Resident1	Dementia	Nuts	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Record"/>	<input type="button" value="View"/>
1	p1	Residnet2	Parkinson	Meat	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Record"/>	<input type="button" value="View"/>
2	p2	Resident3	Hearing Impairment	Milk	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="button" value="Record"/>	<input type="button" value="View"/>

# Some Achievements of the GUI

## ➤ The USER STORY 3 – Manager of Elderly Home



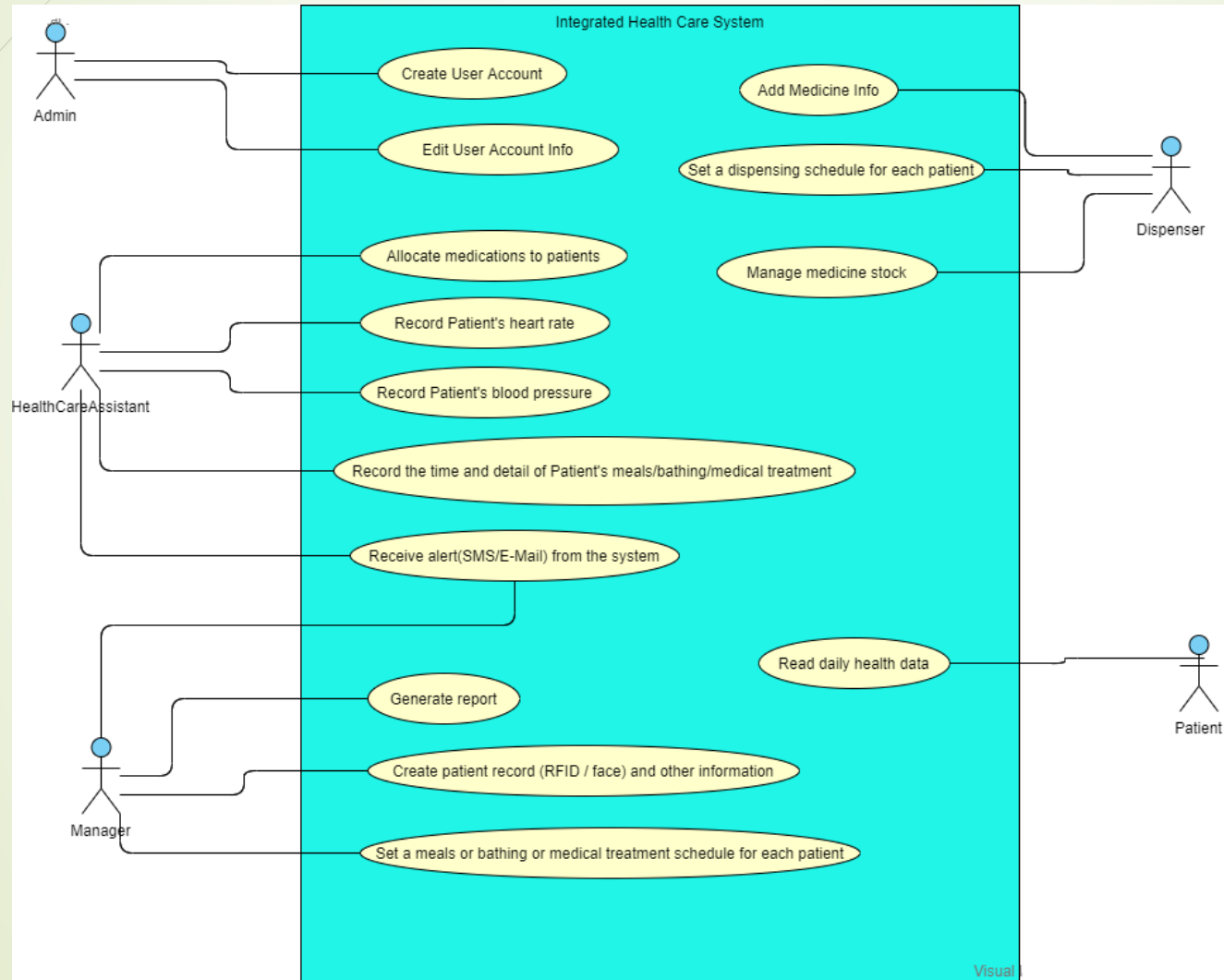
#	ID	Name	Sex	Aged	Checkin Date	Health Care Record	Diet alert	Modify	Medicine Taking Record	Access Record	Medicine Taking Time
0	p0	Resident1	Male	66	2020-10-10 10:00:00	Dementia	Nuts	Modify	View	View	View/Change
1	p1	Residnet2	Female	50	2020-10-11 10:00:00	Parkinson	Meat	Modify	View	View	View/Change
2	p2	Resident3	Male	80	2021-03-11 08:00:00	Hearing Impairment	Milk	Modify	View	View	View/Change

# 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
<b>Total:</b>	<b><u>HKD 5390</u></b>	



# System Function



# Sprint Backlog

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

- Completed** Fung Mark  
Schedule Table in database  
🕒 4 Apr - 10 Apr
- In Progress** Fung Mark  
Email Remind Function  
🕒 14 Mar - 27 Mar
- In Progress** Fung Winter  
RFID Identify Detection  
🕒 21 Mar - 3 Apr
- + Add another card

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

- In Progress** Fung Winter  
RFID Access Detection  
🕒 4 Apr - 17 Apr
- Completed** Fung  
Face Access Detection  
🕒 28 Feb - 6 Mar
- + Add another card

**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
- Completed** Fung Mark  
Winter  
Create account in web application  
🕒 21 Mar - 3 Apr
- Planning** Fung Mark  
Winter  
Database Encryption  
🕒 3 Apr - 17 Apr
- Completed** Fung  
Input and storage residents health record  
🕒 11 Apr - 17 Apr
- + Add another card

**User Story 4: Manning work for health care worker**

- Planning** Fung Mark  
Winter  
Manning function in web application  
🕒 4 Apr - 10 Apr
- + Add another card

# Sprint Backlog

The image displays a Kanban board with six columns, each representing a sprint. The columns are titled as follows:

- Sprint from 21 Mar to 27 Mar
- Sprint from 28 Mar to 3 April
- Sprint from 4 April to 10 April
- Sprint from 11 April to 17 April
- Sprint from 18 April to 24 April
- Sprint from 26 April to 2 Mar

Each column contains cards for tasks and user stories. The cards are organized into sections: Foundation Task, User Story 2, User Story 3, and User Story 1. Each card includes a status label (Completed, In Progress, Fung, Mark, Winter), a title, and a date range. A clock icon is present on each card, indicating a time-based workflow.

For example, in the first sprint (21 Mar to 27 Mar), the tasks include:


- Foundation Task: Build up FTP connection between Raspberry Pi with NAS (Completed, 22 Mar).
- User Story 3: The storage of the personal data and clinical records of residents by a secured database (In Progress, 7 Mar - 3 Apr).
- User Story 2: Locate and track the locations of the residents by health care givers (In Progress, 21 Mar - 3 Apr).
- User Story 1: Reminding the daily schedules of the elderly people (In Progress, 14 Mar - 27 Mar).

The board also includes a '+ Add another card' button at the bottom of each column.






# 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**