MVP

DECO3801

Design Computing Studio 3 – Build

Wearable Tech for Bike Riders

With **Bicycle Queensland**

Content

Product Overview

The core purpose of the product is providing protective guidance to users by demonstrating on-time and historical UV index.

The intended users are the cyclists in Queensland, especially members of Bicycle Queensland. The potential risk of skin health is significant for bicycle riders who exposed to high UV without suitable protection.

DECO3801 – Team Wyzards MVP video:

https://www.youtube.com/watch?v=fcc1wuJDaMM&feature=youtu.be

Real-time and Historical UV Index

Our project provides users with real-time UV index detected by the UV sensor device which is fastened to the bike handle. The UV index is sent to the mobile application via Bluetooth and displayed in the homepage. Also, it is stored in the database as historical information.

The historical UV exposure can be reloaded and rendered as a graph for a specific workout. Users are required to register to use this application.

Furthermore, for the convenience of the rider the on-time UV intensity level is demonstrated by the colour of the LED ring (Figure 1).

UV index	Color of the LED
1 - 2	(Low) Green
3 - 5	(Normal) Yellow
6 - 7	(Medium) Orange
8 - 10	(High) Red
11+	(Extreme) Violet

Figure 1. UV index and corresponding LED color

Forecast

The mobile application is also able to provide weather and UV index forecasts for cycling preparation. The UV index forecast shows the UV index for the next five hours from the current time. The weather forecast displays weather for the next five days from “today”. All forecast information is fetched from the Dark Sky API according to the user’s current location.

Generally, the application provides an integrated and convenient information system with UV index as the core (Figure 2). Users can easily get all the UV index-related information from the application.

	UV index source	Where to use
Past	Fetch by PHP from database (stored before)	UV Historical Page
Current	Detected by UV sensor (store in the database)	Home Page / LED
Future	Fetched by API according to the current location	UV Forecast Page / Weather Forecast Page

Figure 2. The system of getting and using

Exposure Duration

A notification is pushed when the user is exposed to UV for a long period. When the exposure time is higher than a threshold, the application will push a notification and warn users to find shade or use some protection. When the UV index is going to be higher than a specific amount or it is going to be rainy according to the forecast, different types of notification can be pushed through as well.

Web Application

Users can share their historical UV index. Once a user decides to share personal UV index, a URL will be generated. User can send the URL to a relative who is also a member of our application. The receiver can visit the cyclist's UV index for a specific workout as a UV index graph in the webpage directed by the URL after logging in.

UI Test Evaluation

In order to meeting intended users' requirements, we ran iterative prototype tests to improve the project based on the feedback. The prototype test is deployed based on the initial design of the project. The delivery MVP has made several improvements based on the feedback.

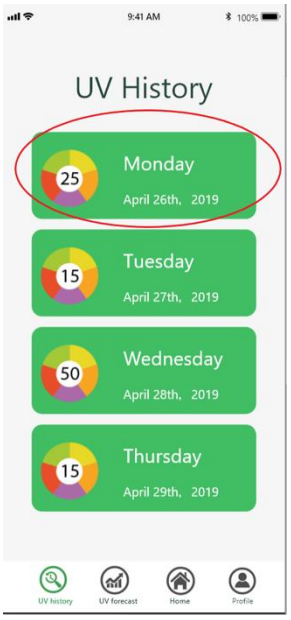
Prototype Task

For testing core functions of the project, three tasks are required to be tested during the prototype test:

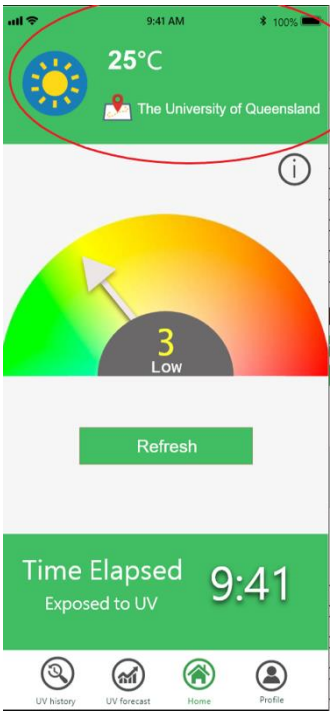
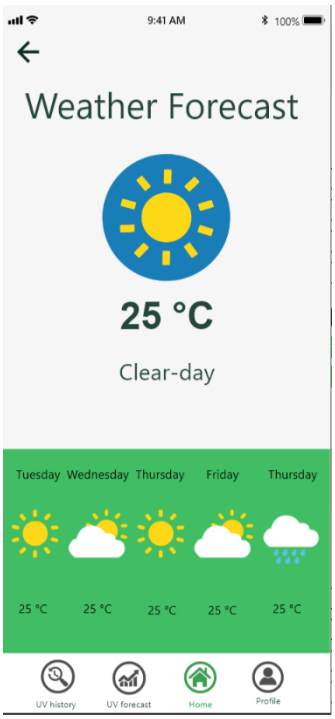
1. Find the page that displays the historical UV index graph.
2. Find the page that displays weather forecast.
3. Find the page that displays UV index forecast.

Test Situation

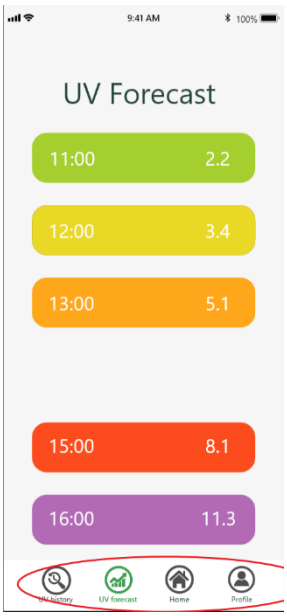
Task 1. Find the page that displays the historical UV index graph.

<table>
<tr><td>Description</td><td colspan="2">Based on the design of prototype, the historical UV index graph can be discovered by choosing a workout in UV history page (Figure 3, Figure 4) to see a UV index for a specific period.</td></tr>
<tr><td rowspan="2">Screenshots</td><td>Figure 3 – UV history page</td><td>Figure 4 – Graph demonstration page</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Result</td><td colspan="2">3 out of 3 participants were not able to find the graph. The reason of this situation is assumed as the unclear guidance for this function. Hence, we considered to alter the way that users choose a period, or to add an instruction to lead users.</td></tr>
</table>

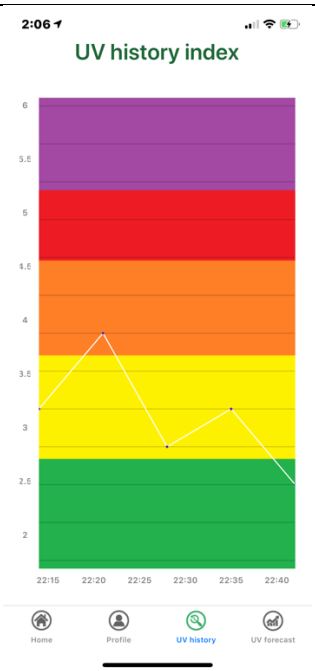
Task 2. Find the page that displays weather forecast.

<table>
<tr><td>Description</td><td colspan="2">The weather forecast can be discovered by clicking the weather demonstration area at the home page (Figure 5, Figure 6).</td></tr>
<tr><td rowspan="2">Screenshots</td><td>Figure 5 – Home page</td><td>Figure 6 – Weather Forecast entered from the home page</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Result</td><td colspan="2">2 out of 3 participants accomplished the task smooth. The rest one was hesitating but also finished the task. The result can be treated as a “passing” test. However, to avoid any further hesitating, an instruction would be useful in future improvement.</td></tr>
</table>

Task 3. Find the page that displays UV index forecast.

Description	UV index forecast can be navigated by the navigation which is positioned at the bottom of the screen (Figure 7).
Screenshot	**Figure 7 –** UV index forecast
	
Result	All participants finished the task in one second. The result is concluded as a “satisfied” one.

Improvement

Description	To improve the most confusing part – UV index graph, we currently delete the function of choosing a specific workout. The historical UV index page shows the UV data stored in the database for users' each workout (Figure 8).
Screenshot	**Figure 8 –** UV index graph for MVP 
Result	The design of future implementation about choosing a specific period is still in progress. The period selection will according to the real data in the future test and the visual effect of data demonstration. Besides, it is considered to show the usage instruction in the information page when users firstly use the application, in order to help them get used to the application in a short period.

More Feedback

As a conclusion of the feedback gathered from three participants. The application is quite simple and concise. There are no complicated and useless functions hence the application can be easily used by a cyclist who don't want to spend too much time on checking the mobile. However, some functions are not clearly to be navigated. The structure of the application needs improvement in order to make functions more understandable.

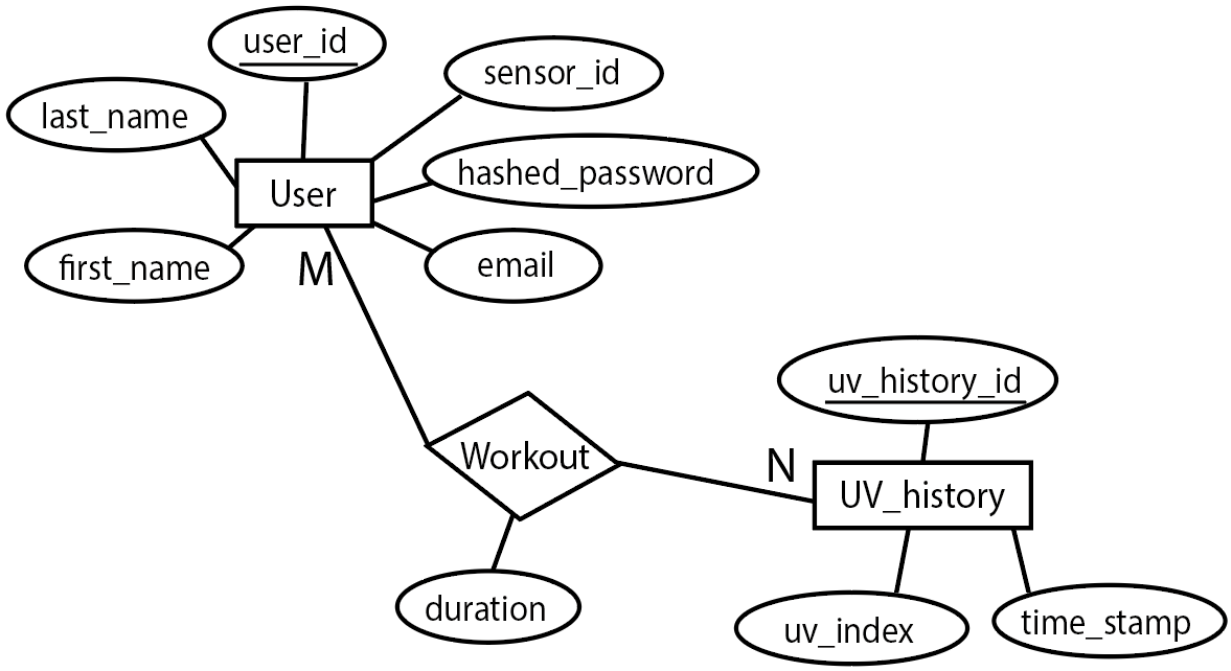
Code guide

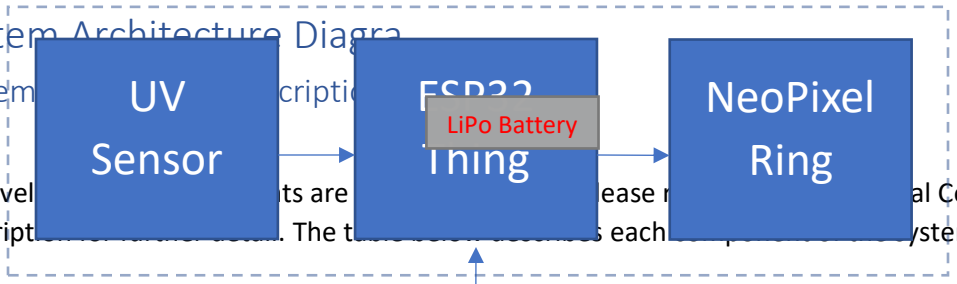
Files breakdown

Backend	Contain the PHP and SQL file which are used to execute functions in the server side
Sensor	Contains .ino file which used to transfer real-time UV index from sensor to backend.
tests	System template folder
Asset **Images** (images folder) **Fonts** (fonts folder)	Contains images and font resources which are used in the application
Components	System template folder
constants	System template folder
Navigation AppNavigator.js – template file AppNavigator.web.js – template file MainTabNavigator.js – implement navigation bar	Folder contains JavaScript files which used in building navigation of the application (e.g. navigation bar & navigation icon & direction of each page)
Screen HomeScreen.js – Home page interface InstructionScreen.js – Information page interface LinksScreen.js – UV history page interface LoginScreen.js – Login page interface ProfileScreen.js – Profile page interface SignupScreen.js – Sign up page interface UvForecastScreen.js – UV forecast page interface WeatherForecastScreen.js – Weather forecast page interface	Folder contains JavaScript files which build application interfaces and define functions to fetch data.
server	System template folder
.gitignore	System template file
.watchmanconfig	System template file
App.js	System template file
App.json	System template file
babel.config.js	System template file
package.json	System template file
package.lock.json	System template file(locked)
yarn.lock	System template file

PHP files in server is in /var/www/html/, which are used to execute functions by using fetch API. In order to run the expo project, environment need to be setup. More information about the installation can be found in **README.md** file.

ER Diagram


user_id
sensor_id
last_name
User
hashed_password
first_name
M
email
uv_history_id
Workout
N
UV_history
duration
uv_index
time_stamp

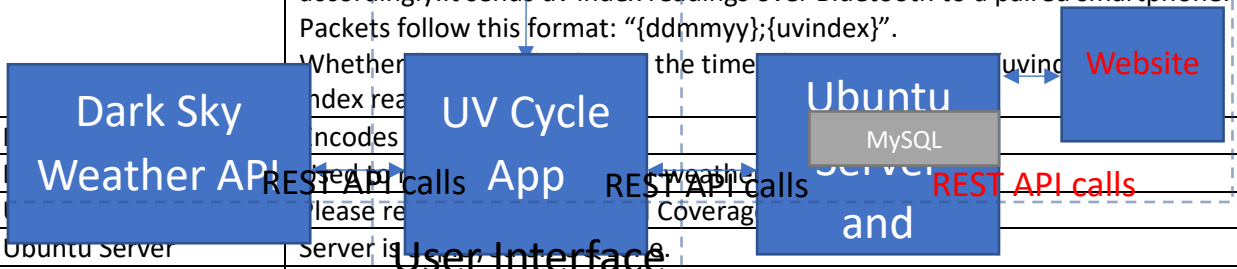


Undevel ts are lease r al Coverage
Descript . The t each ystem architecture.

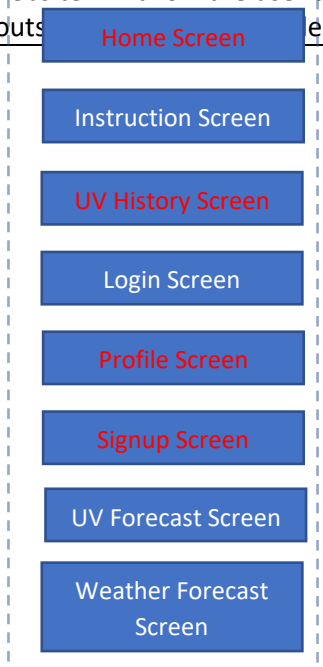
Hardware

Component	Description
UV Sensor	A light sensor h approximates uv index.
ESP32 Thing	A microcontr vith Bluetooth capabilities and portability by using a LiPo battery. This is used to retrieve uv index readings and colour the Neopixel Ring accordingly.It sends uv index readings over Bluetooth to a paired smartphone. Packets follow this format: "{ddmmyy};{uvindex}". Whether the time uvinc ndex rea
	ncodes
	lease re Coverag
Ubuntu Server	Server is e.
Website	This website will allow the user to view uv exposure history and share workouts emented by retrieving data from the database.

Software



User Interface



Functional Coverage Description

Function	Description	State	Subfunctions	Description	State
Log in	A login is a set of credentials used to authenticate a user.	**Finish**	Form validation	Validate the input values meet requirements (same as the signup form)	**Finish**
Sign up	Sign up using Email address and set personal information	**Partially Finished**	Create a new account	Insert new user record into database	**Finish**
			Connect UV sensor	Pair the UV sensor via Bluetooth	**Unfinish**
			Hashed password	Password saved in database should not be plain text	**Unfinish**
Weather forecast	View the real-time weather and forecast according to the location of the user	**Finish**	Weather forecast	Weather forecast displays the weather for next five days	**Finish**
			Real-time weather	Get the weather data from API and display it on the homepage	**Finish**
Receive real-time UV Index value	Get the current UV Index value from the sensor and display in home screen	**Partially Finished**	Refresh Button	Update the real-time data according the change of UV index	**Finish**
Information	Information about what is UV, how to read UV Index and UV light prevention				**Finish**
Time elapse	Record the time that sensor is exposed to the UV in past 24 hours				**Unfinish**
UV history	Draw the diagram to represent the UV index experienced in the past period of time which is stored in database	**Partially Finish**	Share	Share the UV history graph to others	**Unfinish**
Profile	Check and edit personal user information	**Partially Finished**	Change Skin type	Change user skin type selected when sign up and sync to database	**Finish**

	Reset the UV sensor	Pair a new sensor via Bluetooth	**Unfinish**
	Log out	Log out and clean storage information	**Finish**
UV Forecast	Get the UV index value from the same weather API to show the UV forecast for next couple hours		**Finish**
Push notification	Push notification when the UV index is up to 11, or when it is raining, or when it is exposed to UV for a long time		**Unfinish**

Appendix

Appendix A: user testing agreements

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AUSTRALIA

School of Information Technology and Electrical Engineering
HEAD OF SCHOOL
Professor Michael Bruenig

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Facsimile +61 7 3365 4999
Email enquiries@itee.uq.edu.au
Internet www.itee.uq.edu.au

Informed consent form

User interface testing for Studio 3 class exercise

This user testing exercise is for educational purposes only, and is being conducted as a course requirement for Studio 3 (DECO3800/1, DECO7380/1).

You will be asked to interact with a paper prototype, computer program or system, and/or to answer questions about your interaction. We are testing the design; we are not testing you in any way. The test will require no more than an hour of your time, and potentially less.

Consent is voluntary – you do not have to participate if you don't want to. If you do participate, you may withdraw your consent at any point, and all your data up to that point will be destroyed and not used.

All data collected is confidential and will be kept in a secure location, and your data will be indexed by a participant ID rather than by name.

If AV recordings are taken, they will be seen only by the students doing this particular project and possibly also by their Studio tutors and the course coordinator (Dr Alex Pudmenzky).

All your data, including any recordings, will be erased/destroyed once class grades are released.

There is no reimbursement or payment for participation.

I have read the information above and give my consent to participate.

Participant Name: Sun Jie.

Participant Email: jie.sun@uq.net.au.

Signature: _____ Date: 19 / 09 / 2019

Researcher Name: Yan Chen Date: 19 / 09 / 2019

Researcher Signature: Yan Chen

Researchers:

Instructor in charge of Studio 3: Dr Alex Pudmenzky, School of ITEE, UQ (a.pudmenzky@uq.edu.au)

Because this is an in-class educational exercise, performed by course students with UQ students, family or friends only, formal ethics approval has not been sought.

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I have read the information above and give my consent to participate.

Participant Name: Danial Iskandar

Participant Email: danialiskandar123456@gmail.com

Signature: _____ Date: 19 / 09 / 2019

Researcher Name: Yian Chen Date: 19 / 09 / 2019

Researcher Signature: Yian Chen

Researchers:

Instructor in charge of Studio 3: Dr Alex Pudmenzky, School of ITEE, UQ (a.pudmenzky@uq.edu.au)

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Participant Name: Zhang Haoran

Participant Email: _____

Signature: _____ Date: 19 / 09 / 2019

Researcher Name: Yian Chen Date: 19 / 09 / 2019

Researcher Signature: Yian Chen

Researchers:

Instructor in charge of Studio 3: Dr Alex Pudmenzky, School of ITEE, UQ (a.pudmenzky@uq.edu.au)

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