Report: A Context-Aware Behaviour Change Trigger App

CS551 Summer Resit Assignment

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Introduction:

The Application has been created to aid individuals in managing their hydration, exercise, meal patterns and sleep schedules, all of which play a crucial role in maintaining a healthy weight and individuals' well-being. Through the incorporation of functions like hydration reminders, step count tracking, meal suggestions and bedtime alerts, the app offers a comprehensive health assistance platform tailored to assist users in maintaining a healthy weight.
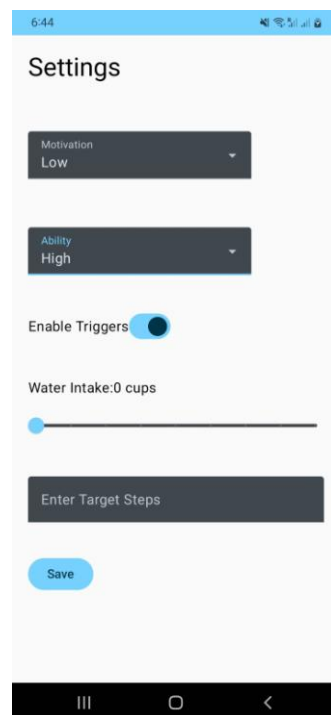
Important features used:

- ➢ **SensorManager -** Accesses the accelerometer for step counting.
- ➢ **WorkManager** – Used to schedule background work periodically.
- ➢ **NotificationManager** – Used to send notifications periodically.
- ➢ **WifiManager** – Used to check the wifi connection.
- ➢ **BatteryManager** – Used to check the battery status.

Settings Screen:
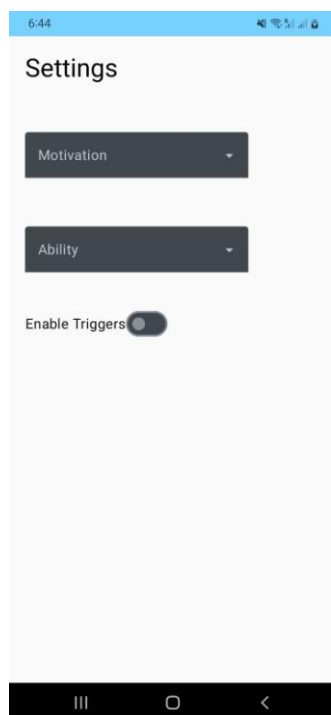

Settings Screen   *Settings Screen when triggers enable*
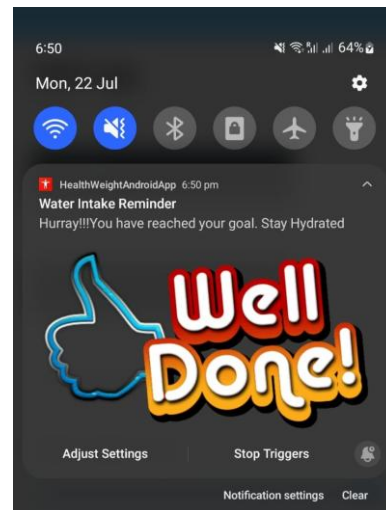
Water Intake Reminder:

When the user enters the number of cups for the water intake, the app checks to see if the device is connected to University Wifi and is not low on battery, and then sends notifications every 2 hours to remind users to drink water or congratulate on meeting the

water intake goals (8 cups of water per day according to NHS) based on the specific conditions provided.
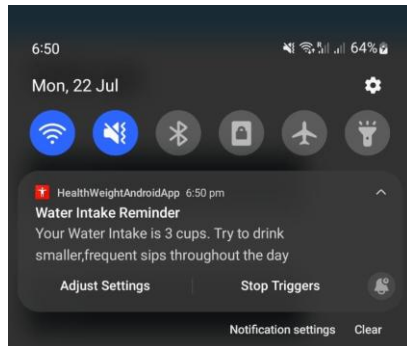
*When the user input for water intake is 3*

When the water intake reaches 8

Step Count:

The Step Counter is designed to continuously track the user activity using the step count sensor in the user's device. It uses the accelerometer of the device to recognise patterns that correspond to human walking or running. When the device is connected to the university Wifi and is not low on battery, the step counter triggers notifications every 2 hours based on daily step count target. If the user accomplishes the target steps for the day, a congratulatory notification is issued to encourage the users. Otherwise, notifications with current steps are displayed every 2 hours. The notifications are designed in such a way to motivate users to stay on track for maintaining a healthy weight.
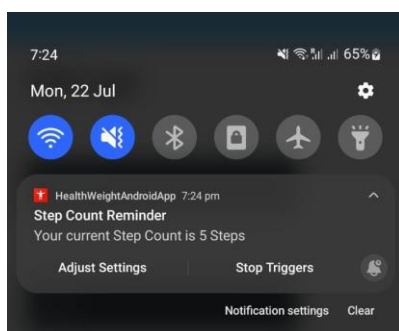

When the Current step count is 5
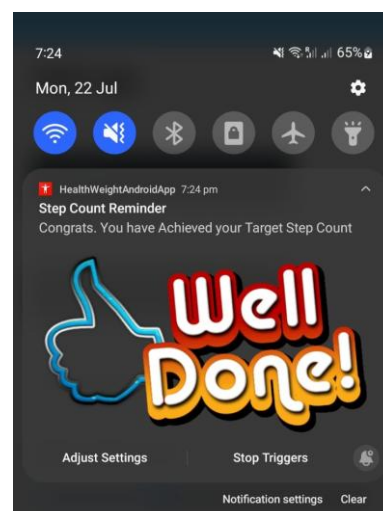
*When the current step count reaches the target steps*

Meal Suggestion:

Based on the current step count recorded, the trigger sends notifications every 2 hours with tailored meal suggestions ensuring that the device is connected to the University Wifi and is not low on battery. This ensures that the user takes appropriate meals based on their activity levels.
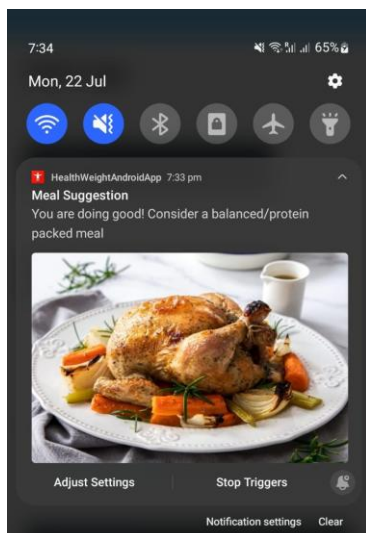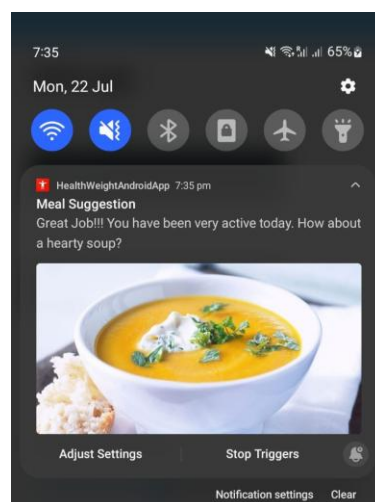

*When the step count is between 100*

and 200
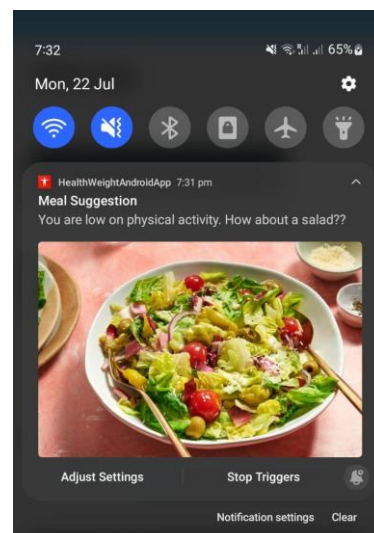
When the step count is below 100

When the step count is more than 200

Bed Time Reminder:

The Bed time reminder triggers a notification at 21:00 everyday urging the user to get atleast 7 hours of sleep (according to NHS) when the device is connected to the University Wifi and is not low on battery. This helps users stay mindful of their sleep routines for overall health and weight loss.
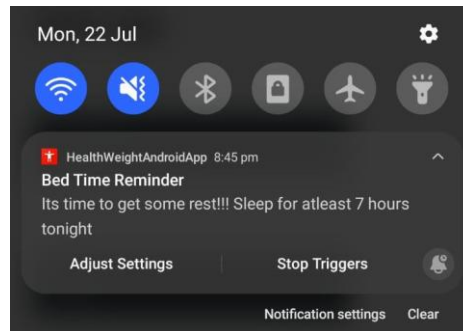
Reflective Critique:

Strengths:

- Users' engagement and motivation to meet their health goals are maintained by frequent notifications.
- The app performs a smart analysis of Wifi and battery level prior to delivering notifications, ensuring that notifications are only sent when conditions are optimal.
- The step counter delivers live monitoring of the user activity, which is crucial for precise feedback and motivation.

Weakness:

> **Context uncertainty challenges:**
- The app's functionality is restricted when the user is off-campus due to its dependence on university Wifi.
- The battery level may fluctuate depending on the usage, posing a challenge to predict the device's ability to send notifications due to power constraints.
- Failure to provide the required permissions may result in the app being unable to accurately obtain the user's context.

> **Mobile Computing challenges:**
- Consistent monitoring of sensors and frequent notifications may result in increased battery usage.

- The precision of step count information may fluctuate depending on the type of device and its positioning.
- Relying on network connectivity to send notifications and update data may pose challenges in regions with limited connectivity.
- During the installation and initial launch of the app, users must provide explicit permissions for accessing specific features such as location services and physical activity data. Obtaining these permissions from users may pose a challenge as users might exhibit hesitancy or forgetfulness.

Security and Privacy concerns:

Privacy is a crucial aspect in addressing an individual's health requirements. As such, the application must provide features that protect the privacy of each user. The App utilizes Preference DataStore and Room Database to store user data. Despite being secure mechanisms offered by Android, they save data on the local storage of the device which rises concerns regarding unauthorized access in case of lost or stolen device. The application provides users with the ability to remove their data at any time which is a beneficial aspect for maintaining privacy. The app requires permissions to access sensor, location, WiFi status and battery level.

References:

1. https://developer.android.com/codelabs/android-preferences-datastore#0

2. https://developer.android.com/reference/kotlin/androidx/work/CoroutineWorker

3. https://developer.android.com/reference/kotlin/androidx/work/WorkManager

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5. https://developer.android.com/develop/ui/views/notifications/build-notification

6. https://developer.android.com/training/data-storage/room

7. https://developer.android.com/develop/background-work/background-tasks/broadcasts#kotlin