

Understanding patients' with ABI (Acquired Brain Injury) experiences of fatigue through an automated user-driven design of a mobile application

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Acquired Brain injury

Acquired Brain Injury (ABI) is brain damage caused by events after birth. There are many possible causes, including a fall, a road accident, tumour and stroke. The common effects to patients with ABI range from only minor problems with memory to long term physical and learning disabilities [1]. In the UK alone, there are 348,934 admissions to hospital with ABI [2]. The rehabilitation process for ABI patients is both long and expensive either for the patients or the public health service provider [3].



Figure 1 Sony Smartband 2 used in the project to capture sleep.

This project aims to provide an automated process for making the research in this area a lot simpler by collecting both passive and subjective data from the patient through the use of a mobile application and a smartwatch. This is an alternative approach to a face-to-face reporting from the patient to the researcher.

Furthermore, data collected will enable further research into the study of the patterns in which the patients experience fatigue.

Heuristic Evaluation

Heuristic Evaluation is a method of assessing usability recommended by Jakob Nielsen, who defined a set of 10 usability heuristics for user interface design [4]. Nielsen recommended 3-5 evaluators, as this is the accepted standard. The usability experimenters should have:

- Experience in the evaluation method
- Knowledge of the system
- Experience in mobile applications and/or mobile computing

For this project, three evaluators were chosen to carry out the evaluation process of the mobile application. The users were given the list of heuristics while they are exploring the user interface.



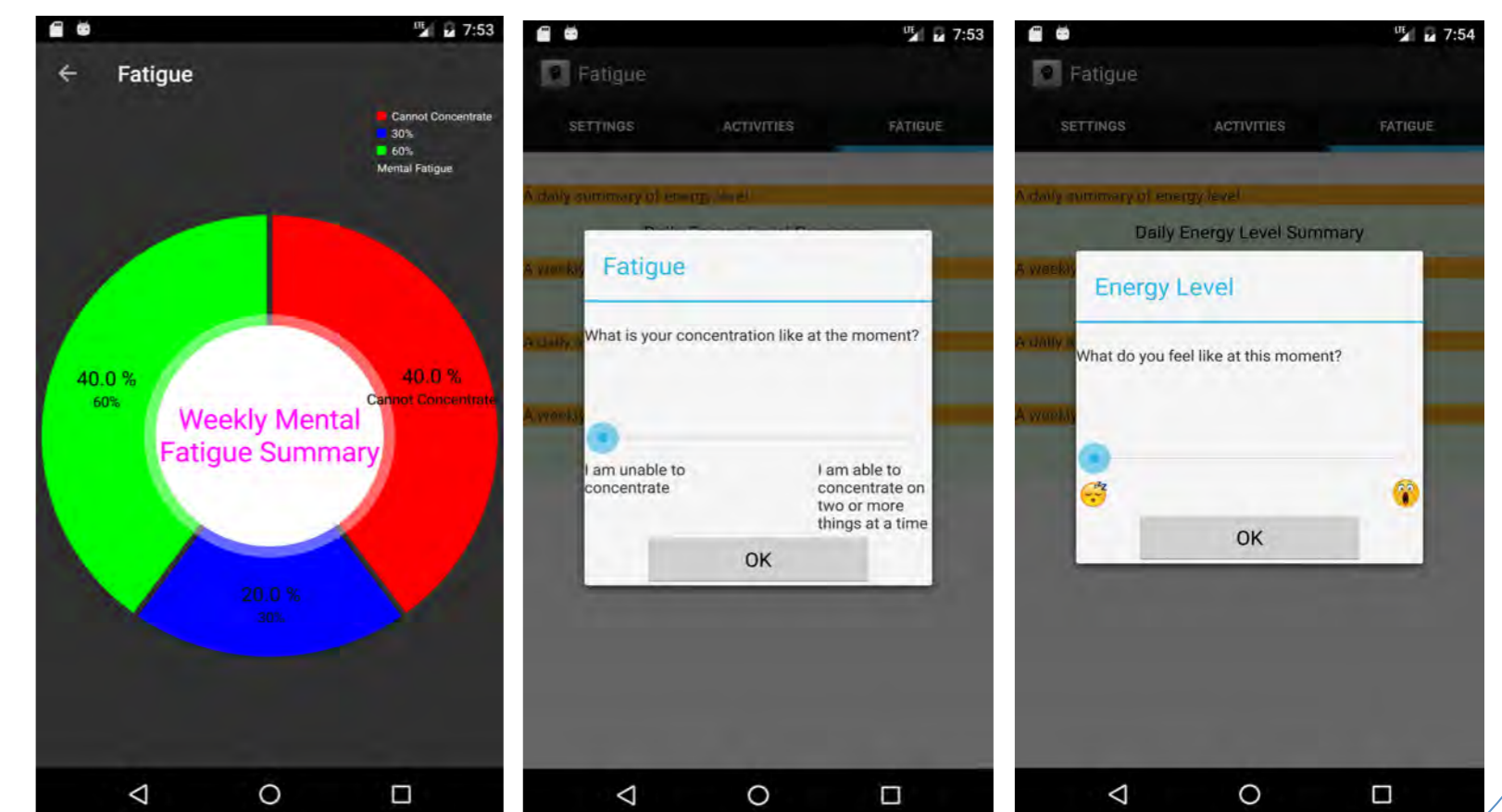
Figure 2 10 Heuristics recommended by Jakob Nielsen for assessing usability [5].

Interface Design

In this project, the design of the user interface was iterated over two prototypes. For which the first prototype was for demonstration purposes only and the second prototype would be considered to be the final version of the mobile application. Heuristic evaluation was carried out on the second prototype to identify any potential usability issues.

The prototypes were developed using the Android Studio IDE, designed for developing Android application. The design of the mobile application focused on minimising the amount of layers the user has to go through to perform their action.

Figure 3 Three example screens from second prototype.



Privacy and Security

Privacy and security in mobile application is considered to be crucial in the current market, especially health care applications. There are a number of challenges that developers need to consider to ensure the integrity of the health data and securely stored in the application such as access control and authentication [6].

In this project, it is a requirement that all the data are securely stored and user are authenticated before accessing sensitive data. All data accessed in the application requires going through the authentication process. For example, subjective data in the application are stored using the Firebase Realtime database. In order to access it, a Google Sign-In would be required to identify the user accessing the data.

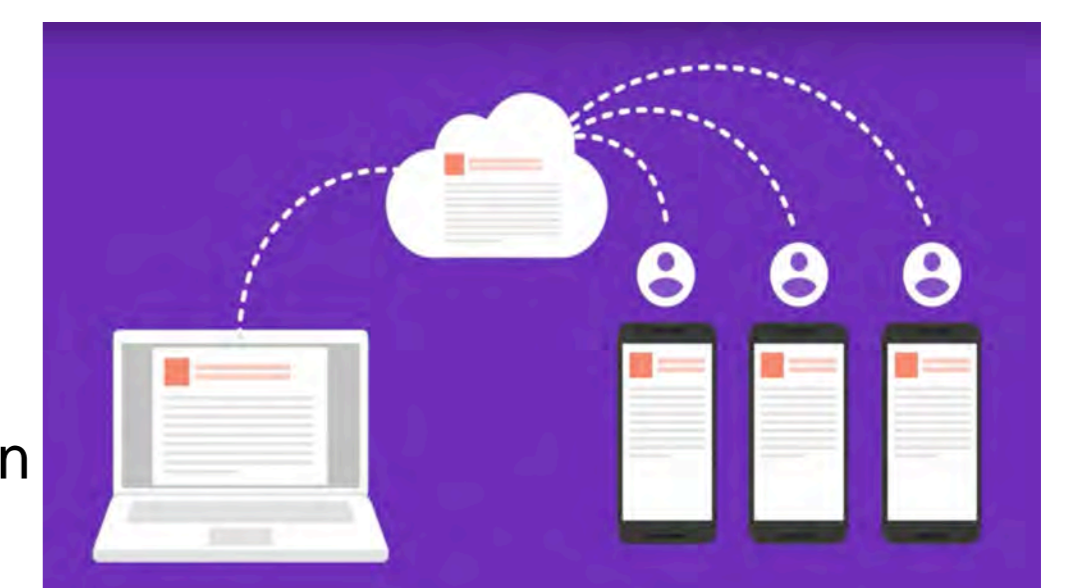


Figure 4 Firebase Realtime Database Process [7]

Further Research and Future Work

This study will enable further research into the study of the patterns in which the patients experience fatigue by using the collected data within the mobile application. This includes being able to identify the frequency in which the patients experience fatigue. Furthermore, we can establish a relationship between the activities that the patient carried out to which they experience fatigue most often. As a result of this study, behaviour of ABI patients can be identified and this allows further work to improving the rehabilitation process for patients.

References

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