Mobile fitness application for beginners

Article *in* Indonesian Journal of Electrical Engineering and Computer Science · October 2021

DOI: 10.11591/ijeecs.v24.i1.pp500-506

4 authors, including:

Mohamed Imran Mohamed Ariff
Universiti Teknologi MARA
23 PUBLICATIONS **40** CITATIONS
SEE PROFILE

Masurah Mohamad
Universiti Teknologi MARA
37 PUBLICATIONS **175** CITATIONS
SEE PROFILE

Indonesian Journal of Electrical Engineering and Computer Science
Vol. 24, No. 1, October 2021, pp. 500~506
ISSN: 2502-4752, DOI: 10.11591/ijeecs.v24.i1.pp500-506

Mobile fitness application for beginners

Mohamed Imran Mohamed Ariff[1], Nabil Farhan Roslan[2], Khairulliza Ahmad Salleh[3], Masurah Mohamad[4]
[1,3,4]Department of Computer Science, Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA, Perak Branch, Tapah Campus, Malaysia
[2]Ministry of Higher Education, Putrajaya, Malaysia

Article Info

Article history:

Received Apr 26, 2021
Revised Jul 22, 2021
Accepted Aug 4, 2021

Keywords:

Beginner fitness
Mobile application
Mobile development
Mobile fitness
Mobile fitness application

ABSTRACT

The present project is motivated by the recognition that the use of mobile fitness application is increasingly popular among sports and exercise participants in recent years. However, an extensive research on mobile fitness application indicates that most of them are not suitable for beginners. Thus, this project paper describes the development process of a mobile fitness application for beginners, who are looking at enhancing their physical fitness level. This mobile fitness application is developed using android studio and java language. Upon the development of this mobile fitness application, a user testing was conducted and analyzed. The result shows that users were satisfied with the applications as most test scores were above average. Based on these results, the usage of this newly developed mobile fitness application can be suggested to be used by beginner exercisers.

Corresponding Author:

Mohamed Imran Mohamed Ariff
Department of Computer Science
Faculty of Computer & Mathematical Sciences
Universiti Teknologi MARA, Perak Branch, Tapah Campus, Malaysia
Email: moham588@uitm.edu.my

1. INTRODUCTION

Engaging in regular fitness activity is important for any individual's body and mind. A regular daily fitness activity is important as it makes the body healthly. It needs to be said though, that for a person to achieve the most benefit from a regular fitness workout or exercising, he should acquire some basic information concerning appropriate training or exercising techniques. This information is vital for beginners as inappropriate technique of exercising may cause serious body injury. Among the basic information needed are; i) the appropriateness of a workout technique, ii) the frequency of the required workout technique and iii) the right postures in preventing body injuries. On top of that, a beginner with no past experience in performing specific exercising technique can lead to a low outcome [1]. It has to noted that, given the stamina level of a beginner, the of intensity of the exercise routine needs to be different as compared to that of an advance exercising routine. A better outcome can be obtained if beginners are provided with a more detailed basic information and specific exercise techniques suiting them. The use of modern technology such as the usage of mobile applications is one of the suggested ways in order for beginners to better achieve their outcome [2]-[4].

2. RELATED LITERATURE

Having a regular fitness activity is very important for any individual specially for those individuals who are keen in losing weight and leading a healthier lifestyle [5], [6]. An outcome of a healthier lifestyle

can be achieved if proper daily routine or proper exercise techniques are followed [7], [8]. This is futher supported by Doinea [9] by stating, in order to achive a full and efficient result in exersing, one (i.e. especially for a beginner exerciser) has to know how to do proper exercise. Previous studies has also suggested that beginner exersier tend to discountinue and refrain themselves if the exercising routine; i) shows little effect, ii) unpleasurable and iii) causes discomfort. Furthermore, to achieve a better health outcome and to retain beginner exerciser, need; i) appropriate basic information, ii) appropriate exercising techniques that are required, especially for beginners, iii) how to execute a movement, and (iv) how many the repetition for a maximum loads [5], [10]. In recent years, technology advancements have led to an increase in the use of mobile application developed for smart phones [11]-[13]. With the focus of health wellbeing, in year 2010, about 17000 fitness related applications were available [14], [15]. The use of these mobile application helps provide accurate workout related information such as; i) time, ii) distance, iii) speed, and iv) estimated calories lost [2], [11]. Although, these information are vital for a person's fitness level, these information are less vital for beginners, as they are only looking for some simple exercising techniques, that can yield a strong foundation towards a healthier lifestyle [16], [17].

Mobile fitness application have recently seen a steady increase in users [7]. These applications highlight several types of workouts and exercising technique, thus promoting a physical healthily lifestyle among beginner and advance users. Some of these mobile applications has even the GPS capability to track distance and speed of the user (i.e., while bike riding or running) [7]. However, upon conducting a systematic review, most previously developed mobile fitness application were found to be lacking on beginner exercise as highlighted in the previous sub section [1], [5], [7], [8], [11], [18], [19]. The frequency usage of mobile fitness application among beginner users is very low [20], [21]. The low usage is mainly due to the lack of information and specific exercise techniques needed by beginner users. Furthermore, a beginner exerciser will need specific exercising technique that is moderate in the early stages so that the experience is not unpleasant which could result in evasion of future exercise [22]. Future exercise technique will need to progress at a steady pace and not push a person too hard so that the exercise experience remains pleasant. Further, the systematic review also found most developed mobile fitness application was the form of one size fits all, thus limiting the benefits to beginner users [1], [19], [23]. Based on this systematic review it can be argued that the usage of previously developed mobile fitness application has not been fully adopted and utilize especially among the beginner users [1], [10]. Therefore, the need to develop a more functional mobile fitness application targeting beginner user is vital.

The main objective of this project is to provide a possible solution towards developing a mobile application that is effective for beginner exercises. Thus, there are three main objectives for this project; i) to develop a well functional mobile fitness application targeting beginner users, ii) to provide an anytime any where point of reference for beginner users who need support towards a healthy lifestyle and iii) to provide appropriate feedbacks to beginner users using this mobile fitness application.

3. METHODOLOGY

The main goal of this project is to develop a mobile fitrness application for beginner exercisers. In order to accomplish this goal, this project focuses on; i) determining if the development of the mobile application can achieve the main goal of this project, ii) determining if this newly developed mobile application can reach the targeted audience (i.e. beginner execrisers), iii) determining the basic exercise technique and information that should be in the newly developed mobile application and iv) testing the newly developed mobile application in making sure it functions well. The following sub sections will highlight the task taken in order to achieve the main goal of this project.

3.1. Gathering information on beginner exercisers need

A mobile application must appeal to its users by having relevant features and an intuitive user interface. Therefore, prior to devekoping this mobile application, a systematic and through literature review was conducted. The findings from this systematic review revealed several basic features and information which was very much needed which was used during the development of this mobile application.

3.2. Designing use cases

A use case diagram was used to create a textual use case which describes the specific interactions between the user (i.e., beginner exerciser) and the application. The use case diagram for this project is shown and described in section 3.7.

3.3. Designing the mobile application graphical prototype

This is the functional design stage, where the working prototype for the application is built and it also highlights the interface flow between each functional element in the application.

3.4. Building the functional model

In this stage, the construction of the mobile application is further developed based on the prototype version. Each element is built based on the required functionality. Due to the nature of the mobile application development process, the mobile application was revised often and updated accordingly to the functional element of this project.

3.5. Assessing the mobile application

In this stage, the users' feedback was vital to determine if the mobile application had features that were appealing to users and how other features (if required) could be included based on improvements that users had suggested. Further, for each feature in the mobile application, users were asked to rate the feature on a scale of one to nine and note their likes and dislikes. Additionally, users were also asked to rate the application as a whole and to jot any further necessary improvement.

3.6. System architecture

System architecture is the structural module design of a system (i.e., mobile fitness application). The application in this project has four modules, namely; i) workout timer; ii) instruction workout instruction; iii) body mass index (BMI) information and iv) workout selection type. Figure 1 presents the system architecture for this mobile fitness application.

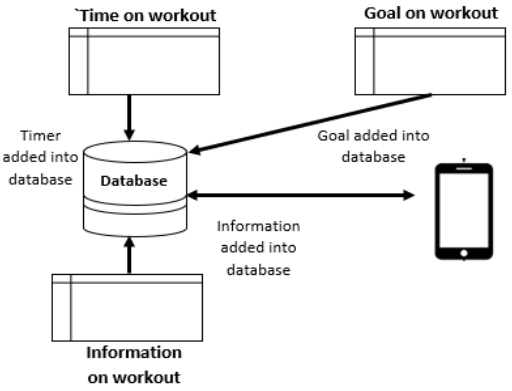

Figure 1. Mobile fitness application proposed system architecture

3.7. Use case diagram

A use case diagram is a narrative overall picture of the set of sequences of action, performed by the system. It uses the unified modeling language (UML) to explain and describe each functional requirement performed by the application [24]. Figure 2 presented, describes how a user connects with each of the functions available in this mobile application. The functions of this application are to view the types of basic workout, to view each workout instructions, to view images of each routine, to obtain the frequency timing for specific routine and to get a BMI score.

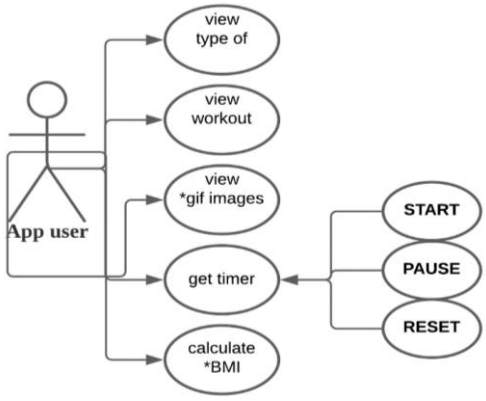

Figure 2. The UML use case diagram

3.8. User interface

The screen display which acts as an intermediary between the user of the system and the actual system is called a user interface [25]. Each of the user interface in this mobile fitness application is developed based on the main modules highlighted in the previous section. Figures 3 to 7 shows the main user interfaces of this project.

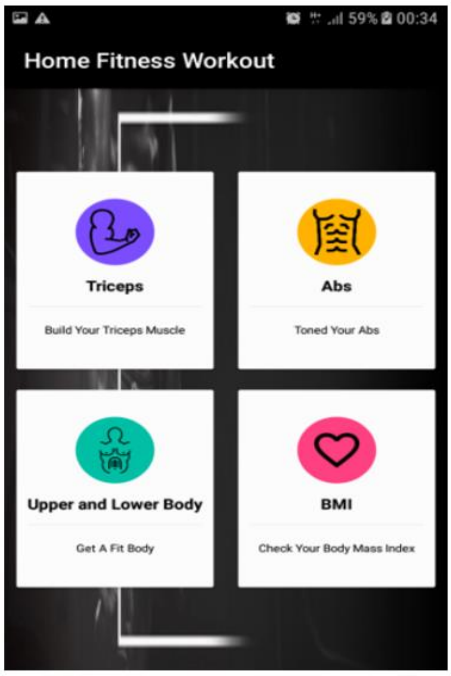

Figure 3. Mobile application main page

Figure 4. Triceps workout interface

Figure 5. Rope pushdown interface

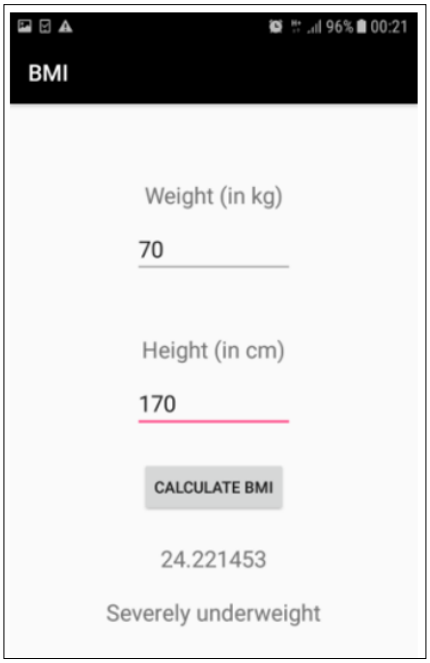

Figure 6. BMI interface

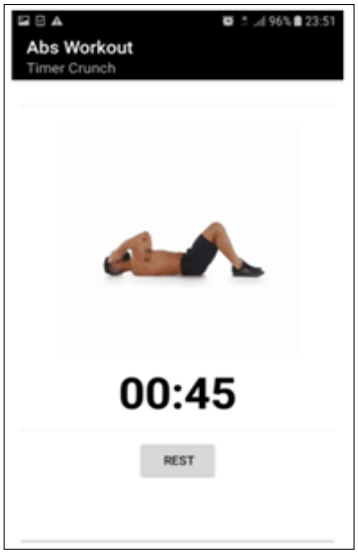

Figure 7. Timer crunch interface

4. TESTING RESULTS

The mobile fitness application developed in this project was subjected to user testing. A user testing aims to validate the quality of the mobile application [18]. The user testing in this project was conducted using a survey method through an online questionnaire distribution. Participants were requested to evaluate the usefulness of this mobile application. The results of this survey are presented in Figure 8.

Firstly, 54.8% of the respondents who participated in this survey choose 'Yes' indicating the *.GIF images in the mobile application helps them to better improve their workout. Next, 64.5% of the respondents choose 'Yes' anticipating that the type of workout presented in this mobile fitness application can help them in becoming fit. Next, 83.9% of the respondents indicated that they understood the basic instruction for each type of workout shown in this mobile application. Finally, 83.9% of the respondents choose 'Yes' indicating that the timer function in this mobile application can help them in getting fit.

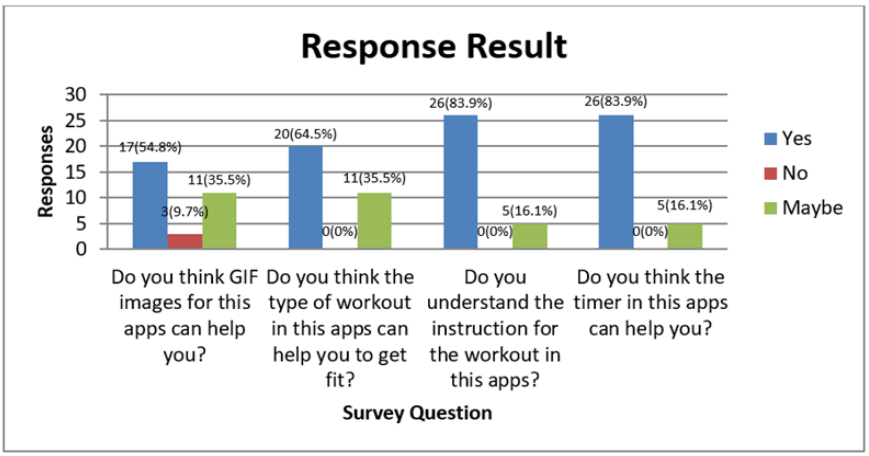

Figure 8. Overall survey result

5. CONCLUSION

This paper has presented the development of the mobile fitness application focusing on beginner exercisers. Furthermore, it can be anticipated that, this mobile fitness application can reach a larger audience as it focuses on exercising techniques for beginners. Furthermore, the development process highlighted in this project would have important practical and theoretical contributions. Practically, the findings of this project can guide the mobile application developers in designing successfully a more persuasive fitness

mobile application that can enhance the physical activity behavior of beginner exercisers. Theoretically, the findings of this project demonstrates that the elements of proper exercising for beginners technique and information can be delivered though modern technology using mobile application. Several recommendations are suggested from this project, namely; i) although the exercising techniques in this mobile fitness application are for beginners, further study needs to be conducted to other possible exercising groups (such as intermediate) as it may attract a larger user audience and ii) incorporating gamification in the mobile application can engage users in this application and increase user interaction as such future researchers can explore methods of implementing gamification in this mobile fitness application. This study offers several contributions. Firsly, the development of this mobile fitness application is ideal as an essential tool to support and contribute to regular exercising specially for beginnners. This will therefore contribute towards regular physical activity and a healthier lifestyle. Next, this project also contributes to sports management research by providing an empirical study of the fitness-related technology adoption, which can serve as a guideline for the mobile fitness technologies programs especially for beginners. Finally, this project has the potential to contribute to the fitness education literature by providing informal learning of fitness programs through the use of mobile technology.

ACKNOWLEDGEMENTS

This work was supported by the Department of Computer Science, Faculty of Computer & Mathematical Sciences, Universiti Teknologi MARA, Perak Branch, Tapah Campus under the final year project (FYP) 2019.

REFERENCES

[1] Z. Mo, *et al*., "Personalizing mobile fitness apps using reinforcement learning," in *CEUR workshop proceedings*, NIH Public Access, 2018.
[2] J. Schobel, M. Schickler, R. Pryss, H. Nienhaus and M. Reichert, "Using vital sensors in mobile healthcare business applications: challenges, examples, lessons learned," in *International Conference on Web Information Systems and Technologies*, 2013, doi: 10.5220/0004501205090518.
[3] C. Arsene, "Design of Deep Convolutional Neural Network Architectures for Denoising Electrocardiographic Signals," in *2020 IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB)*, 2020. IEEE, doi: 10.1109/CIBCB48159.2020.9277718.
[4] I. Khram, W. Itani, and A. M. El-Hajj, "Automated physiological data acquisition in ICU using a novel sensor bed implementation," in *2021 7th International Conference on Electrical Energy Systems (ICEES)*, 2021. IEEE, doi: 10.1109/ICEES51510.2021.9383699.
[5] M. Kranz, *et al*., "The mobile fitness coach: Towards individualized skill assessment using personalized mobile devices," *Pervasive and Mobile Computing*, vol. 9, no. 2, pp. 203-215, 2013, doi: 10.1016/j.pmcj.2012.06.002.
[6] L. Boyette, B. Sharon and L. Brandon, "Exercise adherence for a strength training program in older adults," *The Journal of Nutrition, Health & Aging*, vol. 1, no. 2, pp. 93-97, 1997.
[7] J. Stragier and P. Mechant, "Mobile fitness apps for promoting physical activity on Twitter: the# RunKeeper case," in *Etmaal van de Communicatiewetenschap*, 2013.
[8] M. L. Woods, G. G. Karp, H. Miao and D. Perlman, "Physical educators' technology competencies and usage," *Physical Educator*,vol. 65, no. 2, pp. 82-99, 2008.
[9] M. Doinea, "Mobile Platform for an Exercise Distributed Application," *Body Building Science Journal*, vol. 2, no. 3, pp. 39-48, 2010.
[10] K. A. Schutzer and B. S. Graves, "Barriers and motivations to exercise in older adults," *Preventive Medicine*, vol. 39, no. 5, pp. 1056-1061, 2004, doi: 10.1016/j.ypmed.2004.04.003.
[11] S. Watson, "Using technology to unlock musical creativity," 2011: OUP USA.
[12] A. Ahtinen, "Mobile Applications to Support Physical Exercise-Motivational Factors and Design Strategies, *Tampereen teknillinen yliopisto*, 2015.
[13] T. Vickey, J. Breslin, and N. Tsai, "Mobile fitness apps and Twitter-a systemic review," in *Proceedings of the 8th International Symposium on Computer Science in Sport*, Shanghai, China: World Academic Union. 2011.
[14] M. Kirwan, *et al*., "Using smartphone technology to monitor physical activity in the 10,000 Steps program: a matched case-control trial," *Journal of medical Internet research*, vol. 14, no. 2, pp. e55, 2012, doi: 10.2196/jmir.1950.
[15] K. Hino, Y. Asami and J.S. Lee, "Step counts of middle-aged and elderly adults for 10 months before and after the release of Pokémon GO in Yokohama, Japan," *Journal of Medical Internet Research*, vol. 21, no. 2, pp. e10724, 2019, doi: 10.2196/10724.
[16] A. Grafen, "Optimization of inclusive fitness," *Journal of theoretical Biology*, vol. 238, no. 3, pp. 541-563, 2006, doi: 10.1016/j.jtbi.2005.06.009.
[17] D. G. McDonald and J. A. Hodgdon, "The psychological effects of aerobic fitness training: Research and theory," *2012: Springer Science & Business Media*, doi: 10.1007/978-1-4612-3182-0.

[18] J. Gao, *et al*., "Mobile application testing: a tutorial," *Computer*, vol. 47, no. 2, pp. 46-55, 2014, doi: 10.1109/MC.2013.445.
[19] T. Wongkhamdi, N. Cooharojananone and J. Khlaisang, "E-Commerce Competence Assessment Mobile Application Development for SMEs in Thailand," *International Journal of Interactive Mobile Technologies (iJIM)*, vol. 14, no. 11, p. 48, 2020, doi: 10.3991/ijim.v14i11.11358.
[20] A. Pai, "Nielsen: 46 million people used fitness apps in January," *Retrieved Apr*, 24, p. 2017, 2014.
[21] L. S. Vailshery, Wearables - statistics & facts, Statista, 2021. [Onlie]. Available. https://www.statista.com/topics/1556/wearable-technology/
[22] S. Yuan, W. Ma, S. Kanthawala and W. Peng, "Keep using my health apps: Discover users' perception of health and fitness apps with the UTAUT2 model," *Telemedicine and e-Health*, vol. 21, no.9, pp. 735-741, 2015, doi: 10.1089/tmj.2014.0148.
[23] P. Liao, K. Greenewald, P. Klasnja and S. Murphy, "Personalized heartsteps: A reinforcement learning algorithm for optimizing physical activity," *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, vol. 4, no. 1, pp. 1-22, 2020, doi: 10.1145/3381007.
[24] H. Makhlouf, "Police Electronic Citation Mobile System for Statewide Deployment in Oklahoma," SHAREOK, 2018.
[25] D. Basten, "Gamification," in *IEEE Software*, vol. 34, no. 5, pp. 76-81, 2017, doi: 10.1109/MS.2017.3571581.

BIOGRAPHIES OF AUTHORS

Mohamed Imran Mohamed Ariff is a senior lecturer with the Department of Computer Science under the Faculty of Computer & Mathematical Sciences at Universiti Teknologi MARA (UiTM), Perak Branch, Tapah Campus, Malaysia. He has been with UiTM for more than 17 years. His research interest includes, and not limited to; i) mobile applications, ii) Internet of Things (IoT), iii) Transactive Memory Systems, iv) Information Systems and Smart-PLS.

Nabil Farhan obtained his bachelors degree in computer science, from the Universiti Teknologi MARA (UiTM), Perak Branch, Tapah Campus, Malaysia. His research interest includes mobile application, gamification and system development. Currently he serves as an assistant administrative officer at the Ministry of Higher Education (MoHE), Malaysia.

Khairulliza Ahmad Salleh is a senior lecturer with the Department of Computer Science under the Faculty of Computer & Mathematical Sciences at Universiti Teknologi MARA (UiTM), Perak Branch, Tapah Campus, Malaysia. She now serves as the Head of Faculty. Her research interest include technology adoption, information security management and IT management.

Masurah Mohamad is a senior lecturer with the Department of Computer Science under the Faculty of Computer & Mathematical Sciences at Universiti Teknologi MARA (UiTM), Perak Branch, Tapah Campus, Malaysia. She now serves as the Program Coordinator. Her research interest includes machine learning, soft computing and data mining.