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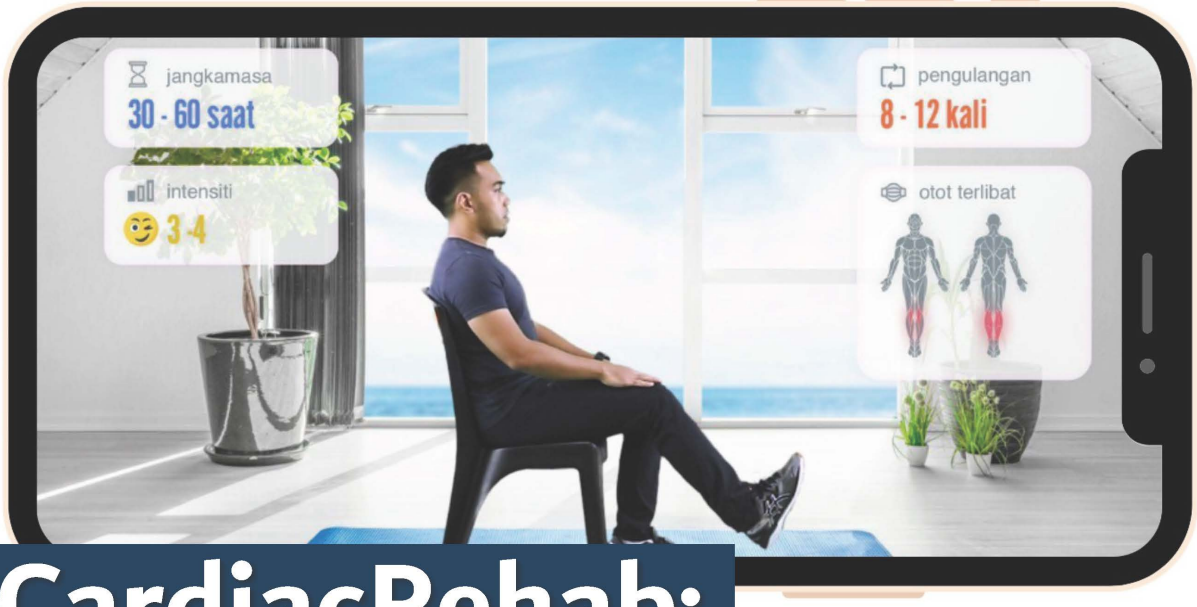

Figure 2: Exercises video

MyCardiacRehab:

Transforming Cardiac Care and Empowering Patients with Mobile Solutions

Dr Azliza Mohd Ali
College of Computing, Informatics and Mathematics, UiTM Shah Alam

Dr Sharifalillah Nordin
College of Computing, Informatics and Mathematics, UiTM Shah Alam

Prof. Dr Sazzli Shahlan Kasim
Faculty of Medicine, UiTM Selangor Branch, Sungai Buloh Campus

Dr Mazlifah Omar
Faculty of Medicine, UiTM Selangor Branch, Sungai Buloh Campus

Mrs Suzana Zambri
College of Computing, Informatics and Mathematics, UiTM Shah Alam

Assoc. Prof. Dr Hashbullah Ismail
Faculty of Sports Science and Recreation, UiTM Shah Alam

Dr Wan Najwa Wan Mohd Zohdi
Faculty of Medicine, UiTM Selangor Branch, Sungai Buloh Campus

Cardiac rehabilitation (CR) is an essential component of recovery for individuals battling cardiovascular diseases. Traditionally delivered through centre-based programmes, CR encompasses a holistic approach that includes exercise training, education, counselling, and support for lifestyle changes aimed at reducing heart risk. Despite the well-documented benefits of such programmes, significant barriers hinder their reach and effectiveness. In Malaysia, where less than ten CR centres are available nationwide, fewer than 5% of eligible patients gain access to these vital services. The challenges are numerous: geographical constraints, limited health mobility, and economic factors make traditional models less feasible for many.

Recognising these challenges, the advent of mobile technology offers a promising solution to bridge the gap in cardiac care. Mobile health applications have the potential to deliver personalised, accessible, and cost-effective rehabilitation services directly to patients' homes. MyCardiacRehab is at the forefront of this innovation utilising AI technology. Developed to counter the limitations of traditional CR, this mobile application facilitates a new avenue for cardiac rehabilitation that empowers patients to actively participate in their recovery process from the comfort of their homes.

The MyCardiacRehab application was developed by an interdisciplinary team of researchers from the Faculty of Medicine, College of Computing, Informatics and Mathematics, and the Faculty of Sport Science and Recreation at Universiti Teknologi MARA. The project was led by Professor Dr. Sazzli Shahlan Kasim, who was inspired by the potential to enhance cardiac patient care through mobile technology. This initiative was supported by a grant from Yayasan Inovasi Malaysia, aiming to facilitate cardiac rehabilitation more accessible and effective. The application's innovative approach has been recognized widely, including the Gold Award at IIDEX 2022 and MPI 2023.

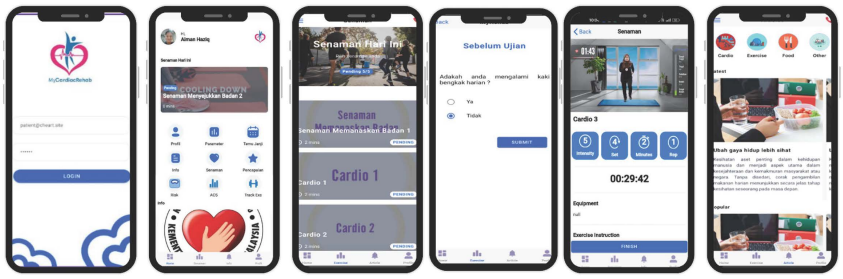

Figure 1: Interfaces of MyCardiacRehab mobile application

A clear motivation to address significant gaps in cardiac rehabilitation (CR) accessibility and patient engagement drove the inception of MyCardiacRehab. Traditional CR programmes, while effective, often pose logistical and financial challenges that can deter patient participation, particularly in underserved areas. Recognising these barriers, the development team at Universiti Teknologi MARA set out to create a solution that leverages cutting-edge mobile technology to bring CR directly to patients. MyCardiacRehab harnesses the widespread availability and versatility of smartphones to provide continuous, on-demand access to CR services. This mobile application eliminates the need for frequent hospital visits by offering personalised exercise programmes, real-time health monitoring, and educational resources, all accessible from the user's device. MyCardiacRehab not only makes cardiac care more accessible, but also significantly enhances patient engagement by empowering them to take an active role in their health management and recovery process. This technological innovation represents a paradigm shift in the delivery of cardiac rehabilitation services, making it a critical tool in overcoming the traditional barriers associated with CR.

The MyCardiacRehab mobile application aims to empower individuals recovering from cardiovascular disease to take a more proactive role in managing their health. Designed to cater to the specific needs of cardiac patients, MyCardiacRehab presents an easy-to-use interface with features that enhance user involvement and self-care. The application's key features include patient screening and baseline health assessments, evaluations before and after exercise, exercise prescriptions, educational resources, clinic appointments and reminders, and user profile management. Additionally, MyCardiacRehab incorporates AI-powered tools to predict the risk of cardiac events and personalise exercise prescriptions based on individual health data, ensuring that each patient receives the most effective and safe rehabilitation routine. This AI-driven approach also enhances adherence by adapting recommendations in real-time as patients progress, further personalising the recovery experience. Figure 1 illustrates the user-friendly interfaces of the MyCardiacRehab mobile application, streamlining navigation and simplifying patient engagement with their health data and rehabilitation activities.

The details about the features are as follows:

Patient Screening and Baseline Measurements: Initially, MyCardiacRehab helps assess each patient's health status by capturing essential baseline measurements such as blood pressure, heart rate, oxygen level, cholesterol information, and sugar levels. These metrics are crucial for customizing the rehabilitation plan to the individual's health condition, ensuring a safe and effective approach to cardiac recovery. Leveraging AI, the app analyzes these data points to predict potential health risks and tailor the rehabilitation activities accordingly, thus enhancing safety and efficacy.

Pre- and Post-Exercise Evaluation: Before each exercise session, the application prompts users to complete a pre-exercise evaluation after they finish the exercise. The user needs to enter their blood pressure, oxygen level, and heart rate. The application will then prompt a few questions to assess your condition before performing the exercise.

Examples of questions are:

Do you have chest pain?
Are you short of breath?
Do you feel like passing out?

This feature helps ensure that patients are in a suitable health state to engage in physical activities, thereby minimising the risk of adverse health events during exercise.

Exercise Prescription: Cardiac rehabilitation experts craft exercise prescriptions within the MyCardiacRehab app, ensuring each routine is both feasible and safe for home execution. The app uses AI to enhance the personalization of each exercise regimen, automatically adjusting prescriptions based on ongoing health updates and patient feedback. The exercise videos are developed in-house, from filming to editing, then uploading them to the application, enabling users to access them following their tailored rehabilitation plans (see Figure 2).

Educational Resources: To empower patients to manage their cardiovascular health, the app offers a range of educational materials. These resources cover topics such as heart health, dietary recommendations, and lifestyle changes, providing patients with the knowledge they need to make informed decisions about their health and rehabilitation.

Clinic Appointment and Reminders: MyCardiacRehab includes a feature to remind patients of upcoming clinic visits and medical appointments. This helps ensure that patients maintain regular contact with their healthcare providers and adhere to prescribed medical regimens, crucial aspects of successful cardiac rehabilitation.

User Profile Management: Patients can manage their profiles within the app, updating personal and medical information as needed. This ensures that the rehabilitation plan remains aligned with current health conditions and personal data, maintaining the relevance and personalization of the treatment. The AI component of the app continuously learns from user interactions and health updates, enhancing the personalization of care and support provided through the platform.

Feedback from patients regarding their experience with the MyCardiacRehab app has been overwhelmingly positive. Users have praised the application for its user-friendly interface, which simplifies the navigation of its comprehensive features, making it accessible even to those who are not tech-savvy. Many have expressed appreciation for the convenience of having a personalized rehabilitation program that they can follow from the comfort of their homes. The reminder features have been particularly noted for helping patients stay on course with their rehabilitation goals.

In conclusion, MyCardiacRehab represents a significant advancement in the field of cardiac care, leveraging the transformative power of AI-enhanced mobile technology to improve patient engagement and accessibility in rehabilitation. This app delivers a comprehensive suite of features specifically designed to meet the unique needs of individuals recovering from cardiovascular diseases. By enabling patients to manage their rehabilitation from the comfort of their homes, MyCardiacRehab offers tailored exercise programmes, educational resources, continuous health monitoring, and real-time feedback, all underpinned by advanced AI algorithms. These AI features not only personalise the rehabilitation process based on real-time data but also predict potential health risks and adapt the recovery plan dynamically. This ensures that each patient receives care that is customised, effective, and convenient. MyCardiacRehab's success in improving patient outcomes, as well as its recognition through various awards, highlights its potential to redefine norms in cardiac rehabilitation. As the app continues to evolve, integrating more sophisticated AI capabilities will be pivotal in making cardiac care more inclusive, effective, and patient-centred. MyCardiacRehab will play a crucial role in transforming the global healthcare landscape, thereby making a lasting impact on the lives of cardiac patients worldwide.

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Department of Research & Innovation,
Level 5, Bangunan Canseleri Tuanku Syed Sirajuddin,
Universiti Teknologi MARA, 40450 Shah Alam, Selangor

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