Institut "Jožef Stefan", Ljubljana, Slovenija

center za prenos tehnologij in inovacij
na Institutu "Jožef Stefan"

Licensing opportunity

Personal Decision Support System as a Mobile Application for Heart Failure Management

Field of use
Technology Keywords:
01003003 Artificial Intelligence (AI)
01003006 Computer Software
01004001 Applications for Health

Current state of technology
Stage of Development:
Field tested/evaluated

IPR status:
Copyright
Secret Know-how

Patent status
TBA

Publication
TBA

Developed by
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Reference
TBA

Contact: mag. Robert Blatnik
Center for Technology Transfer and Innovation,
Jozef Stefan Institute,
E-mail: tehnologije@ijs.si
http://tehnologije.ijs.si/

Background

Comments Regarding Stage of Development: The system decision models and content have been validated by medical experts, while the application is still in development and has to be validated in real-life situations. A systematic review was conducted regarding models predicting mortality/hospitalization and quality of life of congestive heart failure patients. This information was synthesized with existing guidelines for the treatment of this disease and expert opinions, then translated into decision models and content to be administered through a mobile application.

Description of the Invention

Computer science experts from a Slovenian research organisation specialize in development of proprietary methods and algorithms for analysing wearable sensor data, used in different fields, but mainly in medical devices. They participate in several projects covering development of smart watch monitors for independent living of seniors with dementia, detection of falls and abnormal behaviour for elderly, support of older workers in reducing physical and mental stress using wristband and personalized advices, and decision support to help patients with heart issues. The scientists were among finalists of the global competition for medical diagnostic devices and they also won the international competition for activity recognition. Congestive heart failure is a disease in which heart cannot pump enough blood to properly supply the body with oxygen and nutrients. Patients are required to take various medications, monitor their weight, exercise appropriately, watch what they eat and drink, and make other changes to their lifestyle. All this makes disease management very difficult, and to make the issue even worse, each patient is different and may need to manage the disease differently. The development team is actively working on a Decision Support System to help patients suffering from congestive heart failure to better manage it. Support includes regular measurement of patient's physical and psychological state using a wristband and mobile device, and providing advice about physical exercise, nutrition, medication therapy and environment management. The solution aims at providing medical advice to patients using predictive models, clinical care guidelines and expert knowledge. It uses wrist-band sensors to monitor patient's physical activity, heart rate and some other physiological signs. Data can be obtained from additional devices, such as scales, smartphones and from the patient via the user interface of the mobile application. This allows the system to identify the patient's current physical and psychological characteristics. In the end, data is combined with patient's health data to help them decide on disease control measures. The system recognizes five important topics concerning self-management for these patients and are included in the application:

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physical activity, medication, nutrition, monitoring of symptoms and physiological parameters, and environment management. The application has access to patient's health records, it is connected to a monitoring wristband, and keeps a record of the user's past actions. Provided guidance is thus personalized and based on the patient's data. For example, the exercise programme depends on the patient's physical capacity and current heart rate, while the nutrition education is adapted to the patient's comorbidities (diabetes etc.) and focuses on topics the patient has difficulties with. The technology is available either: a) under services agreement as a Software-as-a-Service (SaaS) through application programming interface (API) or b) under license agreement for the software which can be run on a smartphone. Researchers are looking for: a) companies or research institutions that develop applications and would need the service (SaaS) through API (services agreement) or b) companies interested in obtaining a license for implementation of the Personal Decision Support System for congestive heart failure patients in their application (license agreement). In particular, the following companies or research institutions which are active in health domains are sought: - developers and producers of wearable wireless devices; - providers of solutions for remote patient monitoring, on-site professional healthcare monitoring and home/office/work environment monitoring.

Main Advantages

Several mobile applications for congestive heart failure management have been recently developed, but their main functionality is to track the information relevant for the patient's health, while their guidance is general and usually relatively simple. In addition, no existing application includes all topics relevant for congestive heart failure management; rather, most of them focus only on one or two problems (e.g. medication adherence, physical activity, etc.). The system offered here has the following advantages and innovations in comparison to other congestive heart failure systems on the market: - it provides comprehensive guidance to all relevant self-management topics identified through the literature review (physical activity, medication, nutrition, monitoring of symptoms and physiological parameters, and environment management) - it offers a significant degree of personalisation - it raises the patient's awareness of their health through monitoring and providing advice - it has a high degree of adjustability for adding new functionalities or changing the (visual) design of the application - as a complete solution reduces mortality risks and hospital admission.

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