SmartDiet - Personal Wellbeing Assistant and Diet Planner Mobile Service

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Abstract

The paper describes a new mobile service that combines features of personal wellbeing assistant and diet planner. The application area has huge potential and could significantly increase quality of peoples' life. An idea of making services on top of smart space technologies is getting more and more popular not only in academic community, but also in industry. These services help in development of the classical humans' aspiration to make life more comfortable, easy and enjoyable in work, entertainment and housekeeping. The existing smart space solution pilots are helping to manage organization of business meetings and conferences and so allow focusing on the main subject and actual goals of an event. Following the clear success of existing solutions we see a huge opportunity for adopting smart space principles in the field of wellbeing and mobile healthcare.

Index Terms: Diet planner, Wellbeing Assistant, SmartDiet, Smart Spaces, Healthcare.

I. INTRODUCTION

Services on top of smart space technologies help in development of the classical humans' aspiration to make life more comfortable, easy and enjoyable in work, entertainment and housekeeping [1]. To start we would like to list several basic features that characterize smart space technology:

1. The smart space applications implement principle of pro-active service provision, i.e., a user doesn't need to even know about existence of the service until the moment when it will be recognized that such service is really valuable for user at a given time and place;

2. The smart space platform enables to connect various types of devices into the service provision process, i.e., the service are able use all surrounding devices to deliver the best possible user experience in the cost and resource optimal way;

3. The smart space content is physically distributed on the multitude of user devices, but at the same time all content and services are available from any of the space-member devices at any time.

The healthcare and wellbeing are the most important aspect of human life. However, it is so natural for people to recall these aspects only when they face serious problems and there is a need for serious and expensive medical treatment, while most of these issues could be more efficiently addressed by simple and very cheap prophylaxis. Efficient wellbeing and healthcare solutions shall use non-disturbing ways of collecting data, so that a user will not fill how the data is collected. This paper discusses a series of mobile

services for wellbeing and healthcare, part of which are already implemented by our team and available for free download and others are under development. The main research question is how to regularly collect up-to-date information about critical body parameters without changing user's lifestyle and then to develop advanced solution for computer-based pre-analysis of the data, so that deviations of critical parameters will be reported to the corresponding medical specialists at the early phase and with reasonable amount of source data.

II. DESCRIPTION OF SMARTDIET MOBILE SERVICE

Slogan "You are what you eat" is widely known. The choice of food and how eating process is organized have a great impact on one's health. There is a significant group of people that has to follow strict diet because of the health problems, e.g., people with diabetes mellitus, gastritis, allergies and etc.

Based on this we can conclude that services for automated diet control will be really demanded. Our solution is based on adoption of Smart Space principles to provide user with decisions that will ensure personal comfort and meal requirement of personal healthy diet. From other projects [2] we have already discovered a lot of medical devices that can collect and send body data to the mobile phone via Bluetooth, e.g., pulsometer, glucometer, etc.

Nowadays there is an open source platform Smart-M3 [3] that can be used for prototyping smart space applications. Thanks to work done by large research and developer community the Smart-M3 platform is quite stable and has been already ported to a number of operating systems.

Development of SmartDiet service will be split to two stages. In the first stage the basic diet monitoring application is developed based on the conventional technologies of today's mobile development. The second stage targets in adopting all key features of smart spaces solutions by using features that already can be delivered using Smart-M3 platform. The proposed solution will ensure proper combination in one solution the top scientific results in areas of mobile healthcare and smart spaces, with clear addressing of every-day needs of users. Based on this principle the first version of diet monitoring service has been developed already and its functional description is provided in the next section.

The second stage of implementation is ongoing. Currently the main focus of our studies has shifted to exploration of the smart space capabilities in providing a way for communication between different devices participating in SmartDiet service provision chain. For example, refrigerators are de-facto mandatory equipment at every kitchen, which in addition to its main functionally can be used for collecting information about products that the user has.

The first service collects information from refrigerator about the products it has, their amount and condition. The newest technology - radio frequency identification (RFID) [4] is developing by Holst Centre. It is an independent open-innovation R&D centre that develops generic technologies for Wireless Autonomous Sensor Technologies and Flexible Electronics [5]. RFID will help to improve our system as it is simplifying processes of keeping, processing and using all possible information about products in the refrigerator. Among the most useful parameters we have to collect are: name of the product, date of expiration, amount in the pack and etc. The service is gathering all available information and making decisions about what and how can be cooked. Analyze

what kind and amount of products have to be bought. The service is connected to the database of most popular meals and the cooking recipes that match diet restriction of the user and his/her relatives (people who lives with him/her). In addition our service can monitor the meals schedule and remind user to eat. This feature is very helpful for people with some illnesses, for example gastritis, when it is crucial to have regular schedule meals. Additionally the service can be extended with modules connecting to other kitchen equipment, e.g. microwaves, stove and food processors can be used for analysis on how the food can be processed in order to best fulfill all user requirements. The service can warn you on what kind of product it is better to stop consuming and what kind of ways of cooking should be avoided. For example, if your cholesterol is high it is dangerous to continue to fry food and consume fat products cooked with use of a lot of oil and so on.

The SmartDiet service functionality can be extended by connecting additional sensors, e.g., pulsimeter, glucometer, cardiograph and so on, so that some special requirements "healthy diet" can be better fulfilled as a part of patient's treatment or prophylaxis. The real-time data on changes of body parameters will allow faster regulating meals schedule and content.

III. IMPLEMENTATION OF THE SERVICE PROTOTYPE

It was decided that the first version of mobile client shall be done as regular service and released as free application in Nokia Store – BridgetJones [6]. The name was inspired by a certain analogy in the selected approach with ideas presented in Bridget Jones Diary novel. The developed client helps a user to control his/her physical activity, diet and weight at any place and time user wants. With the help of our application, the user can calculate ideal weight, ratio of protein, fat, carbohydrates and sum of used calories. The user can determine whether it is rational nutrition level and define if she/he has proper weight in terms of the body mass index (BMI). The application informs a person about consumed and spent kCal. The user has all internal tools for managing databases of products she/he consumes and performed physical activities. An example screen of the developed application for Nokia N8 is shown in Fig. 1.
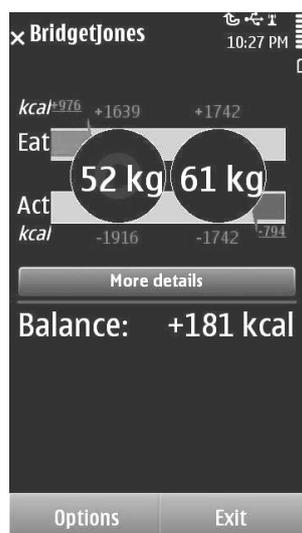

Fig.1. Example screen of application BridgetJones (screenshot of Nokia N8)

Below you can find a list of the main use cases defined for the application:

Edit the personal data – the user is able to manually set and edit the follow information: weight, height, age, gender and define the live style. In order to ensure that the application data is up to date, the user has to regularly update the above listed information in the personal profile. Update of the personal data can be done without Internet connection.

Track food and activity – application displays daily amount of calories that the user shall consume and use in order to achieve/maintain the desired weight. The user also can monitor number of eaten and burned calories, and visualize balance between them. This case together with «Track nutrition value» indicator provides user with all required information to easily track and manage the calories consumption process.

Track nutrition value – for monitoring how much fat, protein and carbohydrates are consumed by the user, how to achieve/maintain desired weight and whether it is rational nutrition or not.

Calculate a product – user can calculate and monitor energy and nutrition value of various food products and when it is necessary add a new product and its description information about amount of fat, protein, carbohydrate and caloric.

Calculate an action – user can calculate and monitor the amount of calories burned in the process of performing some actions. At any moment of time the user can add new actions to the actions database.

Do record in journal – allows recording information about activities and all products consumed by the user.

Set target – can be used to monitor the target weight, monitor history of the previous target weights and set the new target weight.

Get BMI – allow monitoring the body mass index (BMI) and defining user's weight category.

Get help – full user manual of the application.

The above described first version of SmartDiet service is already available for free download from Fixed web browser: http://store.ovi.com/content/183022 and Nokia mobile browser: http://store.ovi.mobi/content/183022. By mid-February 2012 the application has accounted for over xxx downloads. We hope that with further development of the application into SmartDiet the number of users will increase by an order of magnitude. And we see this challenge as a key opportunity to support further development of the solution, increase awareness about it and find new partners from other regions.

IV. CONCLUSION

According to many studies, one of the main reasons for people to break diet requirement is a need to continuously align their specific requirements to the available food offer. For example, when one is in office or on business meeting nowadays it is quite difficult to get food according to the personal requirements, while preserving feeling that a person is a regular member of this society (which is psychologically is very important). Even in a family it is often difficult to prepare meals that everyone like and all personal diet requirements are taken into account. It usually takes a lot of time to decide what to cook, remember what products you may need, how much and what do you have now, which often leads to non-optimal compromises. In addition SmartDiet can be

seen as a good tool for monitoring that all food will be consumed as fresh as possible so improve its quality for the consumer and decrease volume of food waste.

Based on the above specified use cases, the next version of SmartDiet service will be multi-users to allow optimizing diet decisions for the whole family or even office catering points. Also it will include smart food supply (logistics) block, which later will be connected to services that monitor discounts and special offers in preferred shops and so help to decrease time and cost of the food purchase process. If the privacy policy allows, physicians and children can continuously monitor what their elderly relatives are consuming, see changes in the critical body parameters and use special recommendation systems and doctor advices to correct the consumption pattern. Similar scenario is useful for parents, who may want to monitor what is consumed by their children. The SmarDiet will be also very useful tool for sportsmen in the process of training and especially during preparation/participation in competitions. This application can look after some critical levels of medicine preparations or calculate amount of calories and proteins in the food and avoid consumption of food that might cause problems.

Based on that we can conclude that the proposed solution will significantly increase quality of people's life, help developing and following optimal individual diet that fulfills all personal restrictions and preferences and takes into account preferences of other people around the user.

Current project is participating in the contest "GSMA Mobile Health University Challenge 2011-2012". The main aim of the contest is to present mobile as a new channel that will lower cost while improving the quality of care through new and innovative mobile healthcare solutions [7].

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