

# **NUTRITION ASSISTANT APPLICATION**

## **SUBMITTED BY**

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# **LITERATURE SURVEY**

## **JOURNAL TITLE 1**

SmartDiet - Personal Wellbeing Assistant and Diet Planner Mobile Service

## **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.

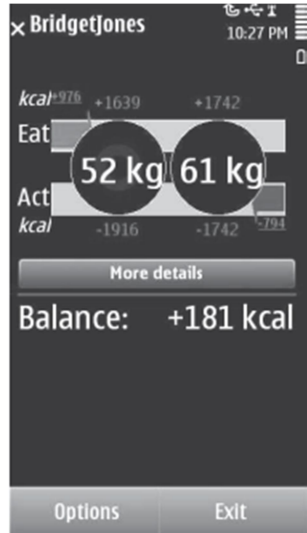
## **ALGORITHM/METHODOLOGY**

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 functionality can be used for collecting information about products that the user has.

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.

## **BLOCK DIAGRAM**



## **FEATURES**

- Edit the personal data
- Do record in journal
- Set target
- Get body mass index (BMI)
- Calculate an action
- Track food and activity
- Track nutrition value
- Calculate a product

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## **DRAWBACKS**

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.

## **JOURNAL TITLE 2**

### **Diet Monitoring and Management of Diabetic Patient using Robot Assistant based on Internet of Things**

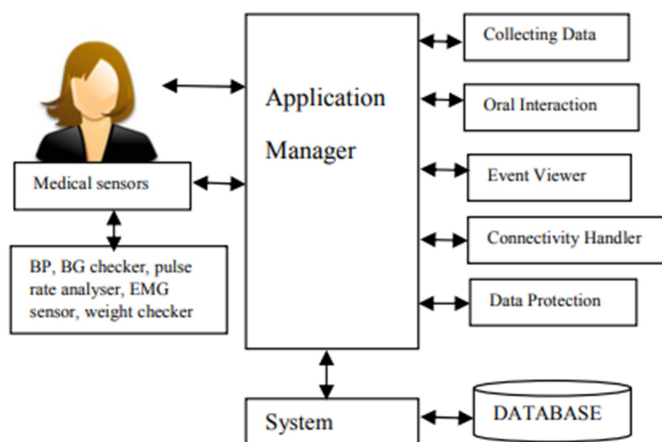
#### **ABSTRACT**

This paper is presented to improve the eHealth care platform by using Robots which are connected through IoT for providing personalized multiple-care approach particularly to a diabetic patient. The architecture of this model is such that it makes use of Internet of Things for Disease Management Hub web-centric platform which is then wirelessly connected to the robot. The robot has a chain of capillary networks in it which contains medicals sensors and sensor for dietary monitoring of the diabetic patient and thus provides them with fully multidimensional-care. The architecture of software is built so simply that even a person with little knowledge of platform can develop various applications out of it. This is possible by using the multi-layer approach which is working on the principle of automatic service delivery and object virtualization.

#### **ALGORITHM/METHODOLOGY**

The main field of this paper is eHealth with the connection to IoT in order to access or manage physical objects remotely. The two network architecture which is used in this platform are 1) Disease management hub(DMH) which is a place to or a web portal to monitor and manage disease2) Physical object's capillary network. Wi-Fi module is used to send the data to long ranges which are connected to the internet. For detecting the dietary habit of the patient we take help of temporalis mastication muscles which raises up the lower part of jaw and thus helps us to chew our food [28] When chewing up the food the temporalis contracts while the teeth clenched this is how EMG sensor comes into play to monitor the behaviour of diet the patient is following. For other eHealth features the medical sensors which include rate monitor, blood pressure, BG monitor and weight scale are fitted in each and every network of capillaries plus an already made AI robot is also there.

#### **BLOCK DIAGRAM**



## **FEATURES**

- Collecting Data
- Verbal Interaction
- Handling events
- Connectivity handler
- Data protection layer
- Database Monitoring

## **DRAWBACKS**

a prototype robot was used as a first step to gain a more realistic understanding of the feasibility and initial results of the application of the robot to community health care for diabetic patients and pharmacists in community pharmacies. Although it was not possible to explore in a single intervention whether robots can have a profound impact on the quality of care in the community and enhance the health care of diabetic patients, the overall direction of the development was recognized by the middle-aged and elderly diabetics in the community.

## **JOURNAL TITLE 3**

An Integrated Approach of Diet and Exercise Recommendations for Diabetes Patients

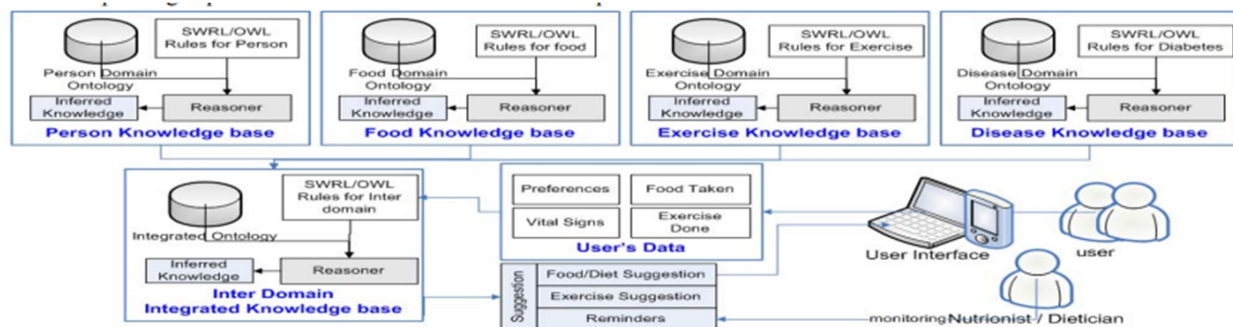
### **ABSTRACT**

Diabetes is among one of the fastest growing disease all over the world. Controlled diet and proper exercise are considered as a treatment to control diabetes. However, food and exercise suggestions in existing solutions do not consider integrated knowledge from personal profile, preferences, current vital signs, diabetes domain, food domain and exercise domain. Furthermore, there is a strong correlation of diet and exercise. We have implemented an ontology based integrated approach to combine knowledge from various domains to generate diet and exercise suggestions for diabetics. The solution is developed as a Semantic Healthcare Assistant for Diet and Exercise (SHADE). For each domain (person, diabetes, food and exercise) we have exercise) co defined separate ontology along with rules and then an integrated ontology combines these individual ontologies. Finally, diet recommendations are presented in the form of various alternative menus such that each menu is a healthy and balanced diet.

### **ALGORITHM/METHODOLOGY**

Diet and exercise suggestions for diabetics needs to share and combine information from various domains. These domains include foods, exercise, personal information, diabetes domain, physical activity or exercise domain and then integration of these domains. Ontology based system is best suitable for various reasons including knowledge base creation, separation of knowledge with rules, reasoning capability and knowledge sharing situation. Using modular approach and to develop separate OWL based ontology for each domain enables to work with each domain independently. Then individual ontologies are imported into an integrated ontology which combines and defines relations among the objects from various ontologies. The reasoner, in our case Pellet, uses semantic ontological (OWL) description logic based class definition and rules defined in semantic web rule language (SWRL) to suggest food items as inferences.

## **BLOCK DIAGRAM**



## **FEATURES**

We have used first ever approach of OWL base ontology, semantic ontological domain concepts definitions and SWRL based rules to generate diet and exercise suggestions. Previously, no reasoning and inference based technique has been used for diet and exercise assistance for diabetics.

Furthermore, our implementation integrates knowledge from various domains for diet and exercise suggestions. No such consideration has been done previously. Our integration approach shows the real benefit of using ontologies i. e. integration and sharing of concepts from various domains knowledge base, defines new relationships among these domains concepts and integrated it into one system.

Diet and exercise are strongly correlated and we have focused on this relationship. If patient has taken more calories, he/she can adjust it by doing extra exercise. Up to our knowledge, no efforts have been made in which the generated suggestions involves both diet and exercise suggestions simultaneously.

Our generated food recommendations are in a menu format which makes our effort to be used in real and practical life.

## **DRAWBACKS**

Managing balanced diet and proper exercise by a diabetic Funct is a complex task. Food and exercise recommendations for diabetics need to consider various knowledge base domains. In our current work we developed person, food, disease and exercise ontologies and then an integrated ontology combined these ontologies.

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## **JOURNAL TITLE 4**

### **Personalized Dietary Assistant - An Intelligent Space Application**

## **ABSTRACT**

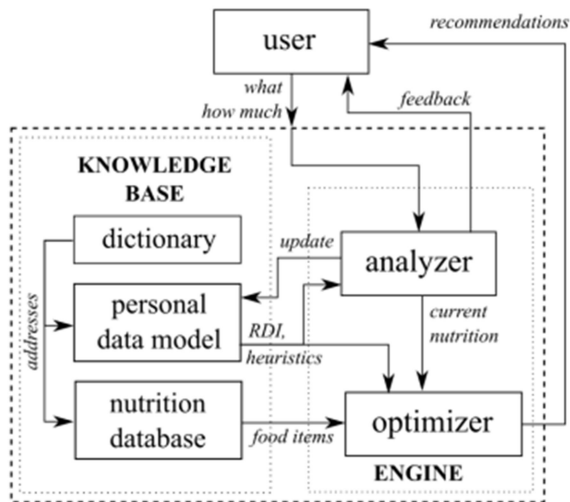
Nowadays, there are numerous types of diets that aim to improve the quality of life, health and longevity of people. However, these diets typically involve a strictly planned regime, which can be hard to get used to or even to follow through at all, due to the sudden nature of the change. In this paper, the framework for an Intelligent Space application is proposed that helps its users to achieve a healthier diet in the long term by introducing small, gradual changes into their consumption habits. The application observes the daily nutrition intake of its users, applies data mining in order to learn their personal tastes, and educates them about the effects of their current diet on their health. Then it analyzes the knowledge base to find different food or drink items that align with the perceived preferences, while also add to the balance of the daily nutrition of the users considering their physical properties, activities, and health conditions (e.g. diabetes, celiac disease, food allergies, etc). Finally, the system uses the findings to make suggestions about adding items from the consumption list, or change one item to another.

## **ALGORITHM/METHODOLOGY**

In this paper, the framework of an Intelligent Space application is proposed for educating human users about nutrition science and helping them achieve a healthier diet in the long term by introducing small but gradual changes to their consumption habits. The knowledge base is realized by a graph-based architecture, where each node represents a concept or a real world instance. The edges connecting the nodes describe the relationship between their concepts, or assign numeric or fuzzy data. The identification of each concept and the data mining is done by specialized fuzzy look-up table classifiers. The operation of the system is shown through an example, where the functionality and the speed of the application is tested. While the initial setup of the application takes ~7 seconds on average, the operation (the evaluation of data and the decision making) takes less than 0.1 seconds. The application is capable of helping the user optimizing their diet over a long period of time, by recommending small but gradual changes.



## **BLOCK DIAGRAM**



## **FEATURES**

The user provides the necessary personal data (age, height, weight, level of physical activity, taste preferences, etc.). Using the given information, the system can determine the Recommended Daily Intake (RDI) of the user.

## **DRAWBACKS**

The disadvantage of this method lies in the complexity of the problem: at first it would seem easy to calculate the nutritional values considering the few nutrients and minerals that are listed on product labels, but in fact there are dozens of nutritional values that are needed to be accounted for, and most of them are not even listed on product labels.