SMART ADVENTURE: CONTEXT AWARE COLLABORATIVE MOBILE APPLICATION

Marija Alagjozovska
Geonet GPS solutions
Skopje, Macedonia

Zlatko Andonovski
CreationPal
Skopje, Macedonia

ABSTRACT

In this paper, a smart phone context-aware application – SMART ADVENTURE is presented. The application uses GPS to locate the user in the nature, and according to his/her location and previous usage, generates information about activities and possible threats. This application represents a link that connects 21 century technology benefits and the old fashion way of doing activities in nature.

Motivation for developing this kind of an application lies in constant trend for improving general human health by doing different kind of open-air activities. At the same time, the proposed solution represents a high level tourist guide. It also increases environmental awareness, strengthens ecological conscience, preserves national treasures. This is done by direct collaboration between users (adding points of interest like activities, animal, plants).

The main contribution of our work is providing proof of concept of the ways new technology can influence few different domains (health, ecology, human culture) at the same time.

The proposed solution is service oriented and context-aware, implemented in android environment using java for developing the services.

I. INTRODUCTION

The biggest challenge in mobile computing nowadays is the exploitation of the changing environment with new type of application that are context aware. This kind of software adapts in accordance with the location, hosts, accessible devices, time changes and other contexts [1]. Mobile system with this type of capability can examine the environment and adapt to its changes.

In this study, context aware application for smart phones is presented. The main application context is location [2]. Location aware service represents one of the most crucial needs for users that own some kind of a smart phone [3][4]. Its importance lies in necessity of finding location based information when it influence the overall behavior of the system and might increase its performance. Location aware services can be used for finding travel information, shopping, entertainment, event information and other types of filtering [9]. In our application, location aware service filters a list of possible activities and threats in accordance with user position on the map Positing is done by GPS receiver integrated in the phone [5]. GPS (Global positing system) represent a spaced-based satellite navigational system that provides time and location information [6]. Location information based on GPS is from crucial meaning because it covers the user security issue (rescued if he is in danger) and it also renders events and places of interest (user can find the event or the place he is interested in) [7].

The proposed application can basically serve as a tourist guide [8], but it differs from other similar applications in terms of how it incorporates collaboration [10]. In our approach, users enter their one point of interest such as activity, animal or plant. . Points of interest (POI) are entered as multimedia data by using the smart phone built in camera. User takes picture of his point of interest, than enters its description in the application and makes it available to other users. Depending on the context of point of interest entered, the same application can be used for environment saving, preserving national treasure, reawaking ecological conscience, sharing old fashion activities added by users from all over the world and for mobile learning (real time learning for local animal and plants) [12][11][13][14].

The main contribution of our work is to prove that by using new technology we can influence different domains that have few points of tangency (health, ecology, human culture).

In the second chapter we will give brief introduction of the system, giving a system overview (components of the system and its collaboration). The third chapter gives details of system implementation, while the forth chapter explains proposed application user interface and interaction. The final, fifth chapter concludes the paper.

II. SYSTEM OVERVIEW

This general architecture of the proposed application is given on Figure 1: It is consists of smart phone with internet access, GPS, mobile network (GSM/WCDMA), web server that incorporates user data base.

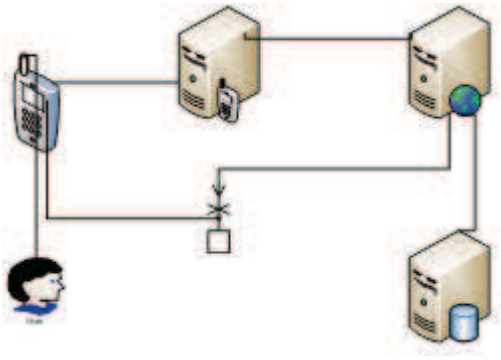

Figure 1. General system overview

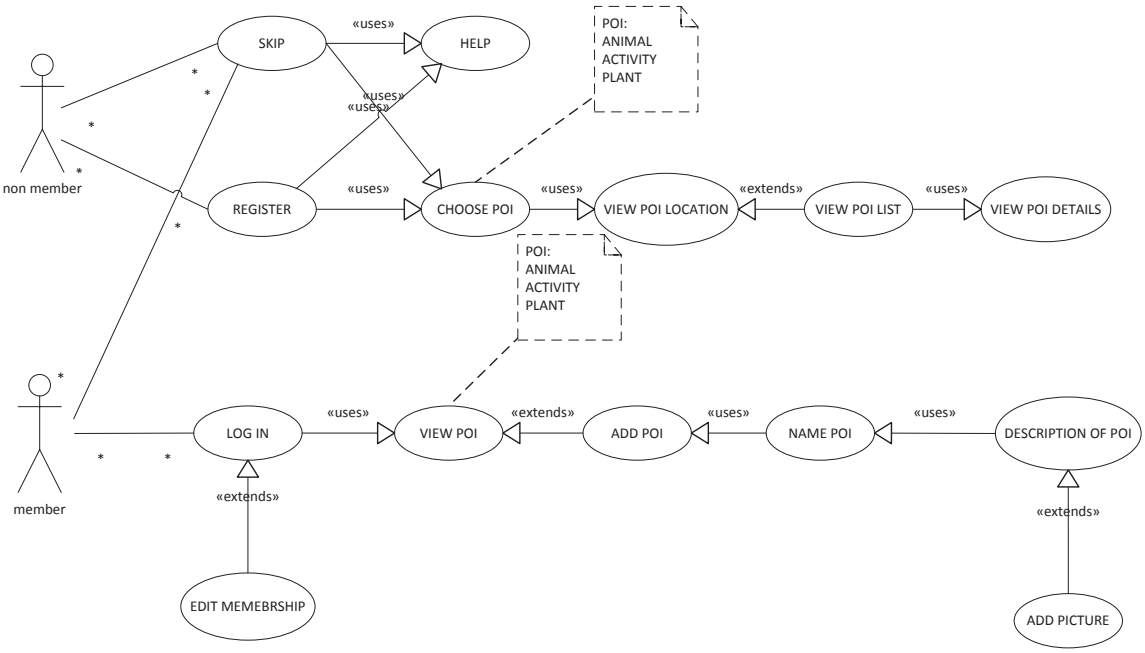

Figure 2. Smart Adventure use case diagram

Smartphone connects to an internet using mobile network and GPS. Web server handles the request for data from the user and gives him feedback. Requested data are stored on data base. When user asks for data, web server connects to data base and filters data for the user. Web server is responsible for users support (member or non member), by monitoring their movement providing them with safety in every moment. The help request handles the mobile network by sending SMS alert to help centre and to predefined number (or any predefined web service). The number (web service) to whom the message will be send is set by the user. The help SMS for members is sent to both help centre and predefined number. Users without account (non members) can only send SMS to help centre.

Proposed application is implemented as a prototype on android platform. For accessing application functionalities, users must connect to internet using mobile network and GPS. When user is loged in he can add POIs. If user is not logged in, system treats users like non members, and provides them with few application functionalities (finds the user position on the map which has been cashed earlier, and seeing points of interest which are saved locally on the phone). Integrated GPS in the phone sends data to the server, and server stores the data in its memory. If there is no internet access, mobile network or GPS, application can not be used.

Smart adventure is defined as an alternative of classical tourist guide. It can be used as additional source of information for certain locations. The main idea of Smart Adventure design is that users with smart phones can log on or register from anywhere and get additional information for the place they are current at. Figure 2 represents the use case diagram of the system. A user logs in, skips or registers in the system. If the user is a member (user with account) he/she can see and add points of interest (animal, plant, activity) or asks for help in case of potential danger. Otherwise if he/she is not a member he/she can just ask for help or see points of interest (animal, activity, plant). When adding points of interest, user can add a picture of the point (optional).

III. IMPLEMENTATION DETAILS

The whole system is service-oriented and implemented in android environment using java for service development environment. It was developed in eclipse ID environment Android 1.6 SDK, and coded in java object oriented language. Application can be used only by user who has smart phones with android platform. For proper working of the application IP mobile network and the GPS has to be on.

The system contains of one package "Adventure" in which classes are placed. The package contains two sub-packages: "Data" and "Model". "Data" sub-package contains classes that give information about activities, animals, plants in accordance with their location. "Model: Sub-package contains all the classes that are not directly connected with the users' views (everything that has to present something real or abstract which existence is not direct connected to the application.) Figure 3 represents the class diagram, in which the structure of the system represented by the classes, their attributes, operations and relationship among them is given. The given class diagram is truncated in order to reduce survey's fussiness. In the class diagram only the classes which have the main importance in system structure are presented.

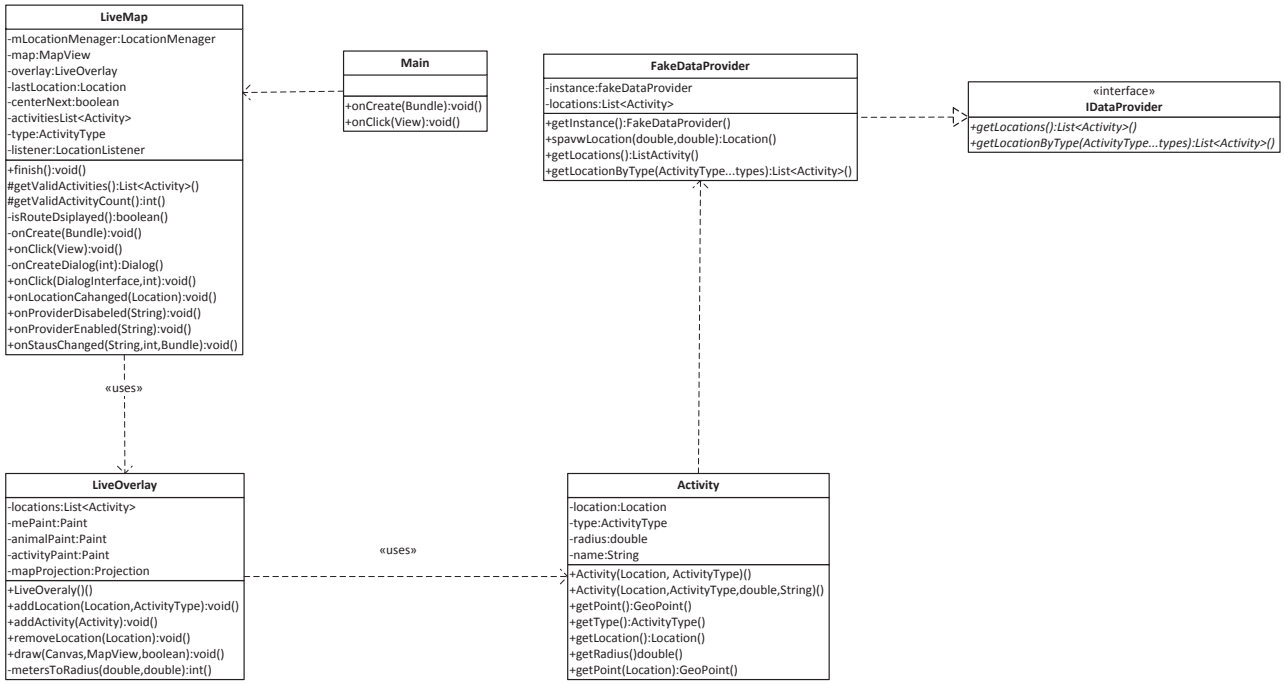

Figure 3. Smart Adventure class diagram

When user chooses one of the offered system functionalities Main class is activated. It handles user's choice and connects with LiveMap class which communicates with LiveOverlay class. LiveMap class determines the use of location on the map, and LiveOverlay displays icons on the map (animals, activities, plants). Activity class is the model class for all points of interest (animal, activity, plant); it contains all information related to POI's like coordinates, names, etc. FakeDataProvider manipulates with crucial data about users points of interest (data for animals, activities, plants) in accordance with his location. It is used like for testing the application. Later it will used as data base mediator.

IV. SMART ADVENTURE USER INTERFACE

Figure 4, Figure 5, Figure 6 and Figure 7 represent the most important features of the application user interface.

Users, after they have logged in the system, have to choose one of the offered application functionalities (animal, activity, help, and plant) Figure 4. The menu is organizes in this way for easy accessing. After choosing one of them, map opens and the user location is mark in it with bright blue colored dot Figure 5. The list is generated by clicking the POI button positioned in the bottom. From the list user can one of the poi's and sees all the details Figure 7and its radius of coverage Figure 7, represented by the big red circle. If the user is in any potential danger he just has to click and hold about five seconds (five second pres) the help button. The five second press is to prevent sending of false alarm. The position of the help button is set in the left and right corner for easy access for both left hander and right hander users.

For better understanding of application usage, we have chosen a concrete location, and for that location we have chosen a concrete animal – grass snake.

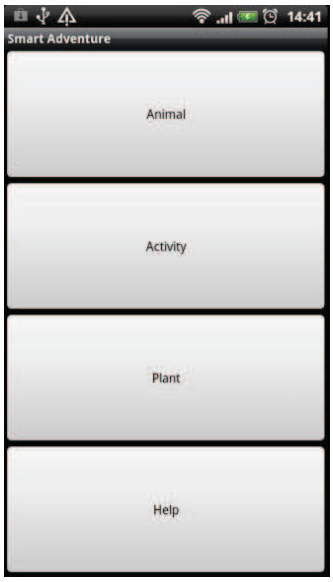

Figure 4. Smart Adventure Menu

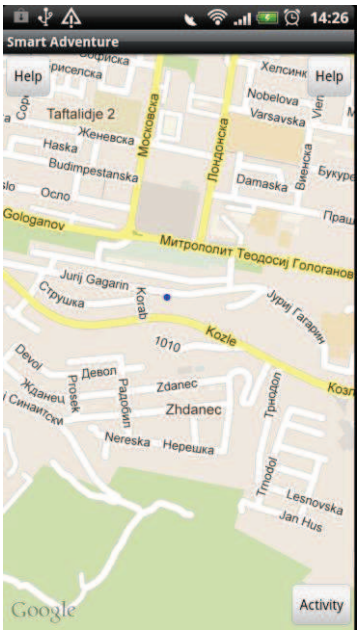

Figure 5. User located on the map

Figure 5 represents a located user in the nature and positioned on the map. User position is marked with bright blue dot. On this picture user is located in Skopje area, Kozle estate.

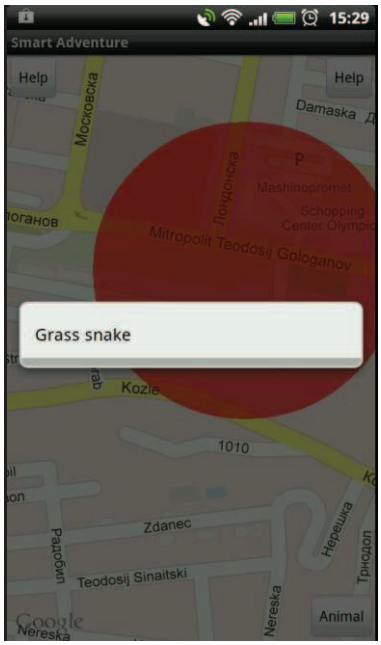

Figure 6. Grass snake coverage

In Kozle estate (Skopje, Macedonia) grass snakes are the animals that user can come across. Grass snakes coverage is marked with big red circle Figure 6.

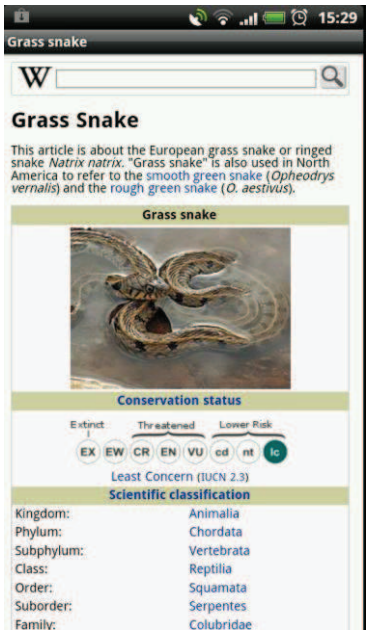

Figure 7. Description of grass snake

The description of the grass snake is given in Figure 7.In the description are given detail information about the snake including a picture of it, so the user can recognized it very easy when he'll come across it.

V. CONCLUSION

In this study an Android application for smart phones was presented.

Very important issue in application development is user acceptance, usability and impact of the product. That will be our next step in the Smart Adventure development. We will exam user experience and in accordance with their remarks we will improve our application. In the next version of Smart Adventure we will develop a service that will offer users to post their activities or need for help on Facebook and Twitter.

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