

Automator – Location and Battery Level Based Profile Changer, Alarm and Sms Sender

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Abstract—This paper discusses the project Automator which is a location and battery level based automatic profile changer, location based alarm and SMS sender. This is a third party software developed for Android operating system. The application takes the location of the device from GPS and changes settings of the device as the user has defined earlier. The main advantage of this software comparing to other similar software in the Android market is the customization in selecting the settings the user wanted to change.

Index Terms—android, alarm, GPS, profile, SMS, mobile

I. INTRODUCTION

This document describes the methodologies, techniques and technologies which are used to develop this software. This is developed to work with any smart phone which runs on 2.2 or newer version of Android operating system ^[1]. This software is divided in to three major parts depending on its functionality. They are automatic profile changer, alarm and automatic SMS (Short Message Service) message sender. The functionality of alarm and SMS sender is activated according to the current location of the device as taken from built in GPS(Global Positioning System)^[2] receiver. The profile changer is activated not only based on its current location but also based on the battery level of the device.

Profile changer let the users to select specific sound settings, display settings and network settings of the device. The user has the ability to select which of the settings that he wants to get activated from the given set of settings. Activation is based on location or/and battery level according to the user's preference. Alarm functionality gives you a notification with a pre-defined message based on the location of the device. Sending SMS functionality sends SMS messages defined by the user based on the device's location.

The user can specify a location using a set of geo coordinates and a radius. Then he can choose whether the activation happens when he enters that area or leaving that area. Battery level can be given

as a range. So when the device's battery level reaches that range in charging and discharging the activation happens.

The next section of the report talks about the background of the project. This includes a description about Android and GPS along with the file storage options used in Android. The design and implementation section talks about how the application is designed and implemented including core software technologies used for the implementation. Discussion and result section talks about how the testing is done, issues faced in the development and results. In the future development section, it defines the enhancements which can be done to this project in the future. At the end of the research paper the conclusion is given.

II. LITERATURE REVIEW

The only written information regarding this project was the information about Nokia bots^[3]. Nokia bots is a similar application developed by Nokia beta labs for symbian operating systems. This is the earliest approach I could find about this type of software. This was stopped and continued as "situations" in pastili labs^[4]. Though there are several apps similar to this in Google Play^[5] there is no documentation regarding underlying architectures or design of those applications rather than the Google Play description.

One of the similar and popular applications is "Llama – Location Profiles"^[6]. Llama uses cell tower triangulation method to find the device's location. It is an automatic profile changer which activates according to your location. Llama profile includes number of sound, display and network settings. One drawback in this application is since it uses cell tower triangulation, the location recognition is not as accurate as using GPS. Similar application which uses both GPS and cell tower triangulation is Profile Scheduler^[7]. When compared to Automator both these applications don't provide the alarm functionality and SMS functionality.

There are separate applications to support location based alarm and location based SMS functionalities. Are You There Yet^[8] is one such

application which will send an SMS when you reached to a location. Location Alarm ^[9] application will help you set an alarm which will ring when you reach a destination.

Although the location based profile changers, alarms and SMS senders are there, they do not provide these three functionalities as a whole. The uniqueness of the Automator depends on providing all these three functionalities as a whole and its customizability.

III. BACKGROUND

A. Android

Android is a mobile operating system which is developed by Google and Open Handset Alliance (OHA)^[10]. The first commercial version, android 1.0 was released in September 2008. Since April 2009, android versions have been developed under a codename and released according to alphabetical order. The recently released version is android 4.4 KitKat.^[1]

The main reasons for Android operating system to become the most popular in a very short period of time is its low cost, high availability, hardware diversity, open source free-market system and strong developer community. Android attracts innovation from both hardware and software. Automator is developed to work in versions 2.2 or higher.

B. Global Positioning System (GPS)

To identify the current location, the software uses readings from built in GPS receiver of the device. The Global Positioning System is a space based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near earth where there is an unobstructed line of sight to four or more GPS satellites^[2]. This is a feature available in almost all the smart phones developed today.

C. File Storage Options

Android provides several options to save the application data ^[11]. They are shared preferences, SQLite or internal storage. Shared preferences store private primitive data in key-value pairs. In SQLite databases the structured data is stored in private storage. These databases are accessible by name to any class in the application. In internal storage the private data in the application is stored on the device memory. By default the files saved to the internal storage are private to the application. These are removed when the user uninstalls the application.

IV. MAIN FEATURES

A. Location and Battery Level Based Profile Changer

User can specify a list of settings including sound, display and network settings to activate based on a specific location or a battery level. Main advantage of this functionality is the customizability of settings and user friendliness. User can choose the specified profile which should be activated based on either a location or a battery level or both. A profile is a set of settings which the user chooses from a list of settings. These lists are categorized in to sound, display and network settings for ease of use. Sound settings include ringing volume, silent mode and vibration mode where display settings include brightness, auto rotation and screen time out. Network settings include Wi-Fi and Bluetooth settings.

B. Location Based Alarm

From this feature user can specify a message and a location. So when the device reach that location or leave the location as defined by the user he will get a notification on the device with a predefined message.

C. Location Based SMS

This feature is also similar to the alarm functionality. The user can specify a number and a SMS message to be sent. Then specify a location where the message should be sent. So when the device reaches or leaves that location the message is automatically sent.

V. DESIGN AND IMPLEMENTATION

Automator's architecture [Fig.1] is divided in to three main parts; user interface design, saving profile, SMS and alarm and service automating the activation.

A. User Interface design

As this is a mobile application, user interface is one of the primary concerns. Attractiveness and user friendliness are major design goals of this process. The splash screen used at the beginning is

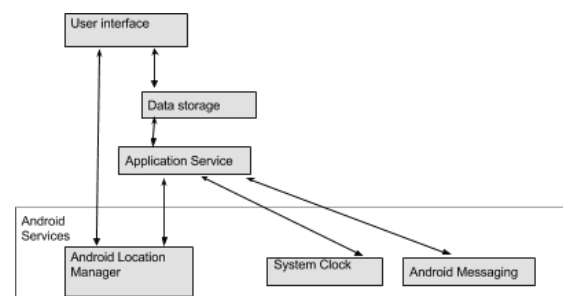


Fig 1: Architectural Diagram

intended to increase attractiveness of the application. [Fig.2] After the splash screen a menu with the three functionalities is shown to the user where he can select one of the functionality from profiles, SMS, or alarms.[Fig.3] After selecting one, user can create, edit or delete their instances according to his preferences. When setting up the location, the application uses Google map API^[12][Fig.4]. When the user wants to set a location he can set a location by using the Google map given and add the radius for the area manually [Fig 5].

B. Saving Profiles, SMS and Alarms

As the coding is done in Java, object oriented programming concepts are used in large scale. Profiles, SMS and alarms are saved as serialized objects in the sandboxed storage allocated to the application. This enhances the security of the data stored. Use of shared preferences is not suitable here because the data can be average in size. Shared preferences is a good approach only for small storage sizes. Although SQLite is efficient for large storages there are not that much of data in this application. Therefore saving the data as serializable objects in the internal storage is the best solution for this kind of scenario.

C. Service for Automating the Activation

A service is an underlying operation that is running in background even if the user switches to another application^[13]. A service should be run in the operating system to automate the activation when required location or battery level is reached. So the service should keep a cached list of locations, battery levels and list of indexes of the corresponding profiles, SMS and alarms.

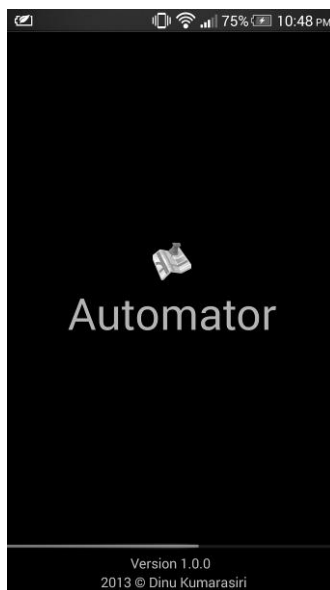


Fig 2: Automator Splash Screen

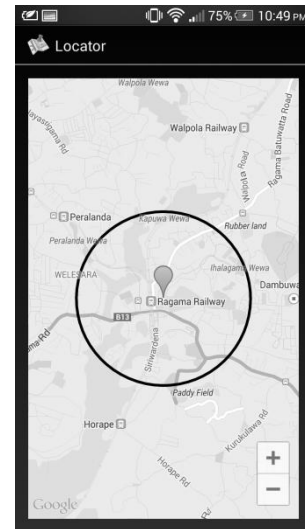


Fig 3: Automator Main Menu 1

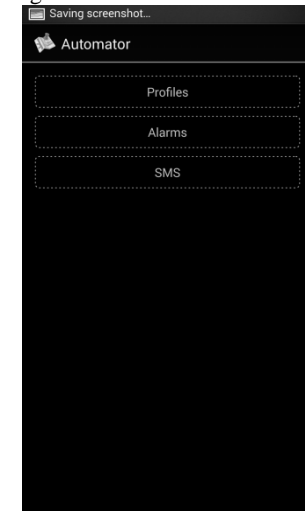


Fig 4: Showing the location using Google Maps

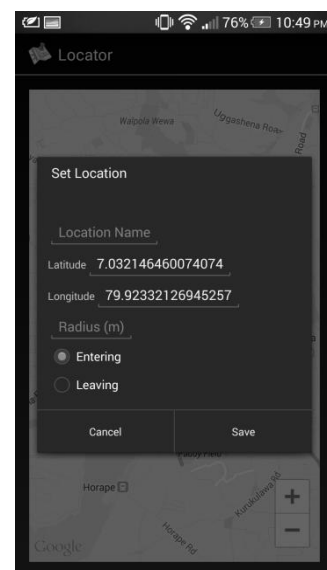


Fig 5: Manually inserting the radius

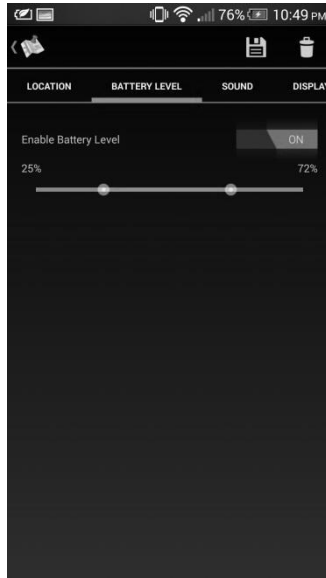


Fig 6: Setting the battery level

VI. DISCUSSION AND RESULTS

For the testing purposes apart from the Genymotion^[14] emulator two devices are used. Those are HTC desire mobile running Android v.2.2 jelly bean and Nexus 7 tablet running Android v.4.3 jelly bean. Their screen sizes are 3.7 inch and 7 inch respectively. JUnit^[15] and Robotium^[16] testing frameworks were used to automate testing.

The main difficulty faced with this project is keeping the targeted API level at 2.2. When adding components in higher versions default components can be used which were not supported in lower versions. This resulted in finding alternative ways to inserting those components like hardcoding them using inserted images.

The result of this project is the application Automator which is a highly customizable location based and battery level based profile changer, location based alarm and SMS sender.

VII. FUTURE DEVELOPMENTS

More settings like changing the wall paper, lock screen image and ringing tone can be added to the application in future as enhancements.

This application can be also improved using artificial intelligence concepts. It can be designed to identify the changes made to settings by the users and categorized them in their locations and time. Then identify patterns and make automatic changes to settings without manually setting up by the user.

Data mining techniques can be also used with artificial intelligence aspects and suggest user profiles based on pattern recognitions So those profiles can be suggested and saved in to

Automator after user confirmed them.

VIII. CONCLUSION

Automator is a location and battery level based automatic profile changer, location based alarm and SMS sender. This idea was initially developed by Nokia beta labs by the Nokia bots software which is developed for the symbian mobile operating systems^[3]. In android market also there are many number of software to provide the same functionalities. But they do not provide the same three functionalities as a whole and most of them are not customizable as well. So we can conclude that Automator is good customizable, user friendly software which will make the day to day life of the android users more convenient.

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