ANDROID AND ARM PROCESSOR BASED LOCATION TRACKING SYSTEM

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ABSTRACT

Since the usage of smart phone and the internet service becomes the trend for information development and software applications, so that services for the mobile devices have become common. Nowadays almost all the smart phones from different vendors have GPS based location identifier along with location image as predefined application. Here the image of location is derived from common Google server. In some real-time application it is necessary to monitor location as well as to identify the movement of distant non respond user. Such kind of application is not currently available in present smart phones. The goal of this paper is to create an android based application, which receives information about the location of distant non respond user an d derive the necessary detail about that location at the monitoring end in terms of location image as well as the detail about that location in text. Moreover the paper has explored how to integrate current technologies like Gmap, browser, GPS. Overall, this should serve as a genuinely helpful for monitoring the movement of elderly people as well as for the survey of wild animals.

Index Terms— android, ARM, GSM, GPS, linux kernel, smart phone.

INTRODUCTION

COMPUTING continues to become more "personal", increasingly accessible anytime, anywhere. At the forefront of this development are handheld devices that are transforming into computing platforms. It is commonly acknowledged that the mobile phones have become more powerful and ubiquitous in our daily life; the applications running on the mobile phones were paid more attention by the people. The usage of Android platform is attracting more and more programmers in mobile computing fields. Android is an operating system for mobile devices such as smart phones and tablet computer. It is developed by Open Handset Alliance led by Google [1].

Android consists of a kernel based on the Linux Kernel, with middleware and core applications. Android has a large community of developers writing applications that extend the functionality of the devices. These are written in customized version and Java. Applications can be downloaded from third party sites as through online stores such as Android market, the application store run by Google.

The Android SDK provider powerful tools and API's necessary to develop applications on Android platform using Java programming language. It is open system architecture with versatile development and debugging environment, which has optimized graphics systems, rich media support and a very powerful browser.

Until now, most of location monitoring systems like Active badge, Cricket, RADAR, Active bat were available for indoor identification only [4,7]. For outdoor, only GPS is used, but it gives undetailed information about the location. Some mobile tour guide systems uses prototype which is to be downloaded on the mobile device or PC, but it's somewhat complex and may not be reliable [3,5]. So with recent technology smart phone is used for refined information [1-2].

In this paper, it is designed and implemented an Android based location identification system which receives information about the location of distant non respond user and derive the necessary detail about that location at monitoring end in terms of location image as well as detail about the location in text.

This paper is structured as follows the section II explains the architecture of Android, section III presents the requirements for designing, section IV describes how the system has implemented, section V discusses about the results of the system and paper concluded in section VI.

II. ANDROID ARCHITECTURE

Android is based on Linux V2.6 kernel, its goal is to deploy the mobile phone sector. Android can also be used on other platforms and applications [1].

Android system uses a layered architecture and it has application layer, application framework layer, system runtime library and Linux kernel layer from top to the bottom. Application layer provides a core applications, including email client, SMS programs, calendar, maps, browser, etc. all application are written using the Java. Application framework layer enables and modifies the reuse of components, any application can publish or use other applications.

System runtime library has a set of core runtime libraries and the Dalvik virtual machine. Linux kernel layer which is used to provide services underlying systems and it is a piece of software between hardware and other software layers. The Android architecture and its main components are shown in Fig. 1 as follows.

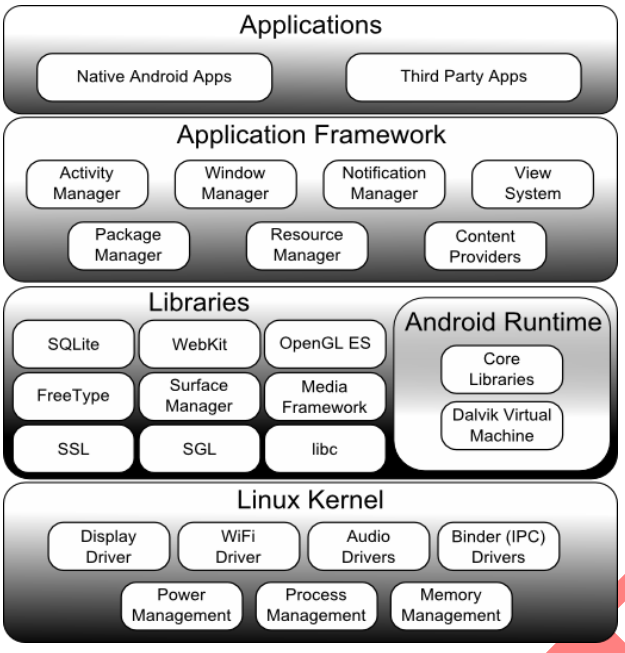

Fig 1: Android Architecture

III. SYSTEM REQUIREMENTS

This design composed of two ends, first is the user end comprised of hardware modules and second is the monitoring end which uses software's like Eclipse and Android SDK.

A. Hardware modules

Hardware modules used to implement this system were GSM, GPS modules, an LPC2148 ARM controller, Android v2.3.3 smart phone and an 12V Rechargeable battery.

1) GSM module: It is a plug and play modem with simple serial interface. It is used to send sms, make and receive calls and do other GSM operations by controlling it through simple AT commands. The modem consists of all required external circuitry required to start experimenting like power regulation, external antenna, sim holder etc.

2) GPS module: It is highly integrated with a ceramic GPS patch antenna. The module is with 51 channel acquisition engine and 14 channel track engine, which be capable of receiving signals from up to 65 GPS satellites and used as emergency locator and for personal positioning.

3) ARM controller: ARM processor have merits of high performance, low power consumption, low cost. It is most widely used microprocessors amongst the 32 bit and 64 bit microprocessors. Also it is a 32 bit Reduced Instruction Set Computer (RISC) Instruction Set Architecture (ISA) developed by ARM and suitable for low power applications. This has made them dominant in the

mobile and embedded electronics market.

4) Android smart phone: The main benefit of using android is unlimited applications can be downloaded on Android phones. This system uses v2.3.3 smart phone.

5) Rechargeable battery: These are lead-lead dioxide systems. If battery is overcharged, special one way valves allow the gases to escape to avoid excessive pressure buildup. The battery is completely sealed and is maintenance free, leakage proof and usable in any position.

B. Software modules

1) IAR embedded workbench IDE: IAR is abbreviation of Ingenjörsfirmun Anders Rundgren which means Anders Rundgren Engineering Company. It is a high performance C/C++ compiler and debugger tool suite for applications based on 8- , 16-, and 32 bit microprocessors. It incorporates a compiler, a linker and a debugger into one integrated development environment (IDE). IAR is advanced and powerful, easy to use and user friendly interface.

2) Eclipse: Eclipse is created by an Open Source community and is used in several different areas especially as a development environment for Java or Android applications. It is multi language software development environment comprising a workspace and an extensible plug in system.

3) Android SDK: It is downloaded in a simple zipped package. The bulk of Android SDK, in number of files, consists of documentation, with programming API's, tools and samples comprising the rest.

IV. IMPLEMENTATION

A. User end

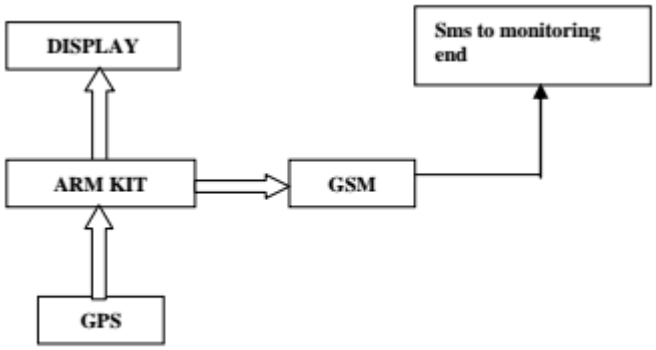

Fig 2: User end

The system is assembled as per the fig 2. In the user end, the receiver in GPS module calculates its position by the signals that include time and satellite position at time of message transmission. The retrieved information will be in NMEA (National Marine Electronics Association) standard.

In ARM controller, ports of GSM and GPS modules were configured as external peripherals. It reads the location information which is in NMEA standard. And also the extracted location information is received by GSM module and forms a sms message and sends it to the predefined mobile number. These were done using IAR workbench IDE and stored in the ARM controller memory using Flash magic.

Fig 3: User end assembly

B. Monitoring end

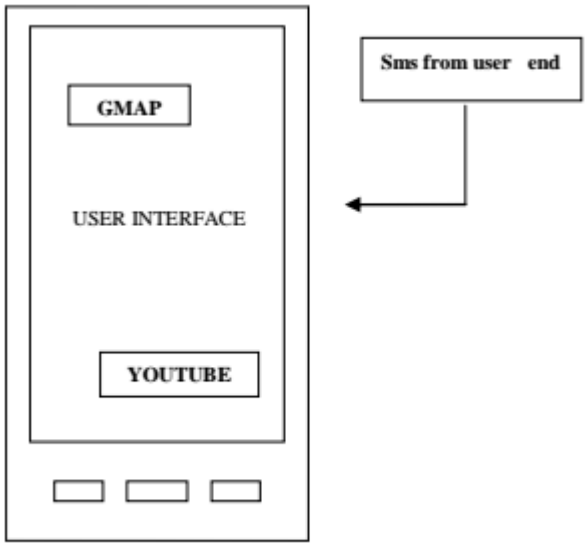

Fig 4: Smart phone (Android based)

In Monitoring end, the Android based application is developed for that a smart phone is programmed to receive and identify the specific message. After identifying it reads and extracts the information. It displays the map image of extracted location information from common Google server as well as the detail about that location in text on user interface.

To develop application for Android devices, we used a set of tools that are included in the Android SDK. Once SDK is installed, the tools can be directly accessed from Eclipse IDE.

The development steps encompass four development phases, which include setup, development, debugging and testing and publishing [9]. The basic steps were shown in Fig.5.

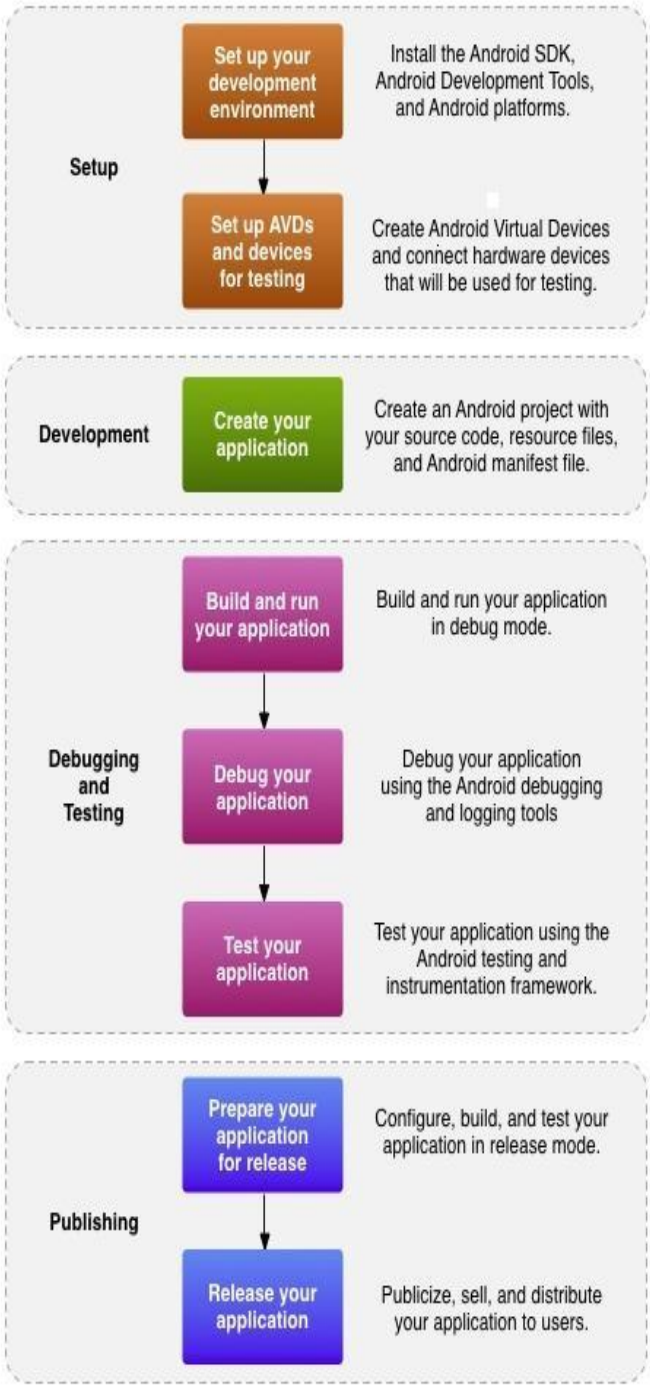

Fig 5: Development process for Android Application

V.RESULTS

Fig 6: Location information displayed in LCD

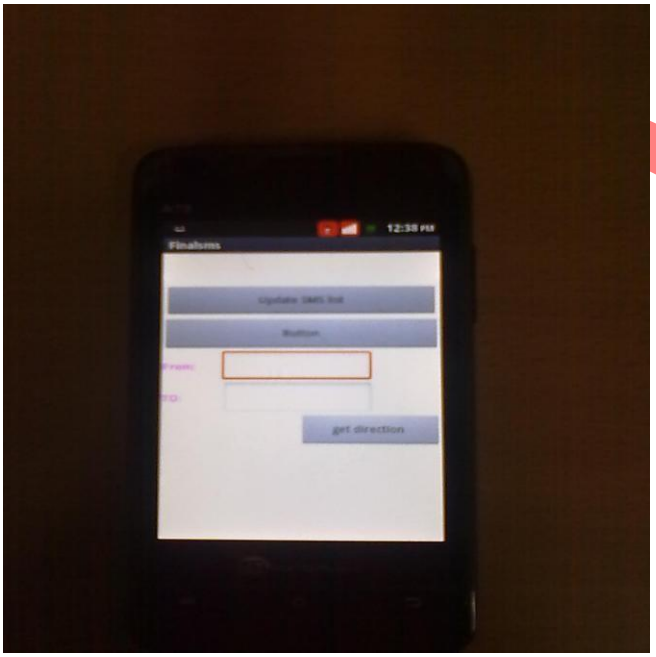

Fig 7: User interface at monitoring end (smart phone)

VI. CONCLUSION AND FUTURE WORK

In this paper, we designed and implemented a location monitoring system which is based on Android system. This concept can be extended to vehicle management system and also to monitor the mobility of children and elderly persons those who are not having respond devices like mobile phone with them. In addition to location information the user interface may be designed to acquire specific information about that location like historical significant and restaurant availability in that particular location. This work is considered as future extended work.

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