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LESS SPACE OCCUPYING CROSS LANGUAGE USED ANDROID APP DEVELOPMENT WITH RESPONSIVE LAYOUT-AN OVERVIEW

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Abstract: With the advancement in technology, the nano devices are more preferred and used in the era. The mainframe computers used decades back are over taken by microcomputers, laptops, palmtops and smart phones. Slowly and gradually the users are switching their use of internet and interest in smart phones. From banking transaction to ticket reservation the users prefer smart phone. Further the layouts used in development of android apps using one device may lose its design and layout in another device. This paper proposes for the use of cross languages like HTML, CSS, bootstrap for responsive layouts of android designs so that the layout remains same in all the smart phone devices and setup of server so that the resources occupying large spaces like audio, video, images can be compromised as the server load and android app can be developed of less space which can have less battery consumption. The paper also explains the SMS enabled feature and emailing feature used in android for the registration and query process by external users using the app.

Keywords: Android, php, Java, Android SDK, Bootstrap, HTML, CSS, Eclipse, Smart Phones.

1. INTRODUCTION

The emergence of smart phones in the recent year has completely changed the definition of mobile phones. Mobile phones these days are not just used for the process of voice calls; there are plenty of uses besides that. Various applications added unlimited fun for people's lives. It is certain that the future of the network will be the mobile terminal. According to the survey, 96% of smart phone users are using android. The open source feature of android has taken its popularity to the peak [1]. Further, as the developing of hardware of mobile is getting better, the performance index is much higher than the actual requirements of the software configuration [2]. Phone's features more depend on software. As the Android operating system is getting more popular, the application based on Android SDK attracts much more attention. But the fast battery consumption and space issues are always the greatest problem in the apps been developed in android. Now the Android system in the electronics market is becoming more and more popular, especially in the smartphone market. Because of the open source, some of the development tools are free, so there are plenty of applications generated. This greatly inspired the people to use the Android system. In addition, it provides a very convenient hardware platform for developers so that they can spend less effort to realize their ideas. This makes Android can get further development [3]-[4]. But the space and battery consumption are always a problem creating indexes in android applications [5]-[6]. To add further the layouts designed in one android phone might differ when we switch from one phone to another. Hence the responsive designs are also the challenging areas. The project aims to develop a full functioning android app which has

different features of static and dynamic implementation, and covers all the necessary tools to impart information about college to anyone who downloads/installs it. It holds the feature of news board, discussion forum, contact us, gallery, information about departments, features of email and sms for query and new registration. It also focuses on using cross languages like java, php, android, html, css, and bootstrap for development of a single app.

2. TECHNOLOGIES USED

a. ANDROID ARCHITECTURE

We studied the Android system architecture. Android system is a Linux-based system, Use of the software stack architecture design patterns [3]-[4]. As shown in Figure 1, the Android architecture consists of four layers: Linux kernel, Libraries and Android runtime, Application framework and Applications [7]-[10]. Each layer of the lower encapsulation, while providing call interface to the upper.

i. APPLICATIONS

Android app will be shipped with a set of core applications including client, SMS program, calendar, maps, browser, contacts, and others. All these application programs are developed in Java.

ii. APPLICATION FRAMEWORK

The developer is allowed to access all the API framework of the core programs. The application framework simplifies the reuse of its components. Any other app can release its functional components and all other apps can access and use this component (but have to follow the security of the framework). Same as the users can be able to substitute the program components with this reuse mechanism.

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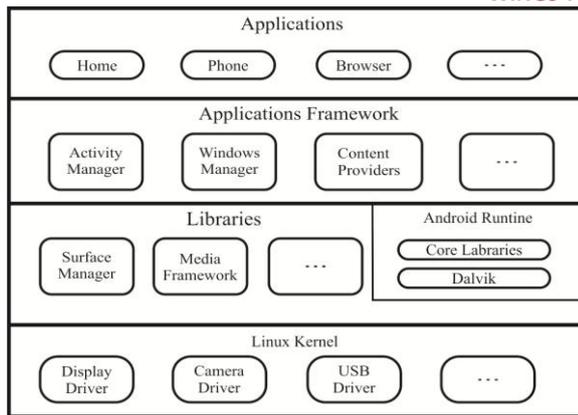


Figure 1: Android Architecture

iii. LIBRARIES AND ANDROID RUNTIME

The library is divided into two components: Android Runtime and Android Library. Android Runtime is consisted of a Java Core Library and Dalvik virtual machine. The Core Library provides Java core library with most functions. Dalvik virtual machine is register virtual machine and makes some specific improvements for mobile device. Android system library is support the application frame work, it is also an important link connecting between application framework and Linux Kernel. This system library is developed in C or C++ language. These libraries can also be utilized by the different components in the Android system. They provide service for the developers through the application framework.

iv. LINUX KERNEL

The kernel system service provided by Android inner nuclear layer is based on Linux 2.6 kernel, Operations like internal storage, process management, internet protocol, bottom-drive and other core service are all based on Linux kernel.

b. PHP

PHP (recursive acronym for PHP: Hypertext Preprocessor) is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML.

c. MYSQL

MySQL is a freely available open source Relational Database Management System (RDBMS) that uses Structured Query Language (SQL). SQL is the most popular language for adding, accessing and managing content in a database. It is most noted for its quick processing, proven reliability, ease and flexibility of use.

d. APACHE

Apache is a freely available Web server that is distributed under an "open source" license. Version 2.0 runs on most UNIX-based operating systems (such as Linux, Solaris, Digital UNIX, and AIX), on other UNIX/POSIX-derived systems (such as Rhapsody, BeOS, and BS2000/OSD), on AmigaOS, and on Windows 2000.

e. HTML

In the late 1980s, Tim Berners-Lee was working as a physicist at CERN (the European Organization for Nuclear Research). He devised a way for scientists to share documents over the internet. Prior to his invention, communication via the internet was limited to plain text, using technologies such as email, FTP (File Transfer

Protocol), and Usenet-based discussion boards. The invention of HTML made use of a model of content stored on a central server that could be transferred and displayed on a local workstation via a browser. It simplified access to content and enabled the display of "rich" content (such as sophisticated text formatting and the display of images).

HTML is a markup language. It tells the web browser what content to display. HTML separates "content" (words, images, audio, video, and so on) from "presentation" (the definition of the type of content and the instructions for how that type of content should be displayed). HTML uses a pre-defined set of elements to identify content types. Elements contain one or more "tags" that contain or express content. Tags are surrounded by angle brackets, and the "closing" tag (the one that indicates the end of the content) is prefixed by a forward slash. For example, the paragraph element consists of the start tag "<p>" and the closing tag "</p>". Hence HTML is a markup language for describing web documents (web pages) with following facts:

- HTML stands for Hyper Text Markup Language
- A markup language is a set of markup tags
- HTML documents are described by HTML tags
- Each HTML tag describes different document content

f. CSS

Cascading Style Sheets, most of the time abbreviated as CSS, is a style sheet language used to describe the presentation of a document written in HTML or XML (including various XML languages like SVG or XHTML). CSS describes how the structured element must be rendered on screen, on paper, in speech, or on other media.

CSS is one of the core languages of the open web and has a standardized W3C specification. Developed in levels, CSS1 is now obsolete, CSS2.1 a recommendation and CSS3, now split into smaller modules, is progressing on the standard track.

- CSS stands for Cascading Style Sheets
- Styles define how to display HTML elements
- Styles were added to HTML 4.0 to solve a problem
- External Style Sheets can save a lot of work
- External Style Sheets are stored in CSS files

g. ECLIPSE

Eclipse is an integrated development environment (IDE). It contains a base workspace and an extensible plug-in system for customizing the environment. Written mostly in Java, Eclipse can be used to develop applications. By means of various plug-ins, Eclipse may also be used to develop applications in other programming language: Ada, ABAP, C, C++, COBOL, Fortran, Haskell, JavaScript, Lasso, Natural, Perl, PHP, Prolog, Python, R, Ruby (including Ruby on Rails frame work), Scala, Clojure, Groovy, Scheme, and Erlang. It can also be used to develop packages for the software Mathematica. Development environments include the Eclipse Java development tools (JDT) for Java and Scala, Eclipse CDT for C/C++ and Eclipse PDT for PHP, among others. The initial codebase originated from IBM Visual Age. The Eclipse software development kit (SDK), which includes the Java development tools, is meant for Java developers. Users

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can extend its abilities by installing plug-ins written for the Eclipse Platform, such as development toolkits for other programming languages, and can write and contribute their own plug-in modules. Released under the terms of the Eclipse Public License, Eclipse SDK is free and open source software (although it is incompatible with the GNU General Public License). It was one of the first IDEs to run under GNU Class path and it runs without problems under Iced Tea.

3. LITERATURE REVIEW

The authors in [11] have tested the app in three environments including hardware, software and network. Test hardware environment is Lenovo Y460 laptop and millet M1 phone; software environment is windows 7 and phone system environment is android 4.0.3. Network environment is China Mobile which is 10M broadband, WIFI LAN and China Mobile GPRS network. By testing each function on mobile phone and the computer simulator, the result showed that video player and audio player run well and no advertising. Sinaweibo client can successfully complete OAuth2.0 certificate authority and login and collect the basic data of the user information from sina server and no redundant information. Expected effect is achieved after testing all the functions. They says that since the Weibo client has to access to the network, when tested on an android phone, the performance under the environment of WIFI network and mobile 2G GPRS network can meet the expected requirements.

This article [12] gives a detailed introduction of android application framework and the working principal of android applications. Finally, a music player on the android platform was put forward as an example to illustrate this mechanism. This paper [13] proposes a MDE approach for android applications development, which addresses how to model specific aspects of android applications, as intent and a data/service request, using standard UML notations. Moreover, it supports static and behavioral code generation from UML class and sequence diagrams, according to the rules imposed by the android platform. To demonstrate our approach, a case study was conducted, in which an android application was modeled in UML and code was generated from it. To generate code, the extension of GenCode was used. However, the actual version of GenCode tool that supports the proposed approach, only made an automatic transformation from UML class and sequence diagrams to the target android Java code, without consider any optimization in the generated code. As future work, we plan to extend this tool in order to consider the good practices for android development [16], and thus generating efficient code. The authors in [14] say that android application development college challenge has only been held two times, but it greatly encourages and promotes the creativity of the college students. With more and more competitive teams participating the contest, it will be harder to win an award. However, many exciting applications will be presented in the contest. This challenge gives us an opportunity to learn about that a lot of ideas we think about can be implemented on

android platform. At the same time, the contest provides a stage for android developer to discuss and communicate with each other. This can effectively promote the development of android and attract more software engineers to develop applications on android platform.[15]

In this research paper [16], through the introduction of the 3D maze game of gravity, understanding of the development of sensors on android platform can be experienced. They claim that with the rapid development of science and technology, the sensor's performance will be greatly improved and become more intelligent and sensitive. They also suggests that combining the characteristics of the sensor with the convenience of mobile phones, we can develop a variety of novel applications in the mobile terminal, which become handheld entertainment for people in spare time, and can provide developers with new areas for development.

This paper [17] proposed an idea to make the android application designing flow more friendly. Users can design android application without installing specific software. Users can design the application just by a browser which supports HTML5. The idea can extend to other application. It makes the gap between common user and programming designer smaller. Compare with exist tools. The idea of this paper provides a concept of module combination rather than logic accumulation. It also put development tool and deploy tool in one system. In the future, it is possible to generate a system to generate many applications for different device with only on click.

In [18] the authors specified the design of a real-time interactive model and discussed details of key techniques that make the system effective and easy to maintain. The system is abstractly divided into three layers, the Application Layer, the Data Management Layer and the Basic Service Layer. To improve the performance of the system, we add the reconnection and retransmission mechanism. The model has been successfully put into use in bus scheduling android client application.

4. EXISTING SYSTEM

The college at current holds two android apps named "GBoard" and "Gec app". One app has just the static implementation and next app has just the dynamic implementation. "Gec App" aims to provide all the information about the college in form of static contents and layouts designed in android platform. "GBoard" uses a web view to display the current news and feeds to the user and works as a notice board for android users. Both app aims to provide the information to the users about the college.

a. LIMITATION OF EXISTING SYSTEMS

- Space required to install is large
- More battery consumption
- One app has just static contents and another needs an internet to operate
- No interactive tools like games are included
- The layout changes when the app is run in different platform.

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b. PROPOSED SYSTEM

“GEC Android app” is full featured college app developed for “Geeta Engineering college. It holds various dynamic and static features so that user can use it when internet connection is not available as well. To reduce the space of app the images and other heavy sized data are loaded at server and accessed through server so that the android app is of less size and does not have problem with installing and using. Further bootstrap is used in the server side for the dynamic responsive designs which can work on any android platform without disturbing the content.

c. BENEFITS OF PROPOSED SYSTEM

- An android app with the static and dynamic features.
- An android app which occupies less space and consumes less battery.
- An android app which has full features embedded required for college information to anyone who downloads it.
- A query handling and registration mechanism setup incorporated within the project
- Registration portal for new admissions incorporated.
- Image Gallery included within the project
- Simple games included within the project
- Discussion forum and news board included.
- It can be used by both users who has internet and who does not has internet as well.

d. CHALLENGES AND ISSUES

- Finding mostly used version was time consuming.
- The software/hardware integration was also a major issue.
- Unable to fix the errors and security issues was also quite difficult to manage.
- To design the responsive layouts for static contents in android is difficult.
- To incorporate the features of SMS facility is challenging.
- The gallery setup in android uses much more processes.

e. BLOCK DIAGRAM

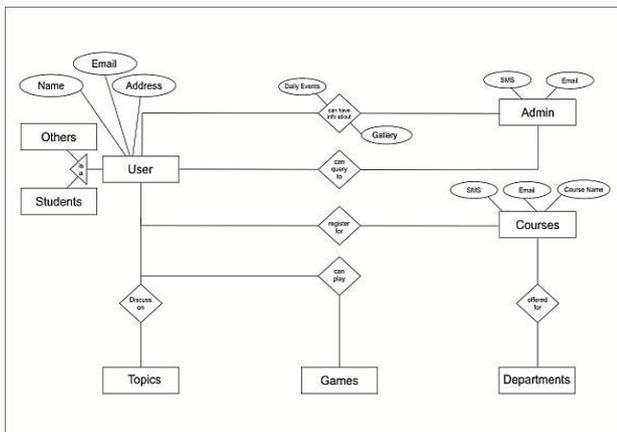


Figure 2: Systems Block Diagram

f. HOW SYSTEM IS MADE EFFICIENT AND RESPONSIVE?

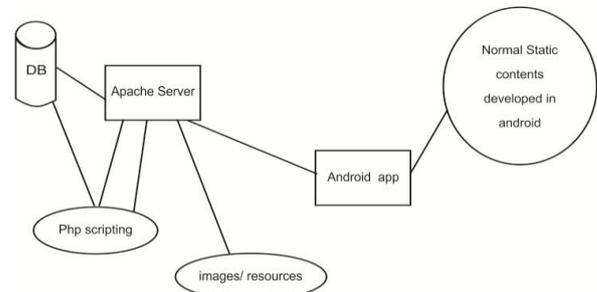


Figure 3: Systems Working

g. SOME SNAPSHOTS OF SYSTEM DEVELOPED WITH RESPONSIVE DESIGNS



Figure 4: Home Page

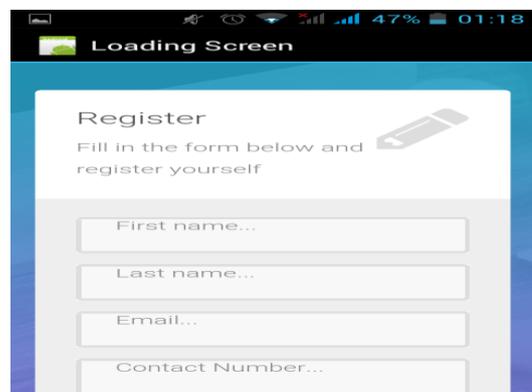


Figure 5: Registration Page with Responsive Layout



Figure 6: Query Page with Responsive Layout

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5. RESULTS AND DISCUSSIONS

a. Space Reduction

i. Use of Pure Android Application

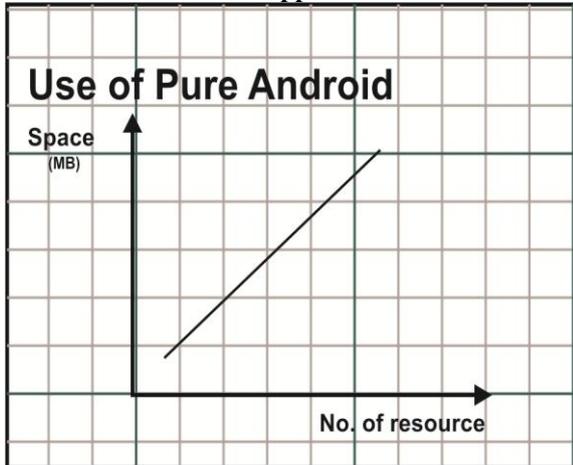


Figure 7: Use of Pure Android Application (Space VS No. of Resource Graph)

ii. Use of Cross Languages

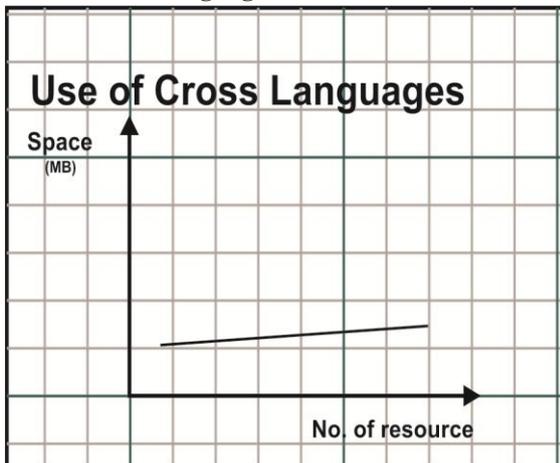


Figure 8: Use Of Cross Language For App Development (Space VS No. of Resource Graph)

b. Fast Processing Speed

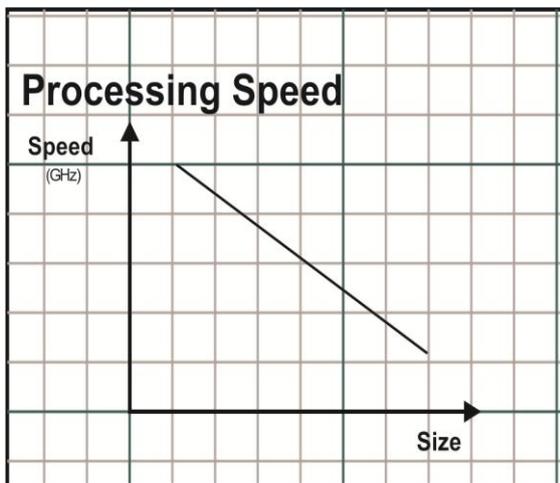


Figure 9: Fast Processing Speed (Speed VS Size graph)

c. Battery Consumption

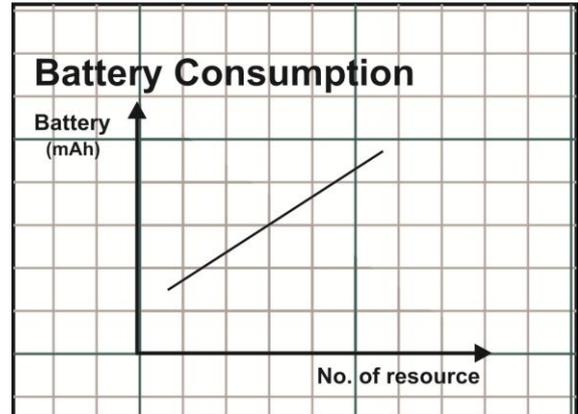


Figure 10: Battery Consumption (Battery VS No. of Resource's Graph)

d. Responsive Design

i. Use of Android Layout

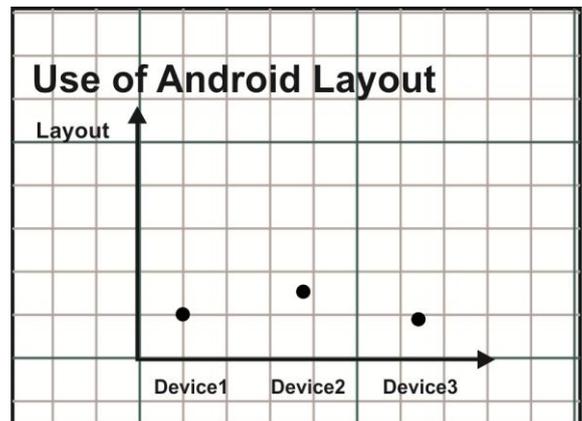


Figure 11: Use of Android Layout (Android Layout VS Device's graph)

ii. Use of Bootstrap

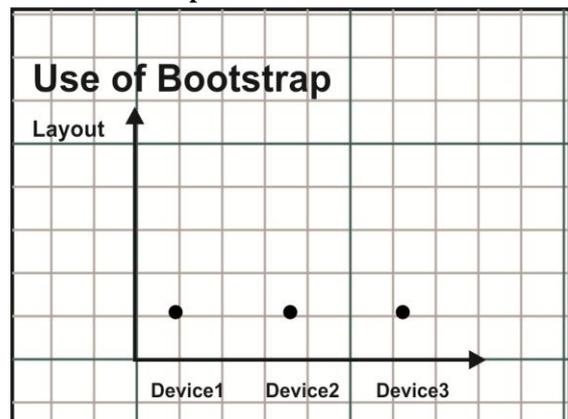


Figure 12: Use of Bootstrap For Layout Design (Bootstrap Layout VS Device's graph)

6. CONCLUSION

Android as a full, open and free mobile device platform, with its powerful function and good user experience rapidly developed into the most popular mobile operating system. This paper gives an overview of the different challenge and

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issues faced in android app development. It gives a detailed reference of a new app "Gec Android App" developed for Geeta Engineering College. The experience of developing an android app is quite challenging, motivating as well as satisfying. The proposed work in this paper for the use of cross languages like HTML, CSS, bootstrap for responsive layouts of android designs and setup of server so that the images content and coding can be compromised as the server load and android app can be developed of less space which can use less battery consumption is successively achieved. Further the SMS enabled feature and emailing feature used in android for the registration and query process by external users using this app is also successively accomplished.

7. FUTURE SCOPE

- The layouts can be easily changed and managed as accordance.
- The necessary updates can be performed easily on the codes.
- Chatting system can be enabled
- Student's login portal can be enabled for notes distribution.
- Result search portal can be enabled.

REFERENCES

- [1] <http://marketingland.com/report-apple-android-now-96-percent-smartphones-globally-119487>. Retrieved from <http://marketingland.com>.
- [2] <http://www.cnet.com/pictures/seven-common-android-problems-and-how-to-fix-them/>. Retrieved from <http://www.cnet.com>.
- [3] M. Butler, "Android: Changing the Mobile Landscape", *Pervasive Computing*, (2011), pp. 4-7.
- [4] B. Proffitt, "Open Android-For better and for worse", *Spectrum*, (2011), pp. 22– 24.
- [5] K. W. Tracy, "Mobile Application Development Experiences on Apple's iOS and Android OS", *Potentials*, (2012), pp. 30 – 34.
- [6] A. Shabtai, Y. Fledel, U. Kanonov, Y. Elovici, S. Dolev and C. Glezer, "Google Android: A Comprehensive Security Assessment", *Security & Privacy*, (2010), pp. 35 – 44.
- [7] A. Shabtai, Y. Fledel and Y. Elovici, "Securing Android-Powered Mobile Devices Using SELinux", *Security & Privacy*, (2010), pp. 36 – 44.
- [8] M. Song, J. Sun, X. Fu and W. Xiong, "Design and Implementation of Media Player Based on Android", *WICOM*, (2010), pp. 1 – 4.
- [9] D. Gavalas and D. Economou, "Development Platforms for Mobile Applications: Status and Trends", *Software*, (2011), pp. 77 – 86.
- [10] X. Zhao and D. Tian, "The Architecture Design of Streaming Media Applications for Android OS", *ICSESS*, (2012), pp. 280 – 283
- [11] Ma, Li, Lei Gu, and Jin Wang. "Research and Development of Mobile Application for android Platform." (2014).
- [12] Liu, Jianye, and Jiankun Yu. "Research on Development of android Applications." *Fourth International conference on Intelligent Networks and Intelligent Systems*. 2011.
- [13] Parada, Abilio G., and Lisane B. de Brisolará. "A model driven approach for android applications development." *Computing System Engineering (SBESC), 2012 Brazilian Symposium on. IEEE*, 2012.
- [14] Peng, Bin, Jinming Yue, and Chen Tianzhou. "The android Application Development College Challenge." *High Performance Computing and Communication & 2012 IEEE 9th International Conference on Embedded Software and Systems (HPCC-ICISS), 2012 IEEE 14th International Conference on. IEEE*, 2012.
- [15] Grgurina, Robi, Goran Brestovac, and Tihana Galinac Grbac. "Development environment for android application development: An experience report." *MIPRO, 2011 Proceedings of the 34th International Convention. IEEE*, 2011.
- [16] Zhi-An, Yi, and Mu Chun-Miao. "The development and application of sensor based on android." *Information Science and Digital Content Technology (ICIDT), 2012 8th International Conference on. Vol. 1. IEEE*, 2012.
- [17] Yang, Zhilong, et al. "Research and Design of a Real-Time Interactive Application Development Model Based on the android Platform." *Computational Intelligence and Design (ISCID), 2013 Sixth International Symposium on. Vol. 1. IEEE*, 2013.
- [18] Jose, Priya, Priyadarshini, Singh et al. "International Journal of Advanced Research in Computer Science and Software Engineering." *Challenges and Issues in Android App Development- An Overview on. www.ijarcse.com Volume 5, Issue 1, January 2015*.