Location Based Shopping application with Augmented Reality

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Abstract: - To build an Android based E-Commerce shopping application. The project provide GPS based shopping facility. GPS facility helps the user to sort shop according to his/her requirement and thereby continue shopping. The application provides Customers to interact directly with the products with the help of Augmented Reality (AR), so that the customer can have Better understanding before purchasing the product. The application is generated using Android studio platform, Firebase database is used as the backend of the application. Node JS is used is interact with both front end and back end of the application which runs on the Visual Studio Platform

Keywords: Android application, Augmented Reality, Database.

I. Introduction

Recent advancement in internet technology and smartphone capabilities endorses more research and development activities in mobile application area. Electronic commerce (e-commerce) enjoys the benefits of the rising number of smartphone users. The number of smartphone users over the world was 1.86 billion in 2015 and is forecast to reach 2.87 billion by the year 2020 [1]. About 38% people of the world is going to use smartphones within 2020 which was 10% in 2011. According to a study conducted by the Kaspersky Lab [2], Bangladesh is ranked 2nd in the percentage of mobile users being attacked by malwares with 36.25% majority. Application development for android platform has become very easy in recent days and it is seen that young enthusiasts with a small team can design and deploy working apps on Google play store. The number of users conducting their online commerce transaction is seen to be steadily raising especially visitors that make purchases using mobile phones or tablets in Asia Pacific.

Commerce shows the gap between the number of shoppers using desktops or laptops and those who use mobile device to shop is below 10 % in Indonesia, Korea and China. Moreover, the number of mobile commerce (m-commerce) increase 22% in 2015 compared to year 2014.
AR has many applications in real life. One of the most popular applications is handheld AR navigation system. In this area, there are two research directions, indoor and outdoor. Indoor navigation is difficult to use global positioning system (GPS) to locate user in the buildings.
Everyday Human survive to find the nearest shops in their location and to find the items available in that shops. Here our work is directed towards developing a location based android application with AR. In this application it fetches the current location and display the nearest store and items available in that store. Users can interact directly with the items with the help of augmented reality. Software Development Life Cycle (SDLC) was the methodology used to achieve this research purpose. The prototype of the application was developed. Several main functions from the application design were chosen to be implemented and tested them to check whether the application can function as required.

II. System Architecture

The proposed system divides into four modules; Authentication, Location, Database, Augmented Reality. The authentication is divided into two; login and registration. The function of location module is to fetch user's current location and calculate the distance to the shop. The database is used to provide information about the shops in user's current location. The augmented reality module place an important role in the proposed system. Augmented reality is divided into two modules one is AR Navigation and other is AR modeling.
The proposed system is an innovative system that includes user interface and augmented reality interface.

III. Authentication Module

Authentication involve confirming the identity of a person by validating their identity documents, verifying the authenticity of a website with a digital certificate. In other words, authentication often involves verifying the validity of at least one form of identification. Authentication includes registering a new user for the application through database and signing up through the details.

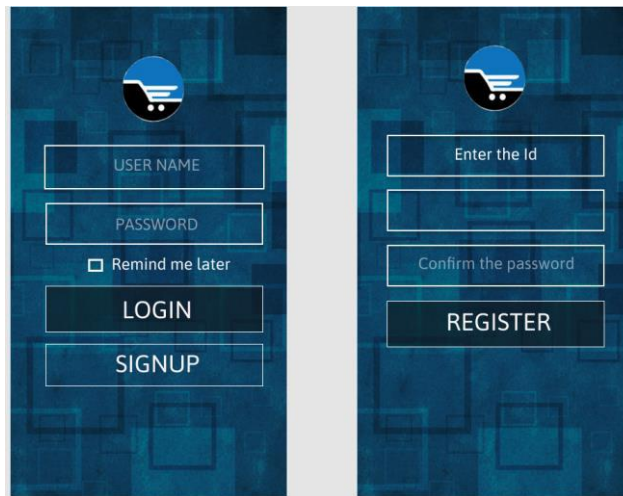### A. Login screen and Registration

Figure1: Authentication

As shown in the above figure the authentication works in mainly three section:

- First the application interface for signing up is loaded and checks whether the user has account or not.
- If the entered user credentials are correct then main module is loaded, otherwise register a new account.
- Once the registration has been completed the main interface is loaded.

IV. Location Module

Location and maps-based apps offer a compelling experience on mobile devices. We can build these capabilities into our app using the classes of the android. Location package and the Google Maps Android API. Android gives our application access to the location services supported by the device through classes in the android. Location package. The central component of the location framework is the Location Manager System service, which

provides APIs to determine location and bearing of the underlying device (if available). As with other system services, you do not instantiate a Location Manager directly. The method returns a handle to a new Location Manager instance.

With the Google Maps Android API, we can add maps to our app that are based on Google Maps data. The API automatically handles access to Google Maps servers, data downloading, map display, and touch gestures on the map. We can also use API calls to add markers, polygons and overlays, and to change the user's view of a particular map area.
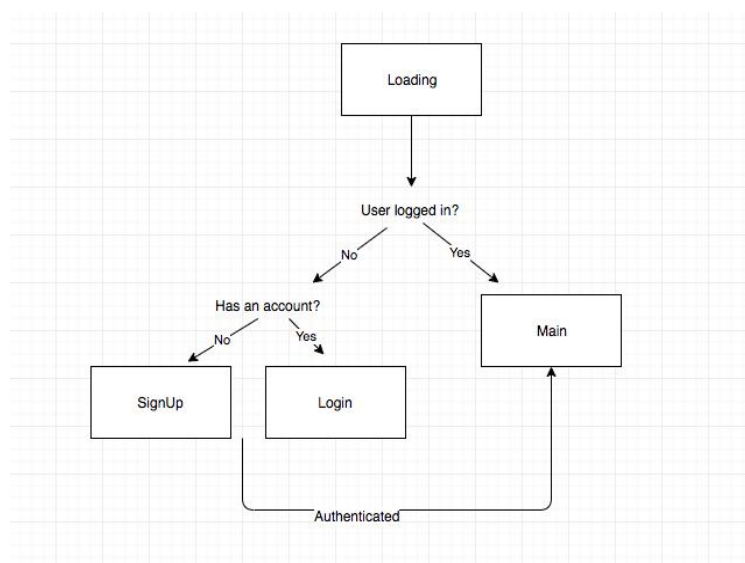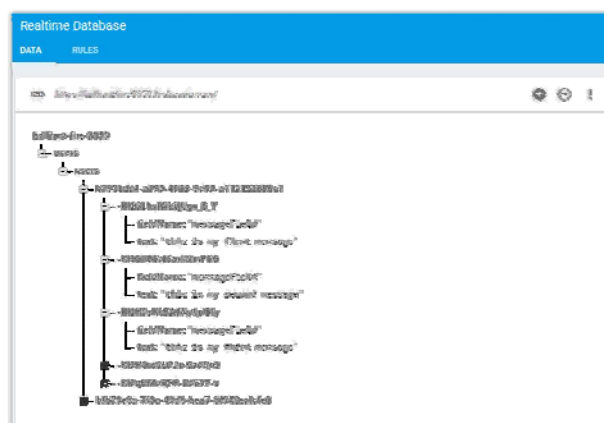

Figure2: Authentication Flowchart

Figure3: Data storage in firebase

The above figure shows how data are represented in firebase

V. Database Connectivity

There are many ways to store our data, such as in an online database, or even in a text file. It is up to us to decide what the best solution for our application. The Firebase Real-time Database is a cloud-hosted database. Data is stored as JSON and synchronized in real-time to every connected client. When you build cross-platform apps with our iOS, Android, and JavaScript SDKs, all of your clients share one Real-time Database instance and automatically receive updates with the newest data.

VI. Augmented Reality

Augmented Reality in our proposed system focus mainly on two criterias.One of which is to provide AR navigation to the user and other one is AR modeling. Augmented reality is an interactive experience of a real-world environment where the objects that reside in the real-world are "augmented" by computer-generated perceptual information, sometimes across multiple sensory modalities. The basic service required by the user are interacted and the service s such as the scenic spot introduction navigation area and AR image selection is arranged and arranged, and external application program interface module connected to the mobile terminal module, to support the work.

Figure 4: Augmented Reality

VII. Android application layout

Android is a platform that can be built using Android Studio, the official IDE (Integrated Development Environment) released by Google. Android platform is free, open source, enables developer to build rich application and easily market the application. To build an Android application, it includes the process of writing Java codes to build the components and incorporates Android are Activity, Intent, Content Provider, Service, and Broadcast Receiver. All these components are registered in an application configuration file named AndroidManifest.xml. Application resources are files or statics contents that are usually declared in XML-based file. The resources includes graphics, audio file, video file, and XML files to declare the all the strings, colors, menus, animations, or even user interface style used by the application. The latter resources will be written in different XML files with different tags and attributes and saved in different project folders. For example, the menu items are declared in an XML file saved in the project folder of res/menu/. The tags used to declare the menu structure are <menu>, <item>, and <group>. In Android, the application resources are externalized in

different project folder and XML files to give flexibility in creating application that can serve different types of Android devices and to easily modify the application without touching the Java program code.
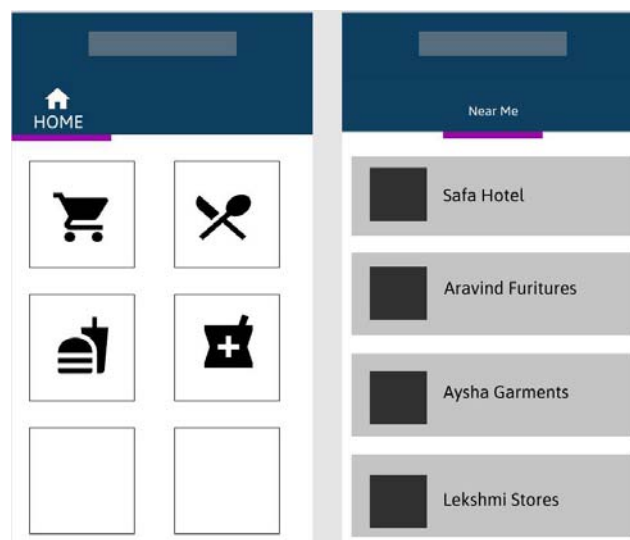
A. Home screen Layout

Figure 5: Home screen layout.

VIII. Conclusion

In this paper, the process of developing an AR based E-commerce application is reported.

The application consist of four modules Including authentication, location, database and Augmented Reaity.the application took the advantage of mature e commerce process by using firebase in backend. In addition to that a web based application was developed as the interface for registration purpose. Through the application in daily work, it finds that the proposed system can achieve higher working efficiency, and the application of the proposed system can meet the user's daily travel.

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