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Design and implementation of a mobile webcast application with google analytics and cloud messaging functionality

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Abstract. Church cast is an application developed to bring the messages of ministries closer to their members by harnessing the Internet and mobile devices. Due to the very busy schedules of people and religious restrictions in some countries, people are not usually able to be physically present at their locations of worship to listen to or watch their ministers. Existing applications developed in the past like DOMI radio and Redemption TV Media were limited to only audio, poor and unintuitive user interfaces and not providing the administrator any interactions with the users of the application. In this work, we develop an Android-based application that makes it possible for users to watch live streams and on-demand videos from their ministries using their mobile devices. The application also incorporates sharing and analytics functionalities to enable users to share videos messages with loved ones and help the administrator monitor users' activities on the application respectively. The cloud messaging functionality enables the administrator to send messages such as announcements to user devices as push notifications. This would eventually increase user knowledge and interaction with the activities going on in their respective places of worship.

1. Introduction

Mobile applications are applications developed for handheld devices such as mobile phones, smartphones, tablets, etc., they provide users with value-added capabilities and resources such as quick access to information, task and time management utilities, communication abilities using the internet and mobile networks which can be accessed anywhere and anytime with great flexibility and ease. Mobile applications are increasingly affecting the way and rate of diffusion of information in organizations today and are arguably one of the most important needs of an organization to implement.

The internet has made the world a global village; people can now communicate, buy, sell and reach out to various countries in the world with the click of a button at an increasingly fast pace. According to [1-2], about 40% of the world's population now use mobile devices. With about one in every five people owning a smartphone the world is indeed already going mobile [3]. An Internet church (i-church) is one that uses the internet to reach its members through the use of online video stream (live webcast), audio stream and written messages [4]. Live streaming enables us to send information straight to the computer or device without saving the file to a hard disk. Webcasting is also used extensively in the commercial sector for investor related presentations (such as Annual General Meetings), in E-learning (to transmit seminars), and for other related communications activities such as church services [5]. Many churches shy away from the use of technology to spread the gospel, the few that have embraced technology have begun to use the internet abilities to reach out to their members all over the world, making use of online video streaming and the social media and are enjoying wonderful feedback [6]. As technology evolves and the world becomes a busier place people rarely have sufficient time to be

physically present at church meetings and gatherings, hence may be left out of the wonderful messages preached continually at their churches, thus have to resort to buying tapes of previously preached messages. In this work, we leverage on the advancement in technology to develop an application for mobile devices that make it possible for worshippers to have access to favorite messages and videos.

Due to the large variety of Android devices regarding API levels, screen sizes and screen density and lack of funds to purchase those, testing of this application were only carried out on only two different android devices using the English language as the default language. These devices are Techno Phantom pad N9 and Samsung Galaxy Tab 3.

2. Related Works

Webcasting first appeared in March, 1992 [7], with a radio broadcast over the internet. However it has evolved rapidly and gained much popularity in recent years as we now have various online television and radio shows, that allow media content to be available anytime and anywhere in the world. Several webcast applications exist with their different features, capabilities and specific functionalities. TALKS on the GO™ boasts as the world's most spectacular iPhone/iPad & Android app for Congress Webcasts. It is a spectacular webcast application that allows one to browse presentations of congresses by session, speaker, personal favorites and even search presentations by keyword with their advanced search tool, read more about each presentation such as the learning objectives and abstract, or learn more about the speakers by reading their biography when available. The app requires an Internet connection specifically designed for Android devices (smartphone & tablets) equipped with Android OS Version 3.2 and above. The LoveWorld TV app is another application owned by the LoveWorld Television Ministry. Webcast Studio makes at- tending webcasts very easy for everyone whether one is part of a mobile workforce or temporarily away from your computer, the user can access live and on-demand webcasts on your Android tablet. DOMI Media Radio is a station that is developed and offered in the play store by Netcaster Media, which is a company that offers a wide range of managed streaming solutions [8]. The Redemption Television [9] is yet an- other application that is offered on the Google Play Store by Netcaster Media a company that offers a wide range of managed streaming solutions [10-11].

Although these applications possess a number of features we present in our work, only very few possess additional features like Google analytics and cloud messaging functionality that enables the administrator to send messages such as announcements to user devices as push notifications.

3. System Requirements

A requirement states what a product or service is intended to perform. It takes into consideration the attributes and characteristics that a system is expected to possess so as to meet the need of a user [12-14]. Functional requirements of the system include:

- The system shall be able to connect to the internet and prompt the user if there is no internet connection
- The system shall connect with an online streaming server, fetch the video and audio feed, decode to an appropriate, playable format, and display the content on the screen.
- The system shall provide the user with appropriate feedback if any error of any kind occurs.
- The system shall connect to an online database and fetch a list of uploaded videos attributes and display them to the user.
- The system shall provide the user the ability to watch a selected video from the list of displayed on demand videos.
- The system shall provide administrator access to an interface that can be used to monitor user interactions with the application.
- The system shall provide an interface for the administrator to send notifications to users devices.

4. System Design and Modelling

An activity diagram is a UML behavior diagram, which shows the flow of control or object flow with emphasis on the sequence and conditions of the flow. The actions coordinated by activity models can be initiated because other actions finish executing, because objects and data become available, or because some events external to the flow occur [15].
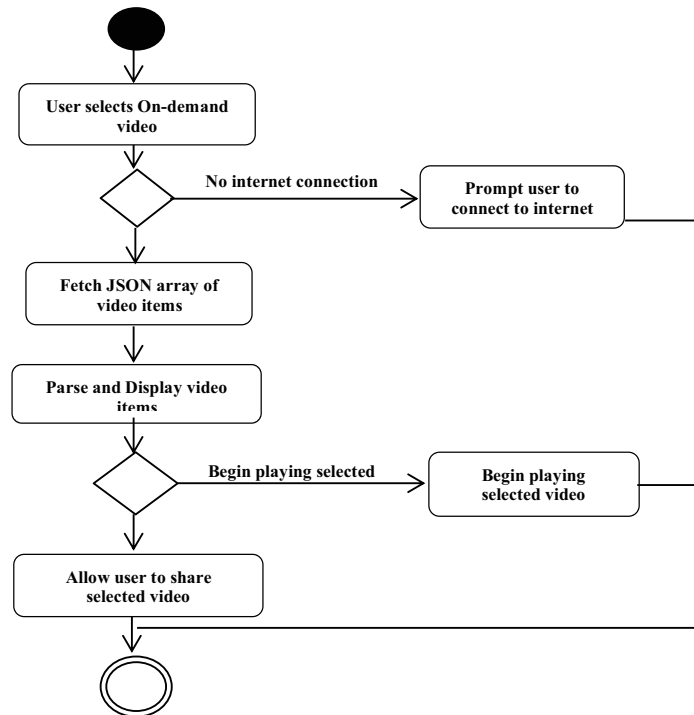

Fig. 1. Activity Diagram for User on-demand

Fig. 1 shows the process involved in fetching video details, parsing the response and displaying it to the user. It also shows the actions the user can carry out on the displayed video items.

5. Implementation of Churchcast Application

This chapter describes each of the program modules that make up the system, their functions and how the system can be deployed, the tools used and the reasons for the choice of tools used in the development of a webcast android application with analytics and cloud messaging functionality. It also features images of all the various interfaces of the system, their inputs and expected outputs.

The tools used for this work include Eclipse Kepler IDE, which was used as the development environment in addition to the Android software development kit (SDK) and Android development tools (ADT) plugin in the Eclipse IDE. The GUI of the ap- plication was designed and built using XML from the Android SDK. Android and Java programming languages are used to build the functionality and drive the GUI of the application. JavaScript Object Notation (JSON) from the YouTube Data API is used in the development of the on-demand section. YouTube Android player is integrated into the on-demand section to play the videos fetched using YouTube Data API. Vitamio media library is used in the development of the live stream player for decoding the streams of various formats into formats playable on the devices. HTML, CSS, PHP, and MYSQL database are used to develop the Admin cloud-messaging interface.

Fig. 2 below represents the welcome screen of the application. This screen is programmed to remain on screen for about 3.5 seconds before the next screen appears.

Fig. 2 Welcome Activity

Fig. 3 below shows the Admin Welcome Panel consisting of two options from which the administrator can choose namely analytics platform and cloud messaging platform.

Fig. 3 Church cast Admin Panel

Fig. 4 represents the Admin Google Analytics Dashboard that displays various metrics that the administrator can use to analyze the reach of his application, metrics displayed include the number of real-time users, countries with the most app usage, which devices is the application running on. This data can be used by the administrator in strategizing to improve the usage of the application.
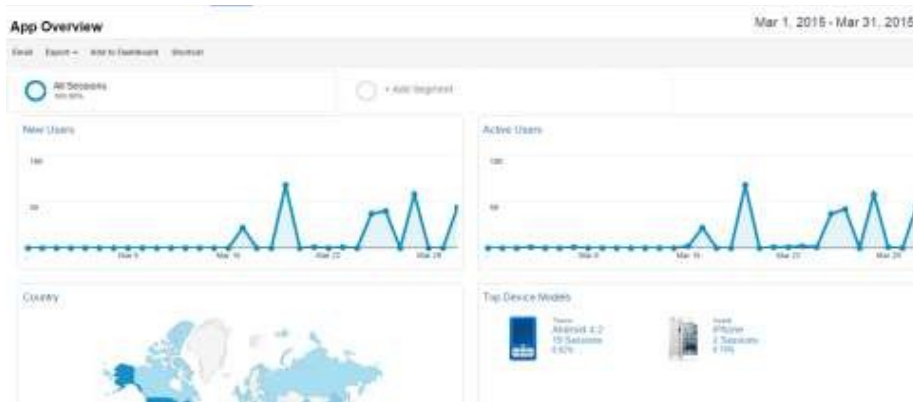
Fig. 4 Admin Analytics Dashboard

6. Conclusion

The mobile application developed can be used to watch live video streams and on-demand videos. It was developed using Eclipse Kepler IDE, Android software development kit (SDK) and the Android development tool (ADT) plugin for development of the Android application, Microsoft Visio was used in the design of Unified Modeling Language (UML) Diagrams on the development system.

The application is integrated with Google analytics and cloud messaging functionality to aid administrators knowledge and interactions with users, various sections of the application were tracked with trackers using Google analytics android API, the information gathered by these trackers are displayed in an intuitive dashboard to the administrator which can be used to make inferences on how the users use the application and determine how best to improve user experience. The cloud messaging functionality is integrated to allow the administrator to send push notifications such as an announcement of services and programs to registered users of the application; this serves as reminders and improves users' engagement with the application.

Acknowledgment

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