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# Development and Research Implementation of Remote Object Monitoring Through Video Streaming Based on Android Mobile

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**Abstract** - Android is a bright young, vibrant, completely open source mobile platform packing warm chirpy waves in the world all around. Android is the first open source software toolkit for mobile environment. Economic Techno Commercial incentives through Market Android has been kindling a tremendous stimulations to technical developers worldwide and has promoted Techno Entrepreneurial influence to Developers as a social boon of Google Android to the Society & Fraternity. This research paper explores the concept of video streaming by implementing Android Applications and uploading the Apps on Android Market. Application for online stored video streaming has been developed. Along with Object Monitoring with Webcam fitted in Laptop and USB based Web Camera works fine with VLC Media Player for capturing Live Video uploading on Media Server which can watched on Android Mobile by authenticating the application. The same concept has been implemented on Android Mobile by capturing video with Mobile Camera uploading the MJPG video on IP network which can be observed on VLC or any supported browser. The system implemented can be used as video surveillance and monitoring application to monitor objects in remote locations and makes use of the camera on the Mobile or Laptop device to capture real time video image from remote stations which is then streamed over the WiFi network so that the video can be viewed on VLC media player as well as browser applications. Android based Webserver application is customized to work as Media Server for this research paper. Finally the Processor Performance Analysis is done to compare the two Video Streaming application for the performance of Processor while each of them is running on Android Mobile The project finds application in Healthcare monitoring, Employee surveillance, Patient monitoring, Baby monitoring, Pets and Remote Location monitoring. It can be implemented for automatic surveillance of Students of Examination centers by Controller of Examination and several other remote video surveillance applications. The applications covered in the research papers has been successfully accepted and uploaded in Android Market by Google.

**Keywords** - Video Streaming, Android Application Development, Android Systems Development, Android Market, WebCamera, Mobile Camera, WiFi, IP Network.

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## I. INTRODUCTION

Android is a bright young, vibrant, completely open source mobile platform packing warm chirpy waves in the world all around. Android is the first open source software toolkit for mobile environment.

It has innovatively positioned itself to meet the growing expectations of users and developers of mobile phones. The journey for development of Android started with an open mindset to create a free software environment which turned out to be a boon and later gladly embraced by members of Open Handset Alliance. Under the aegis of Google and Open Handset Alliance, Android has established itself with a fast paced growth to revolutionize the global embedded market.

Android has set an interesting trend for convergence of computing device with consumer applications. Inspired by Android market and incentives

to developers the Economic climate has kindled a great motivation to explore new ideas and concepts for enhancing Android platform. The suite of easily available free tools in software development kit has transpired creative thoughts and ideas for development of embedded applications using open source applications. Backed by the open source community and corporate support of Google and Open Handset Alliance it has become possible for smart phones to be available at affordable cost and can be used for developing consumer applications conveniently and easily with less developmental efforts and cost.

The charm of Android Application development is that the basic building blocks for development of android applications, are free and open source

With several mobile platforms already established in the global marketplace. Google entered the mobile arena with strategic alliances amidst rampant

speculations offering exciting features to users and developers of mobile phone to achieve blazingly fast success.

The mobile application development has always been at a challenging point where mobile users were seeking more functionalities and customizations. Mobile operators were in a race to provide lucratively unique facilities to their clients in a manageable and exciting ways. Mobile developers wanted to have more freedom to develop the exciting mobile applications fulfilling expectations of users easily and efficiently with less development efforts and cost. And mobile equipment manufacturers expect an affordable and stable environment for their handsets.

Android solved several problems common among already established mobile platforms as they were all closed networks with proprietary software stacks leading to fragmentation of mobile market and hence became a choice of developers for mobile application development.

Android has become a choice of mobile users evident by the huge sales of android based handsets because of its unique features and functions. Mobile Equipment Manufacturers prefer

Manufacturers prefer because they are free to use it without paying any royalty. They can customize the platform according to their requirements. Mobile operators prefer it because the Android Platform is not locked with any particular service provider and provides a lot of useful features. Application Developers prefer it because the platform is provided free of cost and is open source

The promotion of Android Market with open source toolkit by Google has stimulated worldwide interest among developers to create unique and exciting applications. Homebrew developers gladly embraced Android to venture into the field of mobile phone development, while Economic climate favoured the flourishing culture of entrepreneurship as a social boon of Android. Incentives to developers had already revolutionized Android market with spectacular applications.

Android is a fast market moving technology platform because of the functionality available in the platform. The Android SDK provides the tool and APIs necessary to begin the developing application on the Android platforms. The platform has a Linux kernel, with ARM processor based hardware platform and uses the Java language for implementation of the application.

The philosophy of Google has been to release new versions Android as early as possible and upgrade it with new features often. In October 2008, Google released first full version of Android at API Level 1, till date with several new platforms and SDK released API Level 11.

Google and Open Handset Alliance has given a platform independent of any particular device which means that the development can be made for several devices available in the market and thus the application made for a particular handset also works for other as well.

Android Inc. as a small startup company, that initially developed Android Platform. was founded in 2003, in Palo Alto, California, United States in October, 2003 by Andy Rubin, Rich Miner, to develop, smarter mobile devices. Andy Rubin is regarded as the inventor of Android. Google as an established search engine worldwide envisioned huge growth of internet searches in mobile devices and acquired Android, Inc., in August 2005. Main Key developers of Android Inc., including Andy Rubin, Chris White and Rich Miner remained with the company even after the acquisition. At Google, the Andy Rubin led the engineering team to develop a non proprietary, open source, flexible and upgradable mobile equipment platform based on Linux kernel 2.6. Google associated worldwide with Software and Hardware Corporate Giants for a cooperative business alliance

The Open Handset Alliance, OHA was formed on November 5, 2007 as a business alliance of successful corporate giants including Software Developers, Handset Manufacturers, Semiconductor Companies, and Service Providers with a goal to develop open standards for mobile devices. The Open Handset Alliance also released their first product, Android, a mobile device platform on the same day. Google provides Software Development Kit (SDK) for developers along with documentation, tools and forums. Google hosts Android Developer Challenge contests for development of exciting Android applications.

The lucrative option of Android based Application development is that the Software Development Kit along with tools, frameworks and even the source code has been provided by Google as open source free and open. Figure below illustrates the developmental setup of Video Streaming for object monitoring at remote locations. The Web Camera capture the video which is processed in mpeg4 format and streamed over WiFi network to VLC media Player.

## II. ANDROID ARCHITECTURE OVERVIEW

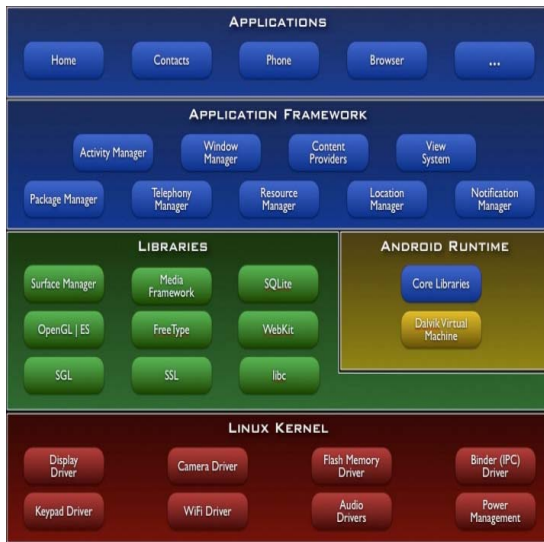


Fig. 1 : Android Architecture [1]

Android [1] is a Linux based mobile software stack. With a fast paced growth it presents enough scope to the application developers worldwide for creating exciting products for consumer and enterprise markets.

## III. DEVELOPMENT ENVIRONMENT

Android Applications can be developed using the Eclipse IDE [2] conveniently. Android Development Tools Plugins [3] has to be added to Eclipse, and Android SDK has to be configured in the system which contains tool chains to produce apk, Android Package file for being programmed in to the device.

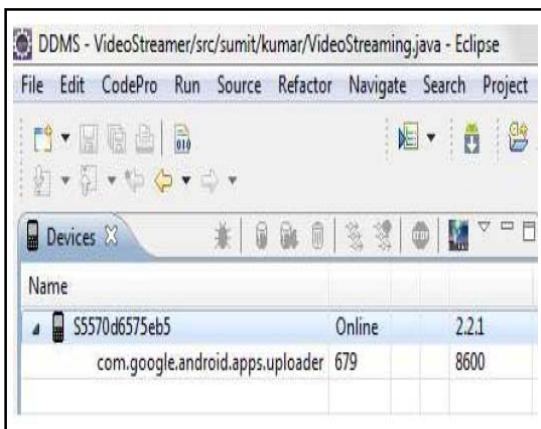


Fig. 2 : Dalvik Debug Monitor Service

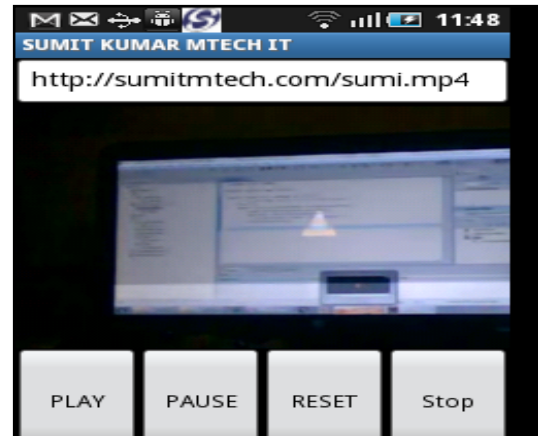


Fig. 3 : Ouput of Online Stored Video Streaming



Fig. 4 : Setup of Laptop to Mobile Streaming

The Laptop Camera capture the video which is encoded in MPEG4 format and streamed over WiFi network using VLC media Streamer. Thereafter the video can be viewed on Android based mobile phone by connecting to the IP network using its WiFi interface.



Fig. 5 : Output of Laptop to Mobile Streaming

Following is Development setup of Streaming from Mobile Camera to Laptop.

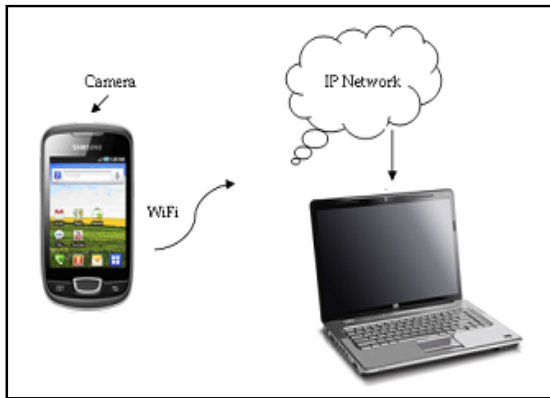


Fig. 6 : Development Setup Mobile to Laptop

Mobile is used to capture the video at remote station. and processed in MJPG format. It also allows user to view the live image on the Mobile screen while recording. The video is then streamed over Wifi network. The client used in the system is the VLC Media Player which receives the streaming video over WiFi network. This system can be used to monitor the activity of object like disabled person, patients in remote locations, baby, pet monitor and surveillance of employees.

VLC Media Player is used for playback of streamed video file in the system implemented. It has been used in the system as it supports several data streaming format including MJPG supported by Android Environment.

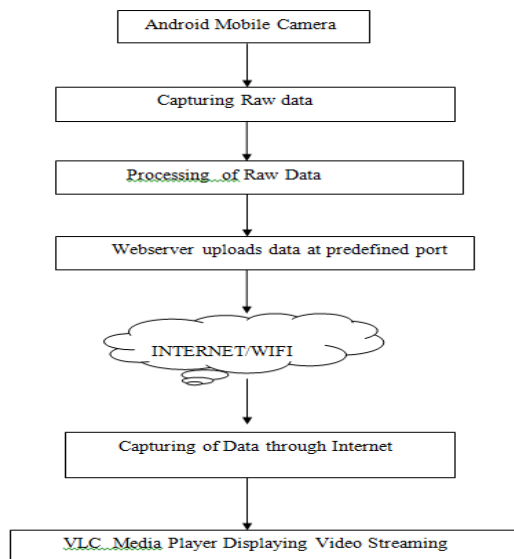


Fig. 7 : Flow Diagram of Application

#### IV. RESULTS OF IMPLEMENTATION

Combining the Video Streaming application running on an Android mobile SAMSUNG Galaxy POP GT S5570 running Android 2.2 Froyo, an MJPG video stream system using the Mobile camera is successfully implemented, with the operation of the system as captured in the photo shown in Figure 9.

The video of the real time clock captured by mobile Camera is streamed by Android to VLC Media Player through the WiFi interface through LAN router, which is then playback in real time by a VLC Media Player.

Using a real-time running clock as the video source, it is noticed that there is playback frame delay

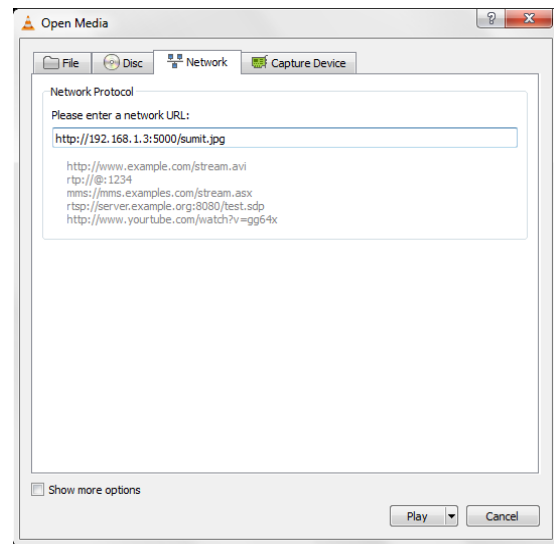


Fig. 8 : Configuration of VLC for Streaming

between the source and the playback video[5]. The delay will depend on the instance the VLC media player is started.



Fig. 9 : Video Streaming Sony to HP Laptop

This is due to the processing of MJPG video by mobile at the remote station on one end and VLC Media Player at the other end.



Fig. 10 : Video Streaming Output

Performance Analysis is done ARM11 based GT S5570 board by comparing cpu usage of user and system and computing the difference and plot the graph.

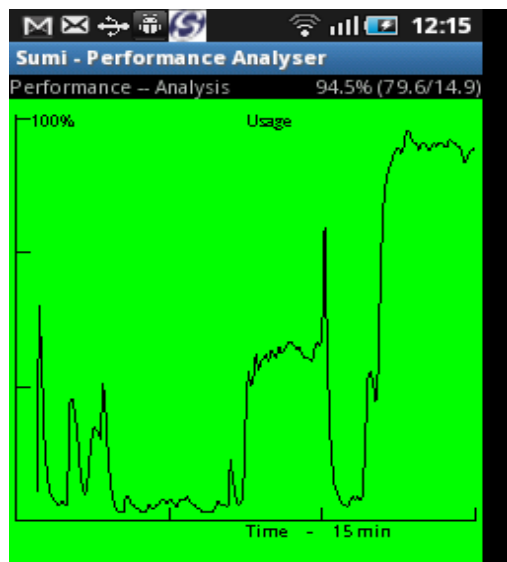


Fig. 11 : Processor Performance Analysis

## V. CONCLUSION

This paper first provides an overview of the Android System and Application Development . It then describes the successful implementation of a video streamer system using a WebCamera with VLC as server and Android as client & then Mobile Camera as the video capturing device and application as the streaming server in Android mobile The MJPG video captured is streamed through the WiFi connection to the VLC Media Player in the same network using Android

Based Webserver customized and configured to work as Media Server for mjpg Video. Thereafter Comparison of Processor Performance Analysis while the two respective applications are running on Android Mobile. The applications hence developed as a matter of learning and understanding the concepts have been accepted by Google Android for publishing and uploaded on market in Android Market successfully.

## VI. ACKNOWLEDGMENT

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