

Offline Data Streamer with Authenticated App using Raspberry Pi and Wi-Fi Module

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Abstract: *In this paper, Raspberry pi based offline data streaming using Android, we used Wi-Fi router to synchronize data between Raspberry Pi and Mobile Applications (Android). Raspberry pi has inbuilt Wi-Fi and Ethernet port for the connectivity. We use memory cards as HDD in Raspberry Pi to store various kinds of data. For this system, we used a memory card of size 64 GB to store data in the system. The main purpose of this system is to serve multiple users with training videos, educational videos, educational books and college notices without using the internet. We only use Wi-Fi to connect mobile devices to the Raspberry Pi. There is no need for Internet Connection but only Wi-Fi connection is sufficient to access the data. We can even download and upload the content like training videos and educational books in and from the mobile applications in order to watch and stream them when we are not present inside the college or institute premises. The maximum number of users that can connect to the system at a time is 25. But the total number of users depends upon the router capacity and Raspberry Pi. In order to manage data (training videos, educational books and notices) we provide a control panel to the system administrator and teachers so that they can manage content at any time. We use Raspian OS for Raspberry Pi. We use the XAMPP server in the Raspberry Pi. We prefer to use Apache and MySQL server in the XAMPP. Android Studio is used for the development of Android Applications. Java is used for logic building and XML is used for user interface development of the Android Applications.*

Keywords: Raspberry Pi, Android Studio, Wi-Fi.

1. Introduction

With the advance technology and rapid increase of Internet of Things devices in our daily life we are seeing a growing market of streaming analytic. The types of analysis of streaming data vary depending on an application, but they can be grouped into two categories: online and offline. The main objective of this system is to go beyond and introduce scalable as well as maintainable architecture for performing online and offline and streaming. The Raspberry Pi based Offline data streaming using Android system is specially designed to assist and provide support in order to fulfill the needs of college going students.

In the 21st generation, each and everyone are using android mobile phones that have Wi-Fi functions which provide smart browsing capability. By taking advantage of this function, we are going to use offline data streaming that can be used by every user and can enjoy different media that will be stored in the Raspberry Pi by the admin. Since, we are going to use Raspberry Pi that has inbuilt Wi-Fi hotspot functions to broadcast the media. In the Raspberry Pi there is one static IP, that there are some PHP files which will access to the user end and they will be able to access the data whatever available on the application storage. All this work will be done on a Raspbian OS platform that contains XAMPP server. By connecting to the Wi-Fi provided by Raspberry Pi, your phone, tablet or laptop is able to access the data through an offline-server provided by the Raspberry Pi. Videos, books and notices can be uploaded, downloaded and read from the users android applications

2. Literature Survey

Raspberry Pi as a wireless sensor node: Performance and Constraints paper published by authors V.Vujovic and

M.Maksimovic Croatia , 2014 [4] system had advantage of wide range of connectivity but the Raspberry Pi version was low due to which system was lagging.

Another "How the Raspberry Pi Works" Internet: computer.howstuffworks.com/raspberry-pi1.html published by author B.Johnson, in May 2015 [2] with the simple design of system and low cost but the system was not reliable and unstable.

Another R. Neves and A.C. Matos, "Raspberry Pi Based Stereo Vision For Small Size ASVs," Proceedings of OCEANS 2013, San Diego, USA, 2013 [3] primary concern of this framework is to interface the various clients and appreciate the mixed media in disconnected mode for films, recordings, melodies while going in the bus but it can be associated limit of 50 clients through cell phone or on pc.

1.1 Relevance

This model on offline data streaming will provide society a different perspective to share data in particular zones of area without internet easily. It will be helpful to the colleges and institutions to provide useful study material to students easily. This will provide an interface where teachers can upload the useful study material in the app and students can watch and download the data accordingly. students can connect to the wifi and enter the default and log in to access the data.

1.2 Existing System

Today various types of media have become an inseparable part of our life. It is used for entertainment, to gain required information as well as for educational purposes. Hence, it has become important to provide good streaming speed on the internet. It is almost impossible to play any video

continuously until it is of a poor quality. It is difficult to find many types of media within a single web-page. Streaming is the technology which enables this, by viewing media while downloading it. Streaming is one of the technologies for playing audio and videos files from a webpage. There are various users that wish to play an audio and video file over the internet in this system. It is necessary to download the video file when it is played over the network. However, user can view video and audio files directly from the web server for immediate playback. When an audio/video file is streamed it does not play continuously. Streaming is a process where the file is downloaded from the network into the system buffer which is a time consuming process. When audio or video is steamed, a small buffer space is created on the user's computer, and data smarts download into it. As soon as the buffer is full, the file starts to play and it uses information in the buffer, but while it is playing, more data is being downloaded. Thus, the whole system is time consuming and has a complex process.

Peer Streaming architecture follows a client/server scheme that help the server in distributing.

3. Proposed System

3.1 Software Requirements

- **Android Studio**
Android Studio is the official integrated development environment (IDE) for android platform. Google provides an IDE called Android studio to develop applications that is freely available under the Apache License 2.0. Android applications require specific configuration files. We are using android studio to develop our android applications which will be used by any students and teachers respectively. The application logic is primarily written in the java programming. The android development tool converts these files into an android application. The tooling allows compiling, packaging, deploying and starting applications which are developed. The Android SDK contains the android debug bridge. ADB is a tool that allows you to connect to a virtual or real android device. This allows managing the device or debugging your application. Most of the androids configuration files are based on XML.
- **Extensible Markup Language (XML)**
XML defines a set of rules for encoding documents in a format which is readable for both humans as well as machines. It provides textual data format that has strong support via Unicode for different languages. In this system, XML is used as the front end for android applications.
- **XAMPP**
It is a free and open source code cross platform web server solution stack package by Apache that consist mainly of the Apache HTTP server, MariaDB database, and interpreters. In this system, we are going to use Apache for php execution and MySQL database to store.
- **Raspbian Operating System**
Raspbian is a Debian-based computer operating system which is used in Raspberry Pi. It is software that contains a set of basic programs and utilities that create our raspberry pi run. However, Raspbian provides a pure OS

that comes with over multiple packages, pre-compiled code bundled in an exceedingly nice format for straight forward installation on our Raspberry Pi. There are several versions of Raspbian including Raspbian Buster and Raspbian stretch. It comes pre-installed with plenty of software for education, programming and general use. It has python, scratch, sonic pi, java, mathematics and more. The operating system is under active development. Raspbian uses PIXEL, pi improved x-window environment and light weight as its main desktop environment of the latest update.

3.2 Hardware Requirements

- **Raspberry Pi**
Raspberry pi is a low cost, credit card size microcontroller. Raspberry Pi has already built wifi and ethernet connection which is required to develop this system. Apart from this, it has 4 USB ports, HDMI, 1 GB Ram, Audio jack, etc. The popular operating system that is used in the Raspberry pi is the Raspian OS or Ubuntu Os. We are using the XAMPP server in the raspberry pi.



Figure 1: Raspberry pi

- **SD Card**
A micro SD card is attached to the Raspberry Pi module. This card stores all the data uploaded in the system. Raspberry Pi can support a maximum 124 GB SD card.



Figure 2: Micro SD Card

3.3 Working

Our system is developed to stream data offline without having internet connection. For this system we have used hardware like Raspberry Pi and wifi module. We have booted raspbian OS in the raspberry pi. An external SD card is connected to the Raspberry pi for storage. We have developed two applications which are integrated into the system. One app is for the students and another app is for teachers. Once students and teachers are in range of the wifi

they can connect to the wifi. After connecting to the wifi every one has to put the default IP address of the R-pi. After entering IP one has to register first. After registration one can access the system only after entering proper email id and password. We have used the MD5 encryption algorithm for password protection. Students can view all the uploaded videos, educational books, pdf and notices. Moreover, students can also download these videos and pdfs which will get stored in their phone memory. They will be able to watch these downloaded videos and pdfs in their mobiles even if they are not connected to the system.

Respectively teachers also have to do registration first and do the signing process with authenticated ID and password. Once teachers are connected to the system they can upload the pdfs, educational videos and notices to the system which will be visible to the students.

4. Participants

4.1 Students

This system is mainly developed for students too easily access the study materials provided by the teachers. Students have to firstly connect to the wifi module. After connecting they need to open the students app provided by the colleges and enter the IP Address.



Figure 3: IP Activity

After entering IP address login appears. students have to login the app with the authenticated email id and password.

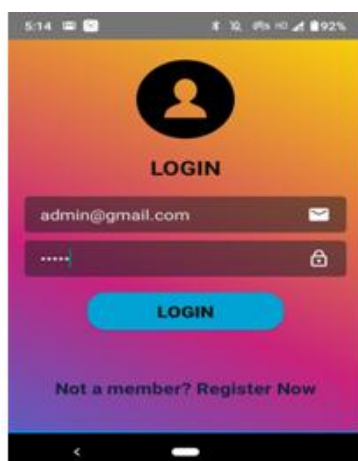


Figure 4: login page

If the user is not registered then they have to register by clicking on the register now.



Figure 5: Registration form

After logging in students can view videos, pdfs and notices uploaded in the system.



Figure 6: PDF interface

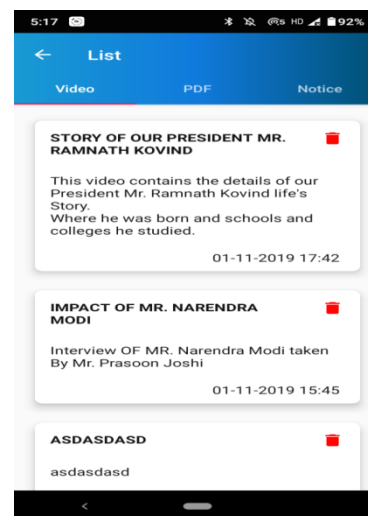


Figure 7: Video Interface

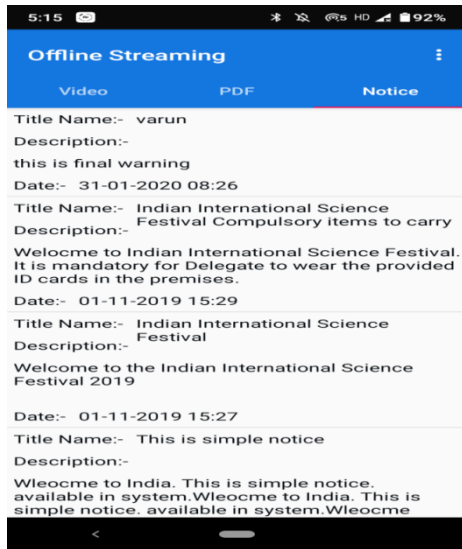


Figure 8: NOTICE Interface

4.2 Teachers

Teachers play an essential role in this system. All the data uploaded in this system is uploaded by the teachers. Teachers are also provided with a different application. Teachers too have to connect to the wifi first. After connecting to wifi they have to enter the IP Address. They have to login with the authenticated ID and password.

Teachers can upload educational videos, pdfs and educational books and notices which will be visible to students. Students can view and download these files.

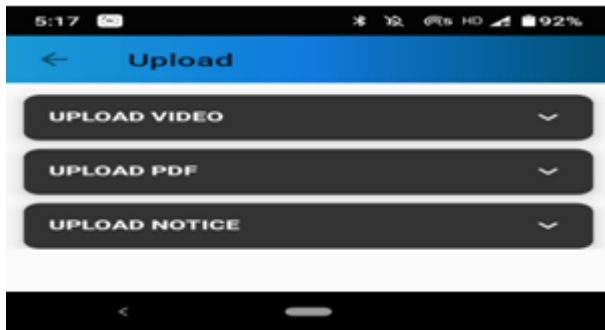


Figure 9: Upload Interface

5. Result

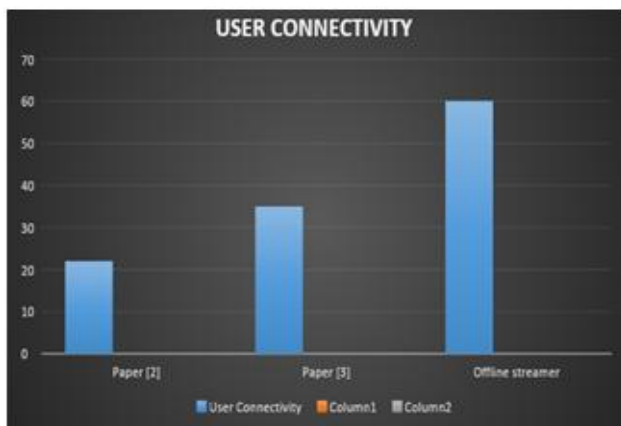


Figure 10: User Connectivity Test

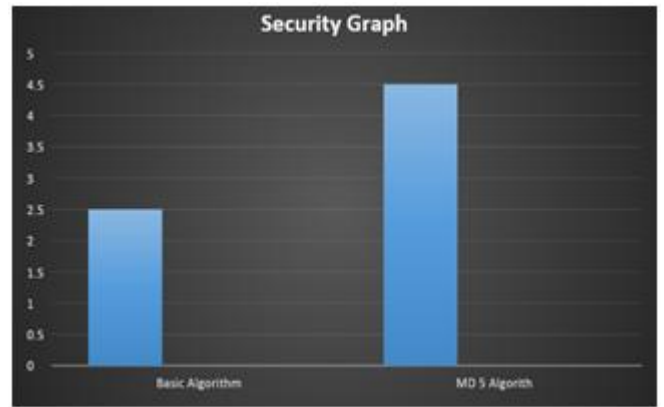


Figure 11: Security test

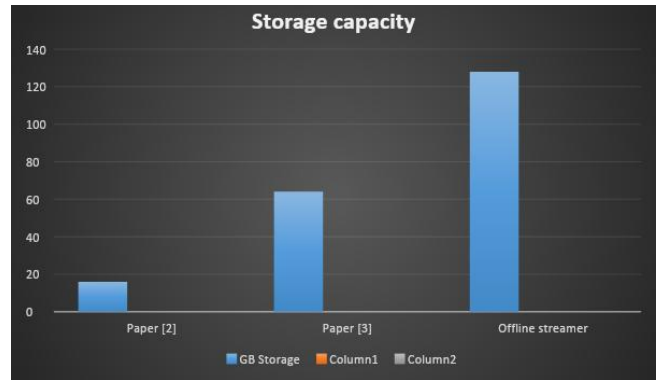


Figure 12: Storage Test

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References

[1] Matt Richardson and Shawn Wallace, Getting Started with Raspberry Pi, United States of America:O'Reilly Media, 2012

- [2] B. Johnson, "How the Raspberry pi works" Internet: computer.howstuffworks.com/raspberry-pi1.html
- [3] R. Neves and A.C. Matos, "Raspberry Pi Based Stereo Vision For Small Size ASVs," Proceedings of OCEANS 2013 San Diego, USA, 2013.
- [4] V. Vujovic and M. Maksimovic, "Raspberry Pi as a Wireless Sensor Node : Performances and Constraints," Proceedings of International Convention on Information and Communication Technology, Electronics and Microelectronics, Opatija, Croatia, 2014.

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