Research Article

RASPIT: WIRELESS BACKUP DRIVE

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ARTICLE INFO	ABSTRACT
	Wireless Backup Drive is a media to store our personal data. It brings together universal access to data with secure communication. It provides users to save, synchronize, stream and share data over the network or internet. It is having less cost, more secured and accessible on almost every types of devices like smartphones, laptops and many more. It uses Nginx Server which is lightweight and high performance as compare to Apache Server. There are options for creating multiple users having different permissions like read only or both read/write access. It consists open source software that can be modified accordingly and can be used commercially. It creates a Personal Cloud Storage connecting it via SSL connection using Android based phone that can be used both in the network as well as by creating and connecting it to a Wireless Fidelity Hotspot in case no router is found within the searching network.

INTRODUCTION

Wireless Backup drive is one of the most trending hardware in this world of technology. Nowadays, every person who is using the technology or who are just learning to use it, everybody is looking for an approach by which all the works i.e. documents, media, or confidential report etc. can be easily accessed to their genuine user with all the proper authentication required. Thus, there is a need of such type of device by which users' data can beaccessed/streamed globally with the help of wireless communication.

There are devices providing services stated above but, it requires a huge amount of money to buy it. Also, there are number of features that are still not well inbuilt together with the hardware as per the need of users.

However, there are lots of these types of devices available to use like Apple Time Capsule, SanDisk SDWS1, Seagate STC and many more of them. But, these are some features which are still not in use by any of the above devices-

- Providing access to multiple storage device at a time
- More than three users access to the data
- Distributed data over different media storage devices
- File sharing to the existing cloud services like google drive, onedrive etc.

Here comes the idea of making a Wireless Backup Drive using Raspberry Pi which meets above mentioned features that are lacking in presently selling devices in the market.A Wireless Backup Drive using Raspberry Pi is a media that comes with all the features like accessing documents, streaming audio/video and sharing everything over the network wirelessly. It is made up using Raspberry Pi 3 Model B which is having an Operating System installed in it, called Raspbian. It uses a direct connection through which Raspberry Pi 3 is controlled using Secure Shell from tablets or smartphones etc. Raspbian is a best optimized Debian based operating system for raspberry hardware. It consists over 35K packages and pre-compiled software bundled for easy installation. Further, it looks for the SSID if found in the searching network and then connects to it. But, in case none of the known SSID is found in the entire network, an automatic hotspot is created where user can connect wirelessly using devices like smartphones or computers [1].

After connecting to desired SSID, registered user can now surely access all the data of mounting devices and can get all features like viewing/editing text files, image files and streaming audio/video files and mounting several mass storage

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devices. The main motive behind making this project is the idea of making such types of devices even with the use of Raspberry Pi. Itmay have less or more features than above mentioned devices. But, if one analyses and compare this project from those existing ones, one can find that, the manufacturing cost of this project is about half of those readymade wireless storage devices [2].

section, Comparison in Section 4, Conclusion in Section 5 and finally Result in Section 6.

Components

This project consists of following components: -

- Raspberry Pi 3 Model B
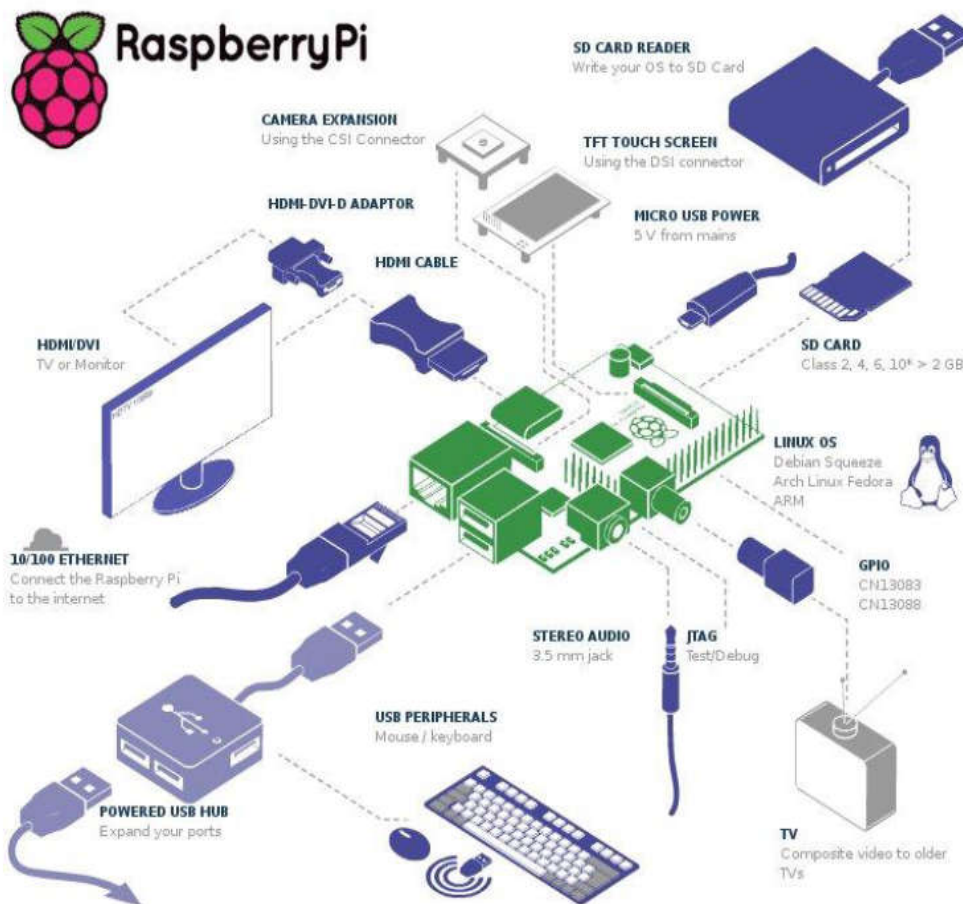

Figure 1 Flow Diagram

Figure 2 Raspberry Pi 3 Model B

The rest of this paper consists Components used in this project in Section 2. Section 3 consist of Methodology having Hotspot Script, Start-up Script, Adding a Service File to System, Cloud Server, NGNIX Server Configuration, Installing Next Cloud, Database Configuration and Mounting Devices as its sub

- SD Card (minimum 8gb)
- Ethernet Cable
- 5V, 2000 mA AC Wall Charger
- Mass Storage Device

Raspberry Pi 3 Model B is a small education-oriented single-board computer releases in February 2016. It is the latest Raspberry Pi bundled with on-board 802.11n Wi-Fi, Bluetooth together with USB boot features.

SD Card for installing operating system called Raspbian and also for writing various scripts which are discussed in methodology section. Ethernet cable for connecting it to a Local Area Network such that it can connect to the network providing access to it all over the connected network.5V 2000 mA AC wall charger for its power supply, and lastly mass storage devices like pen drives or hard drives to be mounted over the network.

Raspberry Pi Components

It consists of following components

- 1 GB RAM
- 4 USB Ports
- Ethernet Port
- Micro SD Card Slot
- Full HDMI Port
- 40 GPIO pins
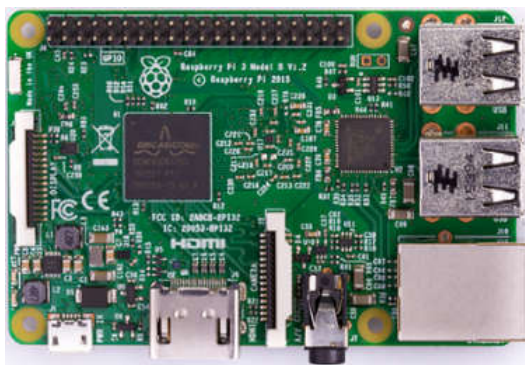- Camera and Display Interface
- 3.5mm Audio Jack

Figure 3 Raspberry Pi 3 Model B Components

Why Raspberry Pi 3 Model B?

As, Raspberry Pi 3 Model B is a small education-oriented single-board computer, it comprises in-built hotspot shield for wireless connectivity, USB ports for connecting storage devices, also it has Ethernet port as well as HDMI port.

All this, components or better to be called as its features, makes it different from that of an Arduino which do not consist of any of the above components.

If we look or try to make this device RaspIt with the help of Arduino, we will need an extra USB shield together with Wireless Hotspot shield that together costs this project about and additional 3000 rupees irrespective of an Arduino price.

Not, only by price perspective, on looking from assembling perspective, it would be difficult for anyone to attach USB shield and wireless hotspot shield with the Arduino and making it then a complete components package required by this project.

METHODOLOGY

This section consists of all the procedures involved while the making of this project. Firstly, Install Raspbian Jessie with

Pixel kernel ver. 4.4 (Operating System) and expand the root file system for enough space for cloud server [3], [4].

Hotspot Script

- Edit hostapd.conf file using a text editor
- Set interface wlan0
- Check driver nl80211 for router compatibility
- Change SSID (Wi-Fi name)
- Set Wpa_passphrase (Wi-Fi Password)
- Save hostapd.conf file [7]

Start-up Script

- Setup the start-up script
- Check availability of router when Raspberry pi 3 is started in the manner of created SSIDs like SID1, SID2 and so on
- The first router found in the list will be connected using existing Configured Wi-Fi
- If none of the listed SSIDs are in the range, Wi-Fi hotspot is created
- Create start-up script in a new file in /usr/bin and write the script and save it [5]

Adding a Service File to System

- Create a file in /etc/systemd/system and add the service file
- Write the script and save it [5]

Cloud Server

- Install packages for required server
- Generate SSL certificates
- Create user [4]

NGNIX Server Configuration

- Create new default configuration file
- Configure Ngnix Server File for Variable/Dynamic IP Address
- Save and exit [4]

Installing Next Cloud

- Fully restart Raspberry Pi
- Provide access to NextCloud server files to the user (www-data) using script
- Enter the RPI IP address into address bar if not mounting and external mass storage [4]

Database Configuration

- Install MariaDB-server package from CentOS repository with yum
- Start MariaDB service and add it to run at boot time
- Configure MariaDBroot password
- Login to MySQL shell and create database and add a new user with password to access the database[6]

Mounting Devices

- Append code to fstab file for mounting to particular folder whose access is provided to www-data user
- Reboot Raspberry Pi

Now the drives are auto mounted and can be checked using the script. Next Cloud Server is used to get access to the mounted drive to authenticated user in Maria DB database. Similarly, for External Access, Port Forwarding is used by logging into the router and getting the WAN IP address [4].

Comparison

As, there are lots of such types of Wireless Storage devices available in the market, it makes us all to think about the uniqueness of this device so called RaspIt, which makes it different from all such existing devices.

After comparing RaspIt from them with all possible features like storage, cost, resource utilisation, back up devices, mounting drive capacity, streaming devices and data distribution, following table is drawn.

On concluding from below drawn comparison table, it can be observed that, RaspIt has both the In-Built storage (SD Card) where Raspbian (Operating System) as well External storages or mass storage devices like pen drives, hard drives etc. If we look at the price range, other wireless storage devices are about 15,000 Rupees whereas RaspIt is just about 6,000 Rupees. Further, RaspIt can mount multiple devices at one place whereas other wireless storage device can mount only single drive, which is the wireless storage device itself. Thus, making RaspIt possible to have backup of multiple drives rather than a single drive. Also, on checking number of simultaneous streaming medias, it is observed that other wireless storage device can stream up to 3 devices at once, on the other hand RaspIt can stream up to more than 3 devices simultaneously. Last but not least feature of Raspit is that, its data is distributed all over the mounting devices which makes it more secure in terms of data loss in case of one or more device's failure.

Table 1 Comparison between RaspIt and Seagate Wireless Plus Mobile Storage

Features	Seagate	RaspIt
Storage	In-Built only	In-Built & External
Cost	High	Low
Resource	More	Less
Back up	To single drive	To multiple drive
Mounting Drive	Single	Multiple
Stream	Up to 3 devices	More than 3 devices
Data	Centralized	Distributed

RESULT

Wireless Backup Drive can now be successfully accessed using Web Browser. To access the Wireless Backup Drive, enter IP Address "10.0.0.5" in the address bar of the web browser and enter login details.
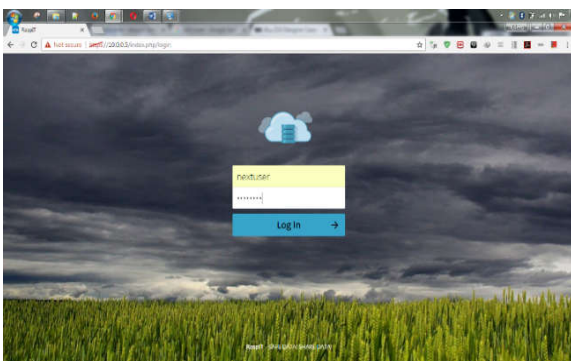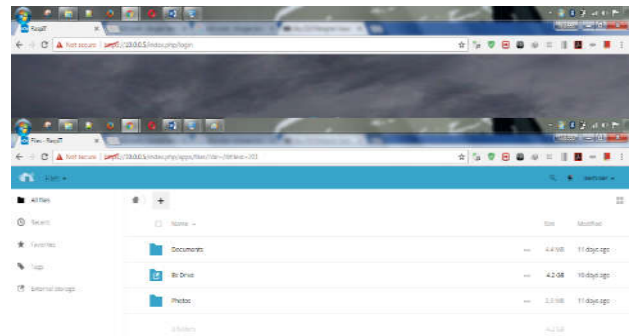

Figure 4 Login Page

Figure 5 Home Page

Also, user can execute all types of file like text file, image files or can also be able to stream audio/video files
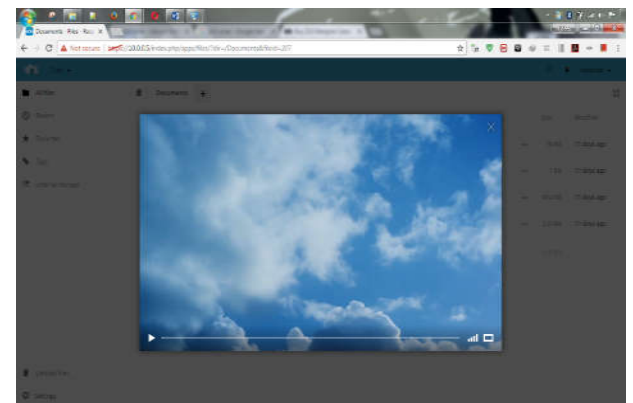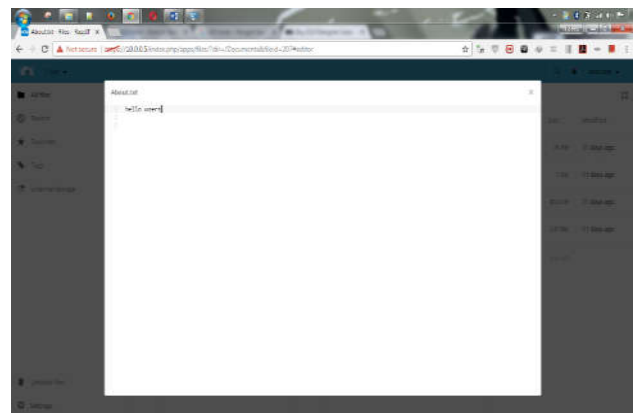

Figure 6 Audio/Video Streaming
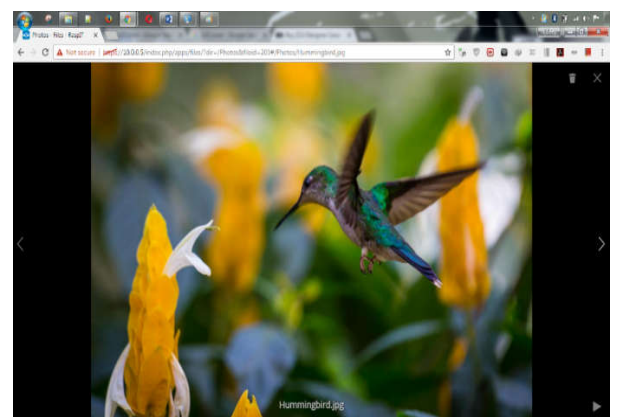

Figure 7 Read/Write Text File

Figure 8 Open Image File

CONCLUSION

If there are files inside the mounted drive, one can see them but if they have not found any file in the mounted drive it is because the mounted drive is empty. Just unplug the drive and plug it in PC or smartphones etc. and create or transfer data into it and the re-plug it into RPI to ensure the proper mounting and access of the mounted drive [4].

Future Work

We will enhance the features of RaspIt by adding features like connecting it by existing cloud services like google drive, put drive etc. So that, user would be able to connect and share their data directly to any cloud services with the help of link or directly the entire data. Further, there would be a feature of audio/video calling where user would also be able to back up their calls and conversations in any of the mounted drives. For more secured authentication of users' access, there would be a feature of multi-step verification like one-time password to their registered mobile number or an access link to their email provided or an extra USB like device which must be attached together with the RaspIt to get access just like a Smart Card in a business laptop.

Acknowledgement

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