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AD-BLOCKING SOLUTION USING RASPBERRY PI-HOLE FOR ENHANCED WEB BROWSING EXPERIENCE

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ABSTRACT
The goal of this project was to create an ad-blocker that would function broadly throughout the network and prevent advertisements from appearing on any website's pages. In order to adequately describe it, we need to ban advertisements on the home network, which is connected to a tiny computer with a SoC (System on Chip), often known as a Raspberry Pi. On the home network, online sites containing advertisements are filtered using software called Pi Hole. Following this, every device—including PCs, laptops, and smartphones—is linked to the home network. After that, these devices are connected to the Pi, and the Pi is now the source of all network traffic. Eventually, the Raspberry Pi filters out the advertisements before they even get to the users' devices. Only when your devices are linked to the network that the Raspberry Pi is operating on will this configuration function. By removing the additional data that these advertisements use during the loading of a web page, this lowers latency and speeds up surfing in any browser. Additionally, by adding a group of websites or a collection of web pages to the Pi Hole software's white list, the user can disable the ad block on those specific websites or web pages.
Keywords: Raspbian, web page, network traffic, whole network, home network, Raspberry Pi, ad-blocker, Pi Hole.

I. INTRODUCTION:

The advertisements on a webpage may be the most aggravating thing there is. While viewing a web series on Netflix or browsing through their daily news feed on Facebook, people don't want to waste their time watching advertisements. Ads are becoming the main source of revenue for website owners, and users constantly wish to remove them. Therefore, an ad blocker that would operate broadly over the whole network and block the adverts from the web pages of any website has been devised as an alternative to employing a third-party ad blocker from an unidentified source.
The future of internet advertising is expanding daily based on the way the environment is changing. It's been a mystery: is there a way for ad publishers and content creators to profit without producing a really obnoxious and disruptive ad experience? It is intended to learn more because a prior Hub Spot research shown that individuals truly lose their temper at certain kinds of advertisements (think pop-ups and automatically playing videos). SSI, an independent survey panel supplier, secures survey results after a research with Ad Block Plus, one of the most popular ad blocking extensions worldwide, helps determine what to ask. An understanding of how and why the advertisements on the webpages that function properly should be stopped is obtained via the usage of Ad Block Plus and replies obtained through the Server Side Include. Additionally, hackers now place advertisements on websites that link to their gateway. When an ad is clicked, the user is taken to the hacker's website, where they are prompted to enter their personal information. Armed with this information, the hacker can then threaten the user. In this instance, Ad Blocker serves the purpose of filtering all advertisements so that the user may work on their tasks in a stylish way.
The goal of this project is to use a Raspberry Pi to create a low-power network ad blocker that can prevent all of the advertisements that are displayed on websites. The Raspberry Pi has a pi hole inserted, which helps filter all of the advertisements. All of the advertisements are effectively filtered so that not a single one will show up on the website

thanks to the router that is linked to the Raspberry Pi and offers connectivity to all of the devices that are connected to it.

1.2 BLOCK DIAGRAM:

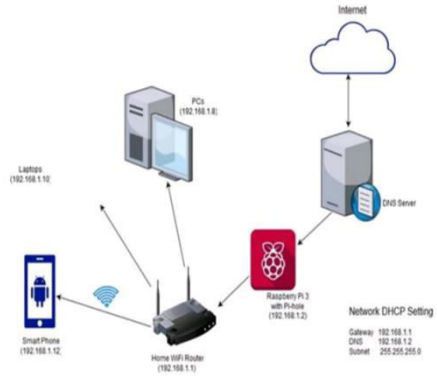


Fig1: Block Diagram

1.2.1 Function of Block Diagram

• RASPBERRY PI-HOLE:

Pi-hole is a network-wide ad blocker based on the Raspberry Pi. It's simple to set up on the Raspberry Pi Zero by performing certain installation instructions on a Raspberry Pirunning Raspberry Pi OS. Once Pi-Hole is setup, you may configure your devices to utilize its IP address, directing all traffic via it. When a website (that serves advertisements) requests the domain of its ad servers to receive an ad, Pi-hole compares the domain name to its list of banned ad-servers.

Then, to begin blocking advertising straight immediately, redirect computers to the Raspberry Pi's IP address. We can also add your favorite websites to a whitelist, which we highly encourage you to do to help them keep the lights on.

• INTERNET ROUTER:

A router is a device that connects two or more packet-switched networks or subnet works. It serves two primary functions: managing traffic between these networks by forwarding data packets to their intended IP addresses, and allowing multiple devices to use the same Internet connection.

There are several types of routers, but most routers pass data between LANs (local area networks) and WANs (wide area networks). A LAN is a group of connected devices restricted to a specific geographic area. A LAN usually requires a single router.

• DNS SERVER:

The domain name system (i.e., "DNS") is responsible for translating domain names into a specific IP address so that the initiating client can load the requested Internet resources. The domain name system works much like a phone book where users can search for a requested person and retrieve their phone number. DNS servers translate requests for specific domains into IP addresses, controlling which server users with access when they enter the domain name into their browser.

1.3 PROJECT ELABORATION:

1.3.1 Methodology:

Pi Black-hole is a little application that runs on the Raspberry PI and block adverts at the DNS level, it can optionally act as your DHCP server as well. Pi Black-Hole works at the DNS level. So, when an ad is blocked, it's actually prevented from being downloaded in the first place because the DNS query is intercepted. Since these ads images, videos, and

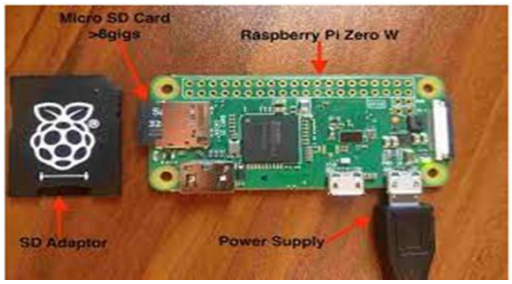
sounds are not being downloaded, network will perform better. For better understanding, domains trying to spread malware through bougs 'Adobe Flash' updates can be blocked at Network level. For devices such as Smart TVs which don't use a browser but still feature ads, these can also be blocked using Pi Black-Hole. Viewing YouTube videos on mobile phones, PlayStation and Xbox gaming consoles, all ads will be blocked.

1.3.2 Framework of Proposed System:

A software is designed in such a way that it is capable of blocking all the ads that is published in the websites. Pi hole which installed in the Raspberry pi with the help of the pihole all the ads will get filtered. The router which is connected to the Raspberry pi, which provides the interconnection to all the devices connected to it, with International Journal of Pure and Applied Mathematics Volume 119 No. 10 2018, 1771-1775 ISSN: 1311-8080 (printed version); ISSN: 1314-3395 (on-line version) url: http://www.ijpam.eu Special Issue ijpam.eu 1771 having the Raspberry pi connected to it all the ads are filtered in a effective way that not even a single ad will appear in the website. A new framework is developed with three components (i) Raspberry pi, (ii) Router and (iii) Keyboard. The first thing is needed to do is download and burn the PiHole image. The image is a version of a Raspberry Pi operating system called Diet Pi, which cuts a lot of junk from Raspbian, and is packed with all the software needed to run the ad blocker. Insert the SD card

into the Raspberry Pi and connect the keyboard. Connect the Ethernet cable to the WiFi router, then plug in the Raspberry Pi, and wait for it boot.

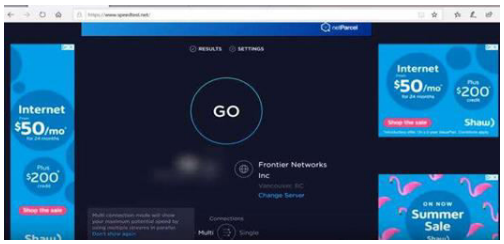
Once the Raspberry Pi is running the Pi-Hole software, still need to route devices traffic through it so ad blocking works. To do this, one need to change the device's DNS settings. Thisway, the devices ping the Pi to block ads as long as the same network remains constant. This is pretty simple, but varies depending on the devices and what the software is running. A user can have software to block ads on a computer, but if any user want to block ads on all devices— from smartphone to the tablets— need something a little stronger. Enter the Pi-Hole, a Raspberry Pi image that blocks ads of all sorts at the router level.



Fig(1.2): Proposed System

II. RESULT:

This project goes on with a network based Ad Blocker, where only the connected devices will be filtered with the ads that appear in websites.The end-user need to be within the network to be filtered with the ads that appear in web pages that the user views. It is better to use a ad-blocker created by us instead of third party ad blocker. Moving on with a non-traditional ad blocker where there is no third party involved only the end users connected with router will get filtered with the ads.



Fig(5.1): Before connecting the device

Fig(5.2): After connecting the device

Thus increases security within the network. Now-a-days there are some traditional ad blockers in the internet, which will be added as a extension.

2.2 APPLICATIONS:

This software or similar process is used in many applications and android apps as mention below:

- AdAway
- Adblock Plus
- AdGuard
- Blokada
- Browsers with ad-block
- Change your DNS
- DNS66
- Brave Browser

2.3 ADVANTAGES:

- Increase in network speed
- No advertisements
- Secured personal information
- Protection from malware
- No third party-cookies
- No online tracking

• Cost and availability
• Excellent power efficiency
• Huge processing power in a compact board.
• Supports Linux, Python (making it easy to build applications).
• Many interfaces (HDMI, multiple USB, Ethernet, onboard Wi-Fi and Bluetooth, many GPIOs, USB powered, etc.).

2.4 DISADVANTAGES:

• Browsing data privacy risk — Some ad blocking software may be sending your browsing behaviour to a third-party server.
• Risk of web pages breaking — Blocking page scripts may hamper the functionality of some websites and lead to a broken browsing experience.
• There is not any fuse protection on the Raspberry pi,so if you connect pins incorrectly, you can damage the board.
• It is not as fast in terms of CPU processing speed nor does it have as much memory as traditional pc or laptops.

III. CONCLUSION AND FUTURE SCOPE

3.1 CONCLUSION:

A framework that filters advertisements using low-power electrical devices that include a Raspberry Pi, router, keyboard (for initial setup), and Ethernet connection. Aside from the conventional ad blockers, which might occasionally cause issues due to the fact that they were created by a third party developer. This project continues with a network-based ad blocker, which filters out advertisements from webpages only on devices that are connected. For the end consumer to be filtered by the advertisements that show up on the webpages they visit, they must be within the network. Ad-blockers made by us are preferable than those made by third parties. Let's move on to a non-traditional ad blocker that filters advertisements just for end users who are connected to the network and does not involve any third parties. Consequently, the network is more secure. It will be included as an extension to the regular ad filters that are now available on the internet. Later on, it will install malicious software, which downloads viruses and creates problems for the user's device. Therefore, it is preferable to continue using an ad blocker built into the network.

3.2 FUTURE SCOPE:

Examining the unexpected environment is crucial since there are a lot of mobile advertising blockers available in the form of application stores like the Google Play Store, and the growing number of user-related faults signal serious ineffectiveness or usability issues. Despite the existence of malware programs, the average mobile phone user rates the usage of ad blockers on mobile phones well. Following completion of the poll, almost sixteen percent of the respondents left negative evaluations, citing some major problems with their performance as well as their failure to use the ad blocking apps. In addition to our testing of ad blockers, a number of practice problems arose when using other induced programs or surfing in the browser due to a variety of ad blockers, including F Secure Freedom VPN.These were discovered by testing the advertisement blockers based on user reviews, assessments, and outcomes. According to the experts, this effort will undoubtedly aid in the investigation of the efficacy of ad blocking. In addition to the guidance offered by our study, a comprehensive set of energetic assessments will be supplied as part of its future work to determine the runtime characteristics of the ad blocking programs. Future Work to provide the administrator access to the user interface and to gather user input regarding the ad-free network.

BIBLOGRAPHY

Websites:

- https://www.the-diy-life.com/setting-up-a-pi-hole-network-ad-blocker-on-a-raspberry-pi-zero-w/
- https://acadpubl.eu/jsi/2018-119-10/articles/10b/59.pdf
- http://www.jsrpublication.com/gallery/6-jsr-february-s356.pdf
- http://www.raspberrypi.org/downloads/
- https://www.lifehacker.com.au/2015/02/turn-a-raspberry-pi-into-an-ad-blocker-with-a-single-command/
- https://github.com/pi-hole/pi-hole

Books:

1. K. W. Y. Au, Y. F. Zhou, Z. Huang, and D. Lie. PScout: Analyzing the Android Permission Specification. In CCS, (2012).
2. Android Permissions. http://developer.android.com/guide/topics/security/permissions.html.
3. M. Ikram, N. V. Rodriguez, S. Seneviratne, D. Kaafar, and V. Paxson. An analysis of the privacy and security risks of android VPN permission-enabled apps. In ACM IMC, (2016).
4. A. Lerner, A. K. Simpson, T. Kohno, and F. Roesner. Internet jones and the raiders of the lost trackers: An archaeological study of web tracking from 1996 to 2016. In USENIX Sec., 2016.
5. C. Wills and D. Ununoglu. What Ad Blockers Are (and Are Not) Doing. Technical Report, (2016).
6. S. Seneviratne, H. Kolamunna, and A. Seneviratne.A Measure- ment Study of Tracking in Paid Mobile Applications.In ACM WiSec, (2015).
7. W. Enck, P. Gilbert, B.-G.Chun, L. P. Cox, J. Jung, P. Mc- Daniel, and A. N. Sheth.TaintDroid: An Information Flow Tracking System for Real-Time Privacy Monitoring on Smart- phones. CACM, (2014).
8. J. Jeon, K. K. Micinski, J. A. Vaughan, A. Fogel, N. Reddy, J. S. Foster, and T. Millstein. Dr. Android and Mr. Hide: Fine- grained Permissions in Android Applications. In ACM SPSM, (2012).

9. A. Bose, X. Hu, K. G. Shin, and T. Park.Behavioral Detection of Malware on Mobile Handsets.In ACM MobiSys, (2008).
10. N. Wang, B. Zhang, B. Liu, and H. Jin.Investigating effects of control and ads awareness on android users' privacy behaviors and perceptions.MobileHCI, (2015).
11. M. Ikram, H. J. Asghar, M. A. Kaafar, B. Krishnamurthy, andA. Mahanti. Towards seamless tracking-free web: Improved detection of trackers via one-class learning. PETS, (2017).