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Affordable Digital Signage with Raspberry Pi

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Affordable Digital Signage with Raspberry Pi

Abstract

Digital Signage is a great way to inform library users about programs, events, services, and other library news. Unfortunately, digital signage can be difficult to implement and come with pricey monthly charges. When looking for ways to implement versatile digital signage, Fort Hays State University's Forsyth Library and Learning Commons discovered an affordable and easy to manage solution - the Raspberry Pi. In this paper, you will discover what Raspberry Pis are and how to purchase and install them. You'll also learn about several methods for creating messages.

Keywords

digital signage, raspberry pi

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Introduction

Digital Signage is a great way to inform library users about programs, events, services, and other library news. Unfortunately, digital signage can be difficult to implement and come with pricey monthly charges. When looking for ways to implement versatile digital signage, Fort Hays State University's Forsyth Library and Learning Commons discovered an affordable and easy to manage solution - the Raspberry Pi. In this paper, you will discover what Raspberry Pis are and how to purchase and install them. You'll also learn about several methods for creating messages.

The Raspberry Pi is a very small, no frills desktop computer that is amazingly affordable. It easily connects to a television or computer display's HDMI port (Raspberry Pi Foundation, n.d.-c). The Pi's small size allows it to easily be hidden or mounted on the back of a display in a variety of ways. It runs natively on a Linux operating system, usually Raspbian which will soon change its name to Raspberry Pi OS, from a micro SD card (Young, 2020). Although Linux can be a little intimidating for new users, resources and tutorials are readily available to accomplish most tasks. It can be navigated with an easy to understand graphical user interface, similar to Windows and Mac, but the command line interface is also utilized more often than most PC and Mac users are accustomed. It provides access to a variety of tasks including installation of software and looping videos. Most commands can be copied, pasted, and simply modified from a variety of freely available interest group websites and Facebook groups; just include the term "Raspberry Pi" when describing the task you want to accomplish in a search engine. Initial setup of a Raspberry Pi signage system may call for someone with better than average computer skills, but updating the signage should be a simple task for all users.

Figure 1: Raspberry Pi 3 Model B+ (Raspberry Pi Foundation, n.d.-a)

There are several models of Raspberry Pi that perform digital signage tasks to varying degrees. The Raspberry Pi 4 is the newest and most robust model in the Raspberry Pi lineup, but comes with two micro HDMI outputs, requiring an extra adapter that most people do not have on hand, for most displays (Raspberry Pi Foundation, n.d.-b). The Raspberry Pi Zero has a lower price point, but its slower speed makes many tasks frustrating if not impossible. The simplest model for this application is the Raspberry Pi 3 model B+. Its full-sized HDMI output allows for fewer adapters and it has plenty of RAM and processor speed to accomplish most digital signage needs. At minimum, you will need the computer itself, also known as the "board" ($35) along with a 5.1V micro USB power supply and a micro SD card; an HDMI cable; an HDMI ready television or monitor; and keyboard and mouse. Kits including the power supply, micro SD card with a pre-loaded operating system, and a few other optional items such as a case can be purchased for around $65 each (PiShop.US, n.d.). Cases provide extra protection but are not mandatory. If your library has a 3D printer, there are many printable case designs available from repositories like thingiverse.com. Another cost saving idea includes using one wireless keyboard and mouse with a dongle that can be moved from one Pi to another as needed, reducing equipment. Forsyth Library has also utilized older computer displays and televisions that have been retired from other usage to be repurposed for signage.

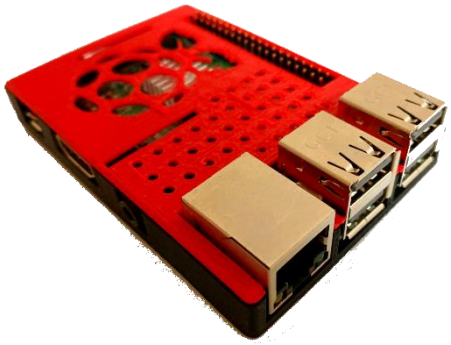

Figure 2: Raspberry Pi with 3D Printed Case

Implementation

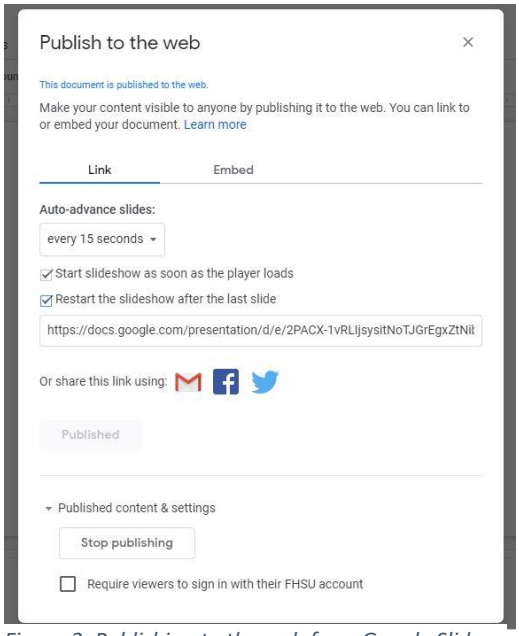

Figure 3: Publishing to the web from Google Slides

For most of Forsyth Library's needs, no complex servers or web design are needed, but a dedicated Raspberry Pi is required for each screen. A simple Google Slides show is the most prevalent methodology. A great example for using this application is for advertising future events on a loop. Simply go to slides.google.com and create a slideshow as you would in PowerPoint. If you have graphic design expertise, almost any image file type can be inserted to fill the entire screen, or you can use the tools native to Google Slides. Create a slide for each event you want to advertise. When finished and ready to display, go to the "File" menu and choose "Publish to the web." This will open a panel where you can choose how long to hold on each slide before auto-advancing, whether to start the slideshow automatically, and restart the slideshow after the last slide. With all those choices made, select "Publish." The resulting web address can be played on any computer. The player controls that appear when hovering the mouse over the bottom left corner of the published slideshow will allow you to display in full screen. Changes to the slideshow can be made from any computer logged in with the same Google account. For each screen displaying the slideshow, just hit the Esc key to exit full screen view, refresh the browser window and return to full screen view.

The second most common way that Forsyth Library displays information with a Raspberry Pi is through looping video. The best example of this is the display located outside of our One-Button Studio illustrating the steps to operate the room. To display a looping video, copy an .mp4 onto the Raspberry Pi using either a flash drive or a cloud service such as Google Drive. The first time you attempt this, you may need to install the Omxplayer. To do this, open a terminal window by clicking the icon on the header of the desktop as seen in Figure 1. At the $ prompt, enter the command, *sudo apt-get install omxplayer* (IBEX Technology Specialists, n.d.). After this installation, you should not need to perform this step again. To start the video loop on this and future occasions, while still at the $ prompt in the terminal, enter the command, *omxplayer -o local --loop /home/pi/video.mp4* substituting the file path for where your video is saved (Martin, n.d.). For instance, if you saved the file "medialab.mp4" to the Videos folder, the command would be, *omxplayer -o local --loop /home/pi/Videos/medialab.mp4.* Notice that it is case sensitive. This should start the video playing full screen on a loop until you press "Esc" on your keyboard.

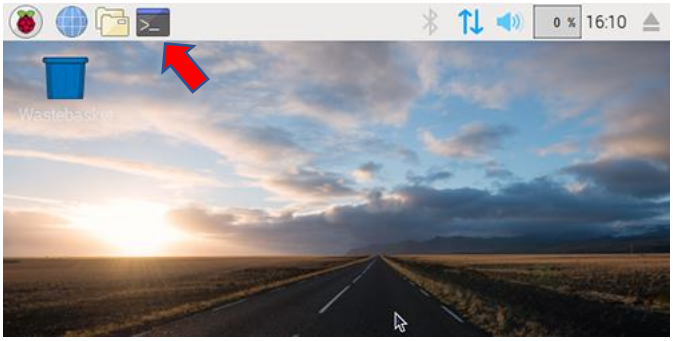

Figure 4: Raspberry Pi Desktop with Terminal Icon (Salminen, 2018)

If you would like to try plunging into a more ambitious signage platform, Yodeck offers a free plan for one screen (Yodeck, n.d.-b). Forsyth Library has only experimented with this method and has not put any of it into practice. Yodeck has much more versatility than the previous suggestions including multiple panels on one screen and widgets like clock, weather, and customizable tickers. With these features comes a more complicated setup. Rather than running on the Raspbian operating

system, it is its own install. Yodeck recommends running it from a 4GB or 8GB Raspberry Pi 4 (Yodeck, n.d.-a). Yodeck content is managed through a web portal which can even be accessed through a PC or Mac. With paid subscriptions per screen, the same or different content can be pushed to multiple screens, but each screen must have its own Raspberry Pi. Yodeck will provide a Raspberry Pi 4 player with the platform already installed that will greatly increase the ease of use, but cost between $7.99 and $12.99 per month for at least a year (Yodeck, n.d.-b).

Conclusion

Raspberry Pi's low cost of implementation and upkeep makes it an attractive platform for powering flexible digital signage that can be easily customized for most needs. Even if the initial learning curve seems a bit intimidating, the cost of trying one test balloon setup will likely not prevent trying alternative solutions if you find it is not the right fit for your needs. Hopefully these tips will provide the guidance you need to get started. Many other resources are available online to help novice users, so don't be intimidated to investigate this as a cost-effective option.

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