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Web Development Diploma 2019

Research Project

Wyze Cam V2

Desktop Computer Implementation

Version 1.0
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Document Information

Date	30 November 2019	**Release**	V1.0
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Version History

#	Date	Reason/Comments
0.1	27 October 2019	Consolidated research undertaken to date.
0.2	15 November 2019	Prepared draft Research Report.
1.0	30 November 2019	Completed final document for submission.

Distribution List (Stakeholders)

Name	Position
Guido Verschoor	Project Sponsor/Lecturer
Nathan McNaught	Project Researcher

Authorisation

Document approved for submission		
Project Role	**Name/s**	**Signature**
Sponsor	Guido Verschoor	

1.0 Research Project

1.1 Proposal

I propose to create a facility to enable footage from an IP camera designed for mobile devices to be viewable from a desktop computer. This technology is known as Real Time Streaming Protocol (RTSP) and is a feature that can be implemented in most IP cameras available on the market. Ultimately, I endeavour to create a web page where a live feed of the camera can be viewed while the computer is connected to the same network as the camera.

Please refer to Appendix A on Page 9 for a Bug Log showing the problems encountered during the implementation of this research project.

1.2 Required Hardware

I chose the *Wyze Cam V2* to implement this project. The *Wyze Cam V2* as is a low cost, fully featured Internet Protocol (IP) Camera that provides an affordable solution to home security. The *Wyze Cam V2* enables users to view content captured by their camera via a Mobile App available for both iOS and Android. Although currently configured to work only with mobile devices, this project endeavours to configure the camera for viewing from a desktop computer. However, doing so requires installation of separate firmware on the device, which renders the standard firmware and some features of the device inoperable.

Diagram 1: *Wyze Cam V2*

1.3 *Wyze Cam V2* availability

The *Wyze Cam V2* is available for purchase from the *Wyze Cam* website for a price of $USD19.99, making it one of the most affordable IP Cameras available on the market. Currently, the company will only ship to United States addresses. The *Wyze Cam* website provides excellent information and resources about the company's product range, and features a forum where users across the world share their views and experiences about the products. A link to the *Wyze Cam* website is included in my website for the convenience of the user.

1.4 Purchasing the *Wyze Cam V2* in Australia

Although currently not available officially outside the United States, *Wyze Cam* products have a strong following in Australia, as evidenced by the number of Australian contributors on the *Wyze Cam* website's forum. For customers outside the United States interested in *Wyze Cam* products, they can be purchased through various internet retailers, including *Amazon.com*. I purchased the *Wyze Cam V2* from the *Amazon.com* website for a price of $AUD54.36, including shipping and import fees. I have included a link in my website for the convenience of the user.

2.0 Project Implementation

2.1 Methods to View *Wyze Cam V2* on a Desktop Computer

There are currently two methods available to view a *Wyze Cam V2* using a desktop computer, as detailed below:

1. Add the *Wyze Android App* to a desktop computer using *BlueStacks Android Emulator* (refer https://www.youtube.com/watch?v=G8T4c-15vng); or
2. Use the URL option (refer https://www.youtube.com/watch?v=EG7m61NAntk).

Having considered both methods, I opted for the second method, seemed simpler and more efficient, enabling footage from the camera to be viewed through a commonly available media player, such as *VLC*. A link to the *VLC* download page is included in my website for the convenience of the user.

2.2 Getting the Rubber on The Road

Before either method outlined in Section 2.1 can be applied, an SD card formatted as FAT32 is required. This enables the required firmware to be downloaded from the internet and saved to the camera.

This situation was made difficult with a Mac, as there is no default option for FAT 32 formatting. However, the link below shows a method to format the SD card as required:

https://www.anyrecover.com/hard-drive-recovery-data/format-usb-drive-mac/

2.3 Step-by-Step Process

Following formatting of the SD card, the Step-by-Step process below can be followed to set up and view footage from the *Wyze Cam V2* on a desktop computer using RTSP. These instructions can also be viewed on the *Wyze Cam* website using the link below:

https://support.wyzecam.com/hc/en-us/articles/360026245231-Wyze-Cam-RTSP.

How to install the RTSP Firmware:

1. Download the *Wyze Cam V2* RTSP file using the link above;
2. Unzip the file, rename the contents to 'demo.bin', and transfer them to a microSD card's root directory (ensure the SD card is formatted FAT32);
3. Unplug the *Wyze Cam* and insert the prepared microSD card;
4. Hold the camera's Setup button while plugging in the USB cable and continue to hold the Setup button until the light turns solid blue;
5. Once the light is solid blue, release the Setup button and wait for 3-4 minutes. The camera will reboot and the status light will change during this time. Note: The "Solid Blue" in this case is not the same as the one normally seen on the camera. Instead, both the blue and yellow LEDs will be on at once, making it appear to be a lighter blue; and

6. Once this process is finished, the *Wyze Cam* should appear in the Home tab on the mobile app without going through the setup process (as long as it was previously paired with the user's account).

How to view the *Wyze Cam V2* live feed using RTSP in *VLC*:

1. Once the *Wyze Cam* is back online, you can access the RTSP function from the live stream (*Wyze* app version 2.3 or later) under *Settings -> Advanced Settings –> RTSP*. The app will automatically check if the installed firmware version is RTSP compatible. If not, the installation process described above must be repeated;
2. Next, turn on the RTSP toggle - You'll be prompted to set up a username and password for this particular *Wyze Cam*. Both the username and password should be 4 – 10 characters without special characters (only a-z, and 0-9). PLEASE NOTE - The username and password is unique to just this camera. Please either use something that's easy to remember or take note of them somewhere, as these will be needed to access the camera's stream via RTSP;
3. Click *Generate URL* and the RTSP URL will show on the next screen. Copy this URL to the clipboard to be used for streaming through any RTSP compatible player on the same local network as the *Wyze Cam* (in this case, *VLC*).
4. Open *VLC* on your desktop computer and go to *File -> Open Network*. Navigate to the *Network* tab and paste the URL you copied in Step 3 into the dialogue box. Click *Open* and the camera's live feed will, appear in a separate window.

The results of the implementation can be seen on my website, where there is a screen-capture video showing the process and live footage from the *Wyze Cam V2* viewed on my *Apple MacBook* computer using the *VLC* media player. The footage was filmed in Room B223 of the NMTAFE Northbridge Campus on Monday, 25 November 2019.

3.0 Further Applications of the Technology

Following a discussion on Monday, 25 November 2019 with NMTAFE Lecturer, Guido Verschoor, further research was undertaken to determine if it is possible to embed the camera's live feed in a website. Outlined in Sections 3.1 and 3.2 below are two methods that could be employed to enable a live feed from the *Wyze Cam V2* to be viewed on a web page.

3.1 Streaming RTSP to a Website using *VLC* media player

Outlined in this Section is a method detailing how to stream the live feed from a *Wyze Cam V2* to a web page using *VLC* media player. The video showing this method can be viewed using the link below:

https://www.youtube.com/watch?v=EbGPN95Vdgo

I attempted to implement this method into my website, as can be seen in the HTML markup, but I was unable to make it work as it does in the video. In my case, nothing showed up on the web page other than the frame for the video. Nevertheless, the step-by-step guide to implement this method is detailed below:

Using *VLC* to Stream RTSP to a Website:

1. Open *VLC* and select "*Open Network Stream*" via the "*Media*" menu;
2. Input the IP camera's RTSP string (with credentials included). The example video uses: *rtsp://test:test@192.168.0.37:554/cam/realmonitor?channel=1&subtype=1*;
3. Click the down arrow next to the "*Play*" button and select "*Stream*";
4. Set the destination to "*HTTP*" then select "*ADD*". In the port field, set what port *VLC* will use to stream the video. The example in the video used *52498*. The path can be left as "*/*";
5. Check the box for "*Activate Transcoding*" and set the profile to "*Video - Theora + Vorbis (OGG)*";
6. Click the "*Screwdriver + Wrench*" icon, set "*Encapsulation*" to "*Ogg/Ogm*", the "*video codec*" to "*Theora*" then set the "*bit rate*" and "*frame rate*" at which you want the web page to broadcast the stream. The example in the video used the camera's standard bit rate and frame rate;
7. Under the "*Resolution*" sub-tab, set "*scale*, *width*, and *height*" to "*Auto*". The "*audio codec*" can be disabled if the camera does not have a microphone or if audio is not required. Also disable "*Subtitles*". Finally click "*Save*" then "*Next*";
8. Check the box for "*Stream all elementary streams*" then click "*Stream*" (please note, *VLC* will show a black box where video would normally be, which is intended). You should see the video timer moving just above the Pause/Play button.
9. Finally, paste the code below into the html markup for the web page:

```
<video id="video" src="http://IP_of_VLC_computer:VLC_Port"
autoplay="autoplay" width="videowidth"
height="videoheight"></video>
```

   Example from the video:

```
<video id="video" src="http://192.168.0.4:8080"
autoplay="autoplay" width="704" height="480"></video>
```

10. Load the web page to see what the video looks like. Do not be concerned if you see what looks like a green screen. Refresh the page every 5 seconds, or so, to force the page to update the stream. This is common with RTSP video transport. In summary, you are turning your PC into a transcoder by way of *VLC* to display RTSP video using HTML5.

3.2 Embedding the *VLC* plugin into a web page

Outlined below is a step-by-step guide detailing a method to embed the *VLC* media player into a website (due to time constraints, this method has not been tested). The instructions can be viewed on the *VLC* website via the following link:

https://wiki.videolan.org/index.php?title=HowTo_Integrate_VLC_plugin_in_your_webpage&action=edit&oldid=19150)

Instructions from *VLC* website:

The *VLC* plugin can be directly embedded into a web page (the fullscreen is currently broken in *VLC* plugin itself - *VLC*>1.1):

```
<embed type="application/x-vlc-plugin" name="player" autoplay="no"
loop="no" target="udp:@239.255.12.42" />
```

You then have to use the official Mozilla/ActiveX api documented at the following link:

https://wiki.videolan.org/Documentation:WebPlugin

But, if you need *''controls''* (buttons, slidebar, etc), you have to use the *''open source revolunet VLCcontrols''* library.

* the code resides @github : https://github.com/revolunet/VLCcontrols
* you have some demo here : http://revolunet.github.io/VLCcontrols/

Usage example:

```
<!-- include jquery + source -->
<script language="javascript"
src="http://ajax.googleapis.com/ajax/libs/jquery/1.4.2/jquery.min.
js"></script>
<script language="javascript"
src="http://revolunet.github.com/VLCcontrols/src/jquery-
vlc.js"></script>
<link rel="stylesheet" type="text/css"
href="http://revolunet.github.com/VLCcontrols/src/styles.css" />
<!-- embed the player and play a file -->
<script language="javascript">
var player = VLCobject.embedPlayer('vlc1', 400, 300);
player.play('http://download.blender.org/peach/bigbuckbunny_movies
/big_buck_bunny_480p_surround-fix.avi');
</script>
```

4.0 Acceptance and Sign-Off

Guido Verschoor **Project Sponsor/Lecturer**	**Date**
Nathan McNaught **Project Researcher**	**Date**

Research Project Bug Log

Problems/Issues/Bugs encountered during the implementation of this Research Project

Problem #1
The *Wyze Cam V2* camera is not currently officially available in Australia.

Options:

1. Purchase from Amazon.com.au (Australian Amazon) Store at a cost of $47.00 inc. shipping. In this situation, the seller was from China and there was no seller history. In fact, there was 0% positive reviews and the single review that existed mentioned the seller sold fake items. This being the case, I was reluctant to purchase the item from this seller. Link below:
   https://www.amazon.com.au/Wyze-Indoor-Wireless-Camera-Vision/dp/B076H3SRXG?th=1

2. In consideration of the above, my second attempt was to purchase the item directly from the wyze.com website. However, the manufacturer does not currently sell the item directly from their website anywhere outside the US, even to their close neighbour Canada. Responses from the company representative on the community page on their website indicates, as they are a small start-up, they currently do not have the facilities to ship items outside the US. Refer the link below for further information:
   https://forums.wyzecam.com/t/deliver-to-australia/3666

3. The final solution, and the one I chose to go with, was to purchase the item from amazon.com (the US Amazon Store) at a total cost of $AUD54.36 inc. shipping and import fees. Link below:
   https://www.amazon.com/Wyze-Indoor-Wireless-Detection-Assistant/dp/B076H3SRXG/ref=pd_rhf_eeolp_p_img_1?_encoding=UTF8&psc=1&refRID=SDZ5QEA57B1ETMNTX6H6

Problem #2
The *Wyze Cam V2* is scheduled for delivery by Monday, 18 November 2019, leaving me around two weeks before end of semester to complete the assessment.

Options:

1. Wait for the item to arrive, then write up the Project Plan before setting everything up and testing the device.
2. Write the Project Plan in anticipation of the item arriving and adjust the plan, as required, following arrival of the item.

I chose to go with Option #2.

Problem #3
The camera can be viewed on a Desktop using an RTSP compatible media player but the desktop must be connected to the same network as the camera.

Options:

1. Connect the camera to the TAFE Wi-Fi network and show the lecturer on my desktop (also on the network) when it is operating.

2. Give the camera to the TAFE lecturer for marking purposes to set up and operate the device on their own network.
3. Invite the lecturer to my home to show the camera in operation.
4. Film the camera operating and include a video of it on the website.

Of the above options, Option #4 seems to be the most feasible, given the restrictions of the TAFE Wi-Fi network (Option #1) and the impracticalities associated with the Options #2 and #3.

Additional option identified on Monday, 25 November 2019:
NMTAFE Lecturer, Guido Verschoor, offered me an additional option of using the NMTAFE Wi-Fi dongle to attempt to connect the camera and view the live footage from my laptop computer. This option was successful and I was able to effectively connect the camera and my laptop to the network, enabling me to show the live footage to Guido. I made a screen recording of the process to add to my website for assessment purposes.

New information coming into the project on Monday, 25 November 2019

In a discussion with NMTAFE Lecturer, Guido Verschoor, it was proposed that I could embed a live stream of the camera feed into my website. I subsequently researched this proposal and discovered two methods that could make this possible. Both methods are outlined in the Research Project document submitted as part of this assessment, which is available on my website.

I opted to implement method 1 but I was unable to make it work as shown in the YouTube video referred to in the Research Project document. The HTML markup shows the implementation of the code but all that appears on the web page is a blank field where the video should appear.