AUT UNIVERSITY COMPUTING + MATHEMATICAL SCIENCES

# GROUP ASSIGNMENT COVERSHEET

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|---|---|---|---|
| **Paper Code:** | COMP 501 | **Paper Name:** | Computing Technology in Society |
| **Assignment Name:** | Project Report | | |
| **Lecturer's Name:** | Dr. Md Akbar Hossain | | |
| **Assignment Due Date:** | 01/06/2018 | **Date Submitted:** | 01/06/2018 |

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**Members in our group:** Ghazi Suliyanto, Wanjang Zhou, Cecilia Chen, Shuyne Jiang (Grace)

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**Date: 1/06/18 (Friday, June 1st, 2018)**

**Paper Name:** Computing Technology in Society (COMP501)

**Project Name:** The Tech Geeks

Transforming a Raspberry Pi into a Home Theater PC running KODI software.

Abstract

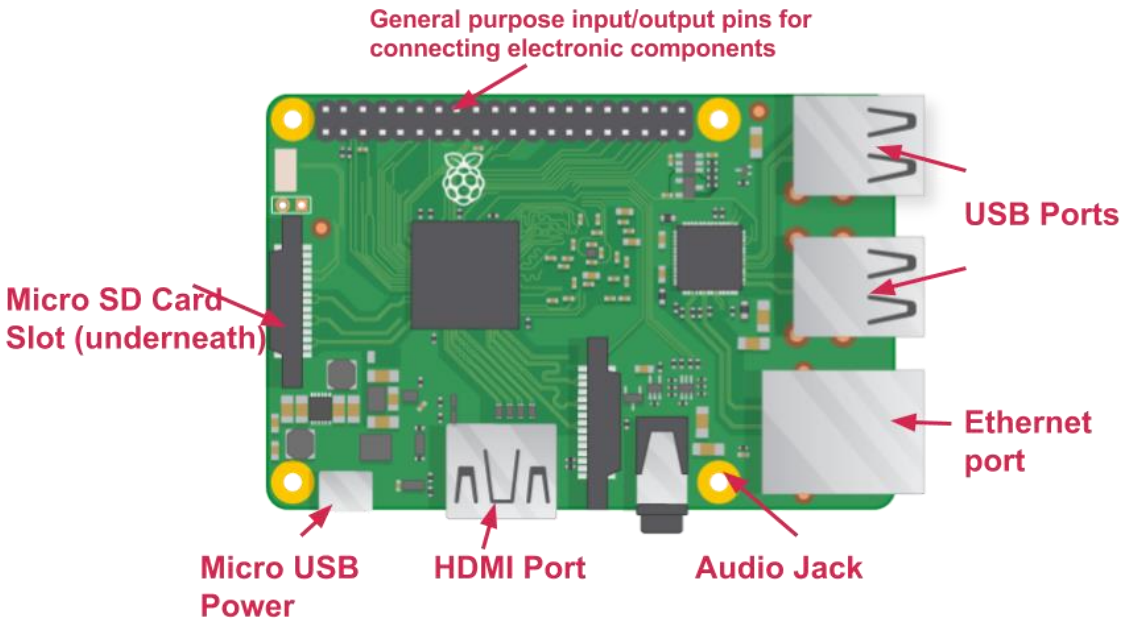
Our group chose to undertake a practical project and we have decided to develop our experiment on the Raspberry Pi platform. Our group came up with this idea by discussing which of the topics seemed most appealing. Raspberry Pi seemed ideal to us as it had a broader range of experiments we could try with it. We chose to work on the Raspberry Pi platform as opposed to the others offered because it serves a broad range of flexibility in what we can do with it, which means we can develop a lot more ideas, and with its processing power and enough ports, we can expand on its functions. The Raspberry Pi is also a new platform for us to program and we would like a new challenge as once we have figured out how to successfully run a project like this, it will prove beneficial in the future. The topic of the project will be to transform a Raspberry Pi 3, into a HTPC device which is a home theatre PC that is used for watching videos and streaming music all in the comfort of your own home. We are wanting to install a Linux Distribution called (LibreELEC), which is the platform that enables us to run XBMC or Kodi. These are softwares that are installed onto the Raspberry Pi that will give the features that we want, similar to installing windows onto a computer to surf the internet. Our goal for this project is to be able to watch videos connected to a monitor at a satisfactory quality with no lagging or glitches. Our goal is to also expand on its features if possible, such as preview photos, play games or surf the internet as well as utilize a remote to control the interface, instead of a traditional mouse and keyboard. In conclusion, the Raspberry Pi is a highly suitable platform to build a HTPC on a budget. Our project has reached its intended purpose but our project has also proven that it is capable of not only playing standard resolution videos, but also high resolution videos, as high as 1080P which is more than enough for today's standards and at a very respectable frame rate.

Introduction

Our experiment consists of working on a Raspberry Pi. According to raspberrypi.org, “The Raspberry Pi is a credit-card-sized computer that plugs into your TV and a keyboard. It is a capable little computer which can be used in electronics projects, and for many of the things that your desktop PC does, like spreadsheets, word processing, browsing the internet, and playing games. It also plays high-definition video.”

Raspberry Pi FAQs - Frequently Asked Questions. (2018). Retrieved from https://www.raspberrypi.org/help/faqs/#introWhatIs

Our final product will be a Raspberry Pi running Kodi that will play high definition videos. This topic is important to research because if conducted correctly, it will be very beneficial for a user that is looking for an affordable alternative to stream on.




(2016, Raspberry Pi Foundation). https://www.raspberrypi.org/help/faqs/
Retrieved from Raspberry Pi Foundation/Meet the Raspberry Pi, 2016, 31th May 2018, from

This diagram shows the components in a Raspberry Pi. In our experiment we have used the USB ports for the keyboard, WiFi dongle, mouse and SD card reader. We have also used the micro power USB port to power the device.

Background:

Technology is advancing each day and consequently old technology is slowly becoming obsolete. An example of this is the decreased need for DVD's ever since platforms such as Netflix have been introduced to the internet. One of the issues that arise with streaming services such as Netflix is how outdated the movies are in their servers. This introduces the need to download the latest movies online. An example of this is iTunes Movies Store which is a platform that people can use to download the latest movies at a cost, and it can be replayed. The Raspberry Pi can fix this issue as it allows people to download the latest movies and stream it using this device. The Raspberry Pi is beneficial and cheap, starting at only $60 NZD, easy to set up the program and can play high quality videos off an external hard drive or a home network. This means that users can save movies and videos directly on the Raspberry Pi which means they do not have to fill up their personal computer storage or save movies on multiple USBs.

Motivation:

What motivated us to work with a Raspberry Pi is that we think Raspberry Pi is necessary for the ever-evolving technological world. This is because as technology advances and progresses faster, there is a need for a platform to experiment and develop on which can produce outcomes needed for these advanced technologies. Raspberry Pi is needed to code on and create software. Since computer prices are increasing due to higher specifications and newer technology, the Raspberry Pi is a compelling option for development.

Method:

Here are the methods that we have applied to get the results that we want in a systematic order:

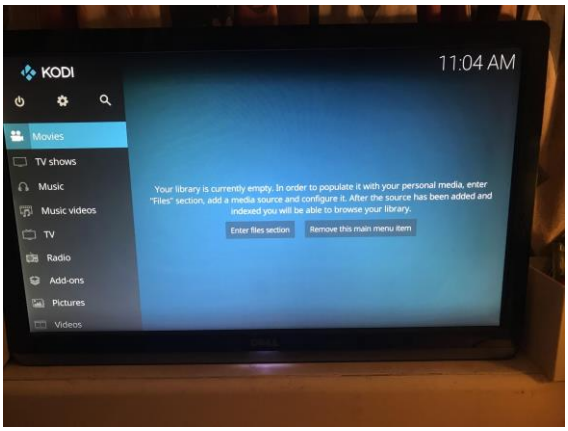
1. We downloaded a software called LibreELEC USB-SD Creator (https://libreelec.tv/downloads/) which gives us the option to download the LibreELEC distribution onto an SD card, as well as select the appropriate hardware to be running on.

2. We inserted the SD card into the Raspberry Pi.

3. We inserted the keyboard, mouse, WiFi dongle into the Raspberry Pi and the HDMI cable, which all then connected to the monitor.

4. We setup the Raspberry Pi and ensured the features are working smoothly. This includes connecting to the WiFi, checking for updates, making sure all the external hardware is working such as keyboard, mouse and USB ports.

5. We connected an external hard drive with video files to ensure that the raspberry pi meets our main intended purpose, which is to run movies.



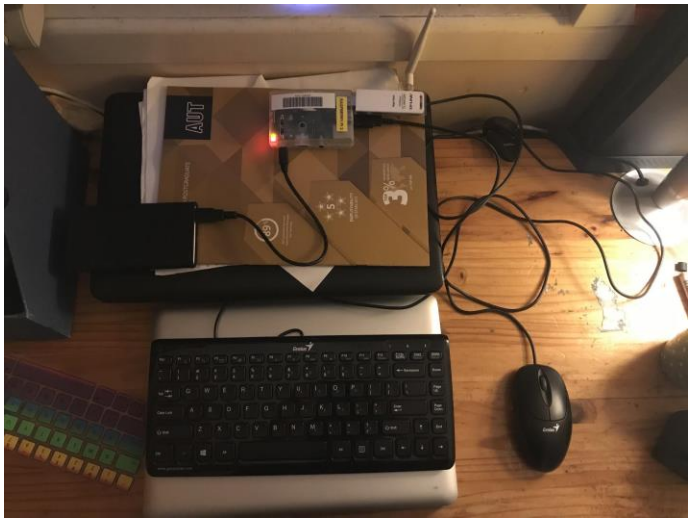

This image shows the general user interface of kodi running on our raspberry pi project.

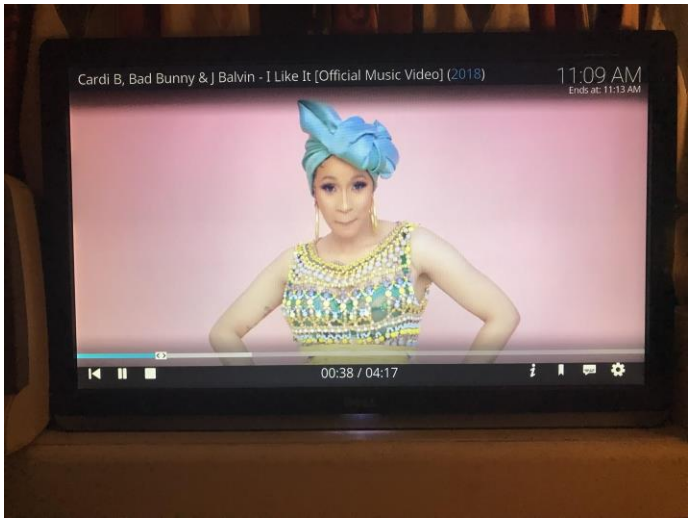
Participation:

In preparing for the project, Grace, Johnny and Cecilia individually, but equally worked on researching how to install Kodi and gathering the required files to install on the Raspberry Pi. Ghazi implemented the idea and installed the files on the raspberry pi and ensured that everything is working correctly.

Results:

The outcome was positive, the project did run as anticipated but we did go through some issues that we were able to overcome quickly. One of the issues that we ran into was the external hard drive that we were using to store videos on was not being detected by the Raspberry Pi, after a quick Google search we have realised that it was because the power adaptor supplied, simply did not provide enough power to the Raspberry Pi to handle all the components attached including our external hard drive. Using a higher amperage charger such as a iPad charger fixed this issue. Another issue that we went through was that the Raspberry Pi itself was not being to handle the Kodi software smoothly. Animations and user interface would be choppy and slow and video playback will be slow, this made our project useless. We discovered that the reason for this is because the Raspberry Pi that we received was a first generation product and did not provide enough processing power to handle the software properly, this was easily fixed by returning the Raspberry Pi that we initially had and used a more recent and powerful one.

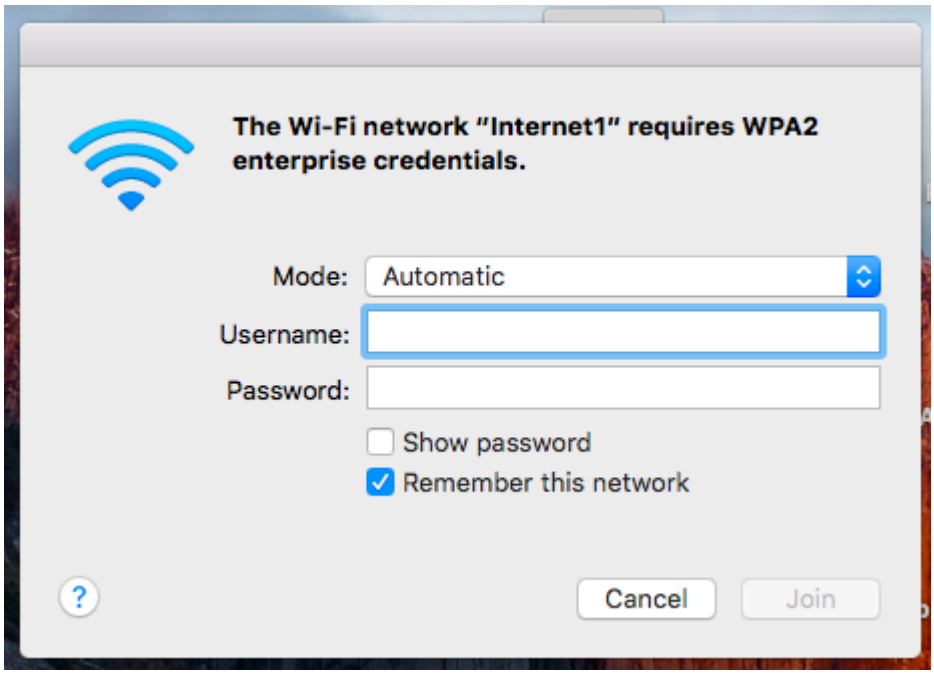



After this, our software ran smoothly with no hiccups.

This is what our Raspberry Pi looks like when set up. Video playback is also playing in the second image.

One of the limitations that we have encountered with the Raspberry Pi was the incompatibility with connecting to WPA2 enterprise wifi networks such as AUT's wifi network. Here is an example of a WPA2 enterprise window:




*Connecting to Wi-Fi (WPA2 enterprise credentials)*. (2018). [Image]. Retrieved from https://community.ubnt.com/t5/UniFi-Wireless/Connecting-to-Wi-Fi-WPA2-enterprise-credentials-help/td-p/1555939

This started to become an issue when we were wanting to use the Kodi app on our phone as a remote and the app relies on WiFi to connect the phone to the Raspberry Pi. If the Raspberry Pi cannot establish a WiFi connection, the Kodi remote app cannot find the device. Our solution to this is rather troublesome. We used our own WiFi router and made sure that there is no WiFi passwords, and connected our phone and the Raspberry Pi which lead to a successful connection and we can now use our phone as a remote.

Conclusion:

In conclusion, the “Raspberry Pi for HTPC” project is aim to transform a Raspberry Pi into a home theatre personal computer device by using a software called Kodi. This project will allow users to watch videos in a reasonable quality and may even be able to browse photos. Our goal for this project was to be able to watch videos connected to a monitor at a satisfactory quality and expand on its features such as preview photos, play games or surf the Internet as well as use phone to control the interface, instead of a traditional mouse and keyboard.

Overall, this project about high technology like Raspberry Pi and other information shows a new platform for entertainment for the modern world. The goal of this project is accomplished and the process of the project went well. All the group members have learnt a lot by working on the project. We believe this project has potential for further development.

Further development

With all of the things that Kodi can do through a Raspberry Pi, there are some things that we would want to further develop. We want to further develop the entertainment aspect of Raspberry Pi by integrating a live TV option. This will provide convenience for the end user. In order to achieve this we would need to find an api that is used on the Raspberry Pi for live TV functionalities and reprogram it to suit New Zealand standards. At this point this idea is too far fetched for our knowledge.

Another aspect that we want to develop on is to include stable streaming services such as Netflix, Youtube and Spotify. This will complete the entire streaming package. Kodi includes pre-installed applications such as Youtube, but it is not that stable for general use and there is still many features missing.

References


1. Raspberry Pi FAQs - Frequently Asked Questions. (2018). Retrieved from https://www.raspberrypi.org/help/faqs/#introWhatIs

2. (2016, Raspberry Pi Foundation). https://www.raspberrypi.org/help/faqs/ Retrieved from Raspberry Pi Foundation/Meet the Raspberry Pi, 2016, 31th May 2018

3. *Connecting to Wi-Fi (WPA2 enterprise credentials)*. (2018). [Image]. Retrieved from https://community.ubnt.com/t5/UniFi-Wireless/Connecting-to-Wi-Fi-WPA2-enterprise-credentials-help/td-p/1555939

## Appendixes

| GROUP MEMBER | CONTRIBUTION |
|---|---|
| Ghazi Suliyanto | - Abstract and keywords<br>- Introduction<br>- Motivation<br>- Results<br>- Future work<br>- Reference<br>- Hardware supplication<br>- Software supplication |
| Shuyue Jiang | - Method: Instruction<br>- Conclusion<br>- Reference<br>- Appendixes<br>- Meeting Minutes |
| Wanfang Zhou | - Results<br>- Method: Hardware<br>- Reference<br>- Hardware supplication<br>- Troubleshooting |
| Cecilia Chen | - Background<br>- Reference<br>- Method: Software |

# Meeting Minutes

Team Meeting 1

Time: 9.30-10.30 Date: 16/05/2018 Location: WG411

| | GOALS |
|---|---|
| 1 | Show how to work on the Raspberry Pi. |
| 2 | Exchange the ideas and findings for further process. |
| 3 | Allocate tasks to group members. |

| | DIFFICULTIES | SOLUTIONS | SOLVED |
|---|---|---|---|
| 1 | Make everyone understand the project. | Ghazi showed the proposal and a video to illustrate the project. Wanfang shared his HDMI cable for the project. | Y |
| 2 | Distribute tasks which can satisfy everybody. | Everyone can get more tasks if they want and trying to help the others. If we can get work done then hold another meeting ASAP. | Y |
| 3 | Give thoughts for the essay and presentation. | Grace shared a draft essay to show the outline and other things may come up with. | Y |

| | TASKS | NAME |
|---|---|---|
| 1 | Introduction, Abstract. | Ghazi |
| 2 | Part of essay, at least the draft main sections and other parts. | Grace, Wanfang, Cecilia |
| 3 | Part of presentation | Ghazi |

Team Meeting 2

Time: 9.00-10.30 Date: 30/05/2018 Location: WA611

| | GOALS |
|---|---|
| 1 | Discuss the details of the section of essay “Method”. |
| 2 | Allocate tasks and provide hints for everyone to prepare the final version of essay. |

| | COMPLETED TASKS | NAME |
|---|---|---|
| 1 | Introduction, Abstract, Motivation, presentation | Ghazi |
| 2 | Background, Conclusion, Appendices, Meeting Minutes | Grace |
| 3 | Future work | Cecilia |
| 4 | Results | Wanfang |

| | DIFFICULTIES | SOLUTIONS | SOLVED |
|---|---|---|---|
| 1 | Understand and further discussion of the Method section. | List the questions and discuss them one by one. | Y |
| 2 | Allocate tasks for everyone. | Emphasize the importance of each one’s efforts and the deadline is coming soon. | Y |

| | TASKS | NAME |
|---|---|---|
| 1 | Hardware part of Method | Johnny |
| 2 | Software part of Method | Cecilia |
| 3 | Instructions part of Method | Grace |
| 4 | Photos for the Method | Ghazi |