**M E M O R A N D U M**

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**To:** Professor Michael Parker

**From:** Jacob Alspaw

**Subject:** Project Topic Memo, Work Plan, and Annotated Bibliography

**Date:** 18 September 2016

***Summary***

In this memo, I will describe the functionality and ingenuity of Google’s Chromecast, which is a digital media player that has revolutionized the television industry by connecting HDMI-port enabled television’s to a variety of popular web applications. The sections outlined in this memo will discuss the product in detail, why I believe this product is worth studying, and then discuss a work plan that provides a breakdown of the tasks and subtasks that I will need to complete. The memo will finish with an annotated bibliography of sources that will remain relevant to my work throughout unit one.

On July 24, 2013, Google announced Chromecast, the first generation of new affordable video streaming devices for only $35 [3]. Google strategically enticed consumers with three months of free access to Netflix with a Chromecast purchase [3]. The product quickly sold out on popular online retailers like BestBuy, Amazon, and the Google Play Store, and within one day of its release, the Netflix promotion was ended because of the surprisingly high demand [3]. Since its launch, over 30 million units have sold worldwide and it was the number one selling streaming device domestically in 2014 [2]. Between its launch and May of 2015, Chromecast handled more than 1.5 billion stream requests [2]. Google’s repeated success with its Chromecast device has inspired me to select this product for unit one.

***Product Description***

Chromecast is a line of digital media players developed by Google and designed as small dongles. The device plays audio and video content on a high-definition home television set by connecting into a HDMI port and streaming it via Wi-Fi from a local network with Internet access. Users select the media to play using web or mobile applications that utilize the Google Cast software development kit. Content can also be directly streamed from a selection of Android devices as well as a personal computer running the Chrome web-browser [2].

Google announced the second-generation Chromecast, an upgraded version of its predecessor, on September 29, 2015. Each model was made available for purchase at the first generation’s price point even more than two years after the original release [4]. Less than a week later, Amazon announced that it would stop selling Chromecast devices in its online store, presumably because they competed with Amazon's own Fire TV Stick [1].

The first generation Chromecast has an HDMI plug built into the devices body which measures 72 mm in length [2]. It contains the Marvell Armada 1500-mini 88DE3005 integrated circuit running a single ARM Cortex-A9 processor at clock cycles between 800 MHz and 2.0 GHz. Radio communication is handled by AzureWave NH–387 Wi-Fi which implements 802.11 b/[g](https://en.wikipedia.org/wiki/IEEE_802.11g-2003)/n along the 2.4 GHz frequency band. The device has 512 MB of Micron DDR3L RAM and 2 GB of flash storage [4].

In contrast, the second-generation Chromecast has a short cylindrical body with a small length of flexible HDMI cable attached. The cable can magnetically attach to the device body for more positioning options behind a television [4]. The second-generation model uses a Marvell Armada 1500 Mini Plus 88DE3006 integrated circuit, which has dual ARM Cortex-A7 processors running at a more consistent 1.2 GHz [4]. Even with a lower average clock cycle, the new dual processors will outperform the first generations single processor. The unit contains an Avastar 88W8887 network chip, which has improved Wi-Fi performance and offers support for the latest commercially available networking standard, 802.11 ac, along the wider 5 GHz radio frequency band [4]. The network chip also contains three adaptive antennae for better connections to home routers. The device contains 512 MB of Samsung DDR3L RAM and 256 MB of flash storage [4].

Google’s Chromecast is an innovative solution to the Smart TV problem. Instead of spending hundreds of dollars replacing a single television, a consumer only needs to spend $35 to get the latest Smart TV support. Google is a proven forerunner in the research, development and distribution of technologically based goods and the Chromecast product line is only one example of their ingenuity.

***Project Direction***

My project will explore the initial problem that inspired the creation of low-cost digital media players and Google’s overall impact on the television industry. I will delve into the advantages and disadvantages of streaming devices in general, and take note of the differences between Chromecast and other competitors’ products. To finalize this project, I will theorize the direction of future digital media players, like a potential third-generation Chromecast, which directly relates to my unit two team’s upcoming product.

***Work Plan***

In order to ensure that my project reaches completion by October 16th, I intend to meet the deadlines that I have set in the below table. If I adhere to this timeframe, then my unit one final project will better reflect my best-effort. The work plan accounts for all assignment due dates, so you can expect that I will not hand in any late or incomplete assignments. There is also time built into this schedule so that I may put my project through peer review and faculty review. This review period will enable me to better screen for errors and any missing structural or argumentative elements.

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| DATE | DESCRIPTION |
| 9 / 13 / 2016 - 9 / 20 / 2016 | Locate a selection of sources that can be used for unit one’s assignments. These sources will be incorporated into an annotated bibliography. |
| 9 / 20 / 2016 - 9 / 23 / 2016 | Read and review sources. Outline a status report to confirm that my research is progressing at an appropriate rate, so I may be finished with unit one before the project deadline. |
| 9 / 23 / 2016 - 9 / 25 / 2016 | Finalize and submit status report with pitch description. Put status report memo through peer review process to screen for mistakes or missing elements. |
| 10 / 2 / 2016 - 10 / 9 / 2016 | Create my recommendation report. Document Google’s Chromecast in the form of a value proposition and incorporate class discussion topics. |
| 10 / 9 / 2016 - 10 / 16 / 2016 | Create a pitch presentation that corresponds to the recommendation report. Practice the pitch and ensure that the presentation abides by the allowed 3 minute period. |

**Annotated Bibliography**

Google Chromecast Smart TV Conversion

[1] D. Katzmaier, "Chromecast vs. Apple TV vs. Roku vs. Amazon fire TV," in CNET, CNET,

2016. [Online]. Available: https://www.cnet.com/news/chromecast-vs-apple-tv-vs-roku

3-which-media-streamer-should-you-buy/. Accessed: Sep. 15, 2016.

This article describes the current market conditions for affordable video streaming devices and Google’s position relative to its competitors. Now that video streaming is more popular than ever, consumers are seeing increasingly more devices that can meet their needs. Currently, there are four major affordable video streaming devices available for purchase; Chromecast, Apple TV, Roku, and the Fire TV stick are competing for market dominance. The author, David Katzmaier, reviewed a large collection of the major competitors’ old and new digital media players, and assembled a detailed list of advantages and disadvantages that come with each of the competitors’ products. Google has a leading edge over most, if not all, of its competitors with its low price range, but requires a laptop, or mobile phone / tablet to act as a remote. This list is accompanied by a chart detailing the supported major audio and video applications for six digital media players, including Google’s Chromecast. Each digital media player can support many fundamental features, but will often implement these features in different ways. The source will help consumers find the video streaming device that will meet their needs. The comparisons outlined in this article will enable me to view digital media players in a broader sense.

[2] "Introducing Chromecast - Chromecast help," in *Google*, 2016. [Online]. Available:

https://support.google.com/chromecast. Accessed: Sep. 15, 2016.

In Google’s Chromecast help center webpage, there is a collection of helpful short articles detailing product features, specifications, and set up guides. Google notes that Chromecast allows for users to easily enjoy their favorite movies, TV shows, photos, music, and more, by simply connecting the Chromecast device into any television sets HDMI port. The webpage notes Chromecast’s flexibility with how a consumer may control the device from a variety of smartphones or laptops, and how Chromecast will automatically update to work with a growing number of supported applications. Google presents the Chromecast in a very consumer friendly way, such that the company has placed emphasis on the Chromecast’s most important features. The article provides a look at Google’s own thoughts for what makes the Chromecast such a popular choice among consumers.

[3] J. Evangelho, "Google’s Chromecast A brilliant play for the living room -- especially with

$35 price tag," in *Forbes*, Forbes, 2013. [Online]. Available:

http://www.forbes.com/sites/jasonevangelho/2013/07/24/googles-chromecast-a-brilliant-play-for-the-living-room-especially-with-35-price-tag/#7c4fff2f5207. Accessed: Sep. 15, 2016.

This article provides a firsthand account of the excitement that Google created with its Chromecast announcement. Published on the day following the release, the author provides a detailed product description, and consumers’ initial thoughts on Google’s new affordable digital media player. The author notes a strategic promotion offered by Google to entice customers to purchase the Chromecast. Each Chromecast purchase came with a free three month Netflix subscription which Chromecast supports. Google quickly ended the promotion with Netflix because of Chromecast’s unforeseen demand. The author notes that Google executed a research and development phase brilliantly because Chromecast is not device-driven, but rather application driven, allowing consumers to decide from which device to control Chromecast with. Because of the articles publication date and focus, product researchers are able to infer which features created the greatest consumer excitement from Google’s Chromecast announcement.

[4] R. Smith, "Google’s Chromecast 2 is powered by Marvell’s ARMADA 1500 Mini plus –

dual-core cortex-a7," in AnandTech, 2016. [Online]. Available: http://www.anandtech.com/show/9688/googles-chromecast-2-is-powered-by-marvells-armada-1500-mini-plus-dual-cortexa7. Accessed: Sep. 15, 2016.

This article specifically notes a frustration with Google’s repeated focus on Chromecast’s features and uses over Chromecast’s specifications during the first and second generation announcements. The author notes that because Google physically reformed the device, there were going to be specification changes from the first to the second generation Chromecast. A press release from Marvell, a third party company contracted by Google for the Chromecast’s platform design, would later confirm this theory. The author provides an in-depth analysis into exactly what components the Chromecast is produced from and its changes along the product line. In all, the article is a comprehensive look at the product specifications that many other articles neglect to answer.