

# Echo-Mote

## Project Plan

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## Introduction

### Project statement

Echo-mote is a hardware module that the Amazon Echo can communicate with to perform basic operations on your television. These operations include turning the volume up and down, changing the channel up, down or to a specific channel as well as turning off and on your television. A product of this type has not yet been created and we hope to be first to market.

### Purpose

The Echo-Mote is a project primarily aiming to allow visually impaired people to be able to operate their television on their own. There are handicapped people all over the world that need assistance with daily tasks--this serves as a simple solution

### Goals

We aim to create a device that anyone can use. This includes those with physical handicaps. We hope to deliver a product that is not only incredibly simple, but also physically appealing. We hope to have compatibility with all televisions. We will allow control using everyday language. It must be easier to use than a remote.

# Deliverables

We will deliver a hardware module, a power adapter, an application to configure the remote and a user manual. We will create a design for the packaging the remote will be marketed in. We will deliver a kickstarter style website in order to generate potential crowdfunding.

# Design

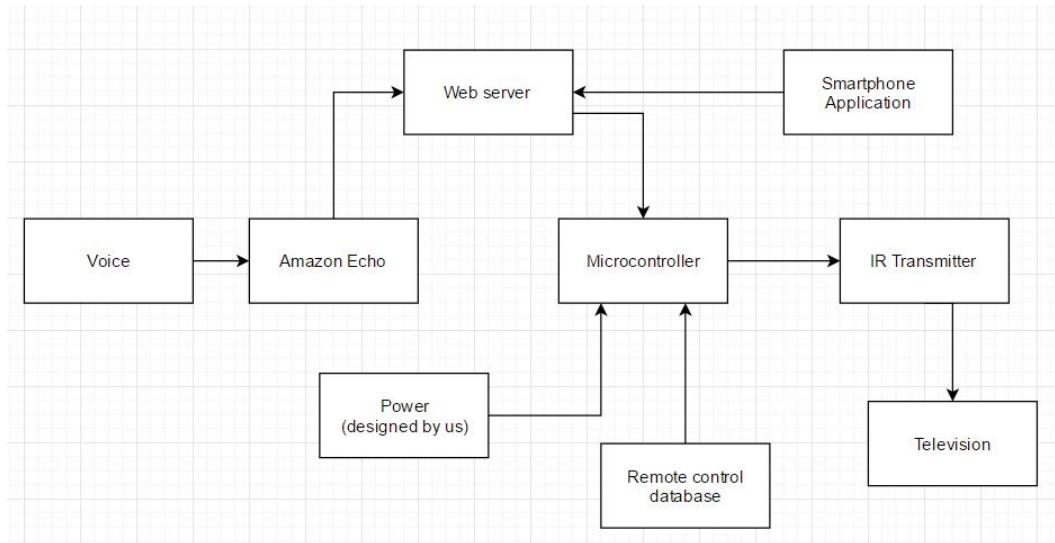
## Previous Work/Literature

We have found a device that is similar to our product called the anyMote (see references for link). Their device cost \$140 and the voice commands are not as natural. We aim to make our product better and for a more affordable price.

## Proposed System Block Diagram

This block diagram discusses how the user, amazon echo, web server, microcontroller, and television will all interact. We will work from right to left to complete this project. We will start by being able to turn on the TV with a microcontroller [3], then utilizing a web server and connecting this portion to the amazon echo and the voice [1].

The way our product will work is as follows. The user will say something like, “Alexa, turn on the TV. [2]” Then the amazon echo will interact with the web server and the web server will tell the microcontroller to turn on the TV. Then it will tell the IR transmitter to turn on the TV. The smartphone application will allow the user to select what TV they have, and our remote control data base [4] will have all of the remote configurations.



## Assessment of Proposed Methods

We have made many decisions on the best way to design this product. We have chosen to have the echo communicate via wifi to our device instead of bluetooth so that the echo can be anywhere in the house and still operate the television. We have also chose to have both the battery powered and the wall power options to have the appearance of no cord, but also creating the option for never having to change the batteries by keeping it plugged into the wall. We have decided to have the option for the command “turn up/down volume” to increment a fixed amount, while also having the ability to command the echo to “turn up/down X amount”. We also have selected to have the ability to command “channel up/down”, “go to channel X”, and lastly a feature that is similar to the “tune” feature on the radio that will scan through channels until the user commands “stop”. These are the initial proposed methods that we have decided on and will continue to discuss for the length of our project.

## Validation

We will claim success on this product when we can change volume, channels, and toggle power using voice commands on the all televisions we can get ahold of. Further success will come from building a slick looking device as well as making it easy to use.

## Project Requirements/Specifications

### Functional

The amazon echo will initially be able to do all basic remote functions via a voice command through the amazon echo.

#### Functions:

- Power On/Off
- Input
- Channel Up/Down
- Change to channel X
- Volume Up/Down
- Volume Up/Down Increment
- Mute
- Other options will be added with lower priority

### Non-functional

The project will also consist of many preliminary tasks that will not be seen by the user.

- Connect to wifi

- Creating the hardware compactly
- Proper infrared transmitter that will be strong enough to control a TV
- Wall and Battery Powered
- Power efficient

## Challenges

This project presents many challenges, they are listed below:

- Retrieving remote control information from text files onto hardware
- Communicating across wifi with two devices
- Creating an app that will connect your device to wifi and initialize your device
- Creating low power and compact hardware that will have a lasting life while battery powered
- Expanding upon basic functionality to operate common tv outlets such as (Netflix, Hulu, Amazon, Apple TV)

## Timeline

### First Semester

Week 1	Create Team
Week 2	Decide on Project Echo Mote
Week 3	Confirm Dr. Tuttle as advisor and start initial planning
Week 4	Research how to implement the hardware and software portions of this project
Week 5	Purchase an arduino, raspberry pie and amazon echo
Week 6	Use different television remotes to receive button data
Week 7	Be able to control one TV type using an arduino (Power On/Off, channel change etc.)
Week 8	<ul style="list-style-type: none"> <li>• Work on being able to control all TV types via data base that will be converted to a text file for longevity.</li> <li>• Begin work on website</li> </ul>
Week 9	Be able to communicate between the Amazon Echo and Raspberry Pie Via Voice
Week 10	Receive serial input from microcontroller to be able to control TV

Week 11	Be able to control all TV types via data base that will be converted to a text file for longevity.
Week 12	Be able to control TV with your voice
Week 13	Debug main problems
Week 14	Prepare presentation
Week 15	Final Presentation
Week 16	Finals

## Second Semester

Week 1	Regroup
Week 2	<ul style="list-style-type: none"> <li>• Begin creating app</li> <li>• Continue creating PCB</li> </ul>
Week 3	<ul style="list-style-type: none"> <li>• Explore opportunities for further functionality</li> <li>• Complete first version of app</li> <li>• Continue creating PCB</li> </ul>
Week 4	<ul style="list-style-type: none"> <li>• Create plan of top three further functionalities we would like to implement</li> <li>• Continue creating PCB</li> <li>• Debug and enhance app</li> </ul>
Week 5	<ul style="list-style-type: none"> <li>• Create design for PCB case</li> <li>• Debug and enhance app</li> <li>• Continue creating PCB</li> </ul>
Week 6	<ul style="list-style-type: none"> <li>• Debug and enhance app</li> <li>• Continue creating PCB</li> <li>• Consult on how to 3D print the PCB case</li> </ul>
Week 7	<ul style="list-style-type: none"> <li>• Complete PCB case design to 3D printing specifications</li> <li>• Continue creating PCB</li> <li>• Version two of app complete</li> </ul>
Week 8	<ul style="list-style-type: none"> <li>• Continue creating PCB</li> <li>• 3D print PCB Case</li> </ul>
Week 9	<ul style="list-style-type: none"> <li>• Combine case and PCB</li> <li>• Test final product with app</li> </ul>
Week 10	<ul style="list-style-type: none"> <li>• Work on implementing new features</li> </ul>

	<ul style="list-style-type: none"> <li>• Continue testing final product</li> </ul> <p>Overflow time in case of error</p>
Week 11	<ul style="list-style-type: none"> <li>• Work on implementing new features</li> <li>• Continue testing final product</li> </ul> <p>Overflow time in case of error</p>
Week 12	<ul style="list-style-type: none"> <li>• Work on implementing new features</li> <li>• Continue testing final product</li> </ul> <p>Overflow time in case of error</p>
Week 13	Overflow in case of error
Week 14	Prepare for final presentation
Week 15	Final Presentation
Week 16	Finals

## Conclusions

In conclusion, this device will be able to control a television fully from the Amazon Echo. It will act as other products that already interact with the Echo via wifi. This product will be used by all people but will open the door for people with seeing disabilities to be able to control their television. The final product will look like something that would be purchased at a store, the product will not only be functional, but physically appealing. Finally this project will teach us how to create a piece of hardware that interacts with wifi, how to utilize open source software, and how to plan, design, and create a product.

## References

- [1] PatrickD126. "Control Raspberry Pi GPIO With Amazon Echo and Python." *Instructables.com*. Instructables, 14 Dec. 2016. Web. 02 Apr. 2017.
- [2] FabricateIO. "Home Automation With Amazon Echo Voice Control." *Instructables.com*. Instructables, 12 May 2016. Web. 02 Apr. 2017.
- [3] "Tutorial - How To Control Your TV With Amazon Echo." *AnyMote Home - Tutorials*. N.p., n.d. Web. 02 Apr. 2017.
- [4] "What Is LIRC ?" *LIRC - Linux Infrared Remote Control*. N.p., n.d. Web. 02 Apr. 2017.