Robbie Ivey Project – Detailed view (v3)

By Bill Weis

Review of the Requirements for this project and the high-level design of the solution

Requirements:

1. Voice control his bed (Assured Comfort with a Linak HB22 wireless remote)
2. Make phone calls
3. Watch NCIS on Netflix and other Netflix Programs
4. Watch cable TV
   A. Be able to call up the Guide Button, Page Up, Page Down, and Select
5. Watch DVD and Blu-ray movies that are placed in his Blu-ray player
6. Control the lights in his room – turn on/off and dim
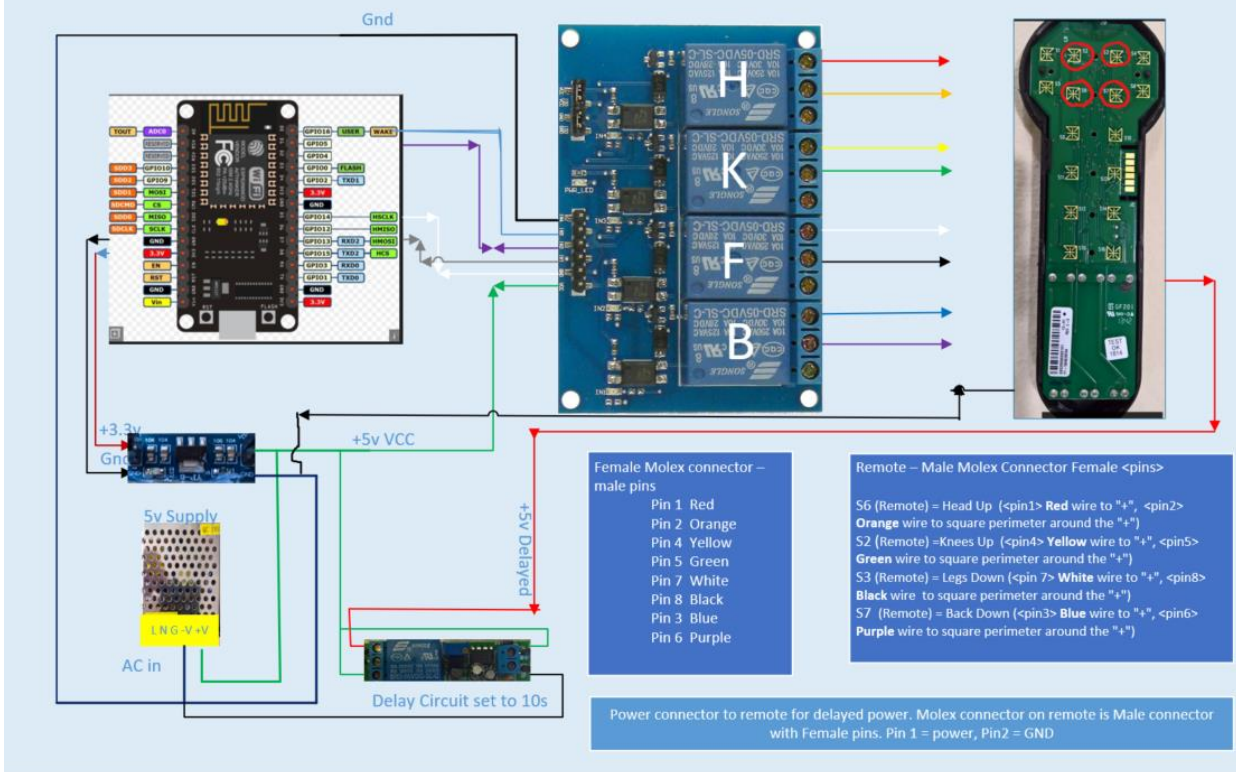7. Turn a tower fan on/off

Solution – High Level:

1. Installed an Amazon Echo and a custom developed bed controller to allow Robbie to control his bed using voice commands
2. Utilized the Alexa Calling and Messaging feature in the Amazon Echo to provide voice phone calling
3. Installed a Google Home, Chromecast Ultra and a Logitech Harmony Hub to enable Robbie to watch his NCIS program on Netflix
4. The Google Home and the Logitech Harmony Hub also enabled Robbie to watch Cable TV and control his Blu-ray player.
5. We replaced Robbie's recessed light bulbs with Lifx BR30 bulbs enabling him to turn on/off/dim/change color through voice commands using Amazon Echo
6. We installed a WeMo Mini Wi-FI Smart plug to give Robbie control over his fan

Just a reminder that at the end of an installation like this one, you will have installed many apps, and created several accounts and passwords to keep track of. Take good notes.

Details of the Solution

1 – Voice Control his bed – After considering different approaches for Robbie's Assured Comfort bed which uses the Linak HB22 remote/controller/linear actuator, I found the quickest solution to giving him voice control over his bed was to use an Amazon Echo and a custom solution which included an ESP8266 microcontroller and a quad relay board. The program flashed into the microcontroller defines 4 switches (GPIO output pins which are connected to 4 relays), and these 4 switches have the name of Head, Back, Knees, and Feet. Head and Knees are commands to drive that part of the bed in the up position, and Back and Feet drive that part of the bed in the down position. Rather than give one command to initiate bed movement and another to stop bed movement, I decided it would be better to instead run each command for a predetermined length of time. We found 3 seconds to work well. This means that going from a flat position to having the head of the bed all the way up as you would to watch TV would require issuing 3 separate commands with each command moving the bed 1/3 of the way up. Taking this approach avoided any issues with internet latency, and avoided any frustration should the Echo not understand speech associated with the stop command. The tricky part was soldering wires to the PCB board inside the remote. (I obtained an extra remote for this project for a few reasons. First Robbie's bed supports multiple remotes being connected, and I did not want to risk destroying the only remote we had). Although I have since simplified the design, here is a sketch of what was implemented.

Voice Controlled Bed Controller based on ESP8266 E-13 NodeMCU and Amazon Echo and Linak HB22-001-00 hand held remote for Assured Comfort bed
Bill Weis 7-27-17

In the picture you can see the 4 relays labeled H, K, F, B (Head, Knees, Feet, Back). You can also see that I am providing power to the remote which normally has (3) AAA batteries. The object in the upper right is the remote with the plastic cover removed. The 4 red circles on the remote are where the relays are wired to. Silicone glue was applied to the board to provide strain relief for the newly soldered wires.

2. Make phone calls

When we started the project, Google Home did not support a calling feature but that has since changed. At this time, Robbie can use either the Amazon Echo or the Google Home to place phone calls. The way Amazon implemented calling is a bit more restrictive than Google's approach. Amazon requires that an app be installed on the smart phone of each person you wish to call and their name needs to be added to a list. With Google, you can speak the number to call, or you can call the person by name if their name appears in your Google contact list. Here is how to set up phone calling with the Echo. Here is one of the resources for setting up phone calling with Google Home. For more information, you can search the internet for more articles or YouTube videos. Also, Amazon and Google support are very helpful.

3. Watch NCIS on Netflix and other Netflix Programs

Keep in mind that everything must work by issuing voice commands only. In my lab, I did testing with an ***Amazon Echo/Roku/Harmony Hub*** combination and found at the time of this project, the Amazon solution for this requirement fell short. I may have been able to accomplish the goal with some Amazon Web Services programming, but that was beyond what I was prepared to do. I was able to meet Robbie's requirement using a ***Google Home/Chromecast Ultra/Harmony Hub*** combination. There were two caveats however:

- Since Robbie was already on season 7 (or something close to that), there was no way to tell Google Home where to begin. So when Robbie said Hey Google, watch NCIS on Netflix, it brought up season 1 episode 1. To get Google Home synced up to the episode where Robbie was currently watching, he had to issue the command Hey Google, Next Episode over 100 times. Once Google was in sync to the episode Robbie wanted to watch, it stayed in sync from then on. It was a one time hassle to get synced to the proper episode but he was successfully able to watch his NCIS program simply by using voice.
- Another caveat, and this is also true for Amazon Echo, when you are watching programs through an "Anytime+" device such as a Google Chromecast or Amazon Firestick, switching back to the HDMI input for TV can be tricky. Although it may not seem to be intuitive, if you are watching (as an example) NCIS on Netflix (through the Chromecast Ultra device), to switch to a TV channel you also have to say Hey Google, turn on TV, even though the TV is already on.

Details for setting up the Logitech Harmony Hub are found in the next section, since those installation details are common to all things TV/entertainment related.

4. Watch cable TV
      B. Be able to call up the Guide Button, Page Up, Page Down, and Select
5. Watch DVD and Blu-ray movies that are placed in his Blu-ray player

Sections 3,4 and 5 are tightly related, so installation guidance is provided in here. After reading section 3, you know why we installed Google Home for controlling Robbie's entertainment. (And if you read the Getting Started BLOG in the **BLOG** section of this website, you would know that neither Google Home or the Amazon Echo can directly control a TV. That is to say, neither device currently has the ability to transmit the signal to your TV that will turn it on, change volume, change channels, etc. This fact will be

painfully obvious if you just installed the Harmony Hub and linked it to your Google home then issued this command "Hey Google, Turn on TV". Unless you already setup shortcuts in Google Home, you will hear a message that says "Sorry, I don't know that yet". By default, you must issue the full command which is "**Hey Google, _ask Harmony_ to turn on TV".** If you don't like memorizing long commands like this, you can go into the Google Home app and [configure shortcuts](#).

Logitech Harmony Hub – The first resource you should know about is the [Harmony Knowledge Base.](#) Next, I found Logitech's support people to be very helpful, so getting the Harmony Hub's initial configuration completed should not be a problem. From a sequence perspective, you will install, configure, and test the Harmony Hub first, then you will link that Hub to either the Amazon Echo or the Google Home later. Here are a few tips:

a) Gather the exact model numbers for the devices you wish to control with the Harmony Hub. For TVs, that would be the model number on the sticker on back of the TV. Why is this important?? The RF Codes that the Harmony Hub sends to the device is very device specific. Since the Harmony Hub can conceivably control hundreds of different TV models, just know that the code to turn on a Visio TV as an example is different than a Samsung. (And models within a manufacturer may differ as well).

b) Install the Harmony Hub app. Here is the download [link](#) for the Ultimate Hub software that we used.

c) Be prepared to install the Harmony Hub app on a tablet or smart phone. This app is needed to configure the Harmony Hub. Inside the app, you will **configure devices** (TVs, Blu-ray players, X-Box, Surround sound, etc). Also Inside the app you will **[create activities](#)**. An example of an activity could be "Watch TV" which could involve several devices. Maybe you have a cable set top box on HDMI3 that needs to be powered on as well as a surround sound for the audio. All these ports and settings need to be defined. There is a menu to step you through the process.

d) Here is an article on setting up [favorite channels](#) in the Harmony Hub so your Google Home or Amazon Echo device can use them.

e) Once you have your devices and activities created, **run the activities** through the app on your smart phone or tablet to test they work correctly **before** linking the Harmony Hub to the Amazon Echo or Google Home.

f) YouTube is a great reference for informational videos. Simply go to Youtube.com and perform a search (ie: Logitech Harmony Hub)

g) [Set Up a Harmony Hub-Based Product](#) (YouTube video)
h) [Harmony Hub and Mini blaster placement tips](#) (YouTube video)
i) [Harmony Support from Logitech website](#) (Links to guidance)
j) Handy customizations – Robbie wanted to be able to bring up the Cable guide and to Page Up and Page Down, then to be able to Select a specific tv program. I have not found any documentation that explains how to do this, and have reported it as a documentation gap to Logitech. I created a step by step process to help you through this. You will click through 15 screens in the Harmony app to configure the activity for the **Guide** button, then you repeat those same steps for **Page Up**, **Page Down**, and **Select**. (And although it is not intuitive, you also need to create an activity called **Page Up Again** and **Page Down Again**). I have not tested if this also applies to an Amazon Echo, but we discovered the need to create these extra Activities for Google home to avoid errors. We learned that if you issue a **Page up** command and follow that with another **Page Up** command, Google Home will report an error since it seems to think the initial **Page Up** command has not completed. The work around is to create a **Page Up Again** activity (also pointing to the Page Up button on the remote), then if you need to Page Up multiple times, you would alternate between **Page up** and **Page Up again**. The same applies to **Page Down**.
k) Watching movies from the Blu-ray player is simply accomplished by adding an activity to Watch Movies, then follow the setup menu to configure the HDMI port, etc.
l) See Appendix A for a list of Google commands for his Cable TV

6. **Control the lights in his room – turn on/off and dim**
   Sometimes just being able to turn a light on after waking in the middle of the night can bring comfort. Robbie's room has 6 recessed lights, 3 are controlled by one light switch and the other 3 lights had their own switch. This is the way the electrician wired the room and it worked well for Robbie, although the lights would forever be configured this way (2 groups of 3 lights each with their own switch). Introduce WiFi enabled bulbs like the LIFX BR30's that we installed and any constraints related to how the room is wired goes out the window. With the new WiFi bulbs installed, you will have the flexibility of turning any light, or combination of lights, on and off.
   Lifx offers [step by step guidance](#) for installing and configuring the bulbs. One tip worth passing on is to install and configure one bulb at a time. If you do as I did and install all 6 bulbs in the ceiling at once, then go to configure them, you waste time trying to sort out which bulb is which because they all have a preassigned network name.

7. Turn a tower fan on/off

Robbie has a tower fan in his room, and likes to run it from time to time on warm days. To enable him to turn the fan on and off by voice, we installed a [WeMo Mini WiFi Smart Plug.](#) For guidance on how to install a WeMo Mini Smart Plug, go [here](#) or search YouTube for examples.

For additional information related to this project, visit the following links:

- [Initial test of bed controller](#)
- TV6 News Coverage [Part 1](#)   Video https://youtu.be/4LQ0_4P8usk
- TV6 News Coverage [Part 2](#)   Video https://youtu.be/dDDpA-OXbjE
- Muscular Dystrophy Association - [MDA Blog](#)
- [Microsoft Alumni News Letter](#)

Appendix A Google Home Commands (Shortcuts)

Cable TV

Hey Google, Turn on TV
Hey Google, NBC
Hey Google, History
Hey Google, Discovery
Hey Google, TRUTV
Hey Google, CBS
Hey Google, ABC
Hey Google, NFL
Hey Google, National geographic
Hey Google, History
Hey Google, Fox sports
Hey Google, Military
Hey Google, ANE
Hey Google, FX
Hey Google, ESPN
Hey Google, ESPN2
Hey Google, AMC

Hey Google, GUIDE
Hey Google, Page Down - <ask harmony turn on page down>

Hey Google, Page Down Again – <ask harmony turn on page down again>
Hey Google, Page Up - <ask harmony turn on page up>
Hey Google, Page Up Again – <ask harmony turn on page up again>
Hey Google, Select

Hey Google, Channel Down
Hey Google, Channel Up
Hey Google, Mute TV
Hey Google, Netflix- <ask harmony turn on Netflix>
Hey Google, Watch tv - <ask harmony turn on watch tv>
Hey Google, Volume up
Hey Google, Volume Down

Netflix (Via Chromecast)

Hey Google, Watch NCIS on Netflix

After a program has been defined, you can switch back and for between tv and Netflix using the **Netflix** shortcut

(Turn Volume Up and Turn Volume down is for Google Home volume control)

DVD - ask harmony turn on DVD

Resources

Amazon Echo

Alexa Support   (Contact Support via the Amazon Alexa app - can have them call your number)

Google Home getting started

Google Home Help Forum

Google Home Support   Phone number for Google Home hardware support = 855-971-9121 (24/7 days a week)

Logitech Harmony Knowledge Base

Logitech Harmony Support Phone # for Support = 866-601-5644 (M-F 8am to 6pm PST)

Lifx

Wemo Support Phone number for Support = 1-844-745-wemo (9366)