
Final Report

Group: Dec14-05

The Senior Citizen Autonomous Remote Control

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Version	Date	Author	Change
1.0	11/30/14	BCT	Initial Document Drafted
1.1	12/7/14	BCT	Adding Appendices and User Interface Information
2.0	12/8/14	BCT	Final Document Complete

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1. Introduction

1.1 PROBLEM STATEMENT

Elderly people have difficulty using television remotes because the average remote typically has between 30 – 50 buttons. Television programming schedules are too difficult to read or comprehend by many elderly individuals, even if they have the mental and physical capability to select channels with a TV remote. Nursing homes lack the staff to support all clients' with around the clock assistance with TV remotes and schedules.

There are some very simple TV remotes that are marketed to support the geriatric population but many elderly people even have difficulty using these and they lack the programmability required to set up a pre-determined program schedule throughout the day or the week. Many people in nursing homes spend much of their day watching television yet they have a difficult time selecting television programming that meets their interests.

1.2 SOLUTION

An Android application that requires weekly assistance with scheduling shows. This application will be installed on an android device and will interact with an infra-red device called Irdroid. The application will instruct the Irdroid to send an IR signal with a specific channel number at the start time of a scheduled program. The Irdroid will change the channel when application instructs it to do so. A web interface will allow for remote scheduling of weekly programs. Both the application and website share a list of scheduled programs via server.

1.3 SCOPE

Create a prototype android application and website. The application prototype should be able to change channels and volume incrementally, turn the television on and off, as well as mute the television. The user will be able to add in their location (zip code), the television type, as well as their cable provider. After retrieving all the users' information the user will be able to schedule a list of programs that they would like to watch. After a program has been scheduled the application will change the television 30 seconds prior to the program starting. The website should have the scheduling functionality. The user will be able to log into the website, have a synced list of the programs already scheduled under the "Scheduled Programs" tab, and be able to add to that list by selecting shows off the "TV Guide" tab.

1.4 DEFINITIONS, ACRONYMS, ABBREVIATIONS

Term	Description
HW	Hardware
LIRC	Linux Infrared Remote Control
STB	Set Top Box
SW	Software
USB	Universal Serial Bus

1.5 REFERENCES

Irdroid™ user manual:

http://www.irdroid.com/wpcontent/uploads/2011/10/Irdroid_Users_Manual_1.0.pdf

Nexus 7 user manual:

<http://nexusmanual.com/>

2. System Design

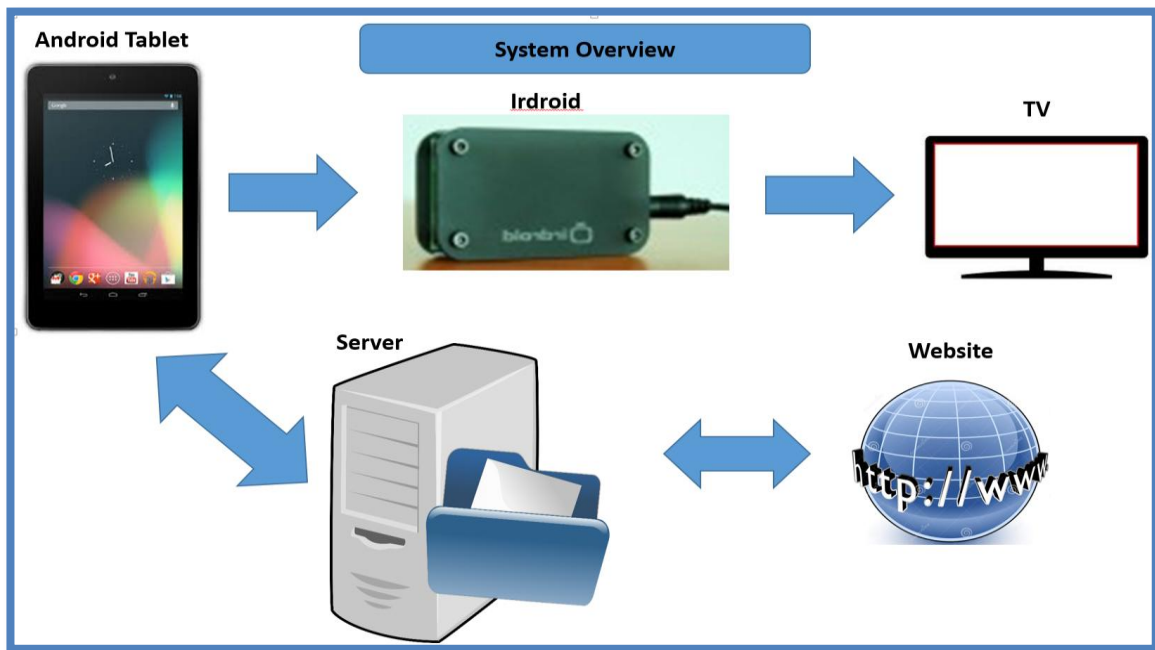


Figure 2-1: Complete System Overview

2.1 SYSTEM REQUIREMENTS

2.1.1 Functional Requirements

- The device **shall** have wireless internet access
- Each module in the application **shall** be connected to the correct activity
- TV guide or cable data in both the application and website **shall** be able to parse through in order for the user to be able to select a program to watch.
- Storage of user input **shall** stay on the device until the user deletes it.
- The application **shall** autonomously change channel
- Data **shall** be available on the application and website before channel programming can occur
- The application and website **shall** limit access to authorized users
- The application and website **shall** sync the scheduled program list with each other

2.1.2 Non-Functional Requirements

- The hardware (HW)/software (SW) **should** change the channel fast.
- The buttons/text in the application **should** be large for ease of use.
- The SW **should** auto connect to HW with Bluetooth.

- The HW/SW **should** be able to run 24/7
- The SW **should** pull up the correct TV guide based on area.

2.2 FUNCTIONAL DECOMPOSITION

2.2.1 Overall Functionality

Figure 2-2, shown below, is the overall functionality of the android application. The android tablet comes with the application already installed. The application then uses the SW to send a Bluetooth signal to the Irdroid device which, in turn, sends the correct IR signal to the user's television in order to autonomously change channels.

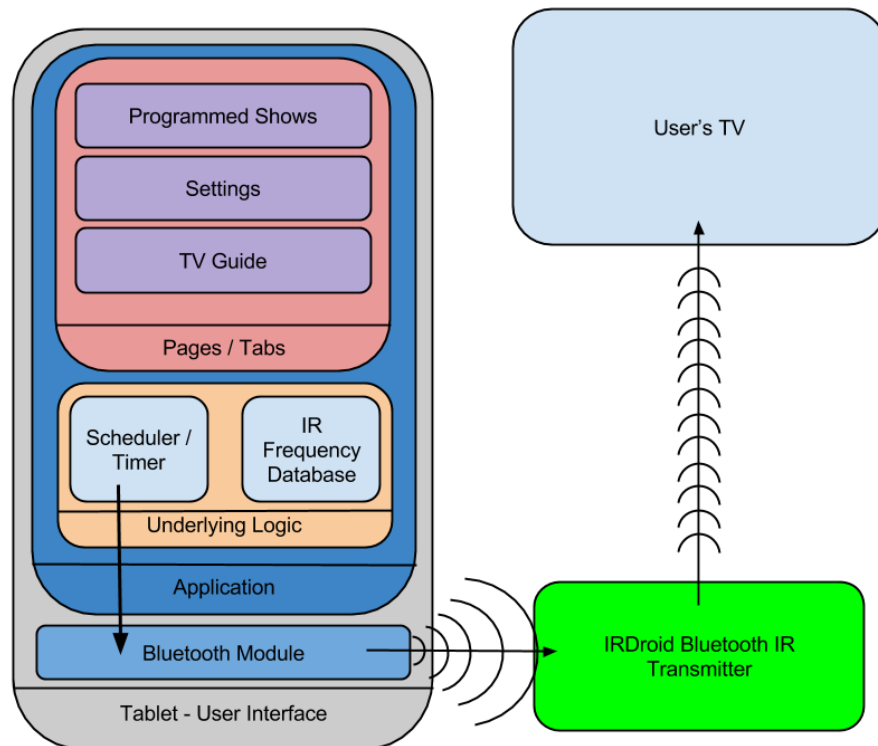


Figure 2-2: Overall Functionality of Application

Figure 2-3, shown below, is the overall functionality of the website. The website has the user first put in their login information. Then the website pulls the information from the server and parses the scheduled programs list and TV guide for that specific user and displays them in their respective tabs.

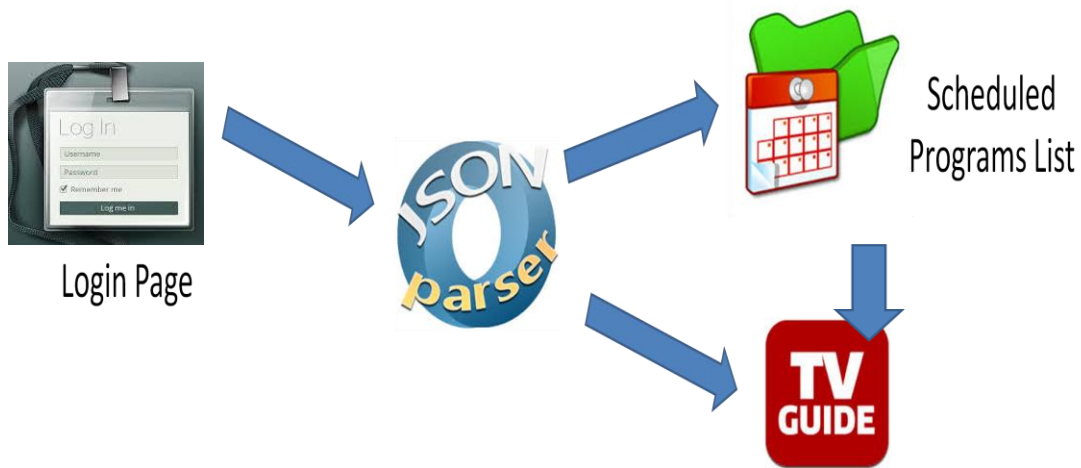


Figure 2-3: Overall Functionality of the Website

2.2.2 Sub-functions

Figure 2-4, shown below, is the overall functionality of the server. This server is built on an SQL Database. The main program is called "Integrator" which manages the caches of the database. The server also pulls TV guide information in XML format from Microsoft's Media Center server and then parses through the XML and stores all relevant information into a JSON file.

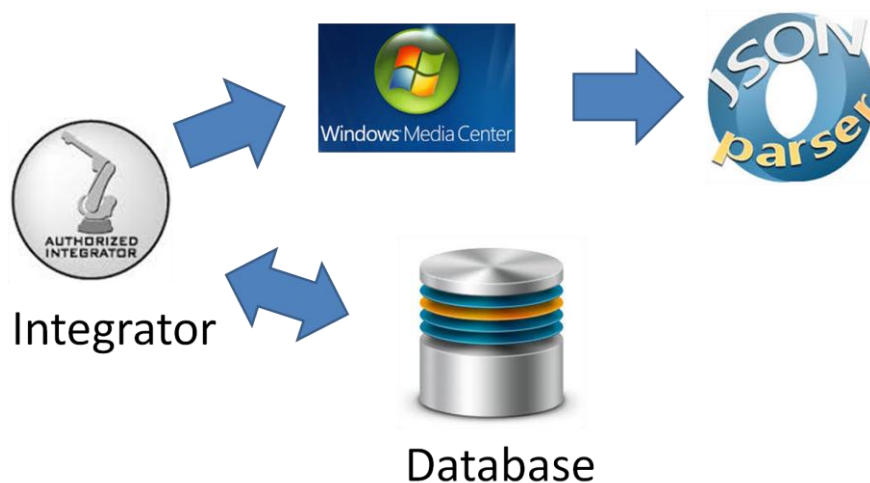


Figure 2-4: Overall Functionality of the Server

2.3 SYSTEM ANALYSIS

2.3.1 Sub-Function Processes

2.3.1.1 XML Parsing

To obtain the Television programming schedule we are employing the help of an application known as MC2XML which provides location and provider specific programming schedules for up to fourteen days. The program outputs an XML file containing much information we do not need so there arises the problem of how to extract the necessary information and inject it into our app. We solve this problem with a server side bulk parse. That will parse the critical information into memory and write a new, much smaller file to be sent to the app. This new file can then be opened by the app and read in much faster and the information can be displayed quickly.

2.3.1.2 Scheduler

The heart of the project is the scheduler which is where the app keeps track of when to switch the channel and turn the television on or off. This will be built mainly around interrupts, as they are able to wait to run a portion of code for a set amount of time. With one of these set for each channel change we assure that the channel is changed at the correct time.

2.3.1.3 Irdroid Functionality

With the decision to use the Irdroid v2.0 we are also able to inherit the functionality that is already programmed to work with the device. The Developer of the Irdroid has released open-source code for interfacing with the device as well as basic remote functionality. The Irdroid is able to control the televisions using the LIRC database which contains the frequency codes for all major brands of televisions. Allowing the device to change the frequencies that it is sending to be able to tailor too many different televisions.

2.3.1.4 Setup and Settings

The application we are developing will require initial setup by the user, including setting location, television programming provider, and television brand. These settings will allow the app to interface with the server to obtain the correct programming information as quick as possible.

2.3.2 Relation of Requirements and Functions/Sub-Functions

2.3.2.1 XML Parsing

The parser interacts both with the settings page and the TV Guide page, as the parser needs to pull in the TV on and time off times to be able to clip the guide into as small of a display as possible so the user is not overwhelmed with more information than needed, and then once the data is received and loaded, the parser passes the data to the TV Guide page to be displayed for the user to select which programs to watch.

2.3.2.2 Scheduler

The scheduler interacts with the TV Guide page and the settings page. The TV Guide page acts as a user friendly control for the scheduler. When a show is selected to be watched. The scheduler creates a timer to change the channel at the correct time to watch the specified show. The settings page is used to know when to schedule the TV on and off functions so the program does not attempt to change the channel when the TV is off.

2.3.2.3 Irdroid Functionality

The Irdroid code interacts with the main page of the app that functions as a very basic remote control allowing the user to turn the TV on or off, or change the channel up or down. The Scheduler also uses the Irdroid code. When a timer goes off and the app needs to change a channel it calls the Irdroid with the appropriate channel number and the Irdroid code uses the Bluetooth interface to send the correct signal to the Irdroid v2.0 to send the IR signal to change the channel on the Television.

2.3.2.4 Settings

The Settings page interacts with the XML Parser to set the location, provider, and time information to tailor the experience to the user's needs. The Settings page interacts with the scheduler to set the boundaries of when timers can be set as well as when to power on/off the television. The Irdroid also uses the Settings page to obtain the brand information for the television so that the correct IR frequencies can be sent to the television.

3. Detailed Design

3.1 INPUT/OUTPUT SPECIFICATIONS

3.1.1 Main Module

- IR/Bluetooth connection

3.1.2 Schedule Module

- Day
- Time
- Parsed channel information
- List of programs scheduled by the user currently

3.1.3 Settings Module

- Wireless
 - Network
 - Password (if applicable)
- TV Information
 - TV brand
- Cable
 - Provider
- Location
 - Country
 - Zip code

3.2 USER INTERFACE SPECIFICATION

3.2.1 App User Interface

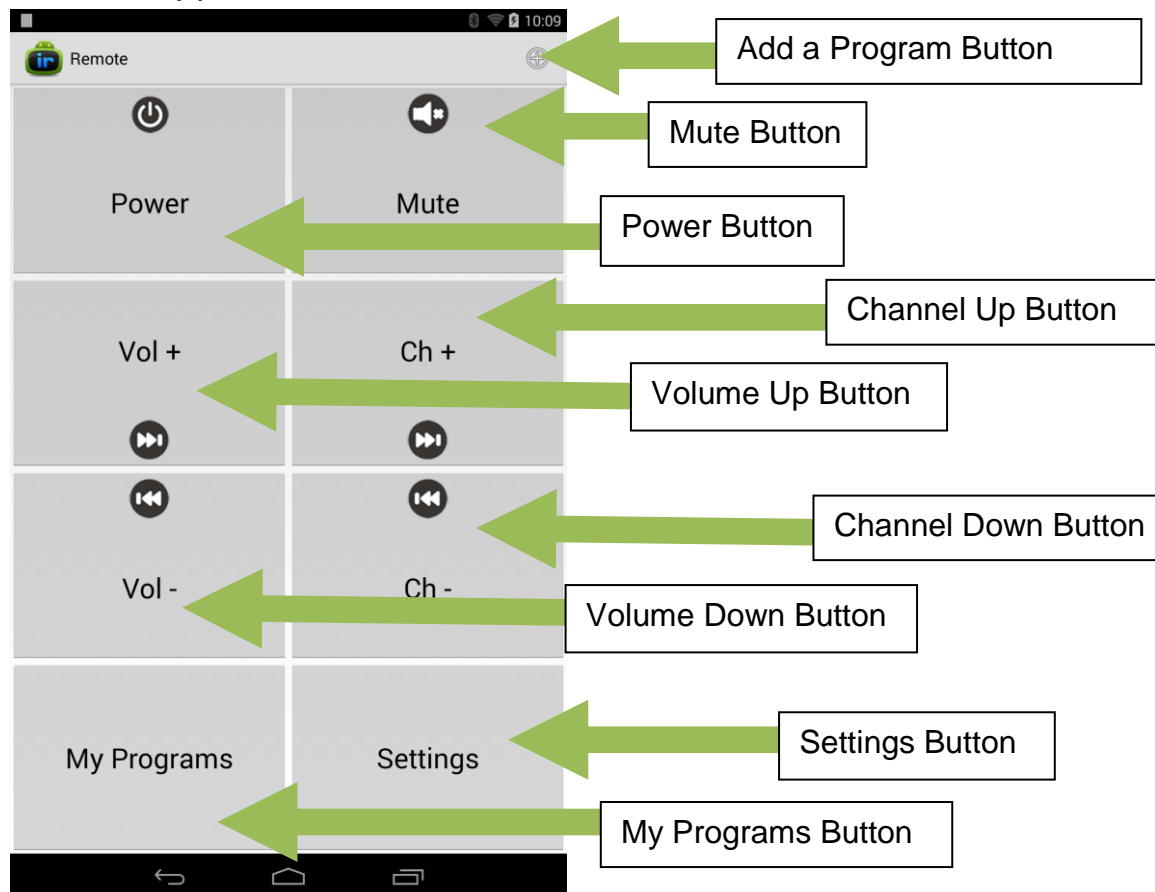


Figure 3-1: Basic Remote Page

Basic Remote Page (Figure 3-1): This is the basic remote page for the application. The Power button allows the user to turn the television on and off. The Mute button allows the user to turn the sound on and off with the button of a button. The Channel Up allows the user to increases the channel number by increments of 1. The Channel Down allows the user to decrease the channel number by increments of 1. The Volume Up allows the user to increases the volume level by increments of 1. The Volume Down allows the user to decrease the volume level by increments of 1. The My Programs button takes the user to the list of already scheduled programs page (Figure 3-2). The Settings button takes the user to the settings page (Figure 3-3). The Add a Program button takes the user to the start of the scheduler program, bringing them through three separate screens; Day, Time, and Channel List.

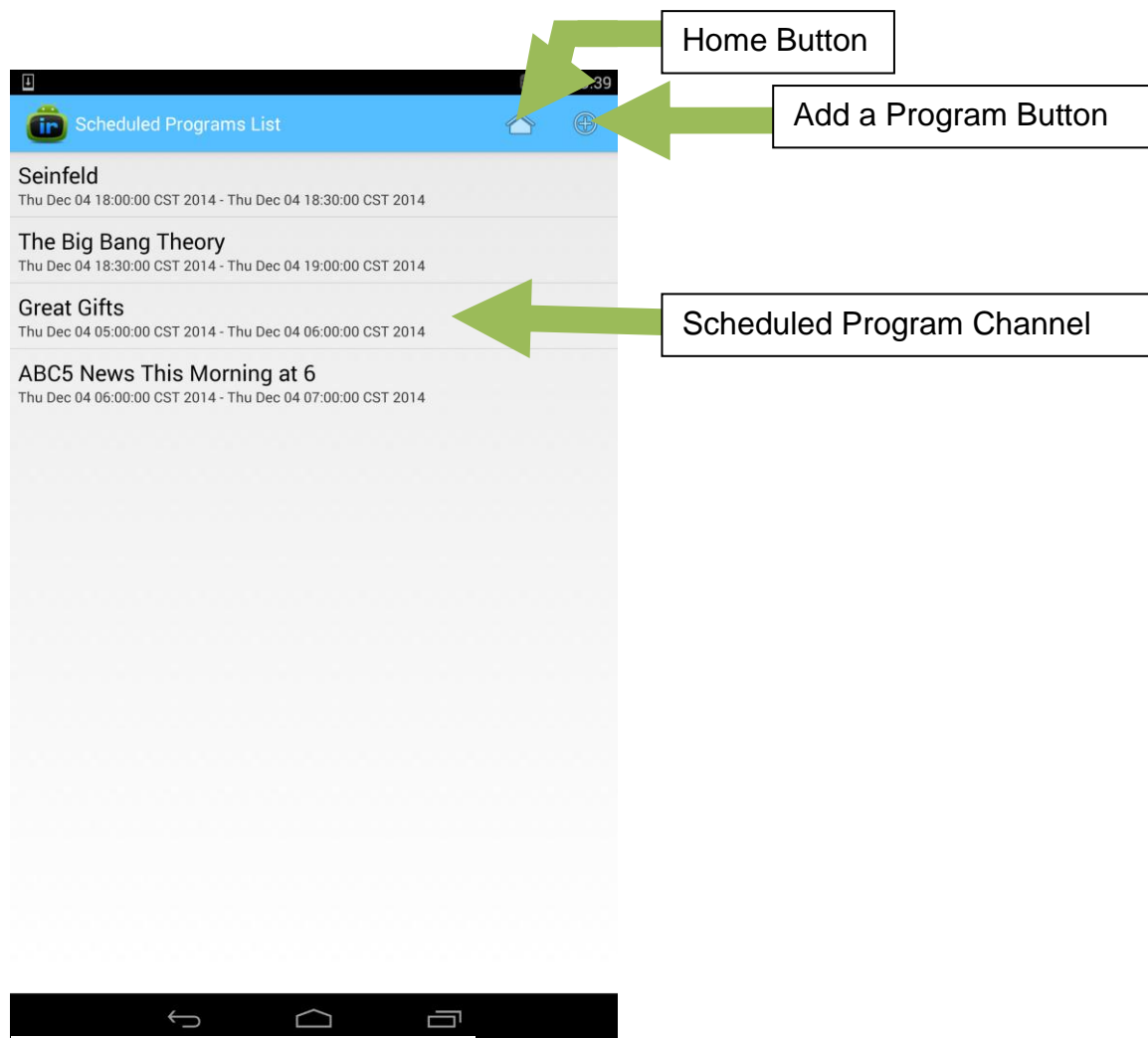


Figure 3-2: My Programs Page

My Programs Page (Figure 3-2): This page will display the current list of programs the user has already scheduled from the scheduler program. The Home button takes the user back to the Basic Remote page (Figure 3-1). The Add a Program button takes the user to the start of the scheduler program, bringing them through three separate screens; Day, Time, and Channel List (Figure 3-5). The Scheduled Program Channel is a selectable item which takes the user to a pop-up dialog (Figure...) to ask if the user would like to remove the program from that list.

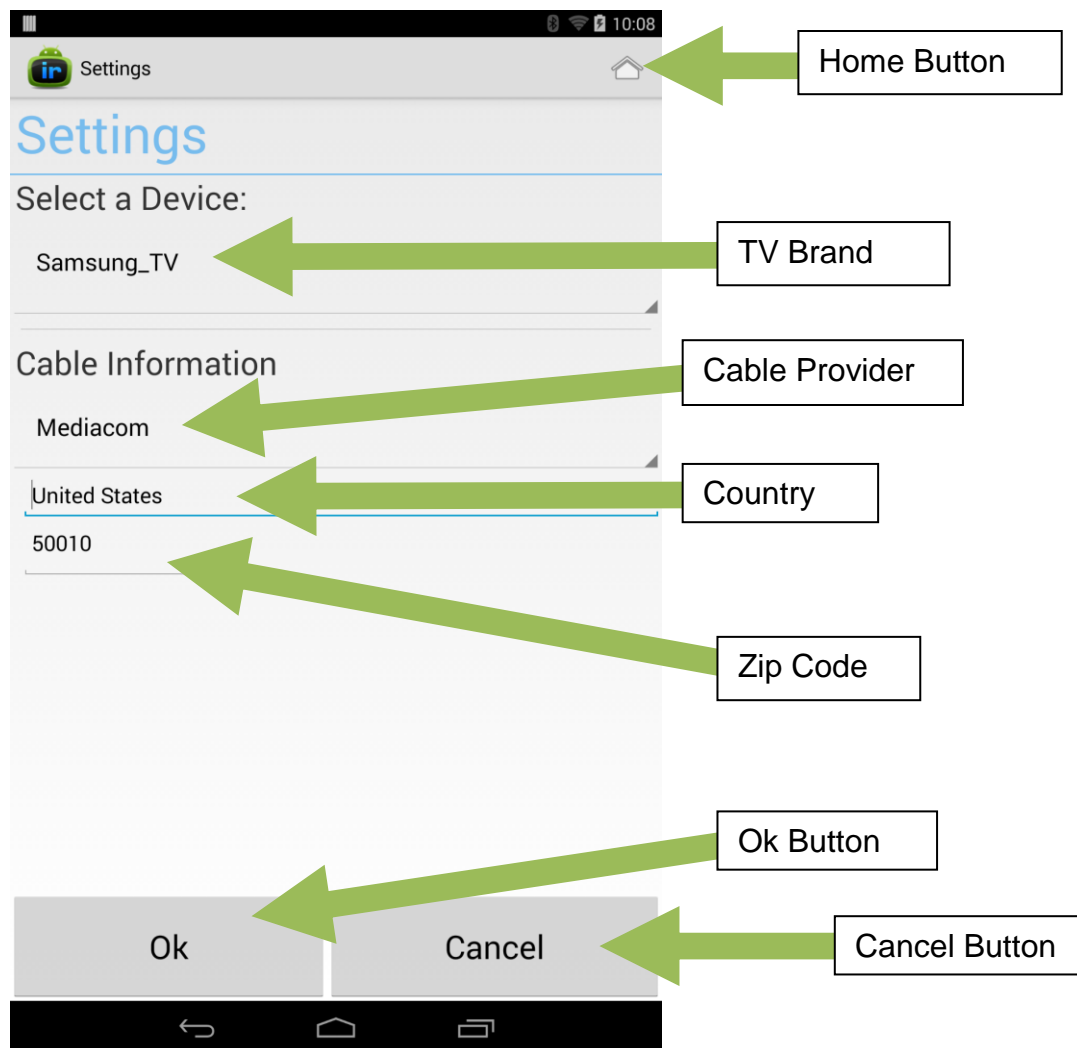


Figure 3-3 Settings Page

Settings page (Figure 3-3): This page is the first page the user will see when opening the application. It is used to setup and/or change the television information or cable information. The Home button takes the user to the Basic Remote page (Figure 3-1) without saving any changes made to settings. The Zip Code text box will allow users to input their zip code. The Country drop-down text box will allow users to input their country. The Cable Provider drop-down menu will allow users to select their cable provider from the list. The TV Brand drop-down menu will allow users to select their TV brand from the list of configuration files. The Ok button accepts changes to the variables determined by the user and returns the user to the Basic Remote page (Figure 3-1). The Cancel button does not save any changes to the variables determined by the user and returns the user to the Basic Remote page (Figure 3-1).

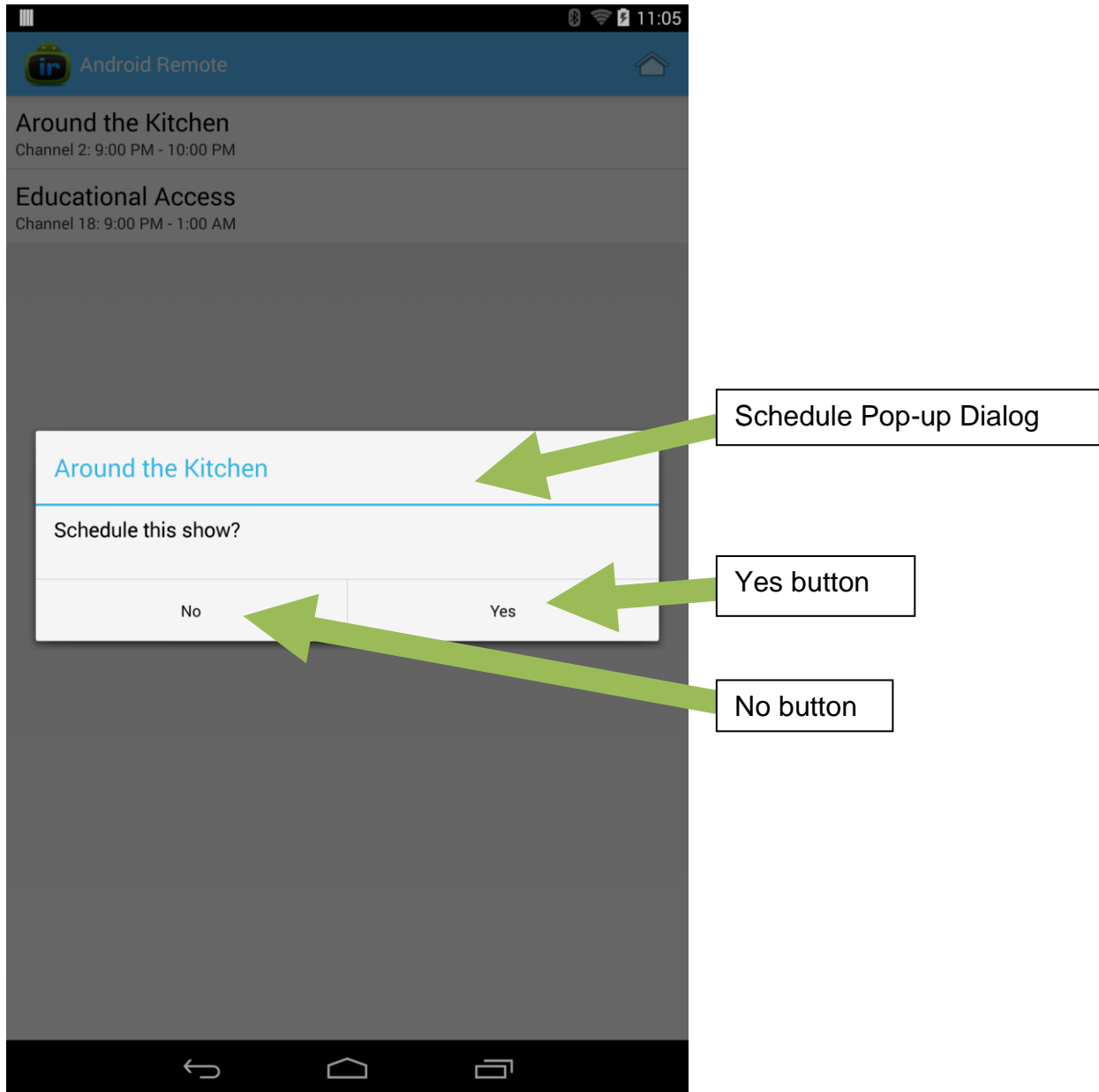


Figure 3-4: Schedule Pop-up Dialog

Schedule Pop-up Dialog (Figure 3-4): This page is used to confirm/deny that a program is wanted in the scheduled list. The dialog for the page reflects the program title and asks if the user would like to schedule this show. The Yes button would confirm and add the program to the schedule. The No button would take the user back to previous screen to make a different selection.

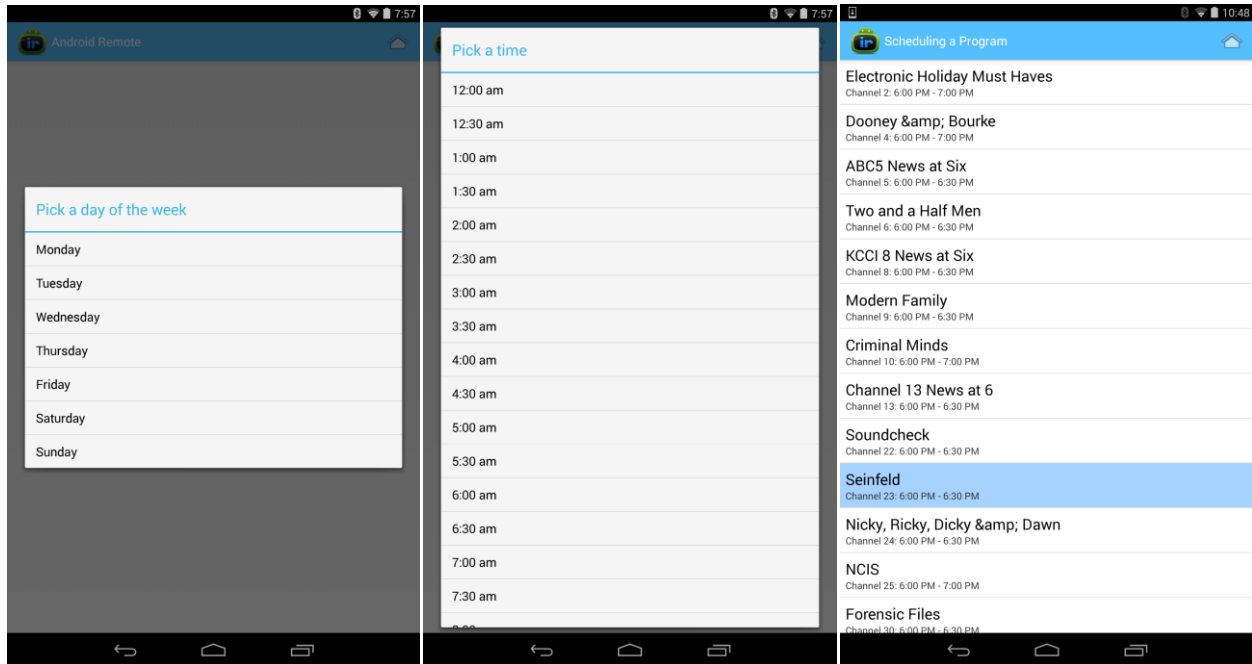


Figure 3-5: Day Time Channel List

Day, Time, and Channel List Pages (Figure 3-5): These pages make up the scheduling program. The user selects an Add a Program button from either the Basic Remote (Figure 3-1) or My Programs (Figure 3-2) pages. The user is then brought to the first picture (Day) to select a day of the current week they would like to add to the schedule. The user is then brought to the second picture (Time) to select a time in the previously selected day to get a list of programs for a specific time. Then the user is brought to the third and final picture (Channel List) which gives the user a parsed list of all the programs available at the previously selected day and time. Once the user selects a program, a pop-up dialog appears to ask if the user would like to schedule the show (Figure 3-4). Once a show is scheduled at the specified time the show becomes highlighted to show the user what is already selected. If there is already something scheduled during the specified day and time, a different pop-up dialog comes forward asking the user if they would like to overwrite the show already scheduled for that time (Figure ...).

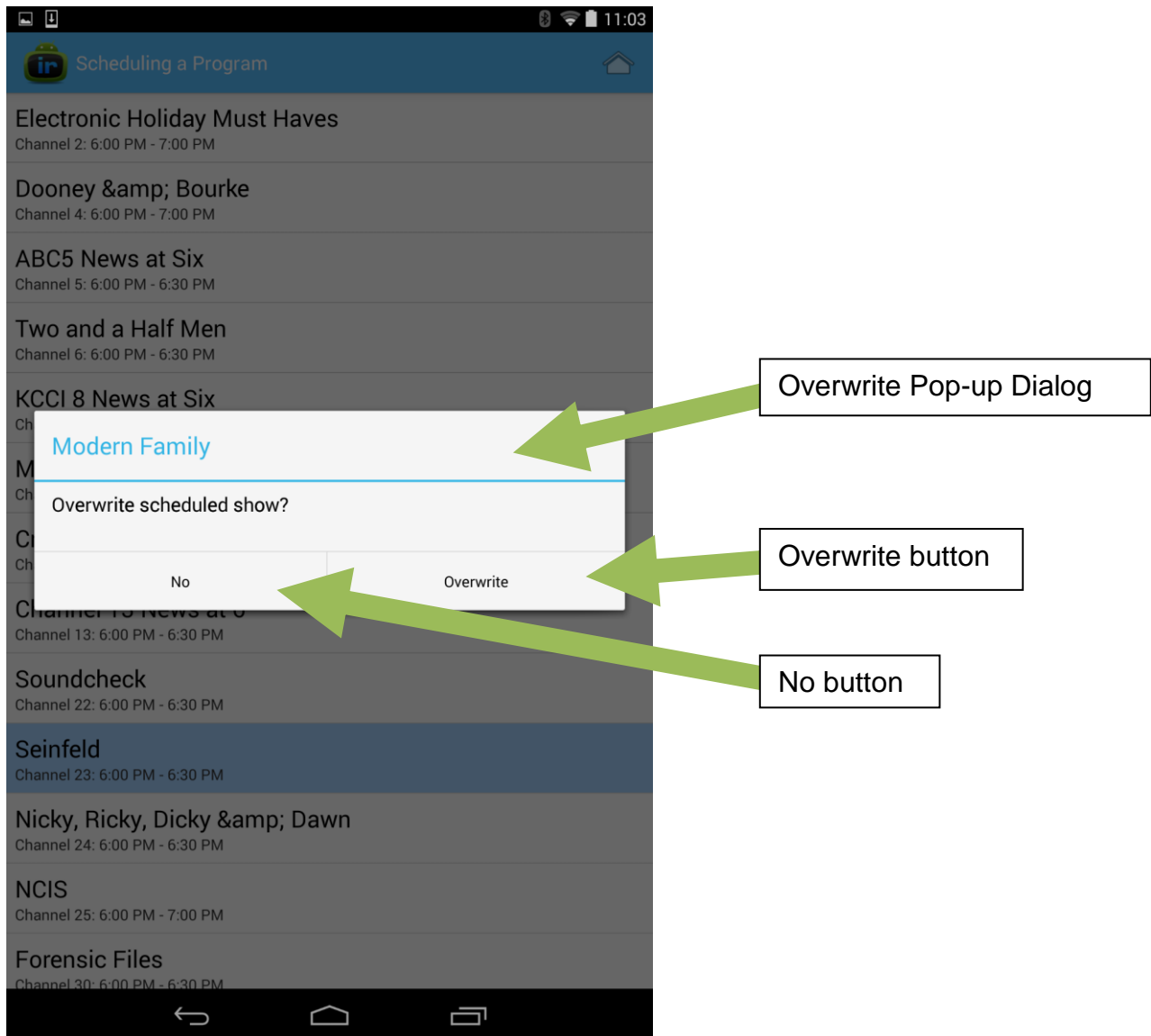
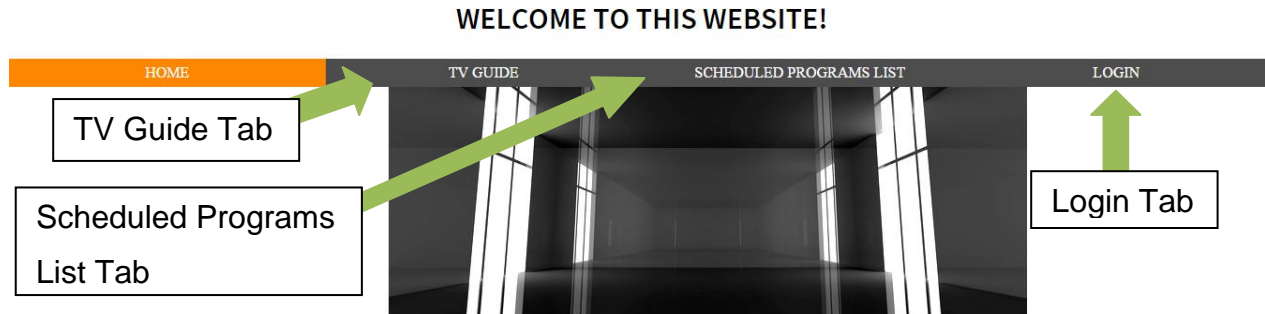


Figure 3-6: Overwrite Pop-up Dialog

Overwrite Pop-up Dialog (Figure 3-6): This page is used to confirm/deny that a program is to replace a program already in the scheduled list. The dialog for the page reflects the program title and asks if the user would like to overwrite already scheduled program with this show. The Yes button would confirm and overwrite the program to the schedule. The No button would take the user back to previous screen to make a different selection.

3.2.2 Website User Interface



TV Scheduling Website for Android

Welcome to the TV Scheduling Website for Android. This website is part of our senior design project and helps to remotely schedule TV programs without the need to be near an android device. Please use the navigation menu to see TV guide and log in to view a list of programs that you have already scheduled.

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Figure 3-7: Website Home Page

Website Home Page (Figure 3-7): This was the first page the user saw when bringing up the website on any internet browser. This page allowed the user to navigate between the Scheduled Programs List Tab (Figure 3-8) and the TV Guide Tab (Figure 3-9) in order to help schedule a list of shows from anywhere with an internet connection instead of on the app itself. In order to grab the information needed, the user had to log into the website with the application and device information.

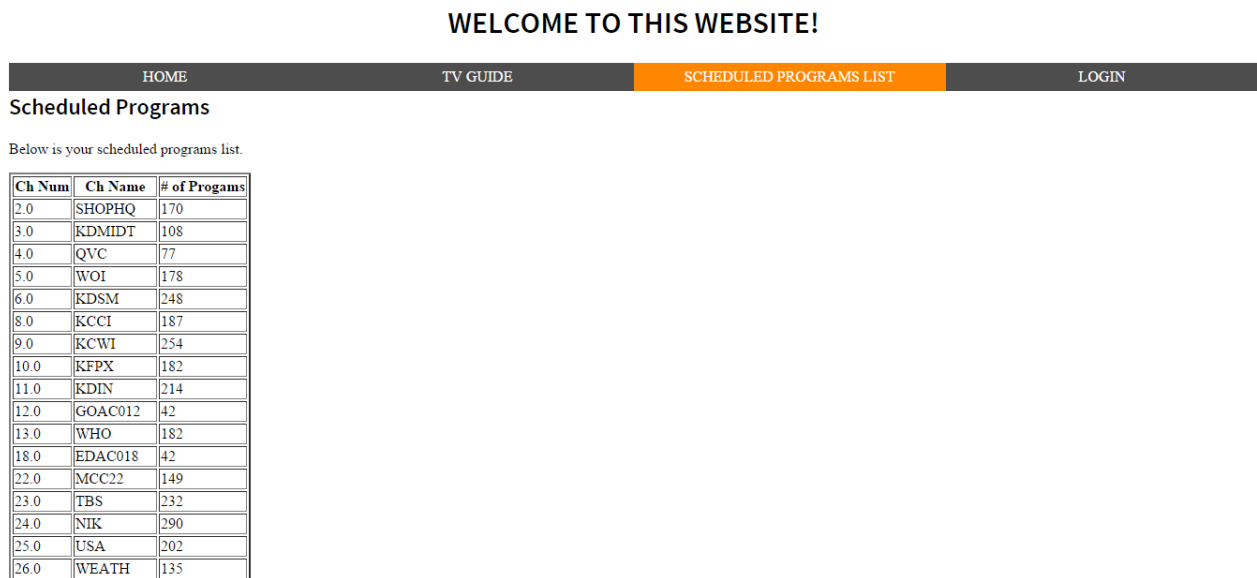


Figure 3-8: Website Scheduled Programs List Page

Scheduled Programs List Page (Figure 3-8): This page allowed the user to see the list of programs that have already been scheduled under the login account. Each item under the

list was a selectable button which brought a pop-up options window asking whether the user would like to edit or delete the item from the scheduled list.



Figure 3-9: Website TV Guide Page

Website TV Guide Page (Figure 3-9): This page allowed the user to see which programs are available at certain times during specific days. Each program in this page was a selectable button which automatically added that program to the list of already scheduled programs unless there was already a program scheduled for that time. If that was the case a pop-up window came up telling the user there was a program already scheduled for that time, what that scheduled program is, and if they wanted to replace that program with the newly selected program.

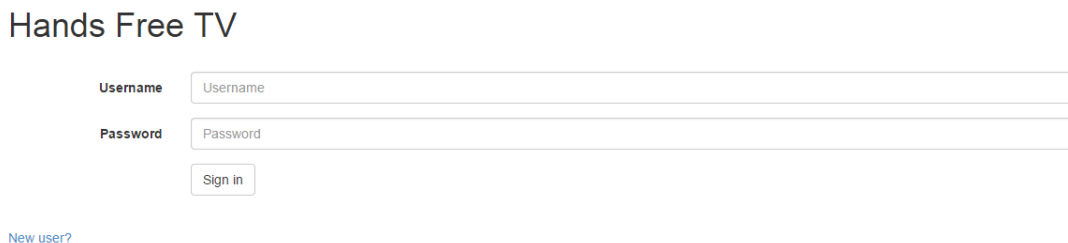


Figure 3-10: Website Login Page

Website Login Page (Figure 3-10): This page had the user log into their account for the application and website to sync together. The username was the MAC address on the android device used to set up the system and the password was the zip code used in setting up the application. This gave the user the correct data displayed in the scheduled programs list page (Figure 3-8).

3.3 HARDWARE (HW) AND SOFTWARE (SW) SPECIFICATIONS

3.3.1 HW Specification

- Irdroid™: A device that sends information through infrared and Bluetooth (see Figure 3-11: Irdroid Front Face and Figure 3-12: Irdroid Top Side).
- Tablet: A compact computer with multiple sensors, a display, and single battery unit.



Figure 3-11: Irdroid Front Face



Figure 3-12: Irdroid Top Side

3.3.1.1 Supported Remotes:

- LIRC Remotes (see a list)
- Samsung
- LG
- Motorola
- Sony
- Panasonic
- Philips
- Communication interface – Bluetooth (A2DP protocol)
- Remote control range 30 meters for Bluetooth (LOS)
- Cool Laser Cut enclosure

3.3.1.2 Module specs:

- Power supply 12V DC
- Bluetooth specification v2.1 + EDR
- Bluetooth Class II device
- Bluetooth Audio Profile (A2DP)
- IR LED wavelength 940nm

3.3.1.3 Package Contents:

- Irdroid v2.0 – 1pcs
- User Manual – 1pcs
- Irdroid Handbook – 1pcs
- Power supply cable – 1pcs

3.4 SW SPECIFICATION

There will be an android application that to control the television and channel the channel when the scheduled program is within 30 seconds of starting. A website will complement application to allow remote assistance in configuring which shows will be watched when.

3.5 TEST PLAN

3.5.1 Test Environment

3.5.1.1 "Alpha" Testing

A professional software engineer takes an android tablet with the application installed and an Irdroid device to their home and tests out the application on their television.

3.5.2 Test Designs

3.5.2.1 Checking Wireless Access

3.5.2.1.1 Function/Requirement Tested

- Wireless Internet access

3.5.2.1.2 Procedure

- Check the wireless flag on the hardware

3.5.2.1.3 Evaluation of Test Results

- True = Wireless Access granted
- False = Wireless Access denied

3.5.2.2 Module Connectivity

3.5.2.2.1 Function/Requirement Tested

- Autonomously change channel
- Each module must be connected to the correct activity

3.5.2.2.2 Procedure

- Run application and test each utility to see if they work correctly with their descriptions

3.5.2.2.3 Evaluation of Test Results

- Passed = All utilities work correctly with their descriptions
- Failed = All or some utilities do not work correctly with their descriptions

3.5.2.3 Parser

3.5.2.3.1 Function/Requirement Tested

- TV guide or cable data must be able to parse through in order for the user to be able to select a program to watch
- Data must be available before channel programming can occur

3.5.2.3.2 Procedure

- Give the parser fake data and then run to make sure it gives out the data needed for the application

3.5.2.3.3 Evaluation of Test Results

- Passed = All fake data was parsed correctly
- Failed = All or some fake data was parsed incorrectly

3.5.2.4 TV Selection

3.5.2.4.1 Function/Requirement Tested

- The app should be able to automatically find the right TV code for the TV setup

3.5.2.4.2 Procedure

- Run application's TV setup program in the settings page and test to see if the TV selected on the application matches the TV

3.5.2.4.3 Evaluation of Test Results

- Passed = TV setup program selected the correct TV
- Failed = TV setup program selected the incorrect TV

3.5.3 Test Results

"Alpha" testing on the application was completed by a volunteering engineer with software experience. This individual took the application on the team's Android device, an Irdroid device, and set up the application to work with their Samsung TV. Technical insight was given to the team after this individual finished using the application for auto-scheduling programs.

There were three issues the engineer encountered when running our application. There were issues handling large amounts of data, causing the application to freeze. There was also an issue with the Irdroid device itself. Since the engineer's TV also had Bluetooth capability, the Irdroid device would get confused and not always connect to the tablet. The final issue was the IR signal sent from the Irdroid device did not always register with the TV.

3.6 IMPLEMENTATION ISSUES

3.6.1.1 Accessing TV Guides

Getting access to all the cable providers' television guide is not as easy as we thought it would be. Many providers require you to pay to get that information. We have found a database that gives us this information for free, but does not include every cable providers. This database includes the major distributors, which is sufficient for now.

3.6.1.2 Irdroid shipment date

Irdroid shipment/arrival is unknown and we have contacted the company, but have not received any response. We need this device to be able to change the channel using the application we are developing on the nexus 7 tablet. If this device does not arrive by the time we return from spring break will design and implement our own version of this device.

3.6.1.3 Android eclipse environments

All the team members have our eclipse setup and configured differently. This is a problem because every time someone pushes to the repo and someone else pulls from the repo, eclipse will throw a ton of errors. To solve this problem we will be making a standard configuration for all members to follow.

3.6.1.4 Difficulty with Configuration Files for Remote Codes

All remote configuration (config) files for different television brands in this project are in one database from a third party, open source website. After September of 2014, the database became public allowing third party users to add their own config files for different models of the same television brand. The issue is all the files are no longer in the exact same format, making it difficult to incorporate into our application. To fix this problem we will change the application to parse through each config file, grabbing all the commands. Then we will search for all the commands needed in the application for that particular TV brand.

3.6.1.5 Dash and Dot codes not available

The dash "-" and period/dot "." symbols are needed for digital programming. Since digital programming is required as of January 2012, all televisions made prior to that date do not have an IR code for a dash or dot button to go straight to digital channels. Currently there is no solution for this issue. Possibly, someone could program a macro or script to go to whole number and then channel up to the actual dashed channel number.

3.6.1.6 Memory limitation of the guide JSON file

The amount of memory consumed when parsing the JSON objects into a Java object is larger than the amount of memory allocated for the android application. The memory

consumed is also much larger than the memory available for the device in general. When trying to load a large file the parsing of the JSON file would steal memory it did not own, which includes memory from the application using the file. The solution for this problem was splitting up the JSON files into days instead of by week so there are seven smaller files to parse through instead of one very large file to parse through, making the application not crash or free the memory allocated to parsing the TV guide data.

4. Conclusion

Our project assisted the elderly, physically and/or mentally impaired individuals with being able to have the luxury of watching the television shows of their choice little to no assistance. The tablet had our android application loaded on it. Someone assisting the elderly, physically and/or mentally impaired individual helped them schedule their current week's worth of programs. This was done using the device or using the website remotely. The application then changed the channel when a scheduled program was within 30 seconds of starting.

A. Appendix I: Operational Manual

Android Remote Application: Initial Setup

1. Plug the IR device into a wall outlet, a blue LED should be blinking if the device is connected correctly.
2. On the android device check to make sure Bluetooth is turned on. You will want to connect to the device called, "Bluetooth_nanoSPK". After connecting the IR device should be blinking less frequently (see Figure A-1).
3. Next download and open the app on your android device. It will bring up the "Settings" page as the first screen (see Figure A-3).
4. Under "Select a Device" touch the drop-down box. Select the TV model you have from the list.
5. Under "Cable Information" touch the first drop-down box. Select the cable provider you have from the list.
6. Touch the text box underneath the cable provider and enter your zipcode.
7. Touch the "Ok" button at the bottom of the page.
8. The app is now ready to work as a basic remote and to schedule programs (see Figure A-2).

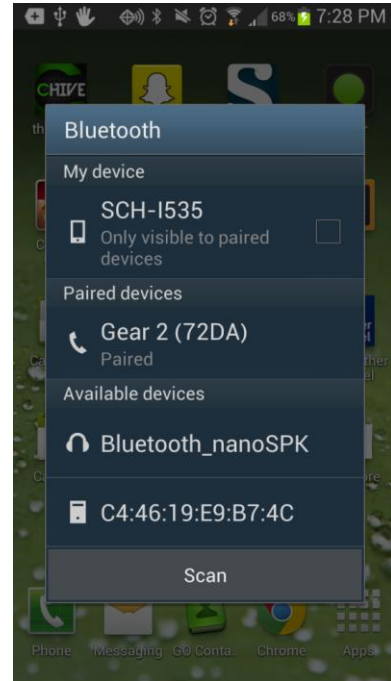


Figure A-1

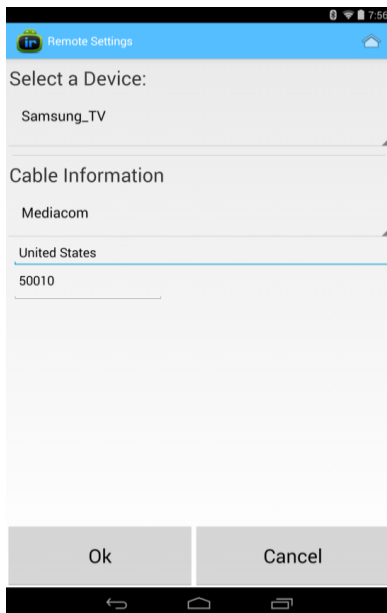


Figure A-3

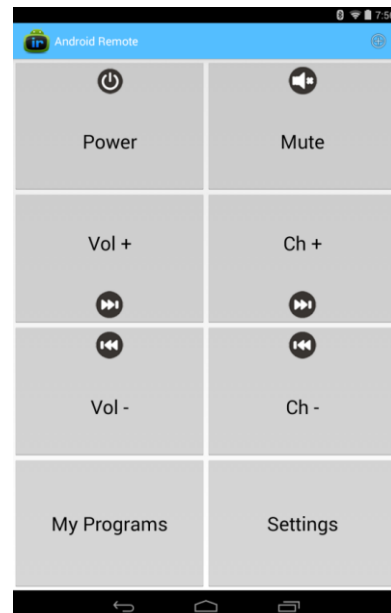


Figure A-2

Android Remote Application: Scheduling a Program

Option 1: From the Basic Remote Page

1. In the Basic Remote Page at the upper-right corner of the screen, select the symbol of a circle with a plus sign inside (see Figure A-4). This is the Add a Program button.
2. Select a day of the current week you want to schedule (see Figure A-8).
3. Select the hour of the previously selected day you want to schedule (see Figure A-7). The app will then populate the screen with all possible channel guide options.
4. Select the show/channel you want for the previously specified time period (see Figure A-6).
5. A pop up will show on screen confirming you want that show, for that hour (see Figure A-5). Select yes and the device will change the TV to that channel at that time.
6. Repeat process to add more channels.

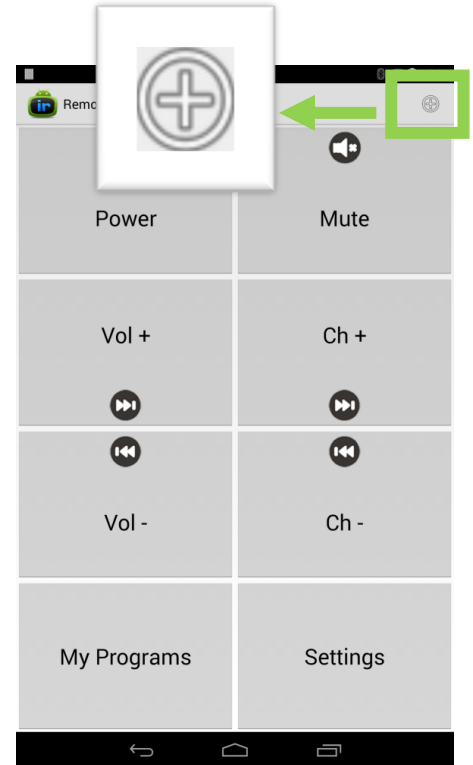


Figure A-4

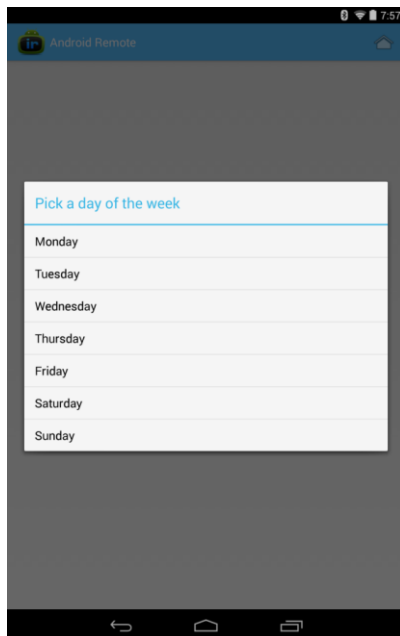


Figure A-8

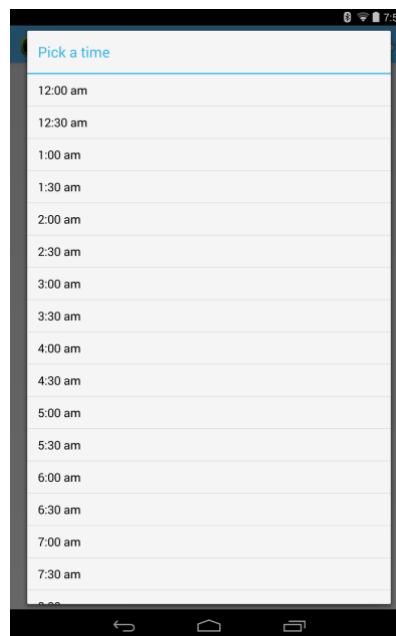


Figure A-7

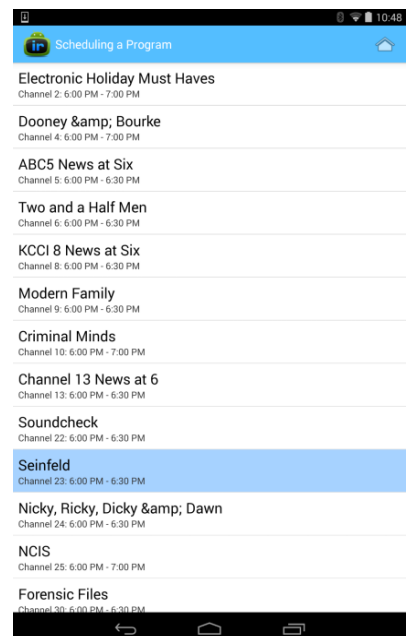


Figure A-6

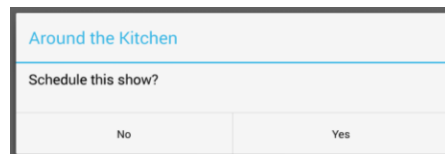


Figure A-5

Option 2: From the My Programs Page

1. In the Basic Remote Page, select My Programs. At the upper-right corner of My Programs, select the symbol of a circle with a plus sign inside (see Figure A-9). This is the Add a Program button.
2. Select a day of the current week you want to schedule (see Figure A-12).
3. Select the hour of the previously selected day you want to schedule (see Figure A-13). The app will then populate the screen with all possible channel guide options.
4. Select the show/channel you want for the previously specified time period (see Figure A-11).
5. A pop up will show on screen confirming you want that show, for that hour (see Figure A-10). Select yes and the device will change the TV to that channel at that time.
6. Repeat process to add more channels.

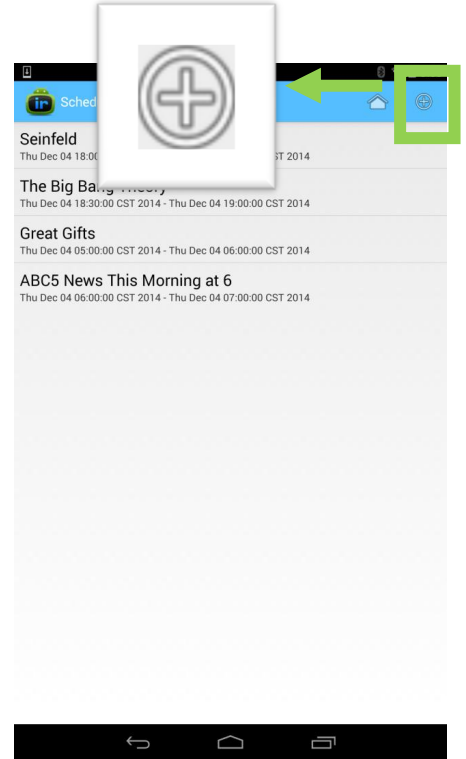


Figure A-9

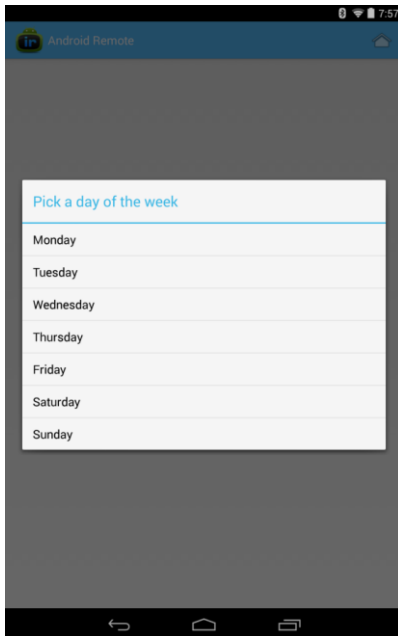


Figure A-12

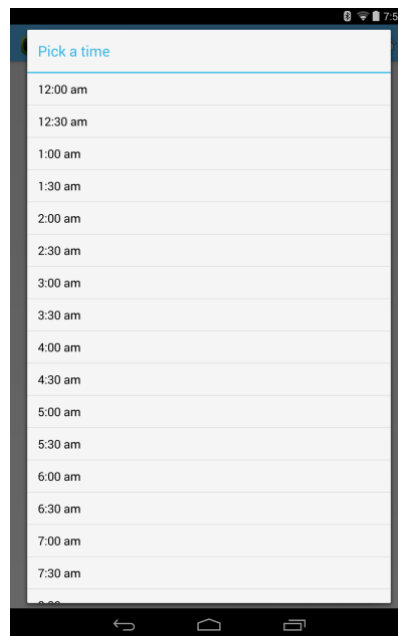


Figure A-13

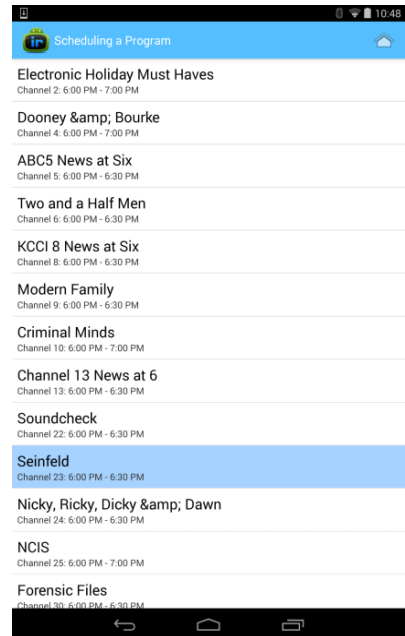


Figure A-11

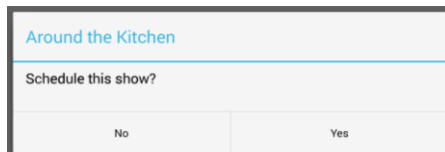


Figure A-10

Android Remote Website: Scheduling a Program

1. In any internet browser enter <http://sddec1405.ec.e.iastate.edu/> in the address bar, taking you to the website home page (see Figure A-14).
2. Click the login tab.
3. The username is the MAC address of the android device.

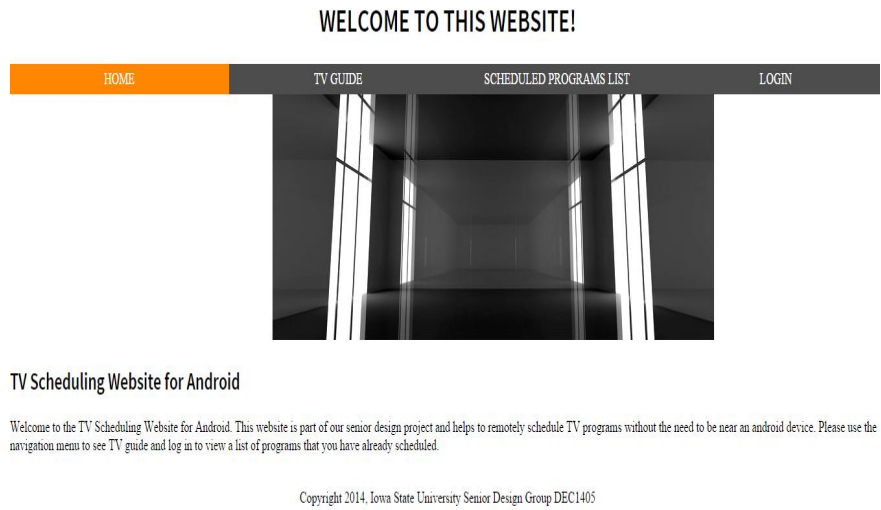


Figure A-14

- a. Go to the android device's settings page.
 - b. Go to "About -> Status". The MAC address is in this page (see Figure A-16).
4. The password is your zip code used when setting up the device on the android device's application (see Figure A-15).

Hands Free TV

Username

Password

[New user?](#)

Figure A-15

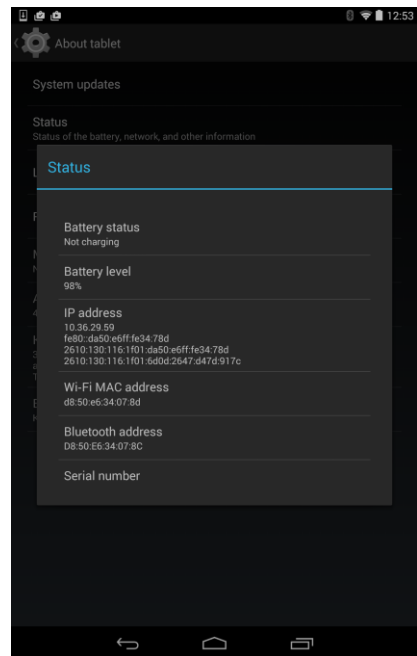


Figure A-16

5. Click on the TV Guide tab (see Figure A-17).
6. Click on any program in the TV Guide table.
7. Click "Ok" on the pop-up asking if you want to schedule the program.
8. Click on the Scheduled Programs List tab (see Figure A-18). All programs selected from the TV Guide tab are in table.

WELCOME TO THIS WEBSITE!

HOME	TV GUIDE	SCHEDULED PROGRAMS LIST	LOGIN
------	----------	-------------------------	-------

TV Guide

Below you can find a list of programs that you can add to you scheduled list (you need to login in order to do this).

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
--------	--------	---------	-----------	----------	--------	----------

Ch Num	Ch Name	# of Programs	Start Time	Title
2.0	SHOPHQ	170	2014-11-24:0:0	Great Gifts
2.0	SHOPHQ	170	2014-11-24:1:0	The Best of ShopHQ
2.0	SHOPHQ	170	2014-11-24:10:0	Practical Gift Ideas
2.0	SHOPHQ	170	2014-11-24:11:0	Portofino Italian Jewelry
2.0	SHOPHQ	170	2014-11-24:12:0	Connie's Gifts of Style
2.0	SHOPHQ	170	2014-11-24:13:0	Connie's Gifts of Style
2.0	SHOPHQ	170	2014-11-24:14:0	Great Gifts
2.0	SHOPHQ	170	2014-11-24:15:0	Portofino Italian Jewelry
2.0	SHOPHQ	170	2014-11-24:16:0	Wine and Mellow Eshions

Figure A-17

WELCOME TO THIS WEBSITE!

HOME	TV GUIDE	SCHEDULED PROGRAMS LIST	LOGIN
------	----------	-------------------------	-------

Scheduled Programs

Below is your scheduled programs list.

Ch Num	Ch Name	# of Programs
2.0	SHOPHQ	170
3.0	KDMIDT	108
4.0	QVC	77
5.0	WOI	178
6.0	KDSM	248
8.0	KCCI	187
9.0	KCWI	254
10.0	KFPX	182
11.0	KDIN	214
12.0	GOAC012	42
13.0	WHO	182
18.0	EDAC018	42
22.0	MCC22	149
23.0	TBS	232
24.0	NIK	290
25.0	USA	202
26.0	WEATH	135

Figure A-18

B. Appendix II: Alternative Versions of Design

1. The Initial Design:

Originally, the team brainstormed an idea where the project was only going to use the Irdroid device found from researching on the internet and an android tablet. The application was going to take an elderly person's television schedule for one week and then the application would start the application and continue to run through that same list of scheduled programs over and over, week after week. The reason the team came up with this idea was due to the fact that most, if not all, elderly people in assisted living or nursing homes watch the exact same programs every day, week after week. This was a simple design and did not require a server, database or website.

This design was terminated after talking with the advisor/client for this project. The team realized the client wanted more usability on the application.

2. The First, Full Design:

After discussing different options with the advisor/client, the team came up with an idea of having the application be able to schedule a new set of pre-scheduled programs every week. This involved an assistant at the facility or a family member to come into the elderly person's room once a week and work with that person to get a list of programs set for that week. The team realized this required work with a server and database in order to store all of the TV Guide information so the application could pull the shows for the user once a week. This added more complexity to the initial design while adding more usability for the project, satisfying the advisor/client concerns.

This design was used but not the final design due to more discussion with the advisor/client. The team discovered an inconvenience about family members trying to go visit the elderly people. Some members were not close to the facility and weekly visits were not feasible. In order to fix this inconvenience, the team decided to design a website to let the family members log in and set up the program list without having to make the trip week after week. The application then would pull the updated list from the website and use it to autonomously change the channel. This was the team's final design.

C. Appendix III: Other Considerations

1. Memory Limitations:

In order to have the project fully functional with the final design of programming a new list of shows each week, there had to be a device or computation engine to parse and hold all the data for the TV Guide information. Android devices (smart phones, tablets, etc...) did not have the amount of memory needed to parse and store all the information so the team decided to create a server to parse and store the information so the android device could save the memory for strictly the application.

2. User Response Time:

Due to the varying ability of each elderly person in nursing homes or assisted living facilities, the team had to take into account the accessibility of the application. Most, if not all, of the time a nurse or family member would help them schedule the list of shows but the team also provided an overwrite remote with basic functionality (mute, power, channel up/down, and volume up/down) for the elderly people themselves. The application needed to have the right amount of accessibility so all elderly people could use the override, basic remote feature so the remote has large buttons with pictures and text to help the elderly use it.

3. Internet Data Rates:

Internet data rates were a variable considered when designing and implementing the project. The team knew providers, like Mediacom, charge extra for faster internet rates. This affected how fast any device downloaded files from the server. With this issue, the team had to determine what rates were used, on average, in nursing homes or assisted living facilities in order to code the application to run smoothly and quickly under all internet data rates.