PROJECT PROPOSAL:

MINI-MIXER

JUNE 4, 2015

DEPARTMENT OF ELECTRICAL ENGINEERING & COMPUTER SCIENCE

UNIVERSITY OF CENTRAL FLORIDA

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SENIOR DESIGN I

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TABLE OF CONTENTS

INTRODUCTION

DESCRIPTION

The Mini-Mixer is a small appliance designed to be compact, fast, and user-friendly for everyday use in a kitchen or dinner/garden party setting. The appliance is designed to automatically mix drinks as quickly and accurately as possible. The appliance take advantage of the user's smart phone to provide a simple, intuitive interface to create and order drink mixtures on the machine via wireless communication.

MOTIVATION

As the world inches closer and closer to automation in all facets of the consumer's life, there is significant room for improvement in the area of beverage dispensers. Specifically, there are very few options for a high quality drink mixer that is both affordable and small enough to carry to different locations such as parties, beach houses or other "getaway" destinations.

GOALS AND OBJECTIVES

The main objective of his project is to design a drink mixer that is small and simple enough to have as many use cases as possible for the consumer. A one-off permanent fixture such as Coca-Cola's Freestyle machine and similar products is not viable for the everyday consumer. However, these types of machines have become extremely popular at restaurants in recent years due to the combination of ease-of-use and high level of customization in mixing the drinks.

The average person will only be willing to purchase an appliance such as this if the number of use cases increases to a point that makes it a reasonable investment for the size and price point of the appliance. We plan to achieve this by making the unit as small as possible to become a semi-portable machine that has a robust feature set suitable for many applications in the consumer's life.

REQUIREMENTS AND SPECIFICATIONS

HARDWARE REQUIREMENTS SPECIFICATIONS

- The unit will be designed to be very compact – small enough to place on a tailgate, countertop, or take out to your patio.
  - The unit shall have a dry weight of no more than 40 lbs.
- The "mixing" process is to be reasonably fast and should not keep the user waiting too long.
  - The unit should produce a mixed drink from start to finish in no longer than 1 minute.
- The "mixing" process should have good accuracy, with a margin of error that you could expect from a human bartender.
  - The amount of fluid in the components of each mix should have an error of no more than +/-10%.

- The variety of drinks should be sufficiently large so that the user has enough choice of mixes that they are not constantly switching out drinks or frustrated at the lack of options.
  - The unit shall provide enough resources to hold 7 different fluids.
- The unit should have a power rating that is safe for both the branch circuit of the source as well as for the user. A power rating around the average small kitchen appliance shall be chosen.
  - The unit shall consume no more than 1,000W of power under load.
- The mixer is meant to be low-cost to be viable in the consumer market. The prototype should be comparatively low-cost as well.
  - The mixer prototype should have a combined total cost of no more than $800.
- The mixer should be extremely easy to use through a mobile device.
  - The mixer will be controlled using a mobile device with an application.
- The mixer should be both portable and have a semi-universal bottle acceptance. These containers should be able to accommodate both standard 750mL spirit's bottles as well as 1-2 L soda bottles.
  - The size of the accepted fluid containers shall be no higher than 250mm.
- The mixer should be able to keep fluids at a chilled temperature that is appropriate for consumption of cocktails and general fluid mixtures.
  - The unit should maintain an internal temperature of the fluid's enclosure of no higher than 55 degrees Fahrenheit.
- The unit is meant to be semi-portable as well as small enough to fit on common tabletop areas. With this in mind, we are aiming for a size similar to the common microwave appliance.
  - The unit shall have dimensions no larger than 2ft H X 3ft W x 3ft D.
- The unit should be able to accommodate most popular cocktail glass types including highball, Collins, and martini glasses.
  - The unit shall accept a glass size of 6 inches in height and 4 inches in diameter.
- The unit's server should be able to accept cocktails submissions from the mobile device at an acceptable range from the unit. With this in mind, the range should be acceptable for a kitchen or outdoor gathering setting.
  - The unit should be able to accept cocktails orders from a range of up to 20ft.

SOFTWARE REQUIREMENTS SPECIFICATIONS

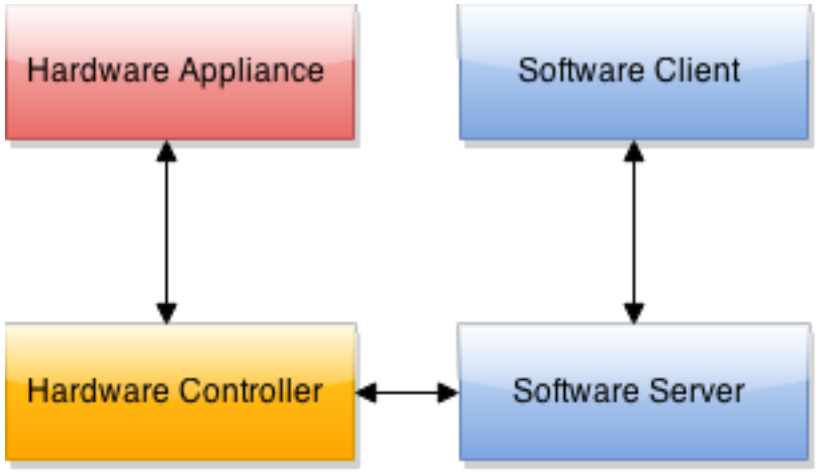
- The mobile application is meant to be very user-friendly and simple to use, while still providing a variety of mixture choices.
  - We're placing a limit of no more than a 4 step process from the application's start screen to a drink in the cup.
- The mobile application should be able to create all possible combinations of the given fluids in the mixing unit.
  - The application should be able to create 128 different combinations of the fluids in the machine.
- The user should be able to adjust the fluid ratios in their mixtures. This must also be in line with the expected accuracy of our pumps used for the fluids.
  - The mobile application should be able to create mixtures in units/steps of 0.5oz.
- The mobile application should limit the total mixture size to a value that satisfies the cup size, average cocktail size, and expected size of general mixtures that are otherwise not cocktails.
  - We are placing a limit of no more than 8oz(~237mL) on the total mixture size that application can create.
- The time it takes from submission of the mixture until the mixing unit is ready to begin mixing should be sufficiently fast so that the user is not frustrated with the wait time.

- The total time from submission of the mixture until the machine begins mixing should be no longer than 1 second.

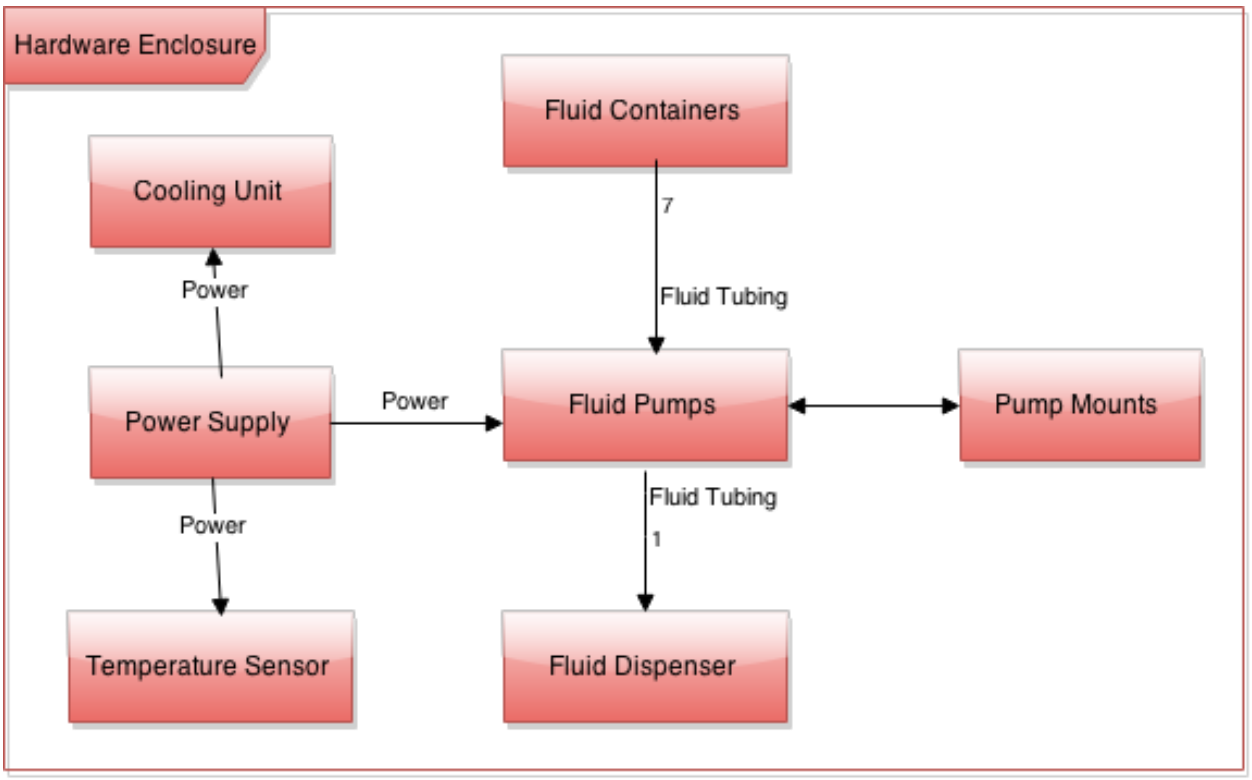
- The user should be able to store a large number of custom drinks in their profile.
  - The maximum allowed custom mixtures for a single user will be limited to 100.
- The user should be able to view a top list of most favorited/popular drinks while still allowing the application to remain performant.
  - The maximum allowed size of the top list will be limited to 100.
- The mobile application should only provide the amount of drinks available to the machine.
  - The application will provide the limit of drinks on the machine, which is 7. Specifically, the application may only provide options for the current types of the 7 drinks in the machine at any given time.

HIGH-LEVEL MODULES

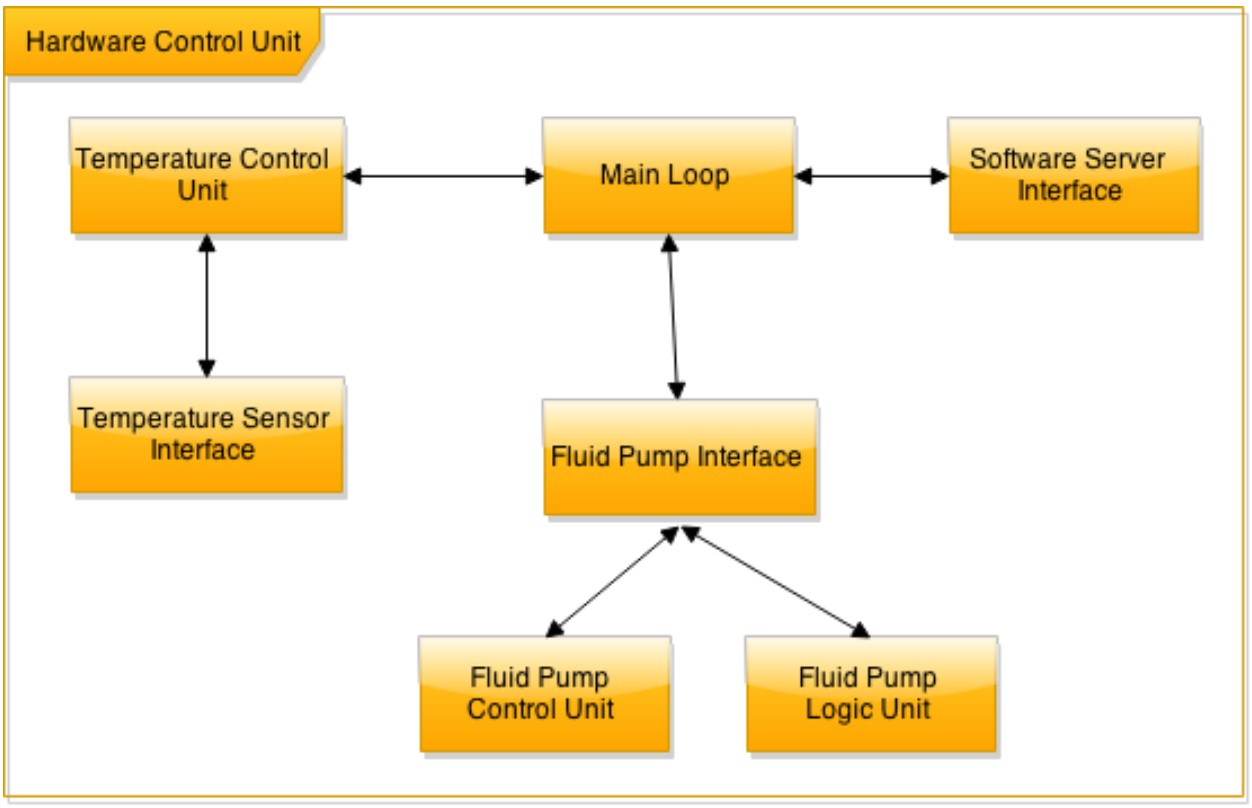
PROJECT OVERVIEW



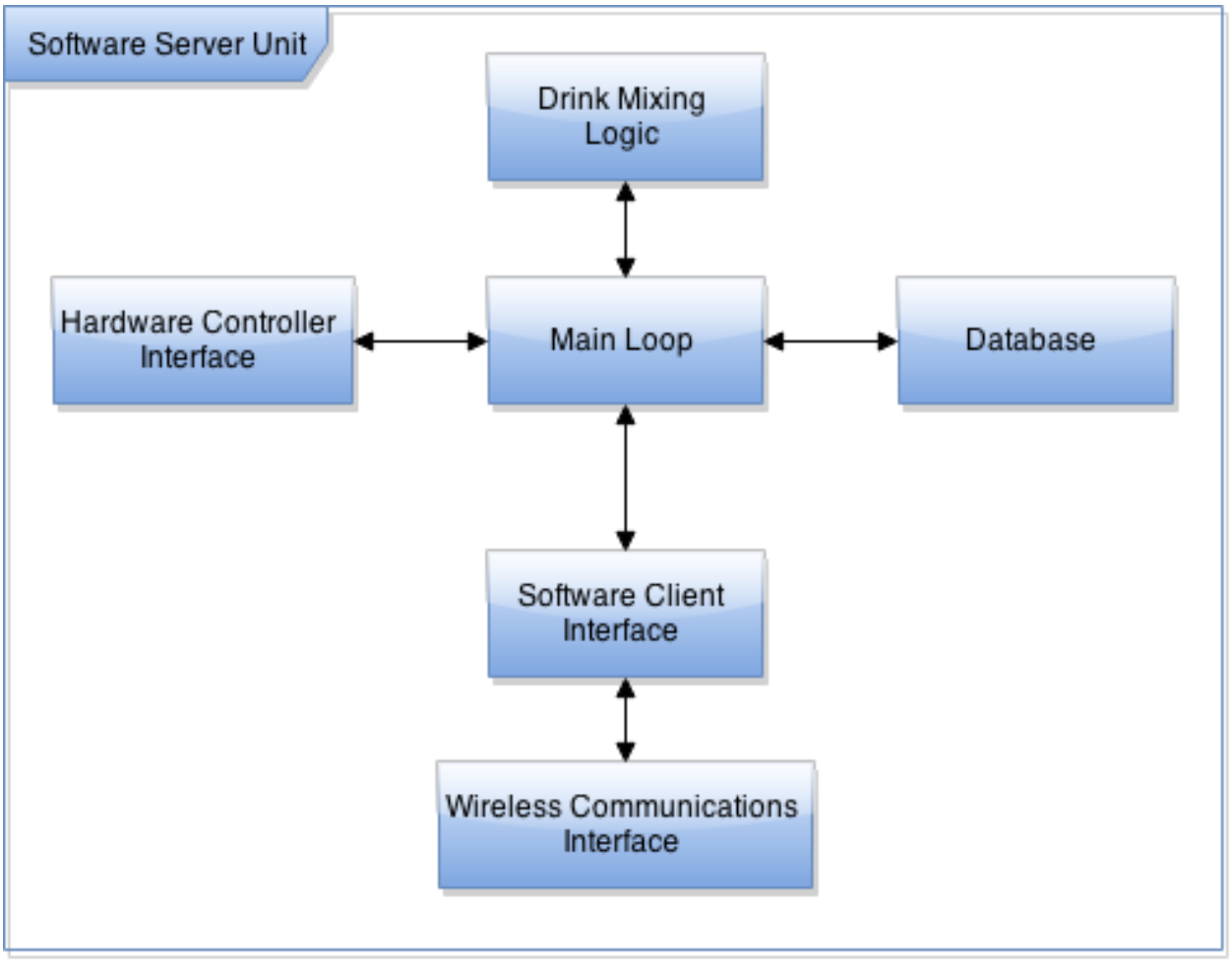
HARDWARE APPLIANCE



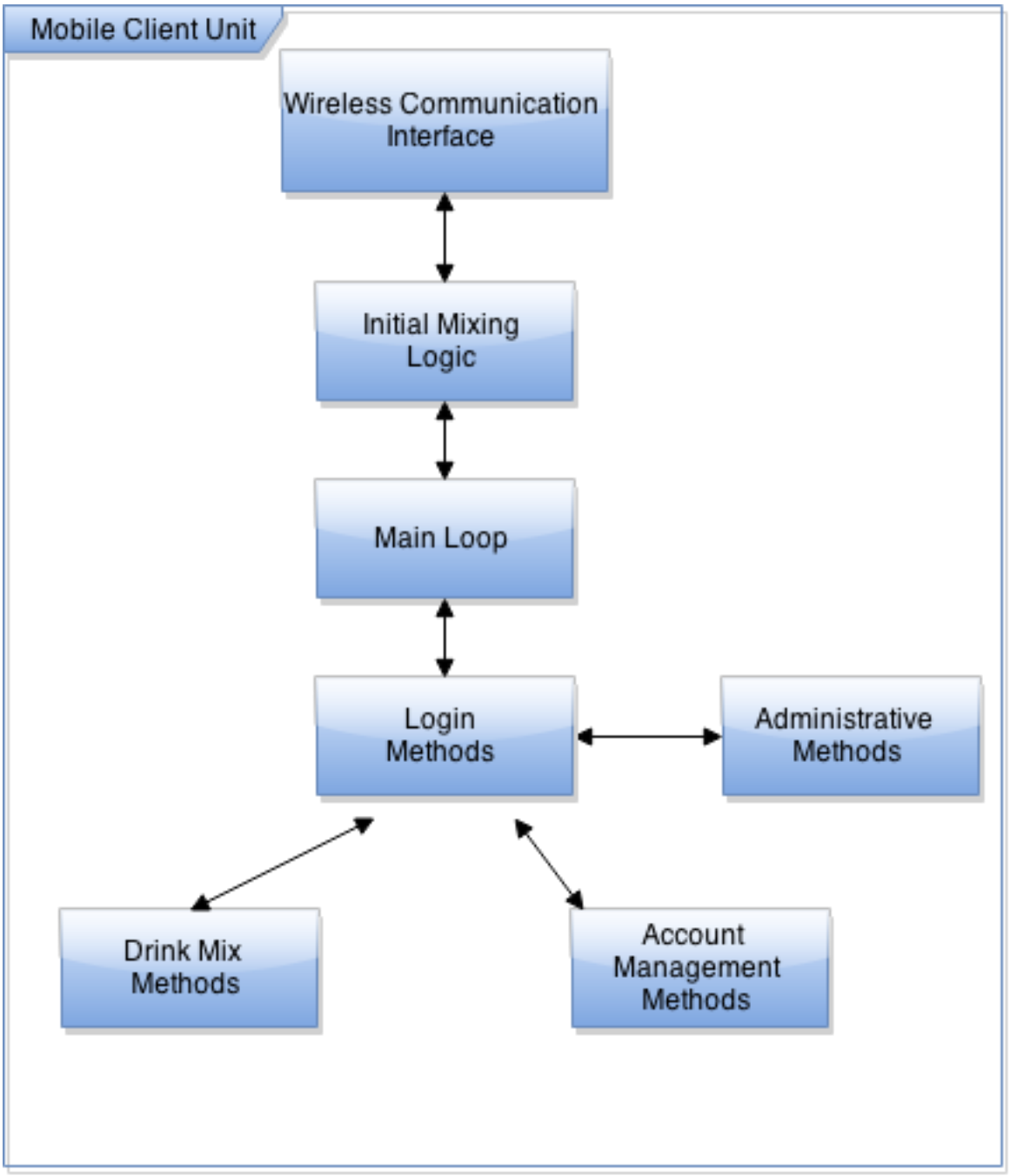
HARDWARE CONTROLLER



SOFTWARE SERVER



SOFTWARE CLIENT



DIVISION OF LABOR

CONSTRAINTS OF INTEREST

Due to the limitation of a prototype design, we have limited ourselves to developing for one mobile platform. Ideally, the Mini-Mixer would be cross-platform on all mobile devices so we have identified this as a constraint.

Cocktails and mixtures are overwhelmingly defined in units of milliliters and ounces. We are constraining our project to use only these units of measurement of our fluids for simplicity and clarity.

STANDARDS OF INTEREST

As we are dealing food products, we have an interest in any Food Grade standards that we have to abide by. One such identified standard is NSF-51 which is a standard regarding food contact with manufacturing of objects. In our case, we are interested in this standard and how it applies to our fluid containers, pumps, and tubing.

The mixing unit is designed as a kitchen appliance so we will have to consider the ISO 3055:1985 standard for general kitchen equipment when refining the requirements specifications for the hardware and unit enclosure.

ESTIMATED BUDGET

Name	Quantity	Price	Total
Microcontroller	1	$100	$100
Sensors	N/A	$25	$25
Pumps	8	$40	$320
Buttons, Switches	N/A	$20	$20
Unit Chassis	1	$50	$50
Fluid Containers/Tubes	N/A.	$30	$30
Power Electronics	N/A	$40	$40
Misc Hardware	N/A	$100	$100
Total		**$715**	

ROADMAP

SUMMER 2015

MAY 31, 2015 – AUGUST 3, 2015 (ROUGHLY 10 WEEKS)

NOTE: * denotes a project milestone

Week 1 (May 31, 2015 – June 6, 2015)

- Completion of the *Initial Project and Group Identification Project Document*. *
- Initial project research.

Weeks 2 - 5 (June 7, 2015 – July 4, 2015)

- Conduct research for the project to form a "*body of knowledge*". This research can be divided in such a manner that will include the following: *
    - The documentation of senior design projects similar to the Mini-Mixer.
    - Real products available on the market that are relevant to the design of the Mini-Mixer.
    - Pertinent hardware (microcontrollers, pumps, valves, etc.) discovered from said similar projects and products.
    - Software methodologies, implementations, and testing procedures that relate to the Mini-Mixer.
- Towards the end of this four week period, a transition from general research (i.e. possible microcontrollers) to more specific research (i.e. which microcontroller) will occur, which will lead into the next time block.

Week 6 (July 5, 2015 – July 11, 2015)

- Select parts and do extensive research on them, documenting all findings. *
- Each member begins to write their own portion of the *Final Documentation.*

Weeks 7 - 9 (July 12, 2015 – July 25, 2015)

- Each member continues to write up their part of the *Final Documentation*, researching and collaborating when necessary.
- By the end of week 9, the *Final Documentation* will be written in its entirety, only subject to slight revisions thereafter. *

Week 10 (July 26, 2015 – August 1, 2015)

- All final revisions are made during the last week.
- The *Final Documentation* is finished no later than August 1st. *

FALL 2015

AUGUST 24, 2015 – DECEMBER 5TH, 2015 (ROUGHLY 15 WEEKS)

Weeks 1-4 (August 24, 2015 – September 17, 2015)

- Completion of working prototype of main unit (hardware, software). *
- Initial testing of working prototype.
- Initial documentation.

Weeks 5-8 (September 18, 2015 – October 18, 2015)

- Begin designing final version of the main unit.
- Continued testing and documentation.
- User mobile application development begins, with testing integrated into the testing of the main unit to streamline the process.

Weeks 9-12 (October 18, 2015 – November 14, 2015)

- Final development and testing conducted for the main unit and user application.
- By the end of week 12, the project is declared finished as a working unit. *
- Any pertinent documentation written during weeks 1-12 is integrated into the *Final Documentation* from Summer 2015. *

Weeks 13-15 (November 15, 2015 – December 5, 2015)

- All required documentation is prepared and finish before December 5th, 2015.
- The presentation is created, revised, prepared, and delivered. *