

# Initial Project Description - Group 1

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## 1. Group Members

- Evan Baytan - Major: Computer Engineering
- Samuel Roman - Major: Computer Engineering
- Patrick Sites - Major: Electrical Engineering
- Brian Webb - Major: Electrical Engineering

## 2. Project Description

### Problem Statement

Many people don't realize that coffee is much like a cookie. There is a noticeable difference between a freshly baked cookie and one that is a month old. The same observation holds for coffee. Most coffee purchased has been roasted and stored for months at a time. Large amounts of the aromatics that give coffee its rich flavor quickly evaporate and leave a comparatively flavorless, bitter mess behind. A lot of consumers don't realize the difference in taste and quality they are missing due to the added labor and work that is required to roast their own coffee. This coffee roaster will provide people a significantly better coffee experience than most coffee houses are able to provide with little effort to the consumer.

Some may say that they don't have time to worry about roasting their own coffee and would probably continue to buy roasted coffee off the shelves. The consumer is content with this tradeoff of losing quality in taste for added convenience. However, the solution we are providing will be familiar and simple for the user in which they will second-guess buying pre-roasted coffee. The reason the coffee roaster will be familiar to the user is primarily due to the implementation of an iPhone and Apple Watch application that will be used to conveniently and easily control the roaster. A coffee roast would only require a few commands in the application to start and keep track of a roast. We believe that the consumer will find this method to be convenient for them to enjoy the coffee that they deserve.

### Goals & Objectives

Our goal is to provide a convenient and simple solution for new and avid coffee connoisseurs to roast fresh coffee in their home. Our objective is to design a complete system that provides users the ability to enjoy freshly roasted coffee with the convenience of controlling it through a website application and through an iOS/WatchOS application. The use of these applications will aid in providing a user interface that is familiar and easy for the user. We believe that most people are not enjoying coffee to its full quality and taste due to using coffee that has been sitting on the shelf for long periods of time. Our solution will allow more people to enjoy coffee with premium flavor and taste in their own homes.

## Functional Description

The primary function of the coffee roaster is to allow users to 1) have complete control of their bean roasting through our custom roast profile section of our website application and iOS/WatchOS applications and 2) create a community of like-minded coffee bean roasting hobbyists and enthusiasts. The appliance itself will have an interface that is connected to our server to allow the user to choose from popular roasts, previously completed roasts and favorites. Once the roast commences, the interface on the roaster will change to a control panel to allow for temperature and air flow control during the roast.

Along with reactive controls of the temperature and air flow, the user will have an ETA on when the roast will be complete. During the roasting process, it will provide the current stage of the beans, for example, 'medium roast: American' which is the roast type, followed by the name of the roast. If the user is not currently in front of the roaster, they will be able to control the appliance through the web application and iOS/WatchOS applications. The strength behind our product will be the community behind it. As users experiment and create new roast profiles, they can then share them with others in the coffee roasting community to test and rate themselves.

### 3. Requirements Specifications

#### 1. Design & Materials

- No plastics should be used due to the high temperatures that it would be exposed to and the fact that we will be dealing with food.

#### 2. Functionality

##### 2.1. iOS/Website App

- Allows for the creation of custom roast profiles
- Full control of roaster with options such as start, stop, air flow up or down, and temperature up or down
- Rating system so that users can better decide on a roast to try
- Ability to signup a user and associate your roaster with the user.
- Ability to login and maintain a user session
- Allow for the user to browse through roasting profiles submitted by others
- The user once a roast has begun will be able to check the current status of the roast

## 2.2. WatchOS App

- Users have the ability to start, cancel and track the progress of a roast
- When a roast is complete, the user receives a notification on their Apple Watch
- Provides access to recommended roast profiles from 3 types of roasts: Light, Medium and Dark
- View history of previously completed roasts

## 2.3. API

- Passwords will be stored as a hash and not plain text
- The user is authenticated in order to receive any data specific to them, e.g. logged in

## 2.4. Coffee Roaster

- Interface will be touch screen
- Once roasting starts the user will be able to control the temperature and airflow live via the touch screen

## 3. Performance

- Consistently produces an even roast
- Ability to achieve darker roasts up to a French Roast

## 4. Maintainability

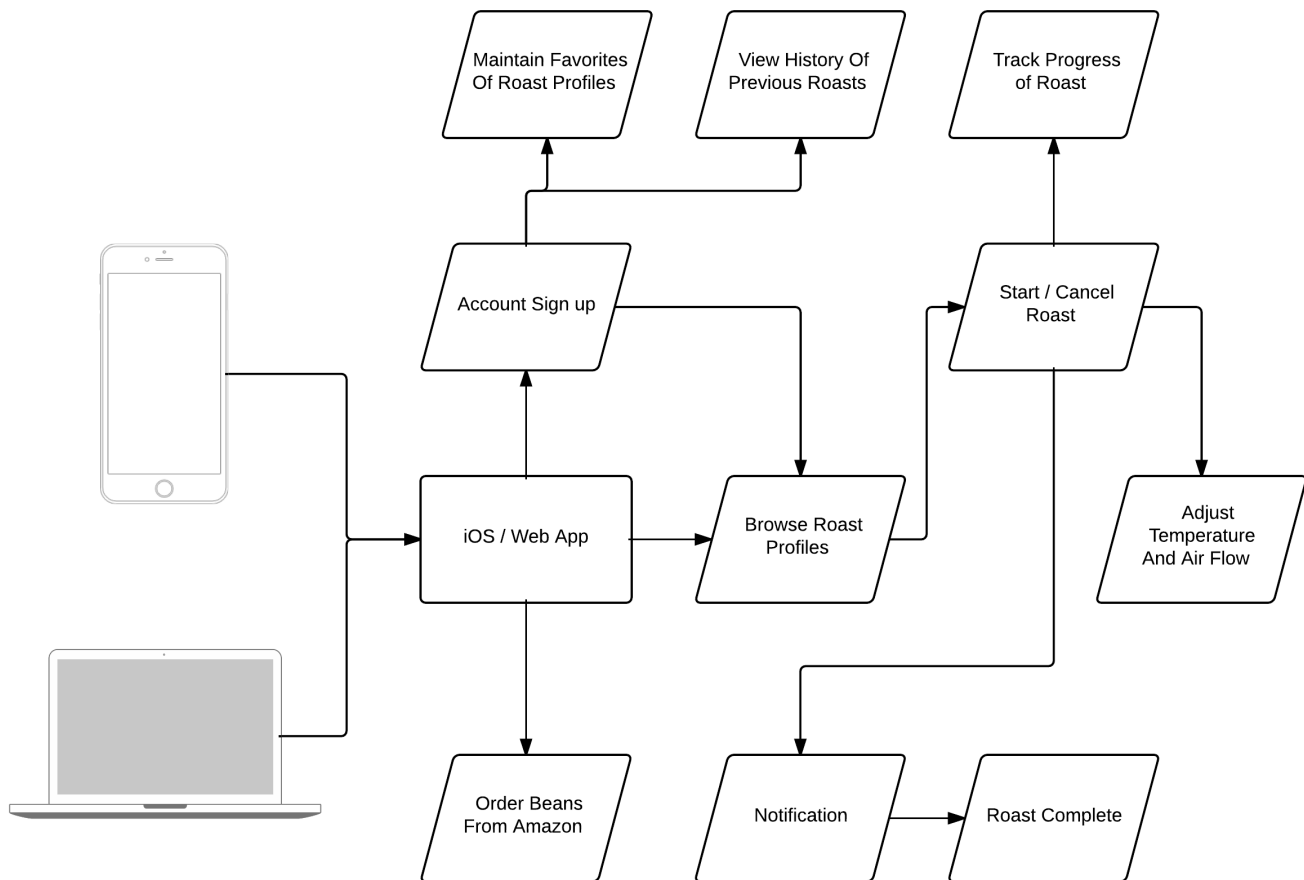
- Inner chamber of roaster will be removable to allow for easy cleaning

## 5. Manufacturability

- Specifically choosing commercial off the shelf (COTS) components to build the coffee roaster

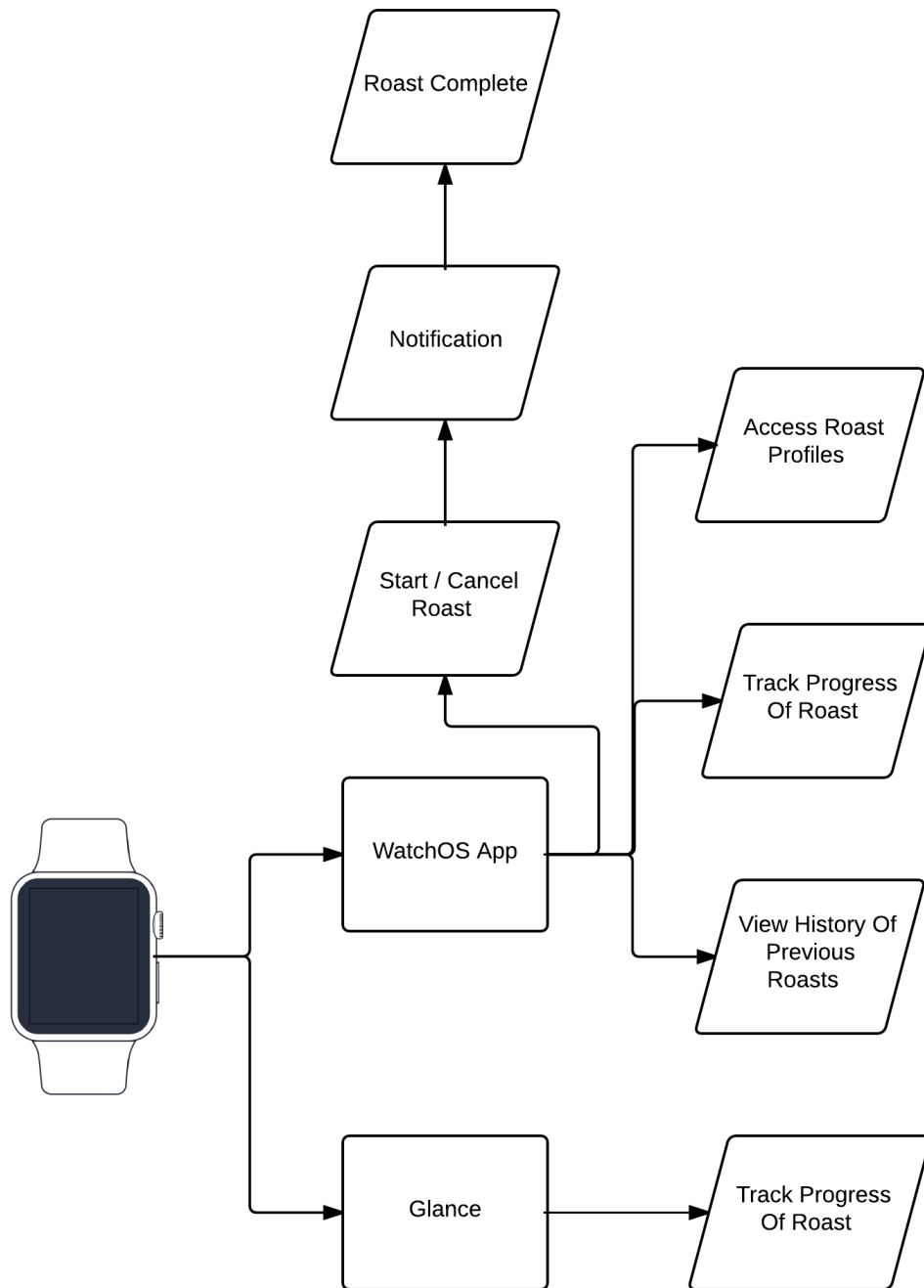
## 4. Block Diagrams

### 4.1. Client - iOS/Website App

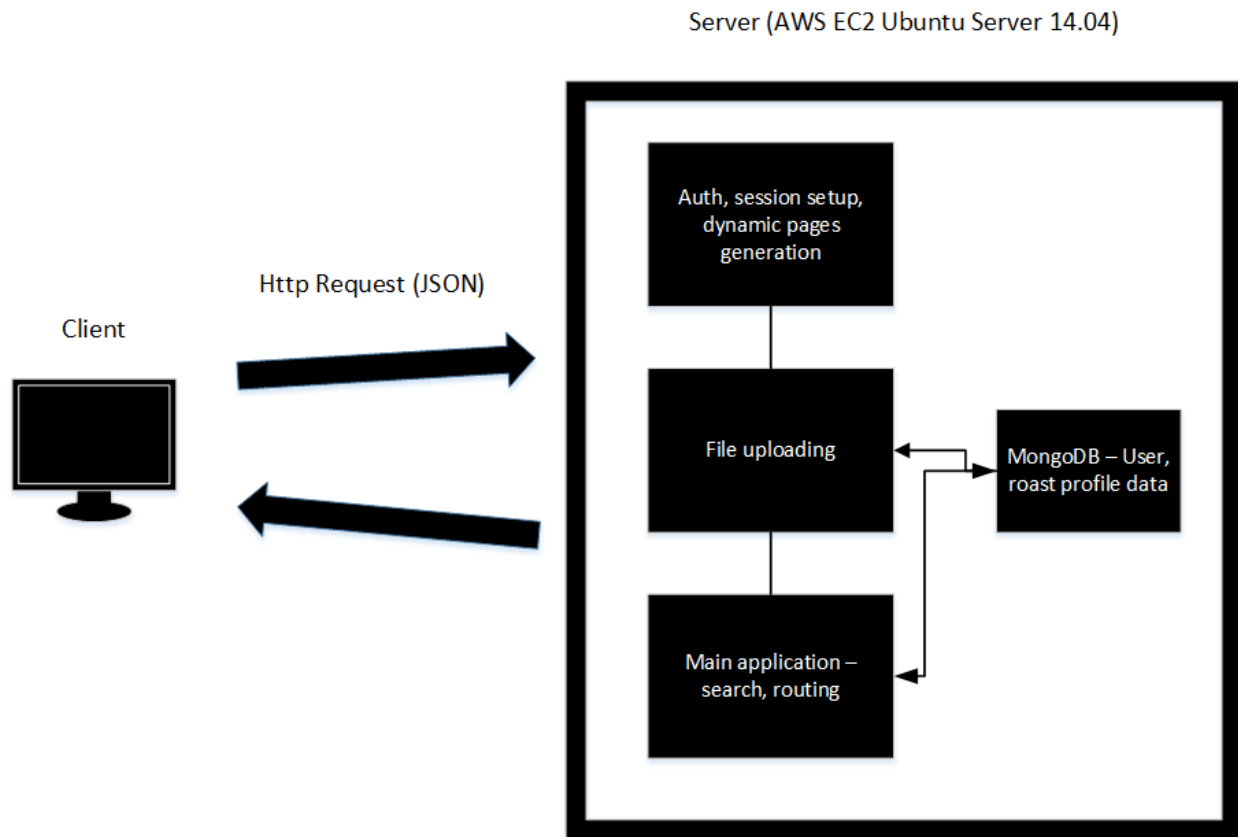


Block Diagram	Responsible Member	Status
Website Application	Samuel Roman	Design
iOS Application	Evan Baytan	Design
WatchOS Application	Evan Baytan	Design

## 4.2. Client - WatchOS App

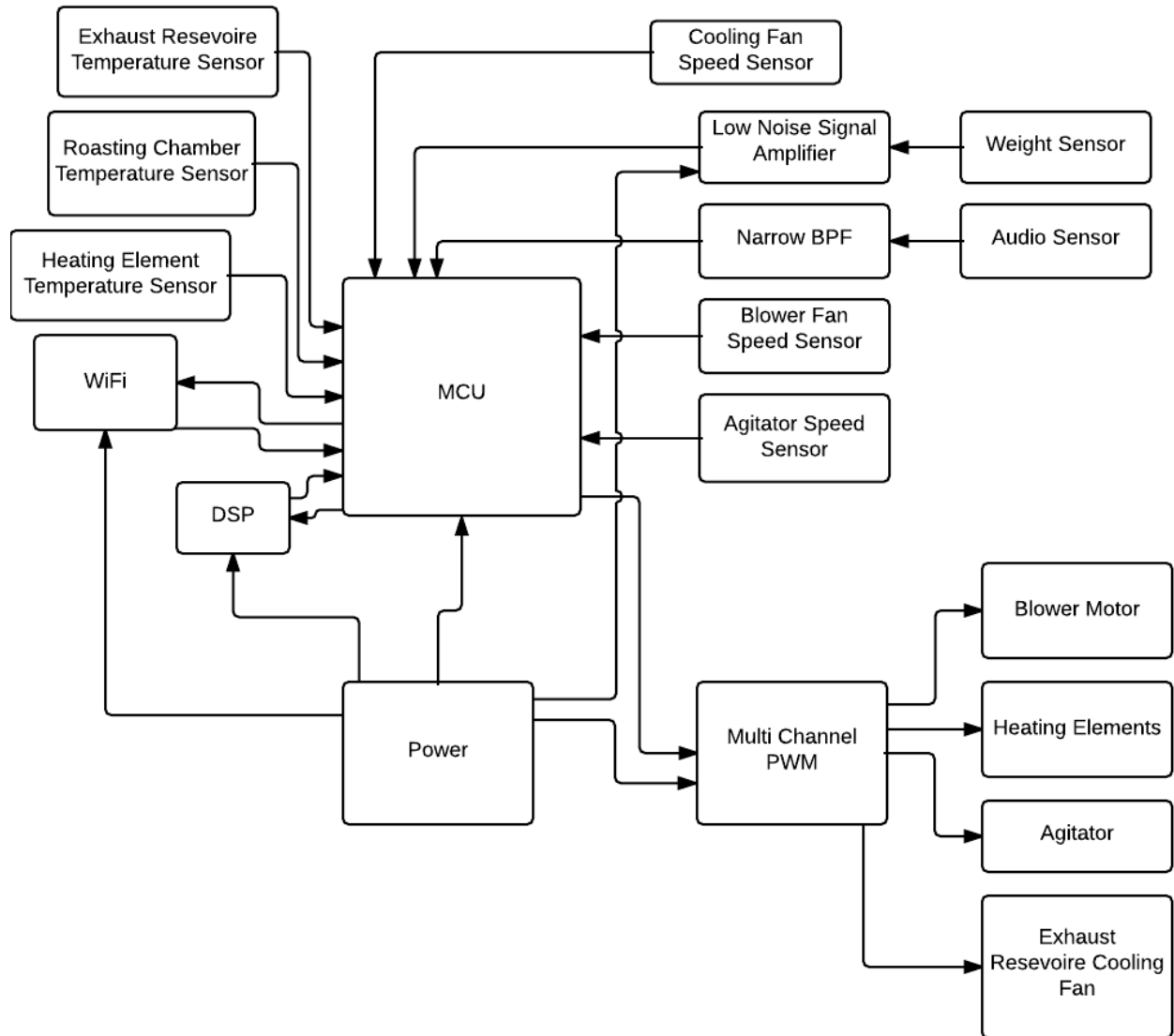


### 4.3. Backend Server



Block Diagram	Responsible Member	Status
Server	Samuel Roman	Acquired
Backend API	Samuel Roman	Research

#### 4.4. Coffee Roaster



Block	Responsible Member	Status
Hardware	Brian Webb, Patrick Sites	Research
Sensors	Brian Webb, Patrick Sites	Research



## 5. Targets For Engineering Requirements

		Setup Time	Dimensions	Connectivity	Cost
		-	-	+	-
User Friendly	+	↑	↑	↑↑	↓
Quality	+		↓		↓↓
Remote Access	+			↑↑	↓
Cost	-	↓	↑	↓	↑↑
Targets for Engineering Requirements		Short Setup Time	Minimal Counter Space	Mobile OS and web app	Minimize Costs

- Left Column
  - User Friendly (+)
  - Quality (+)
  - Remote Access (+)
  - Cost (-)
- Top Row
  - Setup Time (-)
  - Dimensions (-)
  - Connectivity (+)
  - Cost (-)

## 6. Budget & Financing

Item	Cost Per Item	Quantity	Subtotal
MCU's	\$20 - \$30	3	\$20 - \$30
Touch Screen Display	\$20 - \$30	1	\$20 - \$30
Wi-Fi Chip	\$0.00	3	\$0.00
PCB	\$37.50	12	\$450.00
Blower Motor	\$7.43	3	\$22.29
Housing	\$85.00	1	\$85.00
Auger (Agitator)	\$27.50	2	\$55.00
Temperature Probe	\$6.65	5	\$33.25
Insulation	\$14.99	1	\$14.99
Power Supply	\$30.00	1	\$30.00
PWM MOS	\$50.00	2	\$100.00
Heating Element	\$10.00	2	\$20.00
Misc. Expenses	\$142.90	1	142.90
<b>Total</b>			<b>\$1,013.43</b>

## 7. Project Milestones / Schedule

### Senior Design 1

1. Research into desired hardware and compatibility of standards
2. Initial design of server interface
3. Estimated costs approach actual costs, hardware components verified for compatibility
4. Hardware components acquired
5. Wireframes and prototype of iOS/WatchOS/Web applications complete
6. Completed design of coffee roaster, roaster housing, and server
7. Assembled prototype coffee roaster housing
8. Assembled breadboard with appropriate components
9. Breadboard installed onto Roaster
10. Working Prototype of Coffee Roaster with Connectivity via Wi-Fi