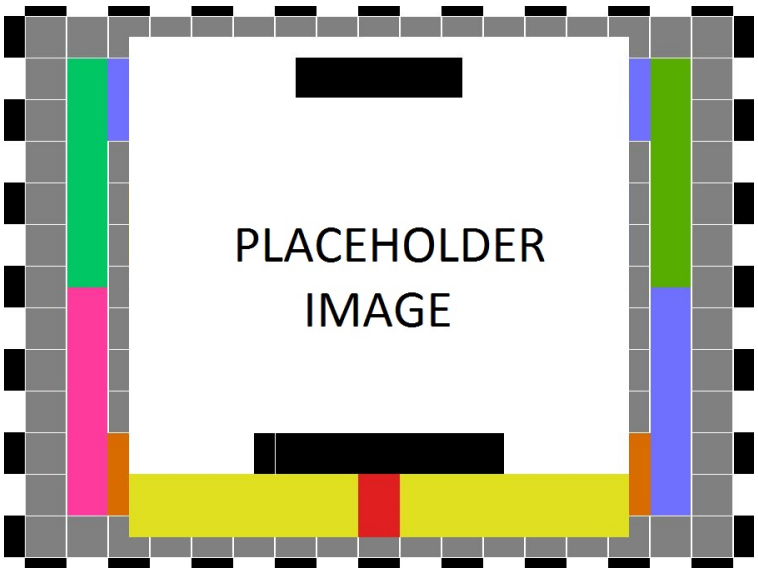
Department of Computer Science & Engineering
The University of Texas at Arlington

System Requirements Specification
CSE 4316: Senior Design I
Spring 2018



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Product Name

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Revision History

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1.1	10.31.2015	AL	added customer change requests

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1 Product Concept

This section provides a high-level statement of your product concept - what it is intended to do and how it is intended to be used. Include in this header paragraph, a brief synopsis of what is described here. For example, this header paragraph might say something like: "This section describes the purpose, use and intended user audience for the X product. X is a system that performs Y. Users of X will be able to Z..."

1.1 Purpose and Use

This is where you describe in a brief, yet clear and concise, manner what your product should do and how you expect it should be used.

1.2 Intended Audience

This is where you describe the intended audience(s) of your product. If this product were to be made available publicly or commercially, who would purchase or use it? Is the product designed for a particular customer, or an overall class of customers? Is it intended for general use, or is it a specific component of a more complex system?

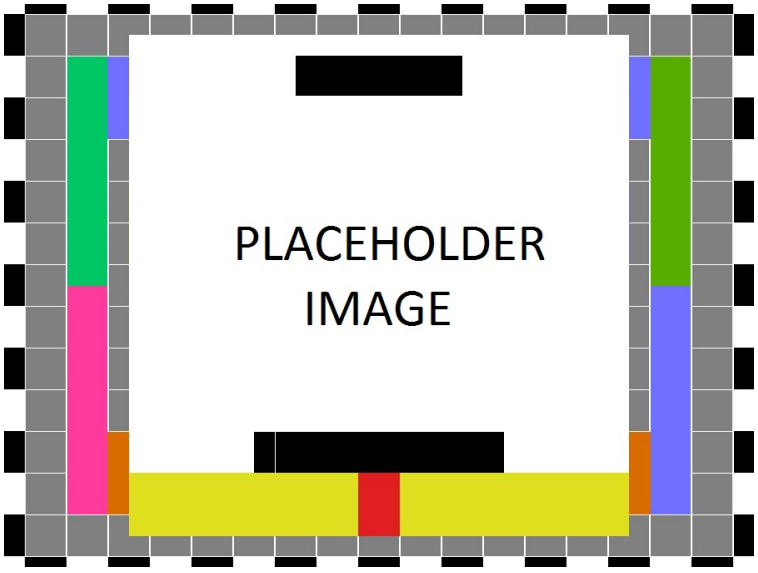

Figure 1: X conceptual drawing

2 Product Description

This section provides the reader with an overview of The Back Burner Brew and will discuss the primary features, functions and interfaces the product will have. The goal of The Back Burner Brew is to automate most of the brewing process to ensure all the liquids heat up and stay at the desired the temperature the brewer wants.

2.1 Features & Functions

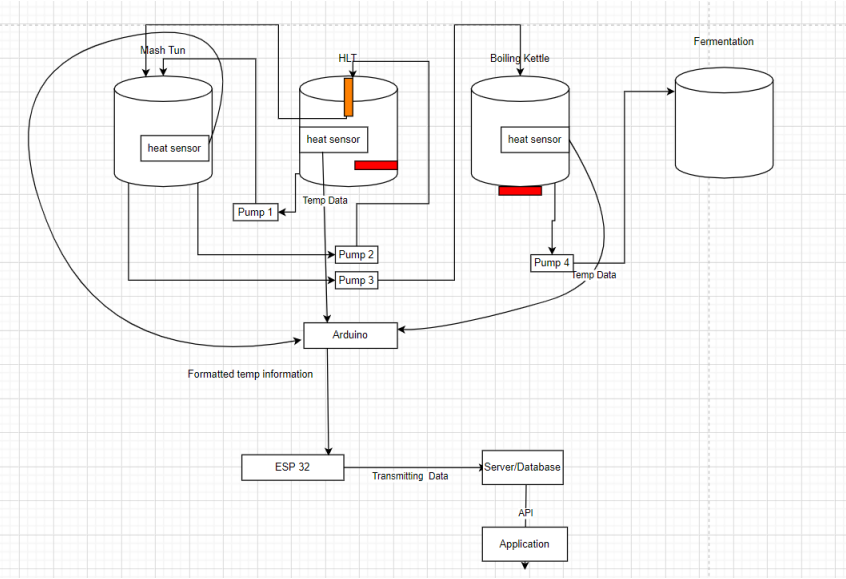

Figure 2: System Overview

The Back Burner Brew will be a utilize four kettles as seen in figure 2 and the liquids will be transferred from each kettle through the use of pumps. The Back Burner Brew will have a user interface, both through a web application and a touch screen connected to a RaspberryPi. Through these interfaces, the brewer will be able to control the temperature of all the liquids inside of the Hot Liquor Tank (HLT) and the mash tun. Along with controlling the temperature, the user will be able to set when water from the HLT will be sent to the mash tun and when the mash tun will send the liquids through the HLT for heating. The liquds temperatures will be monitored through heat sensors and will be sending that data to the web application. The web application will display the current temperature of the liquids to the user and will have a kill switch in case the heating element does not control the temperature of the liquids as requested by the user.

The product will not control the temperature of the boiling kettle, rather the user will be able to control the power output of the heating element inside of the boiling kettle and will have to monitor the temperature and the amount of water loss through the boiling process. Because there will only be three pumps, the user must move connections manually between the pumps in order to have the liquid inside of the boiling kettle be transferred over to the cooler and fermentation kettle. The user must also add in the grains and hops into the different kettles depending on what stage of the brewing process they are in manually.

2.2 External Inputs & Outputs

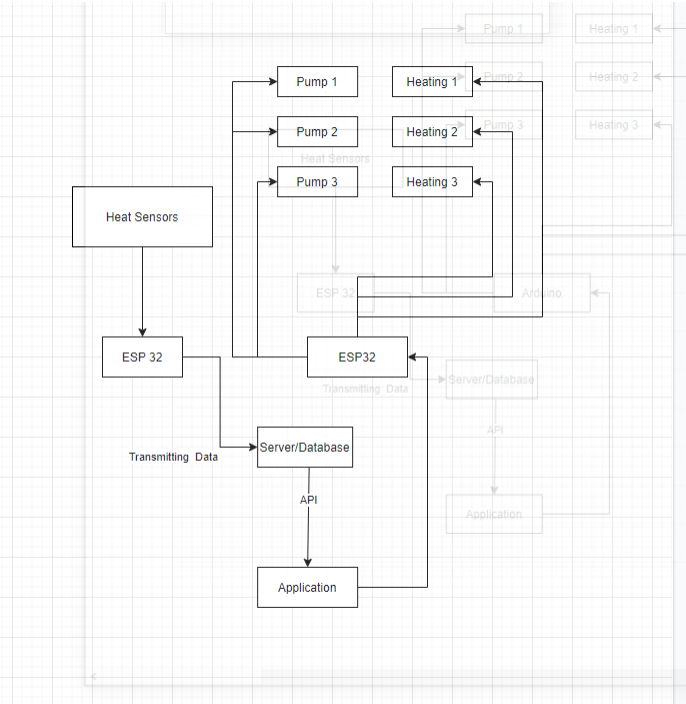

Figure 3: Data Flow and Control

The Back Burner Brew will utilize multiple ESP32's. The ESP32 will be used for reading the temperatures of the different kettles and the Arduino will be used to control the heating elements and the pumps as well.The ESP32 will read the temperatures of HLT and the mash tun and send them to web server. Once the data has been received by the server, the server will then display that data to the user on the web application. The server will also be able to tell the ESP32 which heating element must be turned on to maintain the desired temperature and which pump to turn on as well.

2.3 Product Interfaces

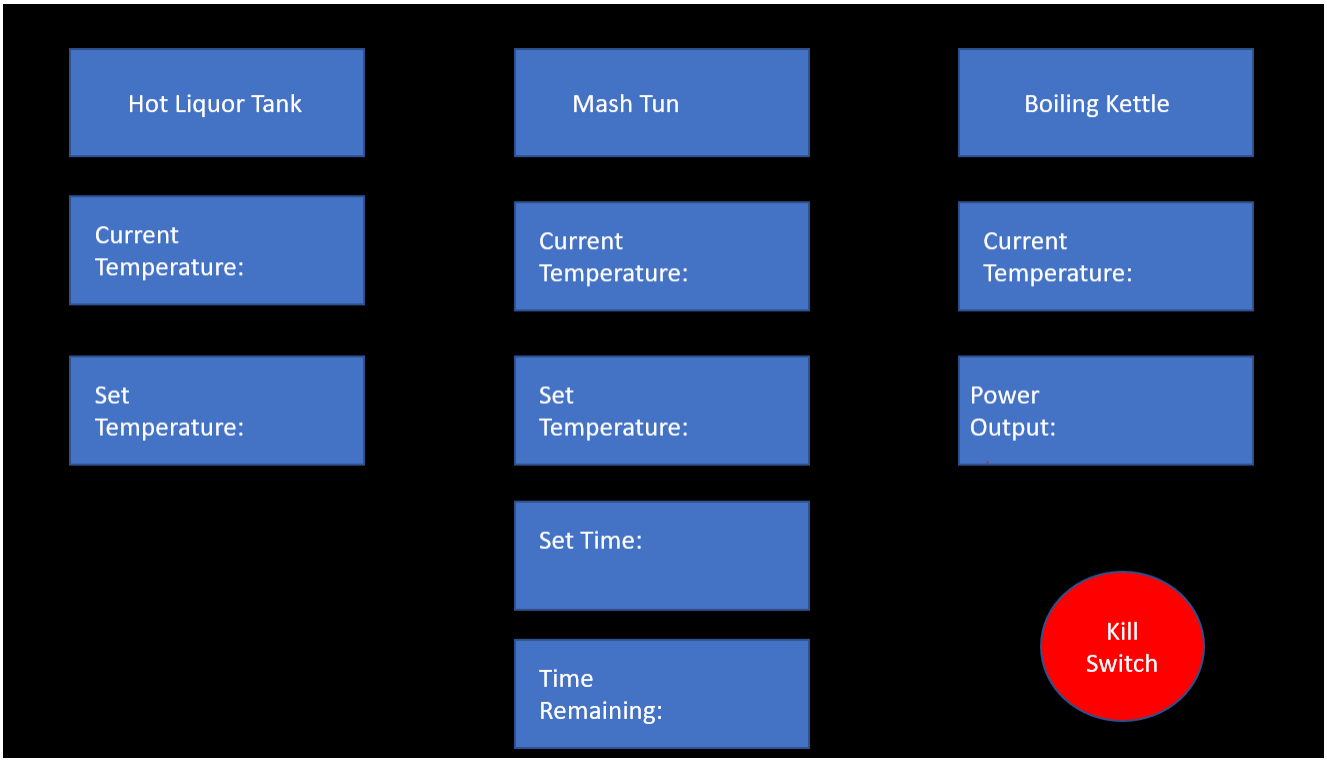

Figure 4: Web Interface Template

The Back Burner Brew user interface template can be seen in the figure above. The web application will allow the user to set the temperature of both the HLT and the Mash Tun and will display the current temperatures as well. The mash tun will also allow for the user to enter the amount of time the mashing process will take, while also displaying the remaining time left on that process. The boiling kettle does not let the user control the temperature of the boiling kettle, rather, it lets the user control the power output of the boiling kettle and they must monitor the temperature of theboiling kettle themselves.

3 Customer Requirements

Include a header paragraph specific to your product here. Customer requirements are those required features and functions specified for and by the intended audience for this product. This section establishes, clearly and concisely, the "look and feel" of the product, what each potential end-user should expect the product do and/or not do. Each requirement specified in this section is associated with a specific customer need that will be satisfied. In general Customer Requirements are the directly observable features and functions of the product that will be encountered by its users. Requirements specified in this section are created with, and must not be changed without, specific agreement of the intended customer/user/sponsor.

3.1 Requirement Name

3.1.1 Description

A detailed description of the feature/function that satisfies the requirement. For example: *The box will be slate blue. This specific color is required in order to ensure that the box matches other similar boxes in the Box Systems Premium line of products. Slate blue is specified as #007FFF, using six-digit hexadecimal color specification.* It is acceptable and advisable to include drawings/graphics in the description if it aids understanding of the requirement.

3.1.2 Source

The source of the requirement (e.g. customer, sponsor, specified team member (by name), federal regulation, local laws, CSE Senior Design project specifications, etc.)

3.1.3 Constraints

A detailed description of constraints on satisfying the requirement (e.g. one such constraint might be: *The specified color must be commercially available in paint capable of adhering to the material of which the box is manufactured. (See customer requirement 3.x for production material specification.)*

3.1.4 Standards

A detailed description of any specific standards that apply to this requirement (e.g. *NSTM standard xx.xxx.x. color specifications [1].*)

3.1.5 Priority

The priority of this requirement relative to other specified requirements. Use the following priorities:

- Critical (must have or product is a failure)
- High (very important to customer acceptance, desirability)
- Moderate (should have for proper product functionality);
- Low (nice to have, will include if time/resource permits)
- Future (not feasible in this version of the product, but should be considered for a future release).

3.2 Requirement Name

3.2.1 Description

Detailed requirement description...

3.2.2 Source

Source

3.2.3 Constraints

Detailed description of applicable constraints...

3.2.4 Standards

List of applicable standards

3.2.5 Priority

Priority

4 Packaging Requirements

Include a header paragraph here. Packaging requirements are those requirements that identify how the delivered product will be packaged for delivery to the end-user; or how it will "look" when finished and delivered. For example, you might specify that the software required for operation will be pre-loaded on the hard drive, delivered on CD/DVD, or available via download. Software might be customer installable, or not, etc. Hardware components could be all in a single package, provided as a "bag of parts" to be assembled/installed by the user, painted a certain color, logos affixed, etc. Care should be taken not to duplicate requirements found in other sections of this document.

4.1 Requirement Name

4.1.1 Description

Detailed requirement description...

4.1.2 Source

Source

4.1.3 Constraints

Detailed description of applicable constraints...

4.1.4 Standards

List of applicable standards

4.1.5 Priority

Priority

5 Performance Requirements

Include a header paragraph specific to your product here. Performance requirements address items such as: how fast specific critical operations must complete; how long it takes to start/stop activities; how long the battery must last; maximum time it must take to set up; etc.

5.1 Requirement Name

5.1.1 Description

Detailed requirement description...

5.1.2 Source

Source

5.1.3 Constraints

Detailed description of applicable constraints...

5.1.4 Standards

List of applicable standards

5.1.5 Priority

Priority

6 Safety Requirements

Include a header paragraph specific to your product here. Safety requirements might address items specific to your product such as: no exposure to toxic chemicals; lack of sharp edges that could harm a user; no breakable glass in the enclosure; no direct eye exposure to infrared/laser beams; packaging/grounding of electrical connections to avoid shock; etc.

6.1 Requirement Name

6.1.1 Description

Detailed requirement description...

6.1.2 Source

Source

6.1.3 Constraints

Detailed description of applicable constraints...

6.1.4 Standards

List of applicable standards

6.1.5 Priority

Priority

7 Maintenance & Support Requirements

Include a header paragraph specific to your product here. Maintenance and support requirements address items specific to the ongoing maintenance and support of your product after delivery. Think of these requirements as if you were the ones who would be responsible for caring for customers/end user after the product is delivered in its final form and in use "in the field". What would you require to do this job? Specify items such as: where, how and who must be able to maintain the product to correct errors, hardware failures, etc.; required support/troubleshooting manuals/guides; availability/documentation of source code; related technical documentation that must be available for maintainers; specific/unique tools required for maintenance; specific software/environment required for maintenance; etc.

7.1 Requirement Name

7.1.1 Description

Detailed requirement description...

7.1.2 Source

Source

7.1.3 Constraints

Detailed description of applicable constraints...

7.1.4 Standards

List of applicable standards

7.1.5 Priority

Priority

8 Other Requirements

Include a header paragraph specific to your product here. In this section specify anything else that is required for the product to be deemed complete. Include requirements related to customer setup and configuration if not specified in a previous requirement. Add any known requirements related to product architecture/design, such as modularity, extensibility (for future enhancements), or adaptation for a specific programming language. Consider requirements such as portability of your source code to various platforms (Windows, Linux, Unix Mac OS, etc.).

8.1 Requirement Name

8.1.1 Description

Detailed requirement description...

8.1.2 Source

Source

8.1.3 Constraints

Detailed description of applicable constraints...

8.1.4 Standards

List of applicable standards

8.1.5 Priority

Priority

9 Future Items

In this last section, you will reiterate all requirements that are listed as priority 5. This is repetitive, but necessary as a concise statement of features/functions that were considered/discussed and documented herein, but will NOT be addressed in the prototype version of the product due to constraints of budget, time, skills, technology, feasibility analysis, etc. Use the following format for this section.

9.1 Requirement Name

9.1.1 Description

Detailed requirement description...

9.1.2 Source

Source

9.1.3 Constraints

Detailed description of applicable constraints...

9.1.4 Standards

List of applicable standards

9.1.5 Priority

Priority

REFERENCES

[1] Kenneth S Rubin. *Essential Scrum: A Practical Guide to the Most Popular Agile Process*. Addison-Wesley Professional, 1st edition, 2012.