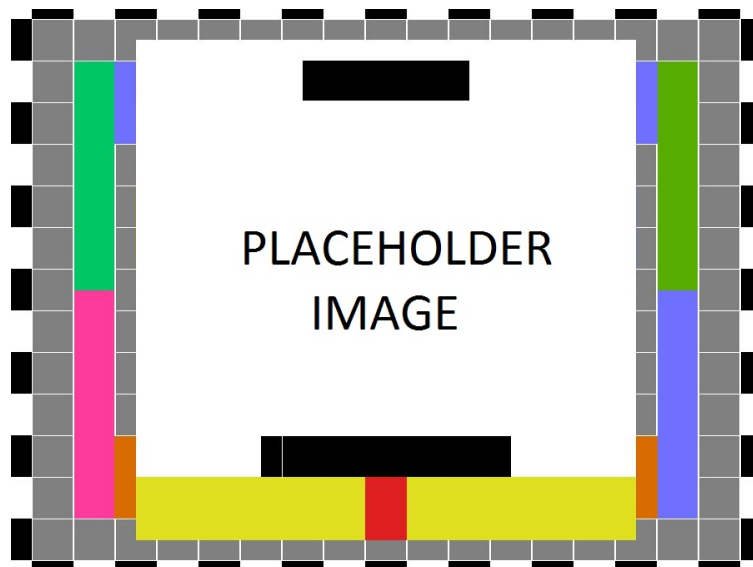


**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
THE UNIVERSITY OF TEXAS AT ARLINGTON**

**SYSTEM REQUIREMENTS SPECIFICATION
CSE 4316: SENIOR DESIGN I
SPRING 2020**



**TEAM FRIENDSHIP
AUTOMATED HOME BREWING SYSTEM**

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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..."

The "Automated Home Brewing System" is built with the sole purpose of brewing large batch of beer in the home environment. This product provides home brewers with a low-cost electric home brewing system that allow them to have precise control over the brewing process. The brewing process can be automated with th help of micro-controller like Arduino Uno which is then hosted to a local website or an app interface.

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.

Arduino Uno is a micro-controller that can receive data such as current temperature of the water or mash from the heat sensors located inside the kettles which can be converted to either analog or digital input. The heating coil can be control using the input from the user as per their desired either to increase or to decrease the temperature. The electric pump can also be controlled by the user through micro-controller to regulate the flow of the water in the kettles. The user will be able to communicate with the brewing system through a web interface or app interface.

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?

The foremost intended audiences for this product would be home brewers or person interested in brewing beer only. Provided that the user manual would be present in the product, any person who wants to brew beer in his local environment can easily use this product. This product is made focusing on how effortless can the brewing process gets simply with the use of micro-controller.

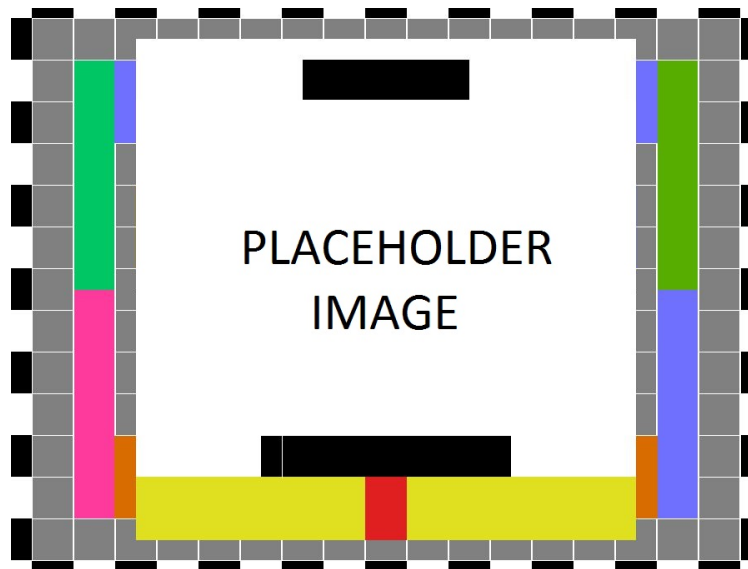


Figure 1: X conceptual drawing

2 PRODUCT DESCRIPTION

This section provides a description of your product and defines its primary features and functions. The purpose is to give the document reader/reviewer enough information about the product to allow them to easily follow the specification of requirements found in the remainder of the document. Your header for this section should introduce the section with a brief statement such as: "This section provides the reader with an overview of X. The primary operational aspects of the product, from the perspective of end users, maintainers and administrators, are defined here. The key features and functions found in the product, as well as critical user interactions and user interfaces are described in detail." Using words, and pictures or graphics where possible, specify the following:

2.1 FEATURES & FUNCTIONS

What the product does and does not do. Specify in words what it looks like, referring to a conceptual diagram/graphic (Figure X). Define the principle parts/components of the product. Specify the elements in the diagram/graphic that are part(s) of this product as well as any associated external elements (e.g., the Internet, an external web server, a GPS satellite, etc.)

2.2 EXTERNAL INPUTS & OUTPUTS

Describe critical external data flows. What does your product require/expect to receive from end users or external systems (inputs), and what is expected to be created by your product for consumption by end users or external systems (outputs)? In other words, specify here all data/information to flow into and out of your systems. A table works best here, with rows for each critical data element, and columns for name, description and use.

2.3 PRODUCT INTERFACES

Specify what all operational (visible) interfaces look like to your end-user, administrator, maintainer, etc. Show sample/mock-up screen shots, graphics of buttons, panels, etc. Refer to the critical external inputs and outputs described in the paragraph above.

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.

This section will provide brief explanation on safety requirement while using this product. There are various risk factors included while operating the Brewing system. Since we are dealing with electrical appliances, there is always a risk of getting electrocuted if proper attention is not given.

6.1 SAFETY HAZARDS WHILE WORKING WITH THE ELECTRICITY

6.1.1 DESCRIPTION

Different electrical appliances like electric heater will be used in this project alongside with water. Even a small misplaced or leakage of water into the micro controller can damage it and can put the user in electrical hazards. While working with mash, it is important to note how hot the mash is in order to prevent burn.

6.1.2 SOURCE

A basic safety measure taken while working with any electrical appliances, especially when a liquid is nearby.

6.1.3 CONSTRAINTS

The product must be built closed to a place where there is electrical plugs. Once built, the product can be difficult and time-consuming to move. The user should be present at the site while brewing at first for some batches to make sure everything is running smoothly.

6.1.4 STANDARDS

Non-applicable.

6.1.5 PRIORITY

Top-priority should be given as this is concerned with the health of the user.

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.