Logical Design Proposal
Give your proposed idea a catchy name
Include your team number

First Student, Second Student, Third Student

Activity Report

Abstract—A one paragraph high-level executive summary on how you plan to improve the existing tensiometer design. Articulate what existing system problem (or problems) you are addressing, why it is important, and identify gaps in the existing system. Indicate how your proposed solution helps solve an important problem and addresses those gaps. Be very brief here, as you'll go into more detail in the background section. Keep it to about a paragraph length (roughly 150-250 words). Do not include any citations in the abstract.

Index Terms—Uniaxial Tensiometer, System Analysis, Engineering Design

1 Background

PROVIDE relevant background information to understand the problem(s) in the existing system that you are addressing, along with a general overview of your idea. Explain the basic idea and don't get lost in technical details that will be explained in the next project milestone (the physical design). Make sure that you identify gaps and limitations in the existing solution (particularly gaps your proposed system helps address). You should also indicate how your idea benefits the customer or project stakeholder? Are any existing solutions on the market relevant or served as inspiration for your idea? If so, cite them. Here is an example citing something [1]. Here is an example, citing multiple references [2], [3]. Citing something else [4].

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2 System Requirements & Constraints

Figure 1 depicts the system use cases discussed in class. In this section, define requirements that your proposed system addresses. See the constraints section (Section 2.3) for non-functional system requirements that have already been defined in class. This section should focus on functional requirements. It is critical here that you prioritize requirements that are the **most important** to the stakeholder. These are the requirements that your proposed idea should be improving. For each requirement, summarize the required functionality in detail. Use subsections to organize this information.

2.1 Requirement #1 Name

Which use case aligns with this requirement? What is the desired functionality? Do not describe how you will implement the functionality, but instead focus on system behavior. For example, how will someone interact with the system? What actions do they need to perform? What will they see or information will they receive?

Normal Flow

This describes the default flow of the use case. Often referred to as the "happy path".

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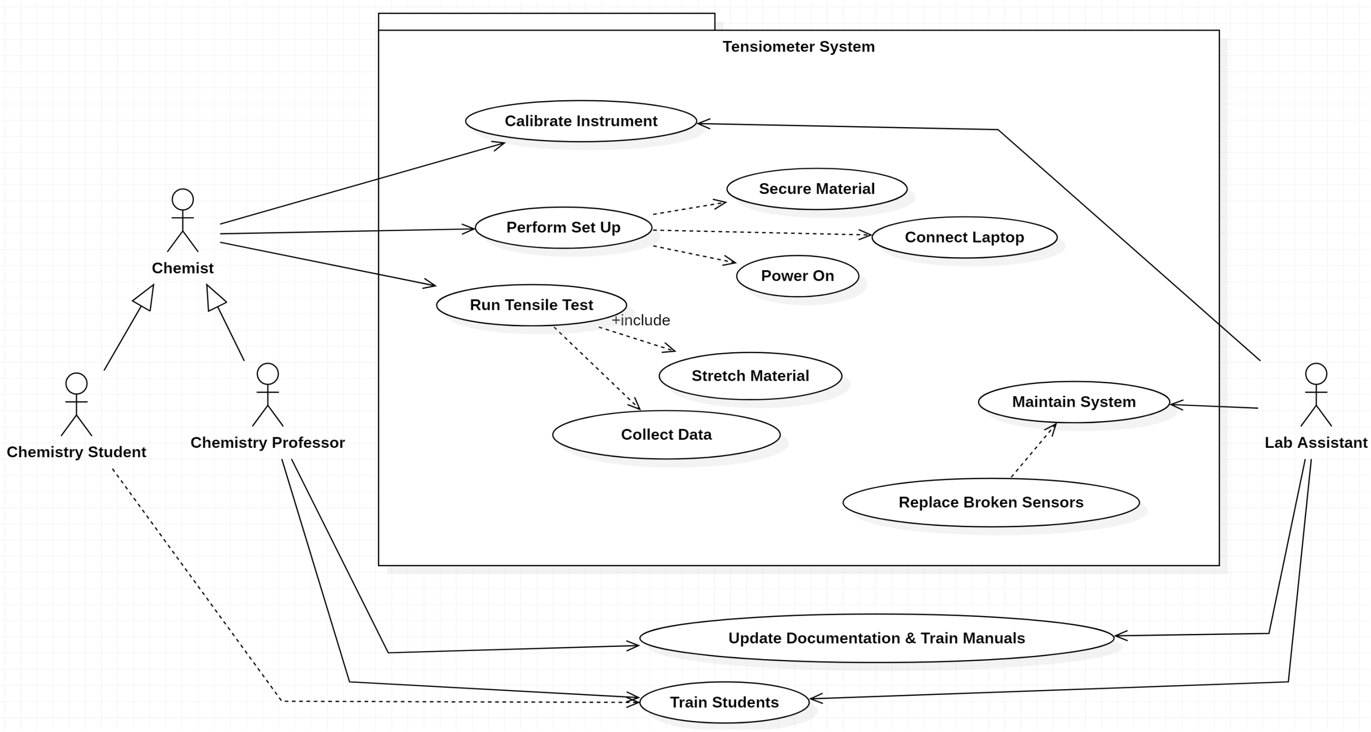

Figure 1. Use case model of the tensiometer system depicting system actors and the desire actions the system is required to support.

- **Step #1:**
- **Step #2:**
- **Step #3:**

Alternative Flow This describes what will happen under an error condition.

- **Step #1**
- **Step #2**
- **Step #3**

2.2 Requirement #2 Name

Follow a similar approach as above for the second requirement. Based on your proposed system improvement, document additional requirements as relevant.

2.3 Constraints

These constraints are typically imposed by the project sponsor, end user, or by external regulations. Constraints restrict the design process and limit the potential solutions. For this project, system constraints have already been defined and have been given to you below:

- **Time Constraint:** Completed and read to presentation/demonstrate by April 22nd
- **Budget:** Cost needs to be below $150. Going over budget will require strong justification as to the value added from the cost overrun.
- **Replication:** Relatively straight-forward process to replicate your work, such that we can build out a lab of identical tensiometers.
- **Accessibility of Parts:** Parts need to be readily accessible, ship quickly (not on back order) and available from common part suppliers (e.g., Digikey, Mouser, Adafruit, SparkFun, Amazon). Avoid parts that are difficult to source.
- **Safety:** System must be safe to operate without significant training or supervision

3 Logical Design

Communicate your idea(s) in more detail here by including a diagram and accompanying text that communicates your concept. This diagram will represent your logical design, so it should be independent of the underlying technology. The diagram that you include can be a hand drawn sketch, data flow diagram, or other

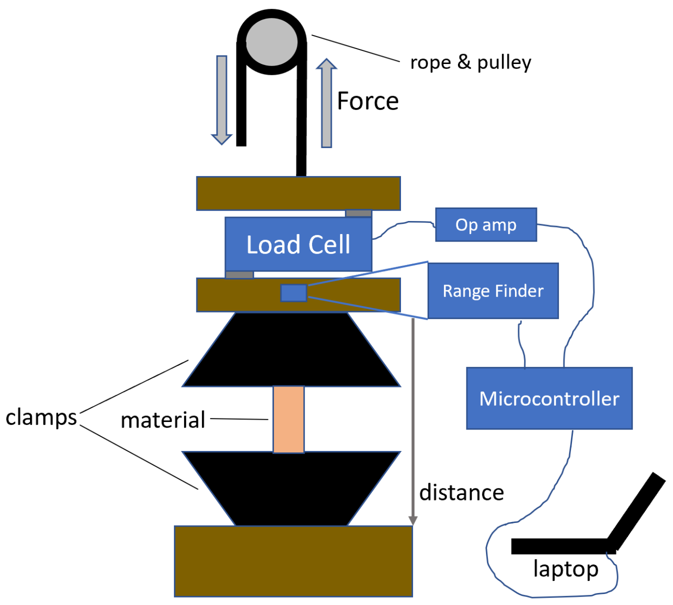

Figure 2. Provide an engineering sketch or model that visualizes your idea(s). Here is a logical sketch of the current system. The initial sketch should avoid any unnecessary details such as specific parts, but instead provide a logical view of the workings of the system.

engineering artifact that illustrates your idea without forcing the idea down a specific implementation path. Therefore, do not include specific parts, programming languages, communication protocols, etc... That will be determined in the physical design which will come later.

3.1 Design Justification

Why was this design chosen versus other potential alternatives?

References

[1] R. Braden, D. Clark, and S. Shenker, *Integrated Services in the Internet Architecture: an Overview*, IETF, June 1994.
[2] H. Schulzrinne, A. Rao, and R. Lanphier, *RFC 2326 - Real Time Streaming Protocol*, RFC, IETF, 1998.
[3] L. Lamport, *LaTeX: A Document Preparation System*. Reading, Mass.: Addison-Wesley, 1986.
[4] J. H. Arrizabalaga, A. D. Simmons, and M. U. Nollert, "Fabrication of an economical arduino-based uniaxial tensile tester," *Journal of Chemical Education*, vol. 94, no. 4, pp. 530–533, 2017. [Online]. Available: https://doi.org/10.1021/acs.jchemed.6b00639