

## **Pre-Lab 2: Assignment Submission Document**

Name:

Lab section:

Read the definitions, then address questions 1-10 in this manual, export as a PDF, and submit on Gradescope. This is an individual assignment.

### **Some Important Definitions**

- **User/Stakeholder Requirements** - documentation of what must be provided to users/stakeholders to satisfy their needs.
- **System Requirements** - documentation of the constraints and capabilities of a system able to satisfy the user/stakeholder requirements.
- **Design variables** - the parameters of the design which can be changed to meet the requirements.
- **Design constraints** - a restriction of the design which does not add capability but effects the implementation. Examples of these include the "-ilities" such as manufacturability, assembleability, reliability, availability, sustainability, etc.
- **Operational Scenario** - Description of an imagined sequence of events that includes the interaction of the product or service with its environment and users, as well as interaction among its product or service components. (ISO/IEC 2011)
- **Verifiable** - can be shown to be met by some user-approved acceptance criteria. The technical specifics of the test will be determined in the *system requirements*.
- **Indivisible (atomic)** - expresses only a single need and cannot be broken down further.
- **Traceable** - can be connected to its source and the artifacts derived from it, and this connection is clearly documented.
- **Solution-neutral** - avoids proposing a solution unless absolutely necessary (e.g., where the system is constrained by existing external factors such as connection to a standard fitting or power supply).

**Part 1: Defining the Need (4 points)**

Now let us apply our human centered design thinking.

1. (2 pts) Read the Project 1 document. Recall that your goal is to create a legged campus service robot that dispenses items, effectively meeting the needs of a specific user group. Think of a specific user or group on campus which you will design the robot for (Babies, Students, UIUC Faculty/Staff, Individuals with arthritis in their hands, etc.).
  - a. Find one or two online sources to inform you about this user's or group's needs (a news article, a post, a video, a research article, etc.) and cite it in the space below.

Fill In

- b. Use a point-of-view statement to focus on an actionable problem and set the scope of work. (Recall: "user needs a way to have dispensed item delivered because of surprising insight/motivation .")

*Example: Professors on campus need to have K-Cups delivered quietly so that they can have their coffee and continue to focus on course development without distractions.*

Fill in

2. (2 pts) Now that we have our user group identified, consider the user's needs that you as a designer want your user to experience as they interact with your design. If you are stuck, consider the point-of-view statement you completed in the previous question. Describe the user's needs that must be met and why in 3-5 sentences.

*Example: Students should have their packages delivered to their dorm door. They should feel comfortable knowing that their package was delivered without fear of someone stealing the robot. Students also need the package to be delivered quietly, so they can focus on studying without interruptions.*

Fill in

## **Part 2: User/Stakeholder Requirements (10 points)**

The user/stakeholder requirements document is a tool for communicating with the users/stakeholders to ensure that their needs are adequately represented.

We are going to refine and build on our answers from Part 1 above.

3. (1 pt) We have already identified the user group for our design. When we think about that user group, what are some key design requirements for anything that group will interact with?

*Example: Anything designed for small children should not have any small pieces that could be swallowed and pose a choking risk.*

Fill in

4. (1 pt) We also know what types of user needs we want our design to meet. What are some requirements for any design that is supposed to cause that emotion?

*Example: A design that is supposed to be loud should make a lot of noise.*

Fill in

5. (3 pts) Based on all of your previous answers, list 3 key capabilities or requirements.

*Example: The design should be easy for a child to operate.*

*The design must contain rapid motion to convey excitement and energy.*

*The design should be colorful and bright.*

Fill in

6. (3 pts) We now need to translate from the key design **capabilities and user needs** to an **activity** that our design will perform. Create a list of a few activities or scenarios that might elicit some of the key needs you listed in the previous questions.

*Example: A robot to cheer up babies should be whimsical and fun.*

Fill in

7. (1 pt) What are some common characteristics of the activities that you have proposed?

*Example: Each activity proposed requires two or more characters to interact.*

Fill in

8. (1 pt) Are there characteristics that are not present in any of the ideas you proposed?

*Example: None of the activities are scary or frightening.*

Fill in

### ***Part 3: Idea Sharing and Sketching (6 points)***

**Be prepared to share your answers to both questions 9 and 10 during lab.**

9. (3 pts) Stakeholder requirements checklist

- Begin by copying your point of view statement (from question 2), and copy your a set of key capabilities (from question 5) in the blank space below. Also add any design constraints that may affect the design, including the physical requirements provided in the project 1 document.
  
- Use the **stakeholder requirements checklist (Found on Canvas)**, and Table 1 (below) on examples of poor and better articulated user requirements to iteratively refine your requirements. List your improved stakeholder requirements below.

## 10. (3 pts) Sketches:

- **Create 5 sketches** of the activities you describe in question 6 and place them below. If you feel that these original ideas will not meet the requirements you just created, feel free to sketch new ideas. These sketches do not need to be perfect, but if you are not confident in your sketching abilities, a good resource can be found [here](#).

Table 1. Example of poor and better articulated user/stakeholder requirements

Examples of poor and better articulated user/stakeholder requirements:	
POOR	BETTER
<p>1. The distributor and customer shall be able to easily load and unload the package to expedite the exchange and create positive customer experience.</p> <ul style="list-style-type: none"> <li>• "Easily" is not yet verifiable</li> <li>• Not yet indivisible (atomic)</li> </ul>	<p>1.1 The time required for loading and unloading by the distributor should be less than the current process.</p> <p>1.2 The process of retrieving a package from the system should take a new user no more than 30 seconds on the first try.</p>
<p>2. The joystick should be user-friendly</p> <ul style="list-style-type: none"> <li>• Not solution-neutral</li> <li>• "User-friendly" is not yet verifiable</li> </ul>	<p>2. The control scheme should use common conventions to reduce learning time.</p>
<p>3. The distributor shall be able to verify that the package is secured before initiating transport.</p> <ul style="list-style-type: none"> <li>• Not yet indivisible (atomic)</li> <li>• Not solution neutral</li> </ul>	<p>3.1 The distributor shall be able to verify that the package is secured.</p> <p>3.2 Transport should only begin once initiated by the distributor.</p> <ul style="list-style-type: none"> <li>• This still assumes a solution, and should only be included if this is a constraint specified by the stakeholder</li> </ul>