

Laundr

Team members: Sam Wolfson, Hang Bui, Emily Zhang, Atharva Naik

Problem and Solution Overview

Many people live in apartment complexes with roommates to reduce the cost of rent. This introduces a problem where people need to share their washers and dryers, which often have limited availability, among everyone in the building. They often do not know what time the washers and dryers will be available, or when is a good time to take their laundry to the laundry room. They also face problems such as not knowing when the clothes in the dryer will be fully dry, and difficulty keeping track of when the washer is done. This leaves people frustrated and with a basket of dirty clothes that they cannot find the time to wash. For this problem, we propose a combination of a scale which weighs your dirty clothes and detects when you should do laundry, as well as a “laundry ball” that goes into the washer and dryer with your clothing, and detects when the washer is finished and when your clothes are dry. The “laundry ball” communicates and coordinates with the laundry machines and other “laundry balls” around the area to detect the appropriate time to start one’s laundry. This allows the users to freely plan their laundry schedule without needing to worry about continuously checking whether the laundry machine is free.

Design Research

Originally, we focused our research on tracking clothing for college students and young professionals, particularly those living in dorms or small apartments and with limited space in which to store their clothing. We reasoned that those with limited space would be most likely to have difficulty keeping everything organized. We interviewed these stakeholders with the original goal of creating a design to help them keep track of the clothing in their closet. We chose to conduct contextual inquiries in clothing stores and as “walkthroughs” of people’s closets so that we could get an idea of schemes that they use to organize and keep track of clothing they own (and want to buy), as well as problems that they run into when doing so. We also asked our participants questions about how they got dressed in the morning, how they decided what to wear based on the weather and their events for the day, and when they prepared their outfits.

After our initial contextual inquiry with John at a clothing store, we decided to change the setting of our contextual inquiry to apartments and dorms because he wasn’t able to really provide organizational details. Our second participant Jen had some difficulty in cleaning her closet. More commonly, though, were issues that our other participants encountered with laundry related tasks. John faced problems in separating different colored clothes in order to wash them separately. Furthermore, sometimes he described going too long without doing laundry, and then needing to wash sheets in addition to his other clothes. When this happens he

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needs to decide if he should do more than one load of laundry, and risks causing other clothes to get tangled up in his sheets. Our next participant was Seymour who lives in an apartment building with one shared washer and dryer per floor. Every time he decides to wash clothes, he needs to walk across the hallway to check if the washer and dryer is free. Sometimes the washer is free but the dryer is unavailable which can result in a lot of time being wasted, particularly if the person using the dryer doesn't come get their clothing once its finished. Rachel, our next participant, had difficulty sorting out her laundry from her boyfriend's, and also with finding matching socks after washing them.

In addition to these more formal interviews, we also conducted a number of more "conversational" interviews with students living in dorms both at UW and other universities, asking them what their process was for doing laundry, issues that they encountered, and ways that they had worked around these issues.

Design Research Results and Themes

Through our research with our first few participants (John and Jen), we learned that they generally do not encounter the issues that we had sought to originally address. Our participants were generally well-organized and had a reasonably good idea of what they had and what they needed. As a result, we had to widen our scope and look for design ideas in a new area. In hindsight, our original research was probably too tightly focused on the idea of tracking *clothing itself* to explore a sufficiently wide design space, which may have contributed to our inability to clearly define a problem.

We decided to refocus our research on the process of doing laundry and conducted additional interviews where we asked people about the process they go through to do laundry. We identified a problem in the tracking of laundry for those who live in dorms, apartment complexes, and those who have to share laundry machines with multiple people in the building. Our later interviews focused primarily on how each of our participants went through the process of doing their laundry and the issues that they encountered in doing so. We found that timing when to do laundry was a difficult problem for some of our participants, because they need to decide if they have enough time to finish their laundry before they need to leave for school or work, or if they can run errands and be back in time to retrieve or move it. This becomes particularly difficult when, for instance, the washer is available but the dryer is in use, and it's impossible to predict when the person using the dryer will actually come to retrieve their clothes. Furthermore, our participants must additionally coordinate this for when they actually have enough dirty clothing that it makes sense to do laundry (particularly in cases where each load costs money), but not wait so long that they have too much clothing to be adequately washed and dried in one load. Since clothing is "compressible" in a hamper, it's difficult to judge fullness by volume alone.

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Answers to Task Analysis Questions

1. Who is going to use the design?

The design would be used by people living in complexes with shared washing machines and dryer such as dorms and apartments. It could also be used by those who have trouble finding time for laundry and would benefit from a design that handles the time management process of when a load is ready to wash, when it is finished washing, and when it is dry.

2. What tasks do they now perform?

People now gather a load of laundry, and when they arrive at the laundry room and realize that there are not any washers available, they need to bring the load of laundry back to their room and try to check back every 15 minutes or so until there is a washer available. Then they repeat the same process to find an available dryer.

3. What tasks are desired?

If people can be notified when they need to do laundry based on the weight of their laundry basket, they can better coordinate their schedule to do their laundry. After a washing cycle is complete, they will be notified when there is a dryer available around it, so they saved a trip trying to look for available machines. They will also be notified when their clothes are actually dry and ready to be picked up.

4. How are the tasks learned?

These tasks are also learned by trial and error from personal experience. For example, if after a drying cycle and their clothes are still wet, people would guess how much additional time is needed and make note of that for the next time they do their laundry. When deciding when to do laundry, a person may figure out that they typically end up with a full load of clothing once a week, and then they can try out different times to do laundry to discover when the machines are typically free.

5. Where are the tasks performed?

Since our focus is primarily people living in apartment complexes and dorms, the tasks will be performed primarily in shared laundry rooms in dorms and in apartment complexes. However, this design is not necessarily exclusive to shared laundry rooms in a complex: it can also be extended to a shared laundry room in a shared apartment, or even to a household with different family members sharing a machine.

6. What is the relationship between the person and data?

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Since everyone uses different machines with different load capacity and strength, and has different schedules, the data that we track will be very specific to each individual. Each person can use these data to track their laundry and better their time management.

7. What other tools does the person have?

The tools available right now are phone apps or websites that track individual machines and tell the person when the machine will be done and send them a text message. Some dorms also offer websites where a user can check whether there are available washers and dryers, but this is less common. Individuals can also set a timer on their phone, which is the most typical approach.

8. How do people communicate with each other?

People don't usually communicate with each other directly about their laundry, especially with strangers. However, those living in shared complexes might wait for visible cues of when a machine is free, such as someone taking clothes out of the washer and dryer. To be polite, they would also ask if that person is done in order to start their own laundry. Some people may communicate indirectly by leaving an empty basket next to the dryer.

9. How often are the tasks performed?

These tasks are performed whenever someone needs to do laundry: it can be as frequent as every two days or weekly or monthly. The frequency of the task being performed can vary depending on the person's need to do their laundry, total amount of clothing, or whether they particularly need a piece of clothing in their laundry basket.

10. What are the time constraints on the tasks?

The constraints can be seen during the laundry cycles and how busy the laundry room is. It is possible that other people are waiting on the laundry machine and it limits the time between the person going to collect laundry and when the person is notified that their laundry is ready. Another time constraint is based on the schedule of the person because it is difficult to coordinate a laundry schedule with other people.

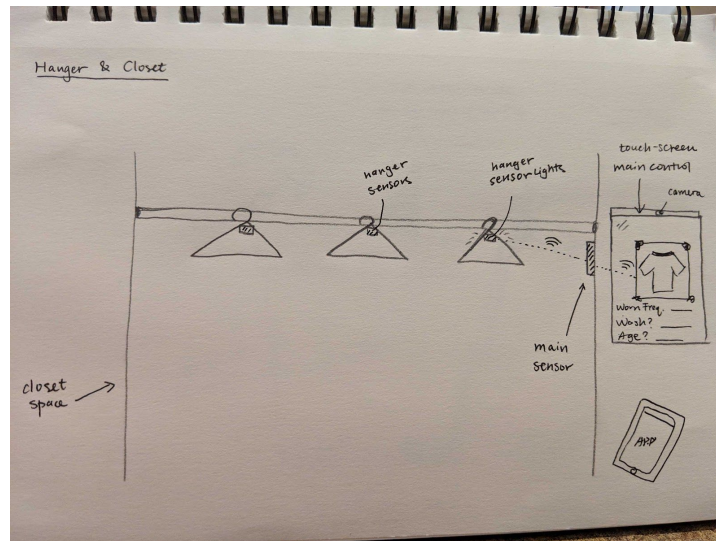
11. What happens when things go wrong?

When people can't keep track of their laundry, they might forget to do it and dirty clothes will piled up. Eventually, they'll have a larger than usual load which can be heavy to carry all the way to the laundry machines. Additionally, people might come 5 -10 minutes before their clothes are finished washing or drying and have to wait until the cycle is completed, thus wasting time that could've been invested elsewhere. This makes laundry a time consuming task if not managed efficiently.

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Proposed Design Sketches - "3x4"

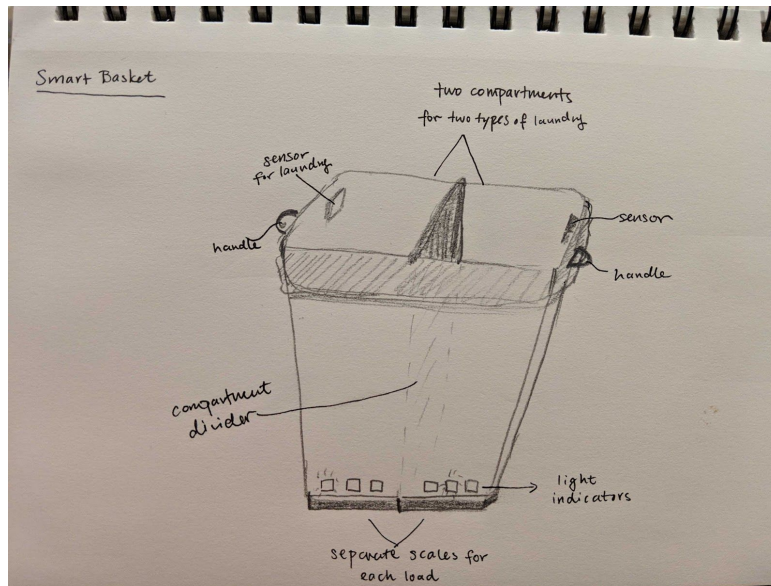


Design Sketch 1 - Smart Closet Tracking Organization

This design consists of mini sensors that you attach to your hangers to keep track of how many times an item is worn. Every time someone takes an item off the hanger, the main control unit would display statistics such as frequency of use and the last time it was washed. When the user tries to hang it up again, the sensor can light up red to let him or her know that the item should be washed instead based on the amount of times it was worn. Since the hangers are linked to a specific item, it can also tell you how something supposed to be washed, and coordinate your laundry schedule to wash like items together after a certain number of uses. It can also suggest items that you seldom wear, either to remind you to wear them, or suggest that you may not need them anymore.

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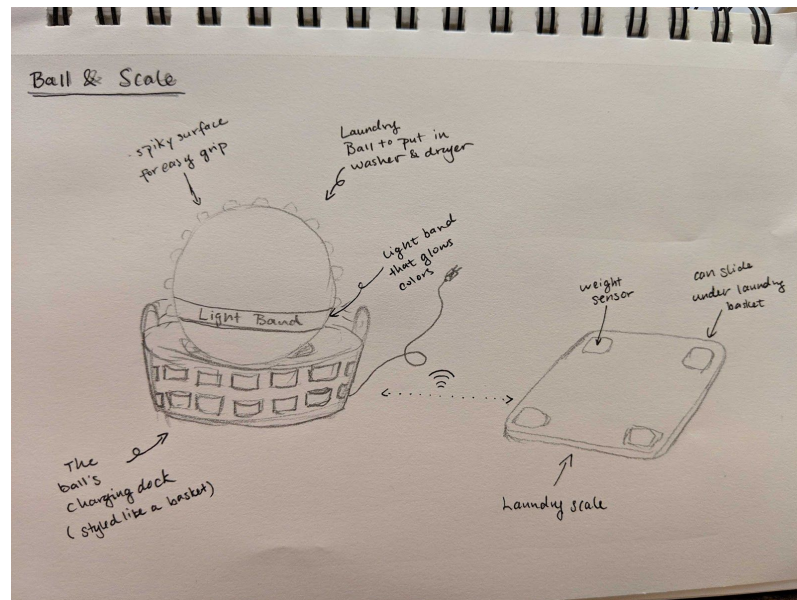


Design Sketch 2 - Smart Laundry Basket

This basket contains multiple compartments for clothes that need to be washed in different ways (e.g., whites, colors, dry-clean) and keeps them as separated loads. These can be chosen by the user when they set up the basket. The basket has a separate scale for each compartment that tells you when each compartment is full and ready to be washed, and can be paired with a smartphone app with instructions for how to wash each type of clothing. The basket can also “learn” how long each type of clothing typically takes to dry, so it can suggest lengths of time in the dryer through the app (i.e., heavy cotton clothes typically take longer than light shirts). This does require some initial setup for the basket where the customer needs to tell it how long the dryer has taken in the past.

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Design Sketch 3 - Smart Laundry Ball & Scale

This design includes a small ball that sits on your desk in a charging cradle and communicates both with a scale that your laundry basket sits on, and other laundry balls. When the basket becomes full, the ball glows to notify you that it's time to do laundry. When you start your laundry, you throw the ball into the washer and dryer with your clothing, and it sends you a notification when the washer is done, and when the clothing is dry, for the washer and dryer respectively. The ball can also communicate with other balls in the vicinity and notifies the owner when a machine is free.

Design Choice - Smart Laundry Ball & Scale

In our research, we did find that many of the people we spoke to—particularly those living in dorms, or in apartment buildings with shared laundry—were frustrated with the cumbersome process of doing their laundry. In particular, figuring out when a machine is free to use and aligning that with the point at which laundry needs to be done presents a challenge. We chose the smart laundry ball and scale design in particular because it is space-efficient: the ball is small and serves multiple purposes, while the scale fits neatly under a laundry basket. The ball is also a physical object, which makes it more difficult to ignore when it pulses to tell you to do laundry. This also allows us to use the ball as a sensor for when the washer and dryer are finished, and give immediate notifications to the client that their clothes are ready to be moved. Some tasks we would like to further pursue are: figuring out when to wash your clothes based on information beyond weight such as number of days, most frequently worn items, and coordinating with your own personal calendar for better time management.

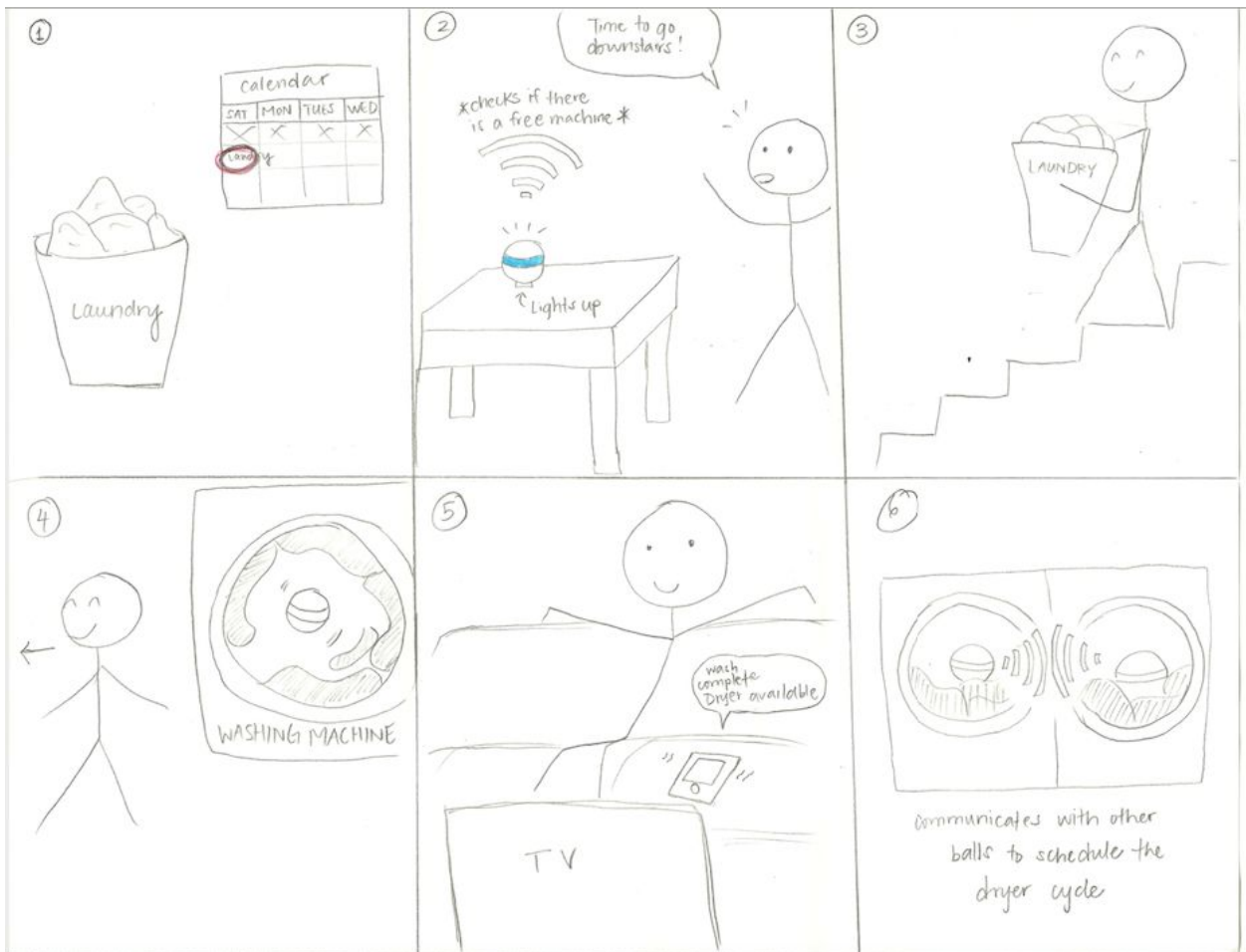
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Written Scenarios - "1x2"

Scenario 1

John lives in an apartment complex where he has to do his laundry in a shared laundry room two floors below his apartment. He likes to do laundry on a Saturday because it is his day off. As expected, the weekends are usually very popular days for others living in the complex as well. In the past, he would struggle with knowing the right time to bring his laundry down since the washers and dryers are always full. However, every since he's been using the Laundr ball that the apartment complex distributed to everyone to help coordinate their laundry schedule, timing has been a breeze. All John has to do is check if Laundr ball is glowing blue to indicate that a washer is available. He no longer has to walk down stairs himself to check for an open machine or miss his chance on the way up to get his clothes. John brings his laundry and Laundr ball down and toss them into the washer. When the wash cycle is finished, John checks his notification to see if a dryer is available, again saving himself the trip down. Since there isn't one at the moment, John can continue watching TV until it a dryer becomes free.



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Scenario 2

Alenna is a busy Bioengineering student who is preparing for 3 exams this week. She's so swamped in her work that she barely has time to do housekeeping chores as she normally would. As she sits down at her desk, she notices that her Laundr ball is glowing red. She has been so busy that she has let her basket piled up. "I'll just skip laundry this week" she thought. However, the Laundr ball continues to glow in her peripheral view. Finally, Alenna couldn't ignore the glowing reminder anymore – just because her laundry is out of sight, it doesn't mean that it isn't there. "No problem, this will only take 5 minutes" she thought. Alenna gets up and brings her basket down the hall of her house and tosses her laundry, detergent, and the ball into the machine and walks away. She studies for the rest of the time, without paying mind because she will get a notification that will let her know exactly when her laundry is done washing and drying.



Contribution Statements

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Team members: Sam Wolfson, Hang Bui, Emily Zhang, Atharva Naik

Emily Zhang: 33% - problem and solution overview, design research, task analysis, scenario

Hang Bui: 33% - storyboard, design description, task reviews, scenario

Atharva Naik: 14% - design research result and themes

Sam Wolfson: 20% significant revisions to the report