# Lab 1 – LivelyShelfs Product Description

Jaylen Wheeler

Old Dominion University

CS411W

Dr. Sarah Hosni

February 7, 2025

Version 1 Draft 2

## Table of Contents



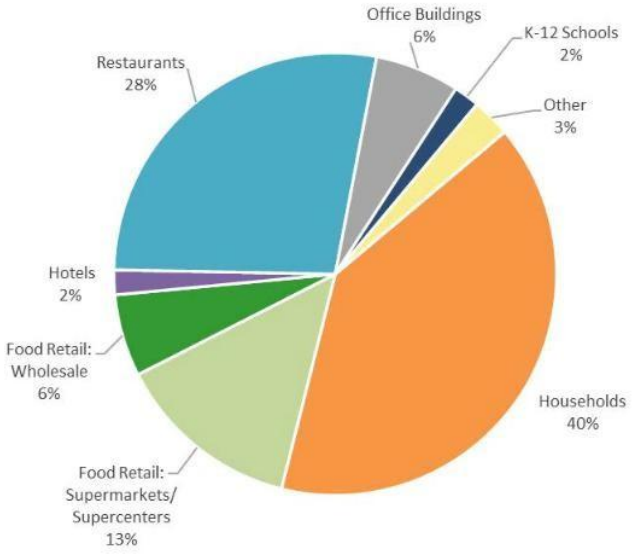
## List of Figures

# 1 Introduction

Every day, food waste is created and sent to landfills. Food waste is an ongoing worldwide issue that contributes to economic, societal, and environmental issues. In turn, these issues fuel the fire of the growing problem known as food insecurity, causing a vicious cycle of food waste turning into food insecurity. While large companies can take part of the blame for this, most of the world's food waste comes from the common household. As seen in Figure 1, the U.S. Environmental Protection Agency found that of the 66.2 million tons of food waste generated in 2019, households were responsible for 40 percent of the estimated total (EPA, 2019).

**Figure 1**

*Percentage of Wasted Food from Residential, Retail, and Service Sectors*




It goes without saying that 'money makes the world go round,' and money comes in finite amounts, so the average person cannot afford to continuously burn their hard-earned cash on wasted food without any consequences. According to Figure 2, every year in the United States alone, $144 billion worth of food is wasted by households, and the average American spends

$1300 on food that will be wasted (Shapiro, 2024; Berard, 2020). This wasted money can go towards other expenses such as bills, vacations, or savings. If consumers were more proactive in handling their food waste, they would see significant changes in the amount of money they saved.

**Figure 2**

*Financial Loss Per Sector in the US*


As the problem of food waste continues to grow, so do the societal implications that come along with it. Valuable resources squandered on wasted food result in increased malnutrition and hunger in the more vulnerable and less fortunate areas of society. The resources that are expended on wasted food could go towards bettering these vulnerable areas through providing water, energy, or even better living conditions. Due to the misuse of resources in 2022, 783 million people were negatively affected by hunger (Nairobi, 2024). A reduction in food waste through the redistribution and sharing of surplus food would alleviate these societal issues.

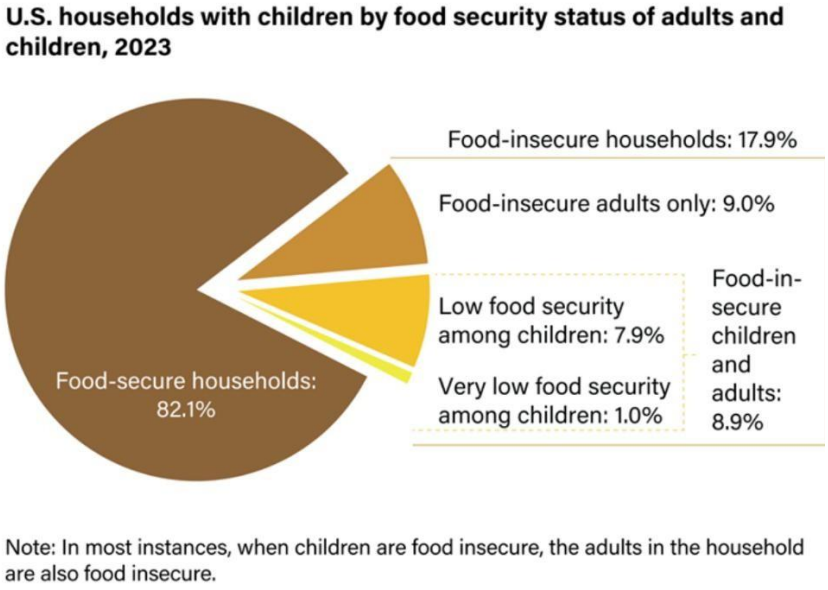
To properly grow and maintain our daily food ingredients, 70 percent of the world's water is utilized in the agriculture process (Lewis, 2024). When this carefully cultivated food is wasted and thrown away, the water used to develop it is also wasted by extension. Our freshwater is

limited, so we cannot afford to waste it so casually. At the end of the day, anything thrown away ends up rotting away in a landfill. These landfills are responsible for eight percent of greenhouse gas emissions globally (*The Environmental Impact of Food Waste*, 2024). Along with contributing to the problem of global warming, the need for more landfills takes priority over other uses of land, further affecting the surrounding environment.

Combining the economic, societal, and environmental issues posed by food waste, the adverse matter of food insecurity arises. Of the 2.3 billion people who suffered from food insecurity in 2023, almost 38 percent of these people have had the unfortunate experience of going without food for a day or longer (Berard, 2020). Less healthy and processed foods cost less compared to the attentively grown and nurtured foods, making eating healthy a luxury to those who have less money. Due to this general pricing, 2.8 billion people (mostly from low-income countries) were unable to maintain healthy diets in 2022 (World Health Organization, 2024). From Figure 3, it is evident that over a sixth of U.S. adults in families suffer from food insecurity, along with their children. Food insecurity is a critical issue that must be addressed to loosen the current grasps it has on many lives. To solve the issues of food waste and insecurity, a practical solution would need to not only educate those in need, but also be capable of providing them with guidance, reviewing their food usage, and connecting them to parties who also face similar challenges.

**Figure 3**

*Percentage of Households Facing Food Insecurity in the US*




The application "LivelyShelfs" is a proposed solution to overcome the numerous hurdles stemmed from food waste. This solution involves a proactive strategy that entails assistance in managing household food to circumvent the stress and common mistakes that can occur when overseeing the pantry, information analysis to introduce learning opportunities from visualized summaries, and a centralized food redistribution system among friends and family to provide a safe and effective method of procuring and giving away food.

## 2 Product Description

LivelyShelfs is a mobile and web application with the goals of facilitating the reduction of food waste, promoting financial savings related to food expenses, and amplifying sustainability to combat food insecurity. Rather than being reactive to the accumulation of household food waste worldwide, LivelyShelfs takes a proactive approach that involves eliminating the common actions that lead to the vexing problem of food waste.

## 2.1 Key Product Features and Capabilities

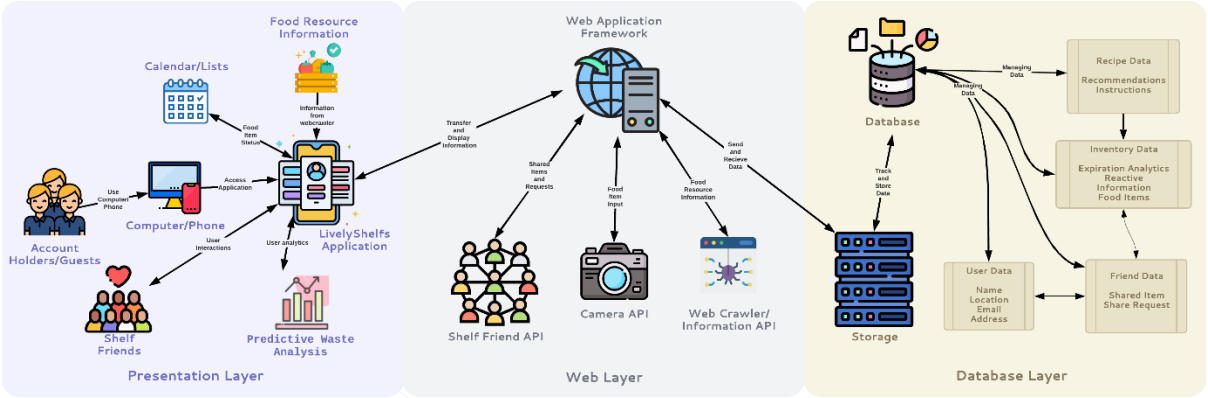
One of the application key features is the comprehensive inventory provided to every user. The inventory stores any food that the user wishes to supply it with, keeping track of expiration dates and analyzing data based upon what happens to the food. This data can change for multiple reasons such as the food expiring before consumption or being regularly consumed in a timely manner. When food within the inventory becomes close to its day of expiration, the user will be promptly notified and recommended methods to utilize the food such as cooking it as part of a recipe or to make use of another key feature, Shelf Friends. Shelf Friends are mutual friends of the user who also want to reduce their household food waste through sharing their unwanted food with close friends and family. Users can enable a ‘shareable’ status on their food items, making it visible to their Shelf Friends. Through utilization of the chat feature, Shelf Friends are able to coordinate with one another when attempting to share food. Another key feature of the application is the predictive waste analysis. Not only does the application provide data visualization after the user’s food has either been consumed or expired, but this feature also utilizes the recorded data to alert the user of potential waste as soon as the food is entered into the inventory. This gives the user a sense of urgency when it comes to the proper utilization of their food.

## 2.2 Major Components (Hardware/Software)

LivelyShelfs makes use of a three-tiered architecture to appropriately manage the relationships between the hardware and software aspects. In Figure 4, the Major Functional Components Diagram displays the contents of the presentation, web, and database layers.

**Figure 4**

*Major Functional Components Diagram*




The presentation layer involves users accessing the LivelyShelfs application to utilize its many features. Data from sources such as Shelf Friends and the calendar have a bidirectional flow, allowing the data to stay up to date. The database layer stores the data related to the user, external recipes, shelf friends, and inventory data in an organized manner. The stored data also has some bidirectional relationships, as certain portions of each data structure depend upon each other. The web layer bridges the presentation and database layers through providing a web application framework that encompasses the selected APIs while utilizing the information from the two adjacent layers.

## 3 Identification of Case Study

The target audience of LivelyShelfs who will purchase the app are the heads of households who want to reduce their food waste. These people are those who generally cook or handle the food within the household. Managing food for one person is already a lot, so managing the food for an entire household may require some form of assistance. The application

will simplify their daily tasks related to food, allowing them to divert their attention to other responsibilities.

Those who will utilize the app will be people who tend to struggle when attempting to monitor their food waste and want assistance in doing so. They would also like to minimize the amount of excess food that they purchase along with being recommended recipes to maximize the returns on their food. Reducing food waste does not have to be an independent task, so LivelyShelfs gives that push that its users may need to motivate and guide them in their food preservation endeavors.

Stakeholders who desire to witness a decrease in food waste and the accompanying environmental impact include community groups who wish to increase their quality of life through the reduction of household food waste, businesses and retailers who are pursuing strategies in minimizing their own food waste, and political organizations that are concerned with the climate crisis and want to make a difference. Investing into the app will allow the stakeholders to leave a positive mark on their surrounding community and those who potentially work under them.

# 4 Glossary

**API:** Also known as "Application Programming Interface" it is a protocol that allows for different software applications to communicate with one another.

**Community Hub:** A part of LivelyShelfs that helps bring the community together and allows user interaction to share sustainable habits and tips.

**Database:** An organized collection of information stored electronically.

**Food Insecurity:** Not having access to enough food to meet ones needs or not being able to access quality food to meet ones needs.

**Food Waste:** Food that isn't used for its intended purpose or is not used before spoiling.

**GitHub:** A service that allows developers to collaborate on the development of projects and provides version control.

**GitHub:** A service that allows developers to collaborate on the development of projects and provides version control.

**JUnit:** A testing framework for Java.

**Landfills:** A site where waste is disposed of, typically the waste is covered by soil.

**Spoilage Calendar:** An efficient and intuitive calendar provide by LivelyShelfs that notifies users of when their food is going bad

**Landfills:** A site where waste is disposed of, typically the waste is covered by soil.

**Spoilage Calendar:** An efficient and intuitive calendar provide by LivelyShelfs that notifies users of when their food is going bad

**Sustainability:** A goal to avoid actions that harm the environment or deplete natural resources while still meeting ones needs.

**Trello:** A service that helps with project management and planning.

**VS Code:** Also known as "Visual Studio Code" it is a development environment used by the team that is compatible with many different languages.

**Web Application Framework:** Software platform intended to help developers in building web applications, providing access to pre-built tools and libraries.

# 5 References

*About Kitche: Kitche Food Waste App: Kitche App*. Kitche Waste Waste App. (2023, July 26). https://kitche.co/the-app/

Assistant Secretary for Public Affairs (ASPA). (2022, May 16). *Foodkeeper app*. FoodSafety.gov. http://www.foodsafety.gov/keep-food-safe/foodkeeper-app

Berard, A. (2020, April 20). *Study calculates true cost of food waste in America*. William & Mary. https://www.wm.edu/news/stories/2020/study-calculates-true-cost-of-food-waste-in-america.php

Ehlert, J. (n.d.). *Food expiration date tracker*. Fridgely. https://www.fridgelyapp.com/

*The environmental impact of Food Waste*. Move For Hunger. (n.d.). https://moveforhunger.org/the-environmental-impact-of-food-waste

*Expiry tracking fridge, pantry and Recipes manager app, Grocery Shopping List • Cozzo smart kitchen app*. CozZo Smart Kitchen App. (2023, January 26). https://cozzo.app/

*The financial cost of food waste*. Brown Advisory. (n.d.). http://www.brownadvisory.com/us/insights/financial-cost-food-waste

*Food security in the U.S. - key statistics & graphics*. Food Security in the U.S. - Key Statistics & Graphics | Economic Research Service. (n.d.). https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics

*Home*. NoWaste. (n.d.). http://www.nowasteapp.com/

Idriss, M. (n.d.). *Foodshiner*. Prevent food waste, save the earth. https://foodshiner.app/en/

Igini, M. (2023, May 29). *10 Food Waste Statistics in America*. Earth.Org. https://earth.org/food-waste-in-america/

Lewis, J. (2024, March 4). *How does food waste affect the environment?*. Earth.Org. https://earth.org/how-does-food-waste-affect-the-environment/

Oliver, S., Johnson, C., Smith, L., & Green, V. (2024, November 26). *Your local sharing app*. Olio. https://olioapp.com/en/

*Save Good Food from going to waste: Too good to go*. Save Good Food From Going To Waste | Too Good To Go. (n.d.). http://www.toogoodtogo.com/en-us

*Save on groceries and fight Food Waste*. FoodHero. (n.d.). http://www.foodhero.com/

Shapiroe.com. (2024, July 3). *The economic impact of Food Waste*. Shapiro. https://shapiroe.com/blog/economic-impact-of-food-waste-effects/

*Sharewaste*. ShareWaste. (n.d.). https://sharewaste.com/

World Health Organization. (n.d.). *Hunger numbers stubbornly high for three consecutive years as global crises deepen: UN report*. World Health Organization. https://www.who.int/news/item/24-07-2024-hunger-numbers-stubbornly-high-for-three-consecutive-years-as-global-crises-deepen--un-report#:~:text=The%20report%20highlights%20that%20access,amid%20the%20COVID%2D19%20pandemic.