Lab 1 – Product Description

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1 Introduction

Litter and illegal dumping is a common problem all people have seen. Litter is not just unsightly; it is dangerous and directly impacts the environment and all of those living in it, including humans. Improperly discarded waste accounts for an estimated 100,000 deaths of marine animal deaths annually. According to a survey from 2016 roughly 21% of beachgoers report they have been injured from litter such as the glass or metal of bottles and cans. The danger and ugliness of litter drives people away. The City of Hampton reports a drop in property values of 7-10% in areas with illegal dumping. Tourist destinations with poor litter control and cleaning see drops in revenue up to 38%. Additionally, when people see litter they are more likely to add to it instead of finding proper disposal locations.

Keeping public areas clean is constant effort. Volunteers in all states of the US have always cleaned up litter on their own. In just the state of Virginia in the last 36 years an approximate 7.1 million pounds of litter have been found and properly disposed. It can take hundreds of such volunteers to scour the miles and miles of land for any given public recreation area. Those volunteers are still not enough. Local governments still end up paying for litter collection, removal, and disposal. In 2020, municipalities across Texas spent over $50 million on trash remediation.

When small crews or individual volunteers come across large dumped items such as appliances, mattresses, or tires, they frequently must leave them behind so that a larger team or properly equipped people can return to haul them away. Many times individuals that take notice of such bulk items either do not know the proper authority to which to report the trash or they forget by the time they leave the area where they saw the problem. These items can then languish there for months or years contributing to all the problems above.

Illegal dumping is a problem that requires multiple solutions. The reason people dump large items in inappropriate places is nearly always a convenience factor. This needs to be solved with expensive buy-in to solutions sponsored by local governments, or in the case of federal land, the federal government. Such programs can be extremely difficult to start due to the bureaucracy involved and difficult to maintain due to budge limits, cuts, and reallocations, especially for very small municipalities in rural areas.

The gap becomes clear between those that see and are affected by illegal dumping and those with the means and motivation to remove it and dispose of it properly. Giving both sides of this equation an efficient means of communicating can close this gap leading to a cleaner and safer environment for people, plants, and animals. TrashTag aims to be this solution by giving citizens the ability to take a photo of the problem they find and easily upload it to a map that anyone can see, including local governments and environment clean-up organizations. At a glance people and organizations can see what issues are nearby to them and effortless gauge the scope of the problem to plan accordingly. Combine this with tools that let citizens organize themselves and provide local information about proper bulk item disposal, citizens can be empowered to make a huge difference in their local area thus making a global impact.

TrashTag also includes additional features to further support the clean-up efforts. Users are prompted when nearby previously tagged trash so that it can be verified, both for being there or if its been cleaned. The system is also gamified for further incentive where users can track their impact and compare their progress against other local users. Finally, organizations and local governments can get access to analytical data showing hotspots of dumping and track the efforts of clean up over time. Empowering individuals and groups, and letting them all connect and plan makes this large work easier for everyone.

2 Product Description

TrashTag aims to improve the litter and waste cleanup process by developing a mobile application where users can photograph and report piles of waste, give their exact locations, and connect with cleanup groups that are well-equipped to handle the cleanup process in order to improve environmental wellbeing and preserve nature's beauty for the public eye.

We are committed to helping the environment and the public by providing a resource that clearly highlights the location, extent, type and weight of the waste as well as provides updates regarding existing cleanup efforts, dangers and geographic littering patterns to help cleanup crews allocate their time and resources more effectively.

2.1 Key Product Features and Capabilities

- Live Litter Reporting and Mapping
- Ranking System for Active Report and Cleanup Users
- Updates Regarding Cleanup Efforts For Each Report
- Images of Litter for Cleanup Crews to Accurately Gauge Its Scope
- Collaboration Space for Other Users to Provide Information and Updates
- Direct Connection Between Reporters and Cleanup Crews
- Mapping Tools to Scope All Reports in a Geographic Area
- Users Receive Alerts When Near Reported Litter to Verify If It's Gone or Still There
- Scheduled Clean ups

2.2 Major Components (Hardware/Software)

- Digital Ocean host for API

    - User post handler
    - Mapping handler
        - Interface for Google Map API
    - User reward system handler
    - Group scheduler
    - Report generator
    - External data linker
    - Database interface
- SQLite database

3 Identification of Case Study

- San Marcos River Foundation
    - A local non-profit dedicated to clean up of the San Marcos River
    - They struggle with efficient use of their volunteers to find trash on the dozens of miles of river in their area
    - Knowing where specific dumped items are let's them use volunteers much more quickly.
    - Features They Will Use
        - Live Map of Trash
        - Mark Completion of Pick Up
        - Report of Trash Hot Spots
- Citizen using the river
    - A local regular person using the river space recreationally.
    - Notices large trash or dumping and is unable to clean it.
    - Wants to report it to someone that can help.
    - Features They Will Use
        - Live Map of Trash
        - Upload photo of trash
        - Verify clean up of other reports

4 Glossary

- **API**: Application Programming Interface. A software mechanism of accepting and providing data from and to external applications/
- **Geotag**: GPS provided location information embedded into images taken with a camera.
- **Dumping/Trash/Litter:** Any material purposefully or otherwise left in an area where it does not belong.
- **Environmental Organization:** Private, and frequently non-profit, groups dedicated to environmental causes.

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