Lab 1 – Product Description

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Version 2

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1   Introduction

Managing the prevalent litter crisis affecting environments and communities worldwide remains a persistent challenge which must be addressed. Over the past 36 years, volunteers in the state of Virginia have removed approximately 7.1 million pounds of litter (Chesapeake Bay Foundation, 2025), requiring hundreds of people to thoroughly scan affected areas for trash (Fawaz, 2023). The environmental repercussions are severe as illegal dumping has led to a serious amount of marine animal deaths and approximately 21% of beach goers report litter related injuries (Campbell 2016). Property values have also been affected by illegal dumping as it has been shown to progressively weaken the house market by 7%-10% (City of Hampton). Hence communities are left to suffer the environmental and economic consequences of waste dumping given that even tourism revenue has decreased by 38% (Keep Texas Beautiful).

Current approaches to cleanup waste have been lacking efficient communication tactics to resolve the issue at hand. Organizations spend more time searching for illegal dumping rather than disposing of the illegal waste, while citizens who happen to stumble upon trash lack the proper equipment to clear the area. Yet even if citizens were to obtain the proper material to dispose of the trash, some waste is far too large to be managed by one person and requires multiple volunteers for assistance. Hence, once arriving at their residence, citizens face two issues: they either forget to report the litter, or their reports get lost in the organization's mailbox forcing them to email multiple organizations simultaneously. Therefore, without a live real-time reporting communication system, citizens are unable to efficiently report litter dumping leaving ineffective cleanup efforts.

2   Product Description

Given the issue revolves around failed communication tactics, the solution must employ live, real time reporting mechanisms that would allow for accurate litter documentation and immediate feedback from organizations through geotagged images, offering location-based mapping. The visual image evidence and documentation would allow for volunteers to accurately gauge the scope and type of waste before arriving on site to efficiently allocate volunteers and resources for efficient cleaning. The updated verification tools and facilitated communication pathway between reporters and organizations would eliminate the waste management gap, creating an astounding resolution for the prevalent issue affecting communities worldwide.

2.1   Key Product Features and Capabilities

TrashTag is a mobile application that connects citizens who encounter waste with organizations that have the resources and volunteers to safely remove it. Users capture an image of the waste and report its geotagged location to an interactive map. Once uploaded, the report gets connected to clean up organizations that will use the information provided on the platform to efficiently remove the waste. The platform not only provides location and waste type but it also regularly updates the cleanup status according to the completion rate. There will be a ranking system implemented that will allow for active recognition of both the reporters and cleanup users, this healthy competition system will allow for further engagement and give users an opportunity to view their measurable impact on the environment. Hence, Trashtag will eliminate the hindering cleanup gaps by opening communication pathways between citizens and organizations while engaging users to maintain public areas clean through motivating ranking systems.

2.2 Major Components (Hardware/Software)

TrashTag will function as both a desktop and web application using HTML, CSS, and JavaScript for the frontend development and Django Python for backend development. Users will be able to report litter on a virtual map and track the live status of that process. The backend development will handle litter report storage and active coordination between reporters and cleanup volunteers. Mapping APIs are a crucial component that will be integrated in this platform to provide geolocation features, enabling precise location marking and report displays on the live map. The platform will provide users with image upload capabilities to capture litter infested areas and an administrative dashboard that will continuously update the cleanup statuses as volunteers mark areas as cleaned.

3 Identification of Case Study

TrashTag is aimed primarily at concerned citizens who encounter trash with no structured way to successfully clean the designated area. Despite multiple attempts to do so, citizens struggle to report the litter incidents to the proper authorities due to lack of systematic coordination systems. Similarly, TrashTag was developed to address certain challenges faced by cleanup organizations that struggle to efficiently locate litter infested areas. Hence, the litter reporting system facilitates the communication amongst both parties, allowing for better coordination and more efficient cleanups.

The app prototype will be used by a small set of ODU students that will test the efficiency and functionality of the TrashTag system. The students will be divided into two groups, one group will report the litter location, while the other will mark the area as 'cleaned' on the live map. This will allow a visual simulation of the communication that would occur between users that report the litter and cleanup volunteers.

      This platform has the capability of reaching a broad audience in the future as environmental advocates continuously inform communities of the impact litter has on the environment and community. Hence, this platform has the potential of reaching not only environmental organizations but anyone that cares about their environment.

4 Glossary

Illegal Dumping: The unauthorized disposal of trash and other hazardous materials onto private and or public property.

Metadata: Descriptive information within data files such as date, location, and timestamp data in photos to be submitted to TrashTag.

Geotagging: The addition of GPS coordinates to images that enable precise location identification where trash was reported.

Live Real-Time Updates: Live data synchronization displaying trash reports to both users and cleanup organizations instantaneously.

Gamification: The incorporation of game-like mechanics such as rankings to motivate user participation and skyrocket cleanup operations.

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