Lab 1 – Product Description

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1 Introduction

Every year, millions of pounds of trash are dumped all over American cities and towns. Over the past 36 years in Virginia alone, volunteers have removed approximately 7.1 million pounds of litter (*48,000 Pounds of Litter Removed Across Virginia on Clean the Bay Day,* 2025). Large trash items, such as mattresses, old tires, and appliances are often dumped in recreational areas, which makes it difficult for visitors to attempt to remove them to an appropriate location. Illegal dumping has also led to about 100,000 marine animal deaths every year (*Effect of Littering*, 2023) and an estimated drop of property values by 7% to 10% in Hampton Roads (*Litter in America*, 2010). Finally, when the general public witnesses illegal dumping or littering, they are more likely to litter in that area as well (Blouin, 2016).

Current solutions to the problem of illegal dumping are often ineffective in the long term, especially regarding proper resources, communication between people, lack of convenience, and the complexity of the overarching issue. Since the general public may or may not have knowledge of proper disposal methods, this makes it hard for them to know who to contact in order to inform others of illegal dumping. Many volunteer organizations and local governments often struggle with tracking and removing litter from outdoor recreational areas, such as parks, river, lakes, and beaches, which makes it much more costly each year. When trash is encountered by the public, people also lack the proper tools to organize clean-up efforts and often require prior coordination with organizations to maximize efficiency. Due to the lack of convenience, people are unable to immediately communicate with others regarding illegal dumping. Thus, the general public are forced to contact multiple organizations, often through email or social media, just to ensure the problem gets enough attention and is hopefully solved.

The solution to illegal dumping aims to improve the litter clean-up process by developing a web application named “TrashTag.” TrashTag would give the public, volunteers, and organizations a way to properly and efficiently report piles of trash and help clean-up cities and recreational areas. The app’s features would include live reporting and mapping; a litter report system; digital rewards; and a verification process to ensure users that the trash was cleaned up or not. The live reporting system would give users the ability to take a picture of the litter with their phone, upload it to the app, and geotag the photo onto a live map of their local area. This system would also allow organizations to properly allocate time, resources, staff, and funding to the clean-up of polluted areas. The litter report system would work in tandem with the mapping system as it would provide users with a visual understanding of the problem and allow them to prepare for proper clean-up. The reward system, named “Litter Hero!”, would be for users who successfully clean up polluted areas from the map; it would also give users a trackable incentive for them to easily measure their impact on the community. Finally, TrashTag would have a verification process to ensure that users can verify if trash is still in a certain area or if it has been cleaned up.

2 Product Description

TrashTag is a web application that 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 well-being and preserve nature's beauty for the public eye.

2.1 Key Product Features and Capabilities

TrashTag's key product features include live litter reporting and mapping; a ranking system for users and active reporting purposes; updates regarding cleanup efforts for each report; images of litter for cleanup crews to accurately gauge its scope; a collaboration space for users; direct connections between reporters and cleanup crews; mapping tools to scope all reports in a geographic area; a system for users to receive alerts when reported litter is nearby; and a listing of scheduled cleanups in the user's area.

2.2 Major Components (Hardware/Software)

Since TrashTag is a web application and can run on any browser, it can run on any device (PC, Android, iOS) that has access to the internet and a browser application. For software, the web application itself is created using Python with Django (for backend), while HTML, CSS, and JavaScript is used for it's frontend. Microsoft Azure hosts the API for the user post handling; the mapping handling (via interface for Google Maps API); location tracking; user reward system handling; group scheduling; report generation; external data linking; and database interface. Azure will also be responsible for hosting the SQL database and the file storage for user-taken images.

3 Identification of Case Study

TrashTag is mainly used by private environmental organizations or by people who want to make a visible difference in their local community. For organizations that live near rivers, they often struggle with effectively using their volunteers to find trash on the dozens of miles on a river bank. If they prematurely knew where specific waste items were located, then they could track down and clean up those areas faster. Meanwhile, solo recreationists often notice large trash piles or illegal dumping spots while enjoying public parks. These people want to contact organizations who can address this issue, or figure out how to alleviate the issue themselves, if possible. In both of these scenarios, TrashTag is able provide both organizations and citizens with the ability to report litter hot spots, upload images of littered areas, and mark cleanups on a live map.

4 Glossary

API: Application Programming Interface. A software mechanism of accepting and providing data to and from external applications.

Database: An organized, electronic collection of data.

Environmental Organization: Private, and frequently non-profit, groups dedicated to environmental causes.

Geotagging: The process of adding GPS-provided location information onto images or videos taken with a camera.

Illegal Dumping: The dumping of trash in a non-authorized trash collection location, such as on the sidewalk or in a public park.

Microsoft Azure (Azure): Microsoft's Cloud computing platform, which offers over 200 products to its various business clients.

Non-Profit Organization: An organization that is private and not managed by the government.

Relational Database: A database that organizes data into distinct rows and columns for easy access.

SQL: Structured Query Language. A programming language used for storing and processing information in a relational database.

Trash (Litter): Unwanted or un(re)usable materials, such as food, paper, and plastic.

Web Application: An application software that runs on a web browser via the internet.

Web Browser (Browser): An application for accessing internet websites.

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