CS 410 Lab
TrashTag Product Description (Outline)
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1 Introduction

- **Background**
  - Over the past 36 years, volunteers in the state of Virginia have removed approximately 7.1 million pounds of litter (Chesapeake Bay Foundation, 2025).
  - It can take hundreds of people to to search an area for all the trash and dumping (KUT News 2023)
  - Oversized items, such as mattresses, tires, and appliances, create challenges for individuals lacking equipment to haul and dispose of them safely.
  - The accumulation of waste has led to approximately 100,000 marine animal deaths annually (Environmental Volunteers, 2023).
  - Illegal dumping has causes an estimated drop of property values by 7% - 10% (City of Hampton, n.d.).
  - Approximately 21% of beach goers report they have been injured from beach litter. (Science Direct 2016)
  - When people see litter or dumping they are more likely to litter or dump more in that area. (Allegheny Front 2016)
  - Litter makes tourist destinations less attractive and causes an estimated drop in revenue by 38% in areas with litter. (Keep Texas Beautiful)
  - Texas has spent $50 million in litter clean up. Costs paid for by local governments. (Keep Texas Beautiful)
- **Problem Characteristics**
  - Resources
    - Organizations struggle to track illegal dumping.
    - Items too much for individuals.
    - Users and Litterers alike may or may not have adequate knowledge of proper disposal options.
  - Communication
    - Users don’t know who to contact regarding trash.
    - Users lack tools focused on organizing cleanup efforts.
    - User reports come in one at a time and require coordination within cleanup organizations to increase efficiency.
  - Convenience
    - Users can’t communicate in the moment when they see the trash.
    - They’ve forgotten by the time they return home.
    - Litterers often dump out of convenience on private or public property
  - Complexity
    - Users reach out to orgs via email/social media which may get lost or go unnoticed.
    - Thus, users contact multiple orgs at a time to ensure attention
- **Who is Affected?**
  - The Environment
    - Open dumping landfills negatively impact the environment by contributing to pollution via toxic chemicals.
    - These landfills account for at least 40% of all global waste.
  - Local Governments
    - Local governments spend millions of taxpayer dollars annually on litter clean up.
    - In Virginia alone, 3.5 million dollars is spent to clean the state’s roadways.

    - Environmental Organizations
        - Safety risks often put volunteer efforts at a significant disadvantage.
        - Rising annual costs are another factor in turning away volunteers and organizations from cleaning up litter.
    - The General Public
        - Excess litter creates various health hazards and diseases.
        - Litter also negatively impacts waterways, communities' aesthetic value, and the cleanliness of natural areas.
- **Summary**
    - Independent organizations and local governments struggle to efficiently locate and remove litter in outdoor recreational areas such as parks, rivers, lakes, and beaches. Without knowing locations and characteristics of waste items, volunteer efforts can be left unprepared and ineffective. Communities lack a live reporting system to connect citizens with organizations capable of safe and efficient waste removal efforts.

2 Product Description

- **The Solution**
  - 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)

- Azure host for API
  - User post handler
  - Mapping handler
    - Interface for Google Map API
  - Location tracker
  - User reward system handler
  - Group scheduler
  - Report generator
  - External data linker
  - Database interface
- Azure SQL database
- Azure file store

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.

5 References

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