A person putting plastic bottles into a recycling bin

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# **Introduction**

In the modern era of technological advancements and rapid societal growth, we are constantly facing the challenge of increasing waste volumes, leading to improper disposal practices that contribute to air pollution and other environmental concerns. Addressing this critical issue, ScrapAway introduces an online platform designed for the efficient door-to-door collection of various types of waste, including plastics, metals, electronics, organics, furniture, and hazardous materials.

ScrapAway's innovative solution enables users to responsibly dispose of their waste without leaving the comfort of their homes, thereby reducing the need for travel, and significantly contributing to environmental sustainability. In today's fast-paced lifestyle, where proper waste management is often overlooked due to busy schedules and inconvenient pickup arrangements, ScrapAway offers a timely and effective response.

Our platform distinguishes itself through its variety of robust features, catering to both waste disposers and collectors. Sellers benefit from features like an intuitive Dashboard for managing pickups and bookings, Easy Waste Listing for different waste types, convenient Scheduled Pickups, and Pricing Estimates to gauge disposal costs. The platform also includes comprehensive Waste Categories for a broad range of disposals. On the collector side, ScrapAway offers functionalities such as Booking Management, allowing waste collectors to efficiently manage their pickup bookings, Route Optimization tools for planning effective collection routes, and Income Tracking features to monitor earnings from completed pickups.

In addition to these core functionalities, ScrapAway enhances user engagement with educational and interactive features. This includes Recycling Tips, Community News, engaging Recycling Challenges, and Real-Time Alerts for an informed and connected user experience.

ScrapAway will be specifically designed to be user-friendly and adaptable, meeting diverse waste disposal needs. Our platform simplifies waste management while contributing to global environmental preservation efforts. By revolutionizing waste disposal methods, we are committed to aligning with sustainability and ecological responsibility.

## **Key Features / Components**

**Seller Features:**

1. **Dashboard:** View and manage pickups / bookings.
2. **Easy Waste Listing:** Sellers can list different types of waste.
3. **Scheduled Pickups:** Choose convenient pickup times and locations.
4. **Pricing Estimates:** Get cost estimates for different waste types.

**Collector / Buyer Features:**

1. **Booking Management:** Collectors can view, accept, or reject pickup bookings.
2. **Route Optimization:** Tools to plan efficient collection routes.
3. **Income Tracking:** Monitor earnings from completed pickups.

**Other Features:**

1. **Recycling Tips:** Learn about recycling and waste management.
2. **Community News:** Read success stories and environmental news.
3. **Recycling Challenges:** Solve riddles/puzzles to learn about recycling.
4. **Real-Time Alerts:** Get notifications and digital receipts.
5. **Partnerships:** Information on recycling partnerships.

## **Initial Hypotheses:**

1. The website will create income opportunities for garbage collectors.
2. A user-friendly website will lead to higher participation in proper waste disposal practices.
3. Streamlined online booking will decrease illegal dumping of large items.
4. Enhanced convenience and affordability will boost resident satisfaction in waste disposal.
5. The platform will raise awareness about the importance of responsible waste management.

## **Assumptions:**

1. There is a significant demand among residents for disposing of items not covered by city services.
2. Garbage collectors are willing and able to handle the increased and varied workload.
3. Users are inclined to use a website for waste disposal scheduling and services.

## **Potential Benefits:**

**For Sellers:** Reduces the hassle and environmental impact of disposing of large waste items, offering a cost-effective solution.

**For Collectors:** Generates additional income and provides a more organized system for waste collection, enhancing efficiency.

# **Proposed Research Methodology**

## **Background Research**

1. **Existing Problem:**

The topic we've selected addresses the challenges associated with solid waste management. Recent data of survey indicates that many Canadian residents struggle with significant waste disposal issues, particularly during the winter. The key difficulties include:

* **Challenges in Disposing of Solid Waste:** This includes the difficulty in disposing of large items such as broken electronics, furniture, tiles, and scrap materials, which are often not accepted by local municipal waste management services.
* **Limitations on Garbage Item Disposal:** Residents face restrictions on the number of items they can dispose of, with a current limit of six items per household per year for corporation pickup trucks. This poses a problem for those needing to dispose of more items.
* **Issues with Missed Garbage Collection Schedules:** When residents are unavailable at home and miss the scheduled pickups by city council garbage collectors, they are left with limited options. They must either store the garbage for another week or opt for expensive private pickup services.

To address these issues, we are developing a website for residents. This platform not only facilitates scheduling waste collection at a time that suits the user but also offers a cost-effective alternative to the fees charged by the city of Surrey. It presents a win-win situation: residents can easily discard items that the city's service doesn't accommodate, while garbage collectors have an opportunity to generate significant income.

Our research will delve into the needs and challenges faced by both waste disposers (sellers) and waste collectors, ensuring our platform effectively addresses the requirements of both groups.

1. **Similar websites:**

<https://my.surrey.ca/largeitems/terms>

<https://vancouver.ca/home-property-development/garbage-and-recycling-collection-schedules.aspx>

<https://city.langley.bc.ca/city-services/engineering-parks-operations/garbage-green-bin-recycling>

1. **Research papers:**

<https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3808542&download=yes>

<https://www.researchgate.net/publication/235217579_Development_of_A_Web_based_GIS_Waste_Disposal_Management_System_for_Nigeria>

## **Uniqueness of the project:**

The uniqueness of the website lies in the solutions it provides to the residents as there is no such website available for them that can provide them with a pickup option of all kinds of solid waste that too in adverse weathers such as winters.

**Competitive Prices and validation:** The ability for users to check and compare prices for waste disposal is a pivotal factor. This feature enables users to make informed decisions, ensuring they get the best possible value for their waste disposal needs.

**Flexible scheduling of Door Pickups:** Offering scheduled door pickups provides users with the flexibility to choose a time that suits their needs. This feature allows users to cater to the busy schedules who may not have the time to visit waste disposal centers and they throw the cans, plastic, electronic in the bin.

**Location preferences:** Allowing users to choose their preferred location for waste pickups doesn’t matter if their location is in the city or outskirts.

## **Data collection method-user surveys/questionnaires**

Our research into waste disposal challenges has involved two key methods: analyzing research papers and websites and engaging in interviews and surveys with people who have encountered waste disposal issues. We've paid special attention to the struggles faced during severe weather, when waste assistance services are often rare.

These real-world experiences, combined with the academic information we gathered, have been invaluable in shaping our understanding of the problem. They have particularly highlighted the gaps in current waste management systems and the need for more accessible and efficient solutions. Based on these insights, we have been working on developing a comprehensive application specifically designed to simplify and streamline waste management processes. This app aims to address the unique challenges identified through our research, making waste disposal more manageable for individuals, especially during challenging weather conditions.

## **Technologies**

We are designing a full-Stack application using **MERN STACK**.

1. **Methodology:** We will use Agile methodology for flexible, iterative development of our app.
2. **Operating System:** Windows.
3. **Front end:** We will use React to develop the User Interface of our website.
4. **Backend:** Server-side activities will be managed by Nodejs, which provides scalability and real-time capabilities.
5. **Database:** MongoDB, a versatile NoSQL database for storing and retrieving data.
6. **API:** Writing Api using Nodejs.
7. **Responsiveness:** Our website will provide consistent user experience across all devices and browsers.

# **Project Planning & Timeline**

## **Timeline**

|  |  |  |
| --- | --- | --- |
| **Deadlines** | **Phase** | **Description** |
| Jan 1 - Jan 14 | Requirement Gathering and Analysis | This phase involves studying various research papers and understanding the user needs to find the problem statement.   1. **Milestone:** Completion of Technical Feasibility Analysis. 2. **Deliverables:** Detailed project Plan, and research findings. |
| Jan 17 - Jan 22 | Designing Prototype | During this phase a rough prototype design will be created.   1. **Deliverables**: Rough estimation of the number of pages and a draft user interface. |
| Jan 29 - Feb 10 | Front End Development | 1. During this development phase responsive UI will be designed using React, Bootstrap and CSS. 2. **Milestone:** Completion of UI of Homepage of our app. |
| Feb 11 | Testing First Set | |
| Feb 12 – Feb 21 | Backend Development | During this phase database connectivity is set up with the front end and Api will be written using NodeJS.   1. **Milestone:** Successful completion of database connectivity and validation of user information |
| Feb 22 | Testing Second Set | |
| Feb 23 - Mar 15 | Coding Final Set | 1. Integrate all the functionalities. 2. **Deliverables:** Fully functional website with database connectivity. |
| Mar 20 - Mar 25 | Quality Assurance and Testing | 1. Quality Assurance and Testing activities will ensure all modules are working smoothly. 2. **Milestone:** Successful completion of quality assurance. 3. **Deliverables:** QA reports and bug fixes. |
| 26 Mar - Apr 6 | Presentation and Report | 1. This final phase includes preparing for the project presentation and compiling the report. 2. **Milestone:** Successful project presentation. 3. **Deliverables:** Report and project presentation materials. |

## **Prototypes / Wireframes**

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| --- | --- |
| A close-up of a waste management form  Description automatically generated |  |
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## **Team Contribution**

**Sabiya Sabiya (Group Member #1)**

Her role will be centered on the seller side of the platform. Her primary responsibility includes enhancing the user experience and integrating the database for effective waste listing and scheduling. She will primarily focus on refining the database aspects of the project.

**Laiba Ayyaz (Group Member #2)**

Her focus will be on the collector side of our application more. She will be dedicated to optimizing the UI/UX, ensuring it is user-friendly and efficient for route planning and booking management.

## **Project Management Chart (JIRA Scrum Board):**

We are using the JIRA Scrum Board to visualize the project’s progress and tasks within each sprint. Below is the visual representation.

A screenshot of a computer

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# **Acknowledgement**

I would like to extend my heartfelt thanks to Douglas College for creating an educational environment that greatly encourages learning and innovation. I am especially grateful to **Professor Reza Abbasi** for his invaluable teachings in MERN full-stack development. Additionally, my gratitude goes to **Professor Nikhil Bhardwaj** and **Michael Ma** for their expert guidance in database management, which was crucial in my mastery of these complex concepts.

# **References**

1. <https://my.surrey.ca/largeitems/terms>
2. <https://vancouver.ca/home-property-development/garbage-and-recycling-collection-schedules.aspx>
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4. <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3808542&download=yes>
5. <https://www.researchgate.net/publication/235217579_Development_of_A_Web_based_GIS_Waste_Disposal_Management_System_for_Nigeria>