

BINSENSE : OPTIMIZED WASTE MANAGEMENT

ABSTRACT

Considerable sustainability and operational efficiency improvements have resulted from using Internet of Things (IoT) technologies in trash management. Existing systems, including SmartBin and CleanCity Networks, use IoT sensors and cloud-based platforms to track waste levels and improve collection routes. However, these systems frequently struggle with issues, including rudimentary user interfaces, limited predictive capabilities, and sensor accuracy. To fill these gaps, the BINSENSE model combines predictive analytics to predict waste generation trends and enhance route optimization with calibrated sensors and sophisticated data filtering to guarantee accurate waste monitoring.

Furthermore, BINSENSE delivers an improved web and mobile interface with customizable alarms, historical trends, and dynamic data visualization for better decision-making. Role-based access controls and Secure Sockets Layer and Transport Layer Security encryption help to address security and privacy issues in IoT systems by guaranteeing safe data access and transfer. To provide a scalable, effective, and secure solution for optimal garbage collection, this article examines the developments made by BINSENSE in overcoming the shortcomings of current IoT-based waste management systems.

INTRODUCTION

For cities and urban planners, efficient waste management has emerged as a critical issue as urbanization picks up speed and population densities increase. Waste buildup endangers the environment, jeopardizes public health, and lowers urban dwellers' quality of life. Because traditional trash management methods rely on scheduled pickups and manual inspections, they frequently result in inefficiencies, overflowing bins, and wasteful resource use. We suggest the BINSENSE: Optimized trash Management System, a cutting-edge Internet of Things (IoT)-based solution that improves operating efficiency and automates trash monitoring, as a solution to these problems. BINSENSE provides real-time garbage bin fill level monitoring by fusing IoT technology with waste management procedures. It measures the amount of waste using ultrasonic sensors and sends the information to a centralized web portal, which displays the waste levels and sends out warnings when the bins are full. Waste collection teams can minimize needless trips and the carbon footprint of collection trucks by optimizing routes and schedules with the help of this timely information.

The growing need for smart city solutions makes the BINSENSE project pertinent and timely. The solution is financially possible with small initial expenditures in hardware and software because municipalities are actively looking for technology to increase efficiency. Long-term sustainability is ensured by the rapid return on investment provided by the operating cost reductions from improved collection routes and fewer overflow incidents.

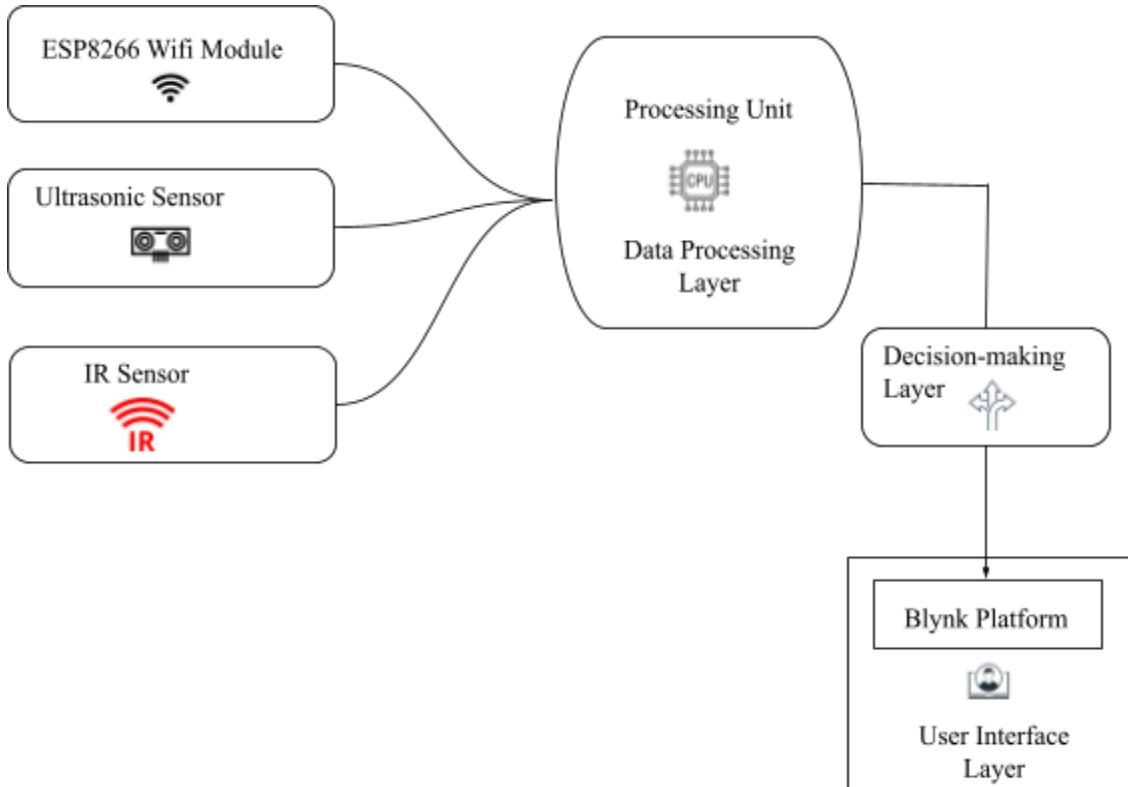


Figure 1. BINSENSE method framework

METHODOLOGY

Effective waste monitoring, data-driven decision-making, and smooth system integration are all guaranteed by the BINSENSE: Optimized Waste Management System methodology. The ESP8266 WiFi module enables real-time data transfer while the system uses ultrasonic sensors to continuously monitor garbage bin fill levels. Predictive analytics and dynamic visualization are made possible by processing and storing the gathered data on a cloud-based platform. When bins reach predetermined thresholds, an event-driven architecture sends timely alerts via SMS, email, or mobile notifications, guaranteeing timely garbage pickup. Waste levels, status alerts, and performance data are all easily accessible through the online dashboard, which was created with the help of contemporary frameworks like React and Django.

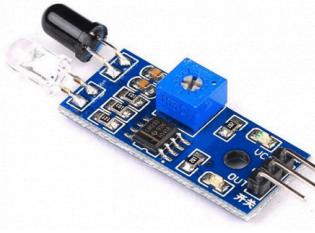
Furthermore, route optimization algorithms minimize operating costs and environmental impact by recommending effective collection schedules based on real-time sensor data and historical garbage trends. Because the system is scalable, it can easily accommodate the addition of more sensors and Internet of Things devices with very minor adjustments. Data integrity and limited access to critical information are guaranteed by security mechanisms including role-based access control and encryption technologies. Prior to a full-scale rollout, pilot testing is conducted in

specific places as part of the implementation's progressive deployment methodology. BINSENSE is a creative answer to contemporary waste management problems because of its architecture and approach, which prioritize automation, usability, and dependability.

High-Level System Architecture

An overview of the interactions between the components is given by the system's high-level architecture. It consists of the following:

IoT Devices (Sensors and Microcontrollers)

Ultrasonic Sensors	These sensors are embedded in waste bins to measure the fill level by calculating the distance to the waste surface.	
WiFi Module (/ESP8266)	This module processes data from the sensors and transmits it to the cloud-based platform for further processing.	
IR Sensors	These sensors are used to detect the presence of waste in the bin, providing an alternative or complementary method for monitoring fill levels.	
Servo Motors	These motors are employed to control the movement of the waste bin lids, automating the opening and closing process to prevent spillage and facilitate easy waste disposal.	

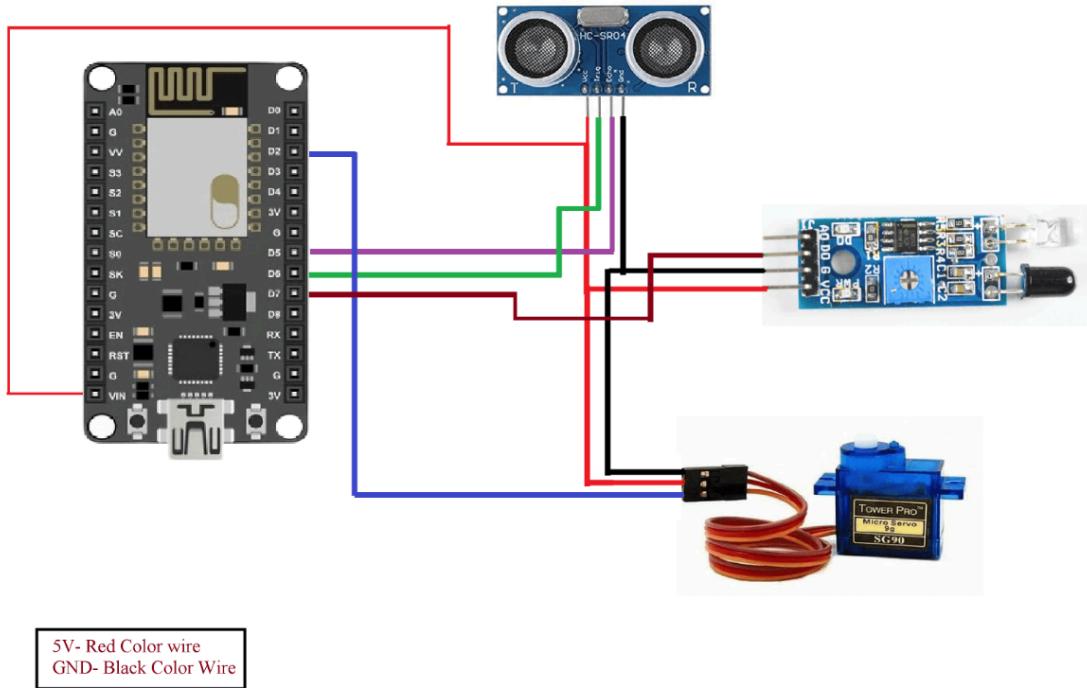


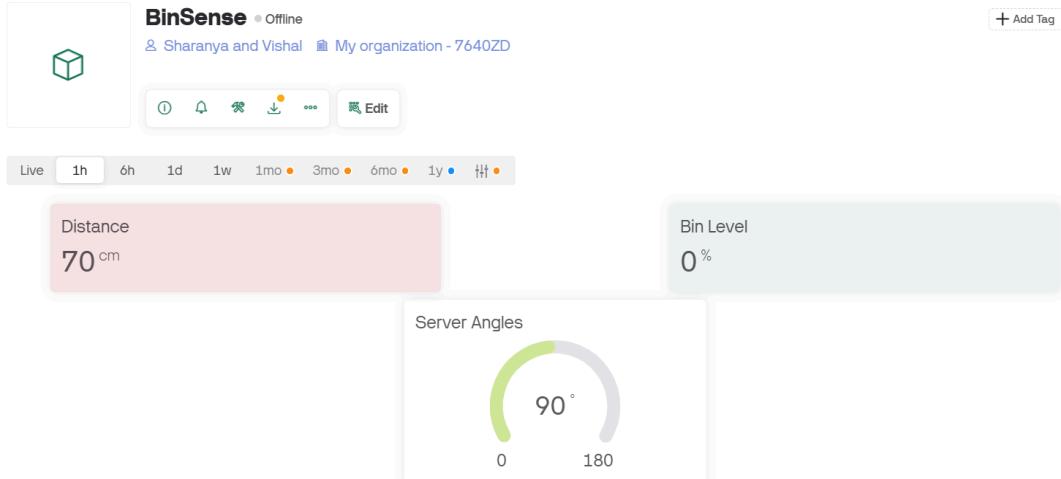
Figure 2. Circuit diagram demonstrating the hardware of BINSENSE

RESULT AND DISCUSSION

The BINSENSE: Optimized Waste Management System's outcomes show its effectiveness in optimizing automated waste collection, predictive analytics, and monitoring of waste levels. During initial testing, the ultrasonic sensors could transfer real-time data to the cloud with little latency and accurately detect fill levels. Sensors and the cloud-based platform could communicate without interruption because of the ESP8266 WiFi module's dependable connectivity. When bins hit the predetermined 75% threshold, the system's event-driven architecture instantly sends out alerts, enabling garbage collection staff to act promptly. React and Django were used to create the web dashboard, which offered an easy-to-use interface for tracking trash levels and producing performance reports by successfully identifying waste generation patterns. The analytics module assisted in streamlining collection schedules. Algorithms for route optimization decreased needless collection trips, increasing operational effectiveness and consuming less fuel. Furthermore, by accurately forecasting future waste trends, historical data analysis facilitated strategic planning and resource allocation.

Scalability-wise, the system incorporated more sensors and devices with no change, confirming its versatility for broader use. Data integrity was protected, and security methods like encryption and role-based access control limited unwanted access. With a high uptime of 99.9%, the system

provided alarm functionality and ongoing monitoring. The BINSENSE system was a dependable, expandable, and reasonably priced waste management solution. The solution greatly improved waste collection sustainability and efficiency by lowering overflow events, streamlining collection routes, and utilizing data-driven insights.



Welcome to Waste Management System

The programme aims to create effective awareness in various levels (of society) to reduce the adverse impact on environment and health arising out of the polluting technologies used in recycling waste in the unorganized sector.

Our Mission: A Cleaner Planet

Join us in making a difference! Together, we can reduce waste, recycle smarter, and build a sustainable future. Let's turn small actions into big impacts.

Reduce, Reuse, Recycle

Every little effort counts. Learn tips and tricks to minimize waste, reuse what you already have, and recycle effectively. Together, we can make waste management second nature.

Community Cleanup Drives

A clean neighborhood is a happy neighborhood. Join hands with local communities in organizing cleanup drives and spreading awareness about proper waste disposal practices.

Innovating for a Greener Future

Waste management is evolving, and so are we. Discover the latest innovations in recycling, composting, and waste reduction, and find out how you can contribute to a sustainable tomorrow.



Dashboard

Our Recipe Services: Cooking Just Got Easier!

Got a recipe you're proud of? We've made sharing it a breeze. Just snap a pic, write down the steps, and hit upload. Boom—your culinary creation is ready for the world to try. Easy peasy!



It was found that only 23% of the workers know the meaning of waste. Only 28% of them were aware of the harmful effects of waste. Seventy-two percent of the workers did not even know that this occupation was not safe and might harm them.



Recycling of Waste!

Recycling of waste. As, when I saw the effects of waste on environment, human and animal life. I personally feel to spread awareness before it is too late.

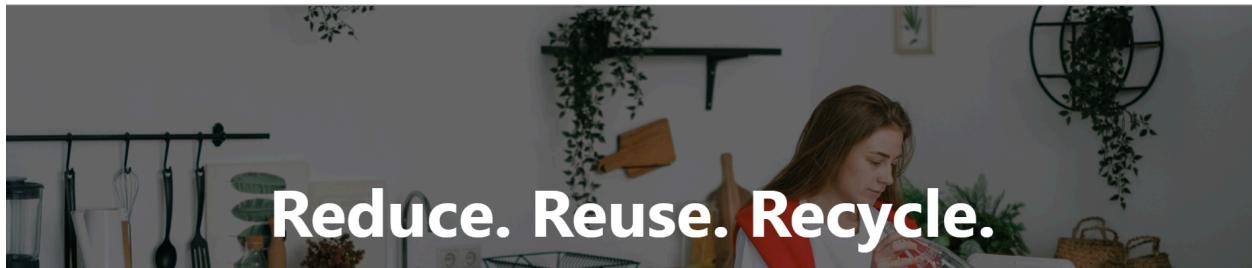


We should be aware of the different methods involved in safe disposal of waste. Be a responsible citizen and save our precious environment. For more visit me I'll tell you more related to waste disposal.

About Waste Management System |

Welcome to our waste management webpage! Here, we are dedicated to promoting responsible and sustainable practices for the disposal and recycling of waste. Our goal is to protect the environment, conserve valuable resources, and raise awareness about the impact of waste on our planet.

We understand the growing concern surrounding the improper handling of waste and its detrimental effects on both human health and the environment. With our expertise in waste management, we offer comprehensive solutions to individuals, businesses, and communities, ensuring that waste is handled and disposed of responsibly.



Reduce. Reuse. Recycle.

Waste Management

Our Services |



Waste Collection

We provide convenient collection services for e-waste from residential and commercial areas.



Eco-friendly Recycling

The screenshot shows a web page titled "Waste Management". At the top, there is a dark blue header bar with the title "Waste Management" in white. Below the header is a grey navigation bar containing links for "Home", "About", "Services", and "Contact". The "Contact" link is highlighted with a dark blue background and white text. The main content area has a white background and features a form titled "Contact Us". The form includes three input fields: "Name" (with a placeholder box), "Email" (with a placeholder box), and "Message" (with a larger text area). Below the message area is a "Send" button.

Figure 3. UI/UX Design of Binsense web dashboard

CONCLUSION

By utilizing automation and Internet of Things technologies, the BINSENSE: Optimized trash Management System effectively tackles the inefficiencies of conventional trash management procedures. The system minimizes environmental effect, lowers costs, and improves operating efficiency with automated alarms, real-time bin fill level monitoring, and an easy-to-use web-based dashboard.

Significant time and fuel savings, fewer overflow occurrences, and streamlined garbage collection routes are some of the system's major accomplishments. Microcontrollers and ultrasonic and infrared sensors worked well together to guarantee precise data collection and dependable cloud platform connection. Notwithstanding minor obstacles like environmental interference and sensor calibration, the study proved that IoT-driven solutions for smart city applications are feasible. In addition to its immediate advantages, BINSENSE offers scalability and prospects for future improvements, including waste prediction based on machine learning and specialized mobile applications.

CODE

Arduino Coding:

```
#define TRIG_PIN 9
#define ECHO_PIN 10
long duration;
int distance;

void setup() {
    pinMode(TRIG_PIN, OUTPUT);
    pinMode(ECHO_PIN, INPUT);
    Serial.begin(9600);
}

void loop() {
    digitalWrite(TRIG_PIN, LOW);
    delayMicroseconds(2);
    digitalWrite(TRIG_PIN, HIGH);
    delayMicroseconds(10);
    digitalWrite(TRIG_PIN, LOW);

    duration = pulseIn(ECHO_PIN, HIGH);
    distance = duration * 0.034 / 2; // Convert to cm

    Serial.print("Distance: ");
    Serial.println(distance);
```

```
delay(1000);  
}  
  
delay(1000);  
}  
  
delay(1000);  
}  
  
delay(1000);  
}
```

Website Code:

Homepage html

```
<!--  
# Project-Name : Waste Management  
# Developers : Sharanya and Vishal  
# Description : Our Waste Management website is dedicated to promoting sustainable practices  
and proper disposal of waste.  
-->  
<!-- index.html -->  
<!DOCTYPE html>  
<html lang="en">  
  <head>  
    <meta charset="UTF-8" />  
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />  
    <title>Waste Management</title>  
    <link rel="stylesheet" href="index.css" />  
    <link  
      rel="stylesheet"  
      href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/5.15.3/css/all.min.css"  
    />  
    <link  
      href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha3/dist/css/bootstrap.min.css"  
      rel="stylesheet"  
      integrity="sha384-KK94CHFLLe+nY2dmCWGMq91rCGa5gtU4mk92HdvYe+M/SXH301p5IL  
      y+dN9+nJOZ"  
      crossorigin="anonymous"  
    />  
  </head>  
  <body onload="n1()">  
    <header>  
        
      <h1>Waste Management</h1>  
    </header>
```

```
<nav>
  <ul class="headings">
    <li class="nav-class" id="nav1"><a href="index.html">Home</a></li>
    <li class="nav-class" id="nav2"><a href="about.html">About</a></li>
    <li class="nav-class" id="nav3">
      <a href="services.html">Services</a>
    </li>
    <li class="nav-class" id="nav4"><a href="contact.html">Contact</a></li>
  </ul>
</nav>
```

```
<section id="hero">
  <h2 id="welcome-text">
    Welcome to
    <b
      style="
        color: #002a54ef;
        text-shadow: 1px 1px 3px lightblue;
      "
    >Waste Management System</b>
  >
  </h2>
  <br /><br />
  <i>
    <b>
      The programme aims to create effective awareness in various levels (of
      society) to reduce the adverse impact on environment and health
      arising out of the polluting technologies used in recycling waste in
      the unorganized sector.</b>
    </b>
  </i>
</section>
```

```
<!-- Mission Section -->

<section class="Mission">
  <h1>Our Mission: A Cleaner Planet</h1>
```

<p>Join us in making a difference! Together, we can reduce waste, recycle smarter, and build a sustainable future. Let's turn small actions into big impacts.</p>

```
<div class="row">
  <div class="Mission-col">
    <h3>Reduce, Reuse, Recycle</h3>
    <p>
      Every little effort counts. Learn tips and tricks to minimize waste, reuse what you already have, and recycle effectively. Together, we can make waste management second nature.
    </p>
  </div>
  <div class="Mission-col">
    <h3>Community Cleanup Drives</h3>
    <p>
```

A clean neighborhood is a happy neighborhood. Join hands with local communities in organizing cleanup drives and spreading awareness about proper waste disposal practices.

```
    </p>
  </div>
  <div class="Mission-col">
    <h3>Innovating for a Greener Future</h3>
    <p>
```

Waste management is evolving, and so are we. Discover the latest innovations in recycling, composting, and waste reduction, and find out how you can contribute to a sustainable tomorrow.

```
    </p>
  </div>
  </div>
</section>
```

```
<div class="dashboard-container">
  <!-- Replace the URL below with the external website's URL -->
  <a href="https://blr1.blynk.cloud/dashboard/414089/global/devices/1/organization/414089/devices/1398135/dashboard" class="dashboard-link">
    <div class="dashboard-icon">
      
    </div>
    <p class="dashboard-text">Dashboard</p>
```

```

        </a>
    </div>

<!-- Section-->

<section class="Service">
    <h1>Our Recipe Services: Cooking Just Got Easier!</h1>
    <p>Got a recipe you're proud of? We've made sharing it a breeze. Just snap a pic, write down the steps, and hit upload. Boom—your culinary creation is ready for the world to try. Easy peasy!</p>

    <div class="row">
        <div class="Mission-col">
            
            <div class="layer">
                <h3>Why Waste is harmful?</h3>
                <a href="https://www.genevaenvironmentnetwork.org/resources/updates/the-growing-environmental-risks-of-waste/#:~:text=Waste%20can%20be%20toxic,materials%20leaching%20into%20the%20environment." id="btn">...</a>
            </div>
            <p class="card-text">
                It was found that only 23% of the workers know the meaning of waste. Only 28% of them were aware of the harmful effects of waste. Seventy-two percent of the workers did not even know that this occupation was not safe and might harm them.
            </p>
        </div>

        <div class="Mission-col">
            
            <div class="layer">
                <h3>Recycling of Waste!</h3>
                <a href="https://earth.org/what-is-waste-recycling/" id="btn">...</a>
            </div>
            <p class="card-text">

```

Recycling of waste. As, when I saw the effects of waste on environment, human and animal life, I personally feel to spread awareness before it is too late.

</p>
</div>

```
<div class="Mission-col">
  
  <div class="layer">
    <h3>Waste disposal</h3>
    <a href="https://techreset.com/itad-guides/waste-disposal-techniques/" id="btn">...</a>
  </div>
  <p class="card-text">
    We should be aware of the different methods involved in safe disposal of waste. Be a responsible citizen and save our precious environment. For more visit me I'll tell you more related to waste disposal.
  </p>
</div>
</div>
```

</section>

```
<div class="e-aware">
  <h3 class="headings">About Waste Awareness</h3>
  <br />
  <p>
    Welcome to our Waste Awareness section, where we aim to educate and raise awareness about the importance of responsible waste management. Waste is a growing concern due to its adverse impact on the environment and human health. When improperly disposed of, waste releases hazardous substances such as lead, mercury, and cadmium into the environment, contaminating our air, soil, and water sources.
  </p>
```

This pollution poses significant risks to ecosystems, wildlife, and human populations. By promoting proper waste disposal and recycling, we can mitigate these risks and contribute to a cleaner and healthier planet. Through informative articles, tips, and resources, we will explore the environmental consequences of waste, the benefits of recycling, and practical steps individuals and businesses can take to reduce their waste footprint. Together, we can make a positive impact by raising awareness and fostering a culture of responsible waste management. Join us on this journey to protect our environment and build a sustainable future.

</p>

</div>

<div class="e-aware">

<h3 class="headings">About Recycling process</h3>

<p>

Our recycling process for waste is designed to ensure the responsible and efficient handling of materials. Once the waste is collected, we carefully dismantle each item, separating different components and materials. This allows us to sort and identify recyclable materials such as metals, plastics, and glass. Our trained technicians use specialized equipment to process these materials and extract valuable resources. Metals like copper, aluminum, and gold are extracted for reuse, reducing the need for new mining and minimizing the environmental impact. Plastics are also recycled, helping to conserve energy and reduce the demand for new plastic production. Additionally, hazardous substances such as lead and mercury are safely disposed of according to environmental regulations. Our recycling process follows strict industry standards and ensures the protection of personal data through secure data destruction methods. By recycling waste, we contribute to the circular economy, conserving resources, reducing landfill waste, and promoting a sustainable future for generations to come.

</p>

</div>

<footer>

<div class="footer-content">

<p>© Waste Management. All rights reserved.</p>

<ul class="social-links">

```

<li>
  <a href="#" target="_blank"><i class="fab fa-facebook-f"></i></a>
</li>
<li>
  <a href="#" target="_blank"><i class="fab fa-twitter"></i></a>
</li>
<li>
  <a href="#" target="_blank"><i class="fab fa-instagram"></i></a>
</li>
<li>
  <a href="#" target="_blank"><i class="fab fa-linkedin"></i></a>
</li>
</ul>
</div>
</footer>
<script
  src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha3/dist/js/bootstrap.bundle.min.js"
  integrity="sha384-ENjdO4Dr2bkBIFxQpeoTz1HIje39Wm4jDKdf19U8gl4ddQ3GYNS7NTKfAdVQSZe"
  crossorigin="anonymous"
></script>
<script src="script.js"></script>
</body>
</html>

```

Homepage css:

```

/* Reset some default styles */
body,
ul {
  margin: 0;
  padding: 0;
}

/* Basic styles */
body {
  font-family: Arial, sans-serif;
}

```

```
.card {  
    justify-content: center;  
    align-content: center;  
}  
  
header {  
    background-color: #0e1e4bef;  
    color: #fff;  
    padding: 25px 20px 25px 50px;  
    text-align: center;  
    position: relative;  
}  
  
header h1 {  
    text-shadow: 5px 3px 5px rgb(0, 0, 0);  
}  
  
#hero {  
    margin: 80px 0px;  
}  
  
#e-waste {  
    width: 200px;  
    height: 150px;  
    border-radius: 100px;  
    position: absolute;  
    top: 18%;  
    left: 10%;  
}  
  
nav {  
    background-color: rgba(40, 39, 39, 0.509);  
    padding: 10px;  
    position: sticky;  
    top: 0%;  
    z-index: 1;  
}  
  
nav ul {
```

```
list-style: none;
margin: 0;
padding: 0;
text-align: center;
}

nav ul li {
display: inline;
}

nav ul li a {
color: #fff;
display: inline-block;
padding: 10px;
text-decoration: none;
}

.Mission{
width: 80%;
margin: auto;
text-align: center;
padding-top: 100px;
}

h1{
font-size: 36px;
font-weight: 600;
}
p{
color: #777;
font-size: 14px;
font-weight: 300;
line-height: 22px;
padding: 10px;
}

.row{
margin-top: 5%;
display: flex;
justify-content: space-between;
```

```
}

.Mission-col{
  flex-basis: 31%;
  background: #f3f5ff;
  border-radius: 10px;
  margin-bottom: 5%;
  padding: 20px 12px;
  box-sizing: border-box;
  transition: 0.5s;
}
h3{
  text-align: center;
  font-weight: 600;
  margin: 10px 0;
}
.Mission-col:hover{
  box-shadow: 0 0 20px 0px rgba(192, 204, 239, 0.2);
}
```

```
.Service{
  width: 80%;
  margin: auto;
  text-align: center;
  padding-top: 50px;
}
```

```
.Mission-col{
  flex-basis: 32%;
  border-radius: 10px;
  margin-bottom: 30px;
  position: relative;
  overflow: hidden;
}
.Mission-col img{
  width: 100%;
  display: block;
}
```

```
.layer{
    background: transparent;
    height: 100%;
    width: 100%;
    position: absolute;
    top: 0;
    left: 0;
    transition: 0.5s;
}
.layer:hover{
    background: rgba(130, 156, 233, 0.7);
}
.layer h3{
    width: 100%;
    font-weight: 500;
    color: #fff;
    font-size: 26px;
    bottom: 0;
    left: 50%;
    transform: translateX(-50%);
    position: absolute;
    opacity: 0;
    transition: 0.5s;
}
.layer:hover h3{
    bottom: 49%;
    opacity: 1;
}
```

```
.dashboard-container {
    text-align: center;
}

.dashboard-link {
    text-decoration: none;
    color: #333;
    display: inline-block;
    transition: transform 0.3s ease, box-shadow 0.3s ease;
```

```
}

.dashboard-link:hover {
  transform: scale(1.1);
  box-shadow: 0 5px 15px rgba(0, 0, 0, 0.2);
}

.dashboard-icon img {
  width: 100px;
  height: 100px;
  border-radius: 50%;
  background-color: #e0e0e0;
  padding: 10px;
  transition: background-color 0.3s ease;
}

.dashboard-icon img:hover {
  background-color: #ddd;
}

.dashboard-text {
  margin-top: 10px;
  font-size: 18px;
  font-weight: bold;
  color: #555;
}

section {
  padding: 40px;
  text-align: center;
}

.service {
  margin-bottom: 40px;
}
.service img {
  width: 200px;
  height: 150px;
  object-fit: cover;
```

```
margin-bottom: 10px;
}

footer {
background-color: #032548ae;
color: #fff;
padding: 20px;
text-align: center;
}

.footer-content {
display: flex;
flex-direction: column;
align-items: center;
}

.footer-content p {
margin-bottom: 10px;
}

.social-links {
list-style: none;
padding: 0;
margin: 0;
}

.social-links li {
display: inline-block;
margin: 0 5px;
}

.social-links a {
color: #fff;
font-size: 20px;
}

.social-links a:hover {
color: #ccc;
}

.nav-class a:hover {
```

```

text-decoration: underline;
color: white;
font-weight: bold;
background-color: #02356cc1;
padding: 8px 12px;
border-radius: 10px;
}
.nav-class {
margin-left: 20px;
}
.e-aware {
background-color: rgba(84, 84, 84, 0.053);
text-align: center;
padding: 30px 35px;
margin: 140px 100px 80px 100px;
border-radius: 10px;
box-shadow: 0px 0px 5px black;
}
.headings {
text-shadow: 1px 1px 3px black;
color: #0b6ed1ef;
}
#welcome-text {
width: 55%;
overflow: hidden;
display: inline-block;
border-right: 1px solid #000;
white-space: nowrap;
margin: 0 auto;
letter-spacing: 4px;
animation: typing 4.5s steps(40, end);
}
@keyframes typing {
0% {
width: 0;
}
100% {
width: 55%;
}
}

```

About Page html:

```
<!-- about.html -->
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="UTF-8" />
<meta name="viewport" content="width=device-width, initial-scale=1.0" />
<title>About - Waste Management</title>
<link rel="stylesheet" href="about.css" />
<link
  rel="stylesheet"
  href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/5.15.3/css/all.min.css"
/>
<link
  href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha3/dist/css/bootstrap.min.css"
  rel="stylesheet"
  integrity="sha384-KK94CHFLLe+nY2dmCWGMq91rCGa5gtU4mk92HdvYe+M/SXH301p5IL
y+dN9+nJOZ"
  crossorigin="anonymous"
/>
<link
  href="https://cdn.jsdelivr.net/npm/remixicon@3.0.0/fonts/remixicon.css"
  rel="stylesheet"
/>
</head>
<body onload="n2()">
<header>
<h1>Waste Management</h1>
</header>

<nav>
<ul>
<li class="nav-class" id="nav1"><a href="index.html">Home</a></li>
<li class="nav-class" id="nav2"><a href="about.html">About</a></li>
<li class="nav-class" id="nav3">
<a href="services.html">Services</a>
</li>
<li class="nav-class" id="nav4"><a href="contact.html">Contact</a></li>
</ul>
</nav>
<br />
<section id="about" style="padding: 10px; margin: 10px 100px;">
<h2 id="about-text">
```

```

About
<b
  style="
    color: #002a54ef;
    text-shadow: 1px 1px 3px lightblue;
  "
>Waste Management System</b>
>
</h2>
<br /><br />
<p>
  Welcome to our waste management webpage! Here, we are dedicated to
  promoting responsible and sustainable practices for the disposal and
  recycling of waste. Our goal is to protect the environment, conserve
  valuable resources, and raise awareness about the impact of waste on
  our planet.
<br />
<br />
  We understand the growing concern surrounding the improper handling of
  waste and its detrimental effects on both human health and the
  environment. With our expertise in waste management, we offer
  comprehensive solutions to individuals, businesses, and communities,
  ensuring that waste is handled and disposed of responsibly.
</p>
</section>
<br /><br />

<!-----Banner----->
<section class="banner__container">
<div class="section__container">
  <div class="banner__content">
    <h2>Reduce. Reuse. Recycle.</h2>
    <p>
      Take a step toward a cleaner and greener planet. Discover effective waste management tips,
      learn sustainable practices, and join hands with our community to make a positive impact on the
      environment.
    </p>
    <button>Learn More</button>
  </div>
</div>
</section>

<!-----Display----->

<section class="display__container">
<div class="section__container">

```

<h2 class="section__title">Why Choose Us</h2>

<p class="section__subtitle">

Join our mission to create a sustainable future. Collaborate with like-minded individuals, participate in waste reduction initiatives, and stay informed about the latest in eco-friendly practices.

</p>

<div class="display__grid">

<div class="display__card grid-1">

</div>

<div class="display__card">

<i class="ri-earth-line"></i>

<h4>Simple Waste Disposal Solutions</h4>

<p>

Managing waste has never been easier. Access practical tips, resources, and tools to help you sort, dispose of, and recycle waste responsibly. Together, we can make waste management efficient and hassle-free.

</p>

</div>

<div class="display__card">

</div>

<div class="display__card">

</div>

<div class="display__card">

<i class="ri-road-map-line"></i>

<h4>Stay Updated</h4>

<p>

Subscribe to our newsletter to stay informed about the latest waste management techniques, eco-friendly innovations, and community events. Let's work together toward a sustainable future!

</p>

</div>

</div>

</div>

</section>

<footer>

```

<div class="footer-content">
  <p>© Waste Management. All rights reserved.</p>
  <ul class="social-links">
    <li>
      <a href="#" target="_blank"><i class="fab fa-facebook-f"></i></a>
    </li>
    <li>
      <a href="#" target="_blank"><i class="fab fa-twitter"></i></a>
    </li>
    <li>
      <a href="#" target="_blank"><i class="fab fa-instagram"></i></a>
    </li>
    <li>
      <a href="#" target="_blank"><i class="fab fa-linkedin"></i></a>
    </li>
  </ul>
</div>
</footer>
<script
  src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha3/dist/js/bootstrap.bundle.min.js"
  integrity="sha384-ENjdO4Dr2bkBIFxQpeoTz1HIcje39Wm4jDKdf19U8gI4ddQ3GYNS7NTKfAdVQSZe"
  crossorigin="anonymous">
</script>
<script src="script.js"></script>
</body>
</html>

```

About page css:

```

/* Reset some default styles */
body,
ul {
  margin: 0;
  padding: 0;
}

/* Basic styles */
body {
  font-family: Arial, sans-serif;
}

header {
  background-color: #002a54ef;
}

```

```
color: #fff;
padding: 25px 20px 25px 50px;
text-align: center;
position: relative;
}

header h1 {
    text-shadow: 5px 3px 5px rgb(0, 0, 0);
}

#about-text {
    width: 50%;
    overflow: hidden;
    display: inline-block;
    border-right: 1px solid #000;
    white-space: nowrap;
    margin: 0 auto;
    letter-spacing: 4px;
    animation: about-txt 3.6s steps(40, end);
}
@keyframes about-txt {
    0% {
        width: 0;
    }
    100% {
        width: 50%;
    }
}

section {
    padding: 40px;
    text-align: center;
}

#e-waste {
    width: 70px;
    height: 70px;
    border-radius: 10px;
    position: absolute;
    top: 18%;
    left: 10%;
}

nav {
    background-color: rgba(40, 39, 39, 0.509);
    padding: 10px;
```

```

position: sticky;
top: 0%;
z-index: 1;
}

nav ul {
list-style: none;
margin: 0;
padding: 0;
text-align: center;
}

nav ul li {
display: inline;
}

nav ul li a {
color: #fff;
display: inline-block;
padding: 10px;
text-decoration: none;
}

.nav-class {
margin-left: 20px;
}

.nav-class a:hover {
text-decoration: underline;
color: white;
font-weight: bold;
background-color: #02356cc1;
padding: 8px 12px;
border-radius: 10px;
}

/*
-----Banner section-----
*/

.banner__container {
background-image: url("Images/display.png");
background-position: center center;
background-repeat: no-repeat;
background-size: cover;
}

```

```
}

.banner__container::before {
  content: "";
  position: absolute;
  top: 485px;
  left: 0;
  width: 100%;
  height: 102%;
  background: rgba(0, 0, 0, 0.5); /* Adjust the color and transparency here */
  z-index: 1;
}

.banner__content {
  position: relative;
  z-index: 2; /* Ensures content is above the overlay */
}

.banner__container .section__container {
  padding: 10rem 1rem;
  display: flex;
  justify-content: center;
}

.banner__content {
  display: flex;
  align-items: center;
  flex-direction: column;
  gap: 1.5rem;
  text-align: center;
  color: var(--extra-light);
}

.banner__content h2 {
  font-size: 5rem;
  font-weight: bolder;
  color: #fff;
}

.banner__content p {
  font-size: 2rem;
  font-weight: 200;
  color: #fff;
}

.banner__content button {
```

```
padding: 0.5rem 2rem;
outline: none;
border: 2px solid var(--secondary-color);
background-color: transparent;
color: var(--secondary-color);
font-size: 1rem;
cursor: pointer;
}

.display__container {
  background-color: var(--secondary-color);
}

.display__container :is(.section__title, .section__subtitle) {
  color: var(--text-dark);
}

.display__grid {
  display: grid;
  grid-template-columns: repeat(2, 1fr);
  gap: 1rem;
}

.display__card {
  display: flex;
  align-items: center;
  justify-content: center;
  flex-direction: column;
  gap: 0.5rem;
  background-color: var(--extra-light);
  text-align: center;
}

.display__card i {
  font-size: 2rem;
  color: var(--primary-color);
}

.display__card h4 {
  font-size: 1rem;
  font-weight: 500;
  padding: 0 1rem;
  color: var(--text-dark);
}

.display__card p {
```

```
    font-size: 0.8rem;  
    padding: 0 1rem;  
    color: var(--text-dark);  
}
```

```
.display__grid .grid-1 {  
    grid-area: 1/1/3/3;  
}
```

```
footer {  
    background-color: #032548ae;  
    color: #fff;  
    padding: 20px;  
    text-align: center;  
}
```

```
.footer-content {  
    display: flex;  
    flex-direction: column;  
    align-items: center;  
}
```

```
.footer-content p {  
    margin-bottom: 10px;  
}
```

```
.social-links {  
    list-style: none;  
    padding: 0;  
    margin: 0;  
}
```

```
.social-links li {  
    display: inline-block;  
    margin: 0 5px;  
}
```

```
.social-links a {  
    color: #fff;  
    font-size: 20px;  
}
```

```
.social-links a:hover {  
    color: #ccc;  
}
```

Service page html

```
<!-- services.html -->
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <title>Services -Waste Management</title>
    <link rel="stylesheet" href="services.css" />
    <link
      rel="stylesheet"
      href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/5.15.3/css/all.min.css"
    />
    <link
      href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha3/dist/css/bootstrap.min.css"
      rel="stylesheet"
    integrity="sha384-KK94CHFLLe+nY2dmCWGMq91rCGa5gtU4mk92HdvYe+M/SXH301p5IL
y+dN9+nJOZ"
      crossorigin="anonymous"
    />
  </head>
  <style>
    #services-text {
      width: 20%;
      overflow: hidden;
      display: inline-block;
      border-right: 1px solid #000;
      white-space: nowrap;
      margin: 0 auto;
      letter-spacing: 4px;
      animation: services-text 2s steps(40, end);
    }
    @keyframes services-text {
      0% {
        width: 0;
      }
      100% {
        width: 20%;
      }
    }
  </style>
  h3,
```

```

p {
  display: inline;
}
h3 {
  margin-left: 10px;
}
</style>
<body onload="n3()">
<header>
  <h1>Waste Management</h1>
</header>

<nav>
<ul>
  <li class="nav-class" id="nav1"><a href="index.html">Home</a></li>
  <li class="nav-class" id="nav2"><a href="about.html">About</a></li>
  <li class="nav-class" id="nav3">
    <a href="services.html">Services</a>
  </li>
  <li class="nav-class" id="nav4"><a href="contact.html">Contact</a></li>
</ul>
</nav>

<section id="services">
<br />
<h2 id="services-text">
  Our
  <b
    style="
      color: #002a54ef;
      text-shadow: 1px 1px 3px lightblue;
    "
  >Services</b>
  >
</h2>
<br /><br /><br />
<div class="service">
  
  <h3> Waste Collection</h3>
  <br />
  <p>
    We provide convenient collection services for e-waste from residential
    and commercial areas.
  </p>
</div>
<br />

```

```
<div class="service">

<h3>Eco-friendly Recycling</h3>
<br />
<p>
    We ensure that the e-waste collected is recycled using environmentally
    friendly methods.
</p>
</div>
<br />
<div class="service">

<h3>Data Destruction</h3>
<br />
<p>
    We offer secure data destruction services to protect your sensitive
    information.
</p>
</div>
<br />
<div class="service">

<h3>E-Waste Disposal Consultation</h3>
<br />
<p>
    We provide expert advice and consultation on the proper disposal of
    e-waste to ensure compliance with regulations.
</p>
</div>
<br />
<div class="service">

<h3>Educational Programs</h3>
<br />
<p>
    We conduct educational programs and workshops to raise awareness about
    e-waste management and its impact on the environment.
</p>
</div>
<br />
<div class="service">

<h3>Refurbishment and Resale</h3>
<br />
<p>
    We refurbish and resell electronics that are still in working
```

```

        condition, reducing e-waste and promoting reuse.

    </p>
    </div>
    <br />
    </section>

<footer>
<div class="footer-content">
    <p>&copy; Waste Management. All rights reserved.</p>
    <ul class="social-links">
        <li>
            <a href="#" target="_blank"><i class="fab fa-facebook-f"></i></a>
        </li>
        <li>
            <a href="#" target="_blank"><i class="fab fa-twitter"></i></a>
        </li>
        <li>
            <a href="#" target="_blank"><i class="fab fa-instagram"></i></a>
        </li>
        <li>
            <a href="#" target="_blank"><i class="fab fa-linkedin"></i></a>
        </li>
    </ul>
</div>
</footer>
<script
    src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha3/dist/js/bootstrap.bundle.min.js"
integrity="sha384-ENjdO4Dr2bkBIFxQpeoTz1HIcje39Wm4jDKdf19U8glI4ddQ3GYNS7NTKf
AdVQSZe"
    crossorigin="anonymous">
</script>
<script src="script.js"></script>
</body>
</html>

```

Service page css:

```

section {
    padding: 40px;
    text-align: center;
}

.service {
    margin-bottom: 60px;
}

```

```
}

.service img {
  width: 200px;
  height: 150px;
  object-fit: cover;
  margin-bottom: 10px;
}

/* Reset some default styles */
body,
ul {
  margin: 0;
  padding: 0;
}

/* Basic styles */
body {
  font-family: Arial, sans-serif;
}

header {
  background-color: #002a54ef;
  color: #fff;
  padding: 25px 20px 25px 50px;
  text-align: center;
  position: relative;
}

header h1 {
  text-shadow: 5px 3px 5px rgb(0, 0, 0);
}

section {
  padding: 40px;
  text-align: center;
}

#e-waste {
  width: 70px;
  height: 70px;
  border-radius: 10px;
  position: absolute;
  top: 18%;
  left: 10%;
}
```

```
nav {  
    background-color: rgba(40, 39, 39, 0.509);  
    padding: 10px;  
    position: sticky;  
    top: 0%;  
    z-index: 1;  
}
```

```
nav ul {  
    list-style: none;  
    margin: 0;  
    padding: 0;  
    text-align: center;  
}
```

```
nav ul li {  
    display: inline;  
}
```

```
nav ul li a {  
    color: #fff;  
    display: inline-block;  
    padding: 10px;  
    text-decoration: none;  
}
```

```
.nav-class {  
    margin-left: 20px;  
}
```

```
.nav-class a:hover {  
    text-decoration: underline;  
    color: white;  
    font-weight: bold;  
    background-color: #02356cc1;  
    padding: 8px 12px;  
    border-radius: 10px;  
}
```

```
footer {  
    background-color: #032548ae;  
    color: #fff;  
    padding: 20px;  
    text-align: center;  
}
```

```
.footer-content {
```

```
  display: flex;
```

```
  flex-direction: column;
```

```
  align-items: center;
```

```
}
```

```
.footer-content p {
```

```
  margin-bottom: 10px;
```

```
}
```

```
.social-links {
```

```
  list-style: none;
```

```
  padding: 0;
```

```
  margin: 0;
```

```
}
```

```
.social-links li {
```

```
  display: inline-block;
```

```
  margin: 0 5px;
```

```
}
```

```
.social-links a {
```

```
  color: #fff;
```

```
  font-size: 20px;
```

```
}
```

```
.social-links a:hover {
```

```
  color: #ccc;
```

```
}
```

Contact page html:

```
<!-- contact.html -->
```

```
<!DOCTYPE html>
```

```
<html lang="en">
```

```
 <head>
```

```
   <meta charset="UTF-8" />
```

```
   <meta name="viewport" content="width=device-width, initial-scale=1.0" />
```

```
   <title>Contact - Waste Management</title>
```

```
   <link rel="stylesheet" href="contact.css" />
```

```
   <link
```

```
     rel="stylesheet"
```

```

    href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/5.15.3/css/all.min.css"
  />
</head>
<style>
#contact-txt {
  font-weight: bold;
  font-size: 27px;
  width: 16%;
  overflow: hidden;
  display: inline-block;
  border-right: 1px solid #000;
  white-space: nowrap;
  margin: 0 auto;
  letter-spacing: 4px;
  animation: contact-txt 2s steps(40, end);
}
@keyframes contact-txt {
  0% {
    width: 0;
  }
  100% {
    width: 16%;
  }
}
</style>
<body onload="n4()">
<header>
  <h1> Waste Management</h1>
</header>

<nav>
<ul>
  <li class="nav-class" id="nav1"><a href="index.html">Home</a></li>
  <li class="nav-class" id="nav2"><a href="about.html">About</a></li>
  <li class="nav-class" id="nav3">
    <a href="services.html">Services</a>
  </li>
  <li class="nav-class" id="nav4"><a href="contact.html">Contact</a></li>
</ul>
</nav>

<section id="contact">
  <h2 id="contact-txt">
    Contact
    <b
      style="

```

```

color: #002a54ef;
text-shadow: 1px 1px 3px lightblue;
text-decoration: underline;
"
>Us</b
>
</h2>
<br /><br />
<form id="contact-form">
  <div class="form-group">
    <label for="name">Name</label>
    <input type="text" id="name" name="name" />
  </div>
  <div class="form-group">
    <label for="email">Email</label>
    <input type="email" id="email" name="email" />
  </div>
  <div class="form-group">
    <label for="message">Message</label>
    <textarea id="message" name="message" rows="5"></textarea>
  </div>
  <br />
  <button type="submit" id="btn" onclick="popup()">
    Send
  </button>
</form>
</section>

<div id="popup">
  <span id="close" onclick="cln()">close</span>
  <h2>Thank you for contacting us!</h2>
  <p style="text-align: center;">We'll be touch soon.</p>
</div>

<footer>
  <div class="footer-content">
    <p>&copy; 2023 E-Waste Management. All rights reserved.</p>
    <ul class="social-links">
      <li>
        <a href="#" target="_blank"><i class="fab fa-facebook-f"></i></a>
      </li>
      <li>
        <a href="#" target="_blank"><i class="fab fa-twitter"></i></a>
      </li>
      <li>
        <a href="#" target="_blank"><i class="fab fa-instagram"></i></a>
      </li>
    </ul>
  </div>
</footer>

```

```

</li>
<li>
  <a href="#" target="_blank"><i class="fab fa-linkedin"></i></a>
</li>
</ul>
</div>
</footer>
<script src="script.js"></script>
</body>
</html>

```

Contact page xml:

```

/* Reset some default styles */
body,
ul {
  margin: 0;
  padding: 0;
}

/* Basic styles */
body {
  font-family: Arial, sans-serif;
}

header {
  background-color: #002a54ef;
  color: #fff;
  padding: 5px 20px 38px 50px;
  text-align: center;
  position: relative;
  height: 62px;
  font-size: 20px;
}

header h1 {
  text-shadow: 5px 3px 5px rgb(0, 0, 0);
}

#e-waste {
  width: 70px;
  height: 70px;
  border-radius: 10px;
  position: absolute;
  top: 18%;
}

```

```
    left: 10%;  
}  
  
nav {  
background-color: rgba(40, 39, 39, 0.509);  
padding: 10px;  
position: sticky;  
top: 0%;  
z-index: 1;  
}  
  
form {  
display: grid;  
justify-content: center;  
align-items: center;  
}  
  
nav ul {  
list-style: none;  
margin: 0;  
padding: 0;  
text-align: center;  
}  
  
nav ul li {  
display: inline;  
}  
  
nav ul li a {  
color: #fff;  
display: inline-block;  
padding: 10px;  
text-decoration: none;  
}  
  
section {  
padding: 40px;  
text-align: center;  
}  
  
.form-group {  
margin-bottom: 20px;  
text-align: left;  
}  
  
.popup {
```

```
position: fixed;
top: 50%;
left: 50%;
transform: translate(-50%, -50%);
background-color: #fff;
color: #333;
padding: 20px;
border-radius: 4px;
box-shadow: 0 2px 6px rgba(0, 0, 0, 0.3);
z-index: 9999;
}

label {
display: block;
margin-bottom: 5px;
}

input[type="text"],
input[type="email"],
textarea {
width: 100%;
padding: 10px;
border: 1px solid #ccc;
border-radius: 4px;
}

button[type="submit"] {
background-color: #333;
color: #fff;
padding: 10px 20px;
border: none;
border-radius: 4px;
cursor: pointer;
}

button[type="submit"]:hover {
background-color: #555;
}

.nav-class {
margin-left: 20px;
}

.nav-class a:hover {
text-decoration: underline;
color: white;
```

```
font-weight: bold;
background-color: #02356cc1;
padding: 8px 12px;
border-radius: 10px;
}

#name,
#email,
#message {
    width: 400px;
}

#btn {
    width: 150px;
    background-color: #002a54;
}

#btn:hover {
    background-color: #013d78e8;
}

#popup {
    visibility: hidden;
    position: absolute;
    top: 57%;
    left: 35%;
    background-color: #fff;
    color: #333;
    padding: 50px;
    border-radius: 4px;
    box-shadow: 0 2px 6px rgba(0, 0, 0, 0.3);
    z-index: 9999;
}

#close {
    cursor: pointer;
    padding: 3px 7px;
    background-color: #555;
    color: white;
    border-radius: 5px;
    position: absolute;
    top: 10%;
    right: 7%;
}

#close:hover {
    background-color: red;
```

```
color: black;
scale: 1.001;
font-weight: bold;
}
footer {
background-color: #333;
color: #fff;
padding: 20px;
text-align: center;
}
footer {
background-color: #032548ae;
color: #fff;
padding: 20px;
text-align: center;
}
.footer-content p {
margin-bottom: 10px;
}
.social-links {
list-style: none;
padding: 0;
margin: 0;
}
.social-links li {
display: inline-block;
margin: 0 5px;
}
.social-links a {
color: #fff;
font-size: 20px;
}
.social-links a:hover {
color: #ccc;
}
```