Zero Hunger Platform

1. Project Overview

Zero Hunger Platform is a social-impact, full-stack web application designed to reduce food waste and fight hunger by connecting **Donors** (individuals/restaurants with surplus food) and **Volunteers** (people who collect and deliver food) through a secure, role-based system.

The platform ensures transparency, accountability, and motivation using **real-time status tracking** and a **Karma Points** reward system.

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2. Problem Statement

Large amounts of edible food are wasted daily, while many people lack access to basic meals. Existing donation systems are often unorganized, lack real-time tracking, and do not incentivize participation.

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3. Objectives

- Reduce food wastage
- Enable real-time food donation & delivery
- Provide transparency via tracking & proof
- Motivate users through Karma Points
- Build a scalable, secure platform

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4. User Roles

4.1 Donor

- Add food/items with expiry
- Track status of donated items
- View personal impact & karma points
- Edit/Delete food (before pickup)

4.2 Volunteer

- View available food nearby
- Reserve, pick, and deliver food
- Upload delivery proof
- Earn karma points

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5. System Architecture

5.1 High-Level Architecture

```
[ React + Tailwind UI ]
          |
          v
[ Flask REST API ]
          |
          v
[ MongoDB Atlas ]
```

5.2 Frontend Architecture (React)

```
src/
 ├── api/
 │    ├── axios.js
 │    └── food.js
 ├── components/
 │    └── ui/
 │         ├── BackButton.jsx
 │         ├── LogoutButton.jsx
 │         └── Pagination.jsx
 ├── pages/
 │    ├── Welcome.jsx
 │    ├── donor/
 │    │    ├── DonorDashboard.jsx
 │    │    ├── AddFood.jsx
 │    │    └── MyFoods.jsx
 │    └── volunteer/
 │         ├── VolunteerDashboard.jsx
 │         ├── PickupCart.jsx
 │         └── VolunteerProfile.jsx
 └── App.jsx
```

Key UI Principles - Soft green & slate palette - Status-based colors - Animations on mount/unmount - Pagination for performance - Reusable UI components

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5.3 Backend Architecture (Flask)

```
backend/
 ├── routes/
 │    ├── auth_routes.py
 │    └── food_routes.py
 ├── models/
 │    └── food_model.py
 ├── utils/
 │    ├── db.py
 │    └── role_required.py
 ├── scheduler/
 │    └── expiry_checker.py
 └── app.py
```

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6. Database Design (MongoDB)

6.1 Users Collection

```
{
  _id,
  name,
  email,
  password,
  role: donor | volunteer,
  phone,
  karmaPoints,
  deliveriesCompleted,
  createdAt
}
```

6.2 Foods Collection

```
{
  _id,
  donorId,
  foodName,
  quantity,
  foodType,
  itemCategory,
  expiryTime,
  location: { lat, lng },
```

```
  address,
  image,
  status: available | reserved | picked | delivered | expired,
  reservedBy,
  deliveredAt,
  deliveryImage
}
```

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7. Food Lifecycle

```
Available
   ↓ (Volunteer reserves)
Reserved
   ↓ (Picked)
Picked
   ↓ (Delivered + Proof)
Delivered → Karma Awarded
```

Expired food is automatically marked by a background scheduler.

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8. Karma Points System

Action	Points
Successful Delivery	+10
Multiple Deliveries	Leaderboard Ready

Karma points motivate volunteers and donors to participate consistently.

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9. Security

- JWT Authentication
- Role-based access control
- CORS configuration
- Input validation
- Image proof for delivery

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10. UI/UX Design

- Modern card-based layouts
- Status color badges
- Animated modals
- Skeleton loaders
- Google Maps integration

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11. Performance Optimizations

- Pagination for large lists
- Lazy loading images
- Parallel API calls
- Separate critical vs heavy data loading

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12. Future Enhancements

- Mobile App (React Native)
- SMS/WhatsApp notifications
- NGO dashboards
- AI-based demand prediction
- Leaderboards
- Multi-language support

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13. Conclusion

The Zero Hunger Platform demonstrates how technology can solve real-world social problems. The system is scalable, secure, and production-ready, making it suitable for **academic projects**, **internships**, and **startup incubation**.

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