

# CrossAware - Final Summary

**Team Members - Donghyeon Lee, Ayman Khan, Ayush Bhardwaj, Rahin Jain**

**Project Summary - Team 27 for CS 440 - University of Illinois Chicago**

## Project Overview

CrossAware is a web-based platform designed to mitigate wildlife-vehicle collisions on highways and rural roads intersecting natural habitats. It integrates satellite imagery, GPS-tagged animal movement data, citizen-reported sightings, and machine learning algorithms to proactively identify high-risk crossing zones. The platform empowers drivers, transportation agencies, and conservation groups to collaborate on collision prevention, conservation, and road safety improvements.

## Functional Requirements

The system's core capabilities are centered on community engagement and real-time data analysis:

- **Wildlife Sightings Reporting:** Users can report wildlife sightings with location, species, timestamp, and optional images.
- **Real-Time Heatmaps:** Sightings update dynamic heatmaps highlighting areas of elevated collision risk.
- **Risk Prediction:** Machine learning models predict future high-risk crossing zones based on historical and spatial data.
- **Notifications:** Subscribed users receive SMS or email alerts when near high-risk zones.
- **Administrative Dashboards:** Authorities can access aggregated reports, export data, and monitor risk zones through secure dashboards.
- **Role-Based Access Control:** Users, administrators, and authorities access only the data and features appropriate to their roles.

## Performance Requirements

The system ensures high responsiveness and reliability:

- **Wildlife report submission:** Completed within 2 seconds.
- **Risk notification dispatch:** Delivered within 5 seconds of analysis.
- **Profile and dashboard loading:** Completed within 3 seconds.
- **System uptime:** Maintains 99.9% annually, with recovery from outages within 30 minutes.

## Data Management Requirements

Robust data structures ensure scalability and integrity:

- **Wildlife reports:** Store coordinates, species, timestamps, images, and status.
- **Risk zones:** Include probability scores, historical trends, and mitigation suggestions.

- **User profiles:** Store contact information, notification preferences, and reporting history.
- **Scalability:** Supports up to 5,000 reports daily and 20,000 active users.

### **Safety and Privacy**

The system prioritizes user safety and responsible data handling:

- **Safety Prompts:** Automated warnings for users reporting near active traffic areas.
- **Inspection Guidelines:** Dashboards provide disclaimers for field inspections.
- **Data Privacy:** User location data is anonymized to comply with regulations such as GDPR and CCPA.

### **Acceptance Tests**

Comprehensive acceptance testing validates both functionality and performance:

- **Report Submission Tests:** Ensure accurate and timely wildlife report processing.
- **Notification System Tests:** Confirm real-time alerts based on location triggers.
- **Dashboard Tests:** Verify data export and monitoring capabilities for authorities.
- **Performance Tests:** Validate response times for maps, analytics, and database queries.
- **Safety and Privacy Tests:** Confirm operation of safety prompts and privacy protections.

### **Overall Summary**

The CrossAware project delivers a scalable, AI-driven platform that enhances public safety, supports environmental conservation, and modernizes wildlife-vehicle collision prevention. By focusing on functionality, performance, reliability, safety, and community engagement, CrossAware establishes a strong foundation for future expansion and integration into road safety and conservation planning efforts.