

# Zoo Wearable Software Project Requirements

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## Project Summary

The Zoo Wearable Software System is a scalable, cross-platform health and environmental monitoring system designed for zoos, animal sanctuaries, and veterinary institutions. It enables real-time monitoring of animal vitals and habitat conditions using wearable devices and environmental sensors. The system aims to improve animal welfare, reduce zookeeper workload, and accelerate response to health concerns by delivering actionable insights and alerts through an interactive dashboard interface.

## Project Description

The project targets the need for continuous, non-invasive animal monitoring by automating the collection of physiological and environmental data. The system includes wearable health tracking devices, environmental sensors for temperature, humidity, and air quality, and an integrated software interface that visualizes trends, generates alerts, and supports remote habitat control (e.g., lighting or HVAC systems).

## Requirements & Design

The system was designed around robust functional, performance, and safety requirements:

**Functional Requirements:** Devices must track vitals like heart rate, temperature, and movement. The dashboard must visualize this data and trigger alerts for abnormal readings. Zoo staff can adjust habitat settings manually or automatically.

**Performance Requirements:** The system responds to user input within 1 second and polls sensors every 10 seconds. Accuracy thresholds were defined for biometric data.

**Safety & Robustness:** Devices are non-intrusive and built from durable materials. Fault-tolerance and availability  $\geq 98\%$  were built into the architecture.

**Security & Access Control:** Only authorized staff can access sensitive data. Role-based permissions ensure privacy and system integrity.

The system architecture supports cloud or on-site deployment, integrates with existing zoo management systems, and features scalable database design to accommodate thousands of animals.

## Key Design Features

**Modular Subsystem Decomposition:** Separate subsystems for wearable communication, environmental data processing, alert logic, and UI rendering.

**Hardware/Software Mapping:** Distributed architecture across wearables, sensors, local gateways, and a central server or cloud service.

**User Interface:** Designed for both mobile and desktop platforms, with an emphasis on clarity, accessibility, and responsiveness.

**Design Patterns:** MVC structure and observer patterns were applied to manage live data updates and alert generation.

## **Use Cases**

Nine core use cases were developed, including wearable deployment, real-time alert generation, dashboard access, data trend analysis, and habitat adjustment. Each scenario was modeled with sequence events, exceptions, and defined outcomes to ensure traceability and alignment with stakeholder needs.

## **Testing & Acceptance**

Each requirement was mapped to corresponding acceptance tests, including tests for system setup, data display, alert triggering, response latency, and fault recovery. Tests validate key outcomes such as reduced manual workload, faster emergency responses, and improved animal well-being.

## **Open Issues & Future Risks**

Potential concerns include:

- Limited Wi-Fi coverage in zoo environments
- Wearable durability for specific species
- Scaling infrastructure for multi-zoo use
- Legal liability in alert misinterpretation
- Integration challenges with legacy systems

Mitigations include modular system design, pilot testing phases, and legal disclaimers.

## **Conclusion**

The Zoo Wearable Software System is a forward-looking, real-time solution that transforms animal care by combining modern sensor technology with accessible, data-driven software. Designed with adaptability, reliability, and user experience in mind, it delivers immediate value while laying a foundation for future innovation in animal welfare management.