AI-Powered Wildlife Monitoring and Poaching Detection

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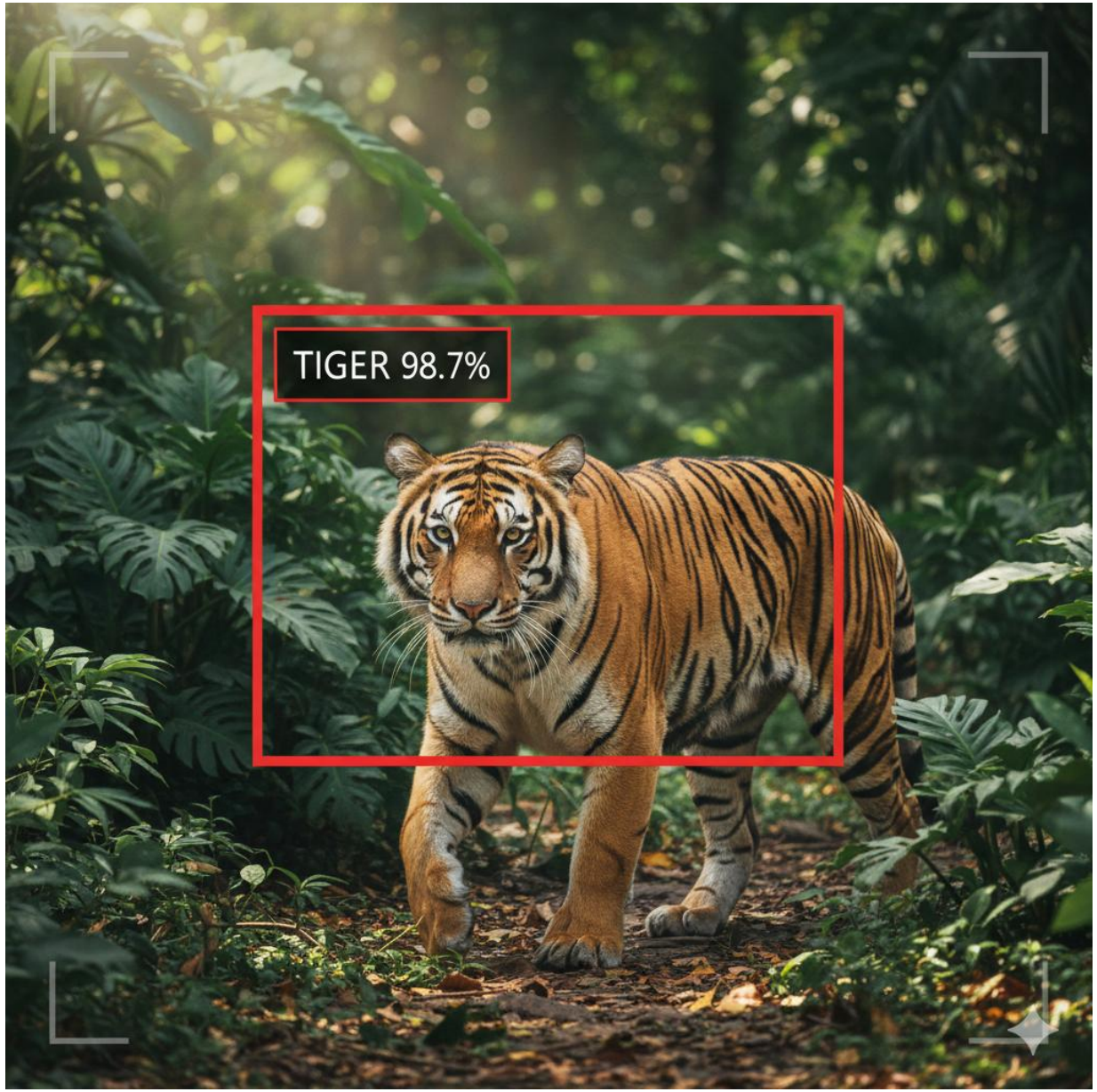
“Embedding AI into the heart of wildlife conservation — making protection and poaching detection a built-in discipline, not an afterthought.”



THE PROBLEM

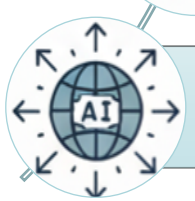
Current Monitoring methods are resource-intensive and slow.

Delayed detection leads to missed response windows.

Operational Constraints in field environment.

Poaching is severe and growing threat to wildlife conservation.

High data volume with low actionable signal.



Need for species level monitoring and accountability.

Our Solution:

Real-Time Animal Detection:

- AI models to detect and label 35+ animal species in images and videos, reducing the need for manual monitoring.

Poaching Prevention:

- Alerts are triggered when unauthorized movement or potential threats are detected.

Scalable & Extensible:

- Designed to monitor multiple reserves and species, with flexibility to add new datasets, sensors, or AI models.

Data Centralization & Analysis

- Collects all wildlife and threat data in one system, enabling analytics, trend detection, and predictive insights

Automated Alerts & Reporting:

- Generates real-time notifications for threats and maintains centralized, easy-to-access reports for decision-making.

Methodology: Agile (Scrum Framework)

Flexibility and Adaptability

- Wildlife protection system involves evolving tools (e.g., new AI detection models, real-time IoT sensors).
- Agile lets us refine requirements, update detection accuracy, and adjust SRS documentation without restarting the project.

Incremental Development and Risk Reduction

- Short Sprints allow gradual integration of modules (animal detection, alert system).
- Risks minimized by testing features (like image detection) in smaller increments.

Focused Planning & Continuous Feedback

- Each Sprint delivers tangible outcomes (e.g., working detection model, poaching model, alert system prototype).
- Quick reviews help ensure the system meets rangers needs and project objectives.

Team Alignment & Clear Deliverables

- Scrum roles clarify responsibilities across team members, enabling simultaneous work on detection model, poaching model, documentation and alert system.
- Daily stand-ups ensure consistent progress and alignment of all project artifacts, from diagrams to functional specs.

PROJECT PLANNING

Sprint 1: Foundation and POC

- **Focus:** PoC inference and Model development
- **Key Tasks:** Collect Datasets, run YOLO on sample images
- **Deliverable:** Working YOLO model and PoC inference, infra documents

Sprint 2: Ingestion & Inference

- **Focus:** Camera Ingestion and model integration.
- **Key Tasks:** RTSP/file ingestion, frame extraction, inference API, annotate frames with bounding boxes.
- **Deliverable:** Inference service integrated, annotated frames saved, unit tests.

Sprint 3: Event Processing Storage

- **Focus:** Event Rules and Storage
- **Key Tasks:** Build Event Processor, DB schema, object store integration, basic alert rules (human presence)
- **Deliverables:** Persistent detection records; example alert pipeline; E2E test

Sprint 4: Model Management & Field prep

- **Focus:** Retrain & edge deploy
- **Key Tasks:** Model registry, retraining pipeline, optimized model export (ONNX/TFLite), field test scripts.
- **Deliverables:** Model deployed to edge/staging, performance >= baseline, field test plan

PRODUCT FUNCTIONS

Ingestion Module

- Accepts RSTP streams, uploaded images/videos.
- Extracts frames at configurable FPS, attaches metadata.

Inference Engine (YOLO)

- Runs the trained YOLO model per frame and return detections.
- Supports model versioning, thresholding, batching and fallback execution.

Event Processor & Rules Engine

- Converts detections to structured detection events, applies deduplication & temporal smoothing.
- Configurable alert rules.

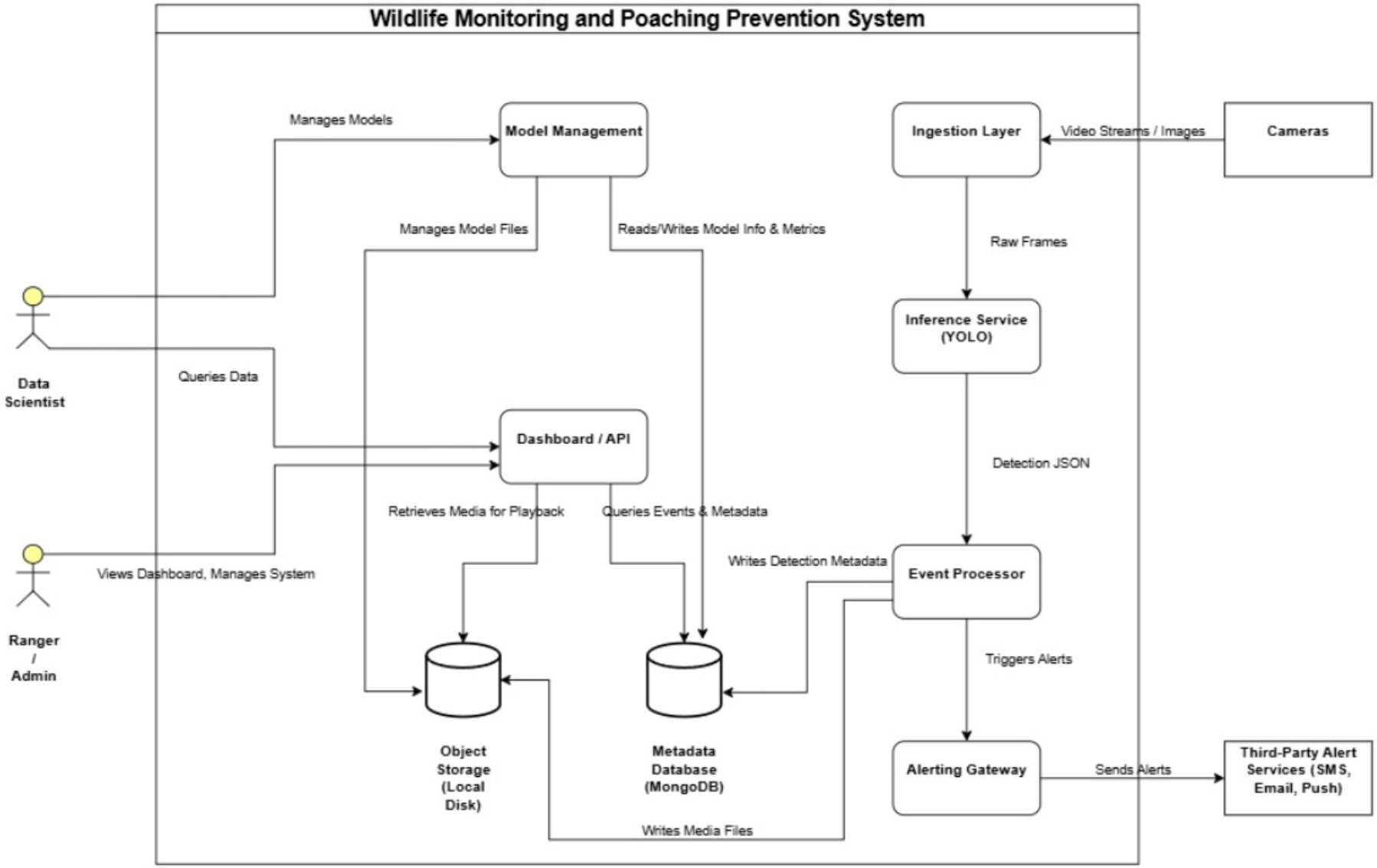
Alerting Gateway

- Sends alert payloads asynchronously to configured channels.
- Supports throttling, retries and priority levels.

Annotated Output

- Produce annotated snapshots and short video clips with bounding boxes + labels + confidence.
- Exports include model_version and timestamps for audit.

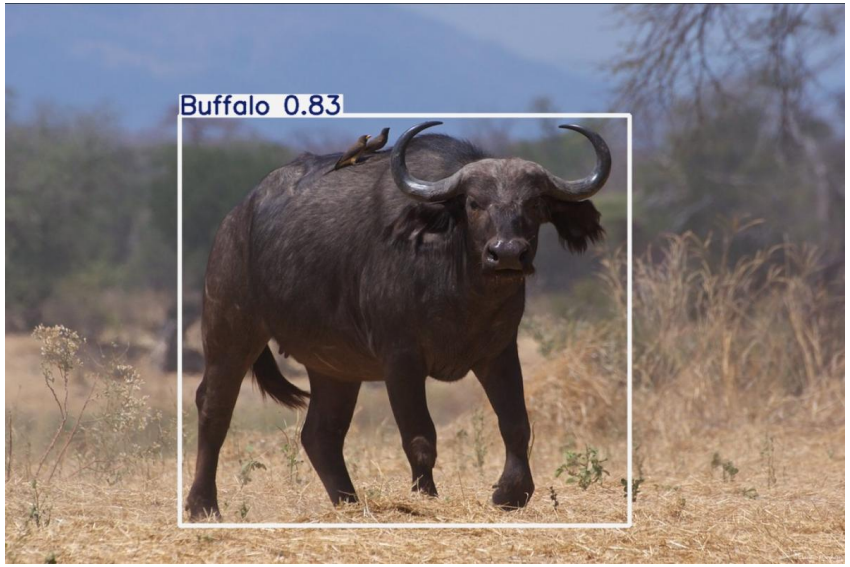
Use Case Diagram

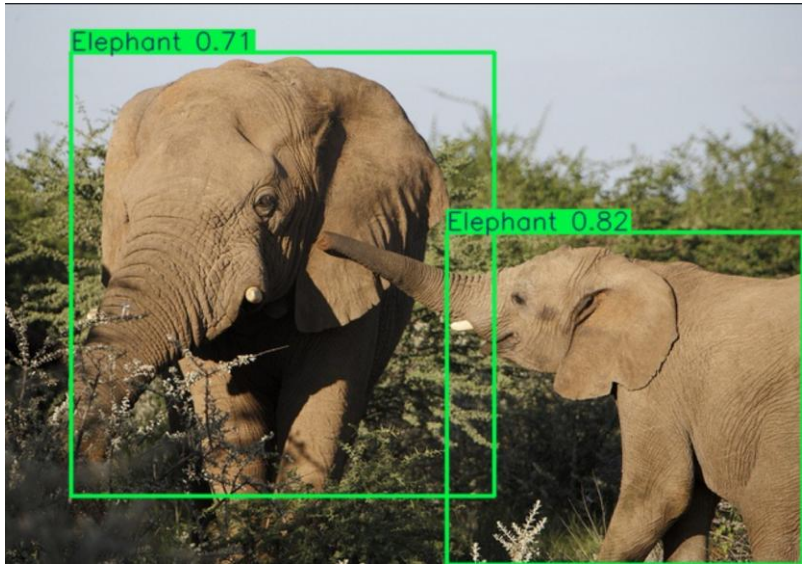


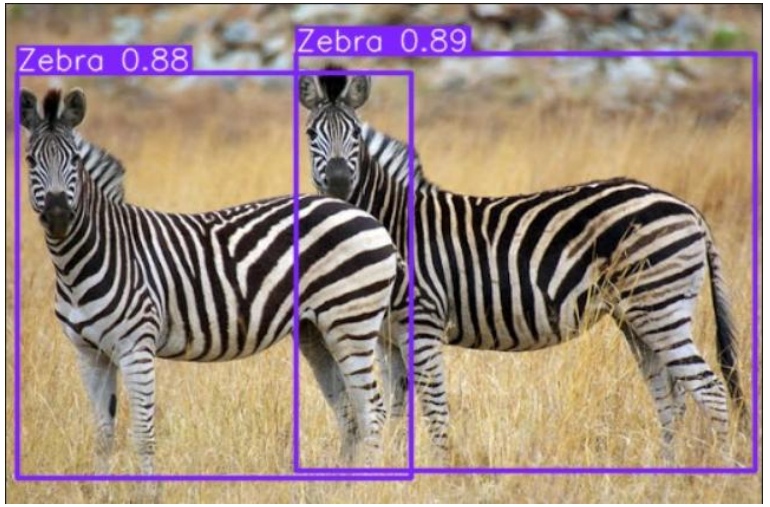
BENEFITS OF THE PROJECT

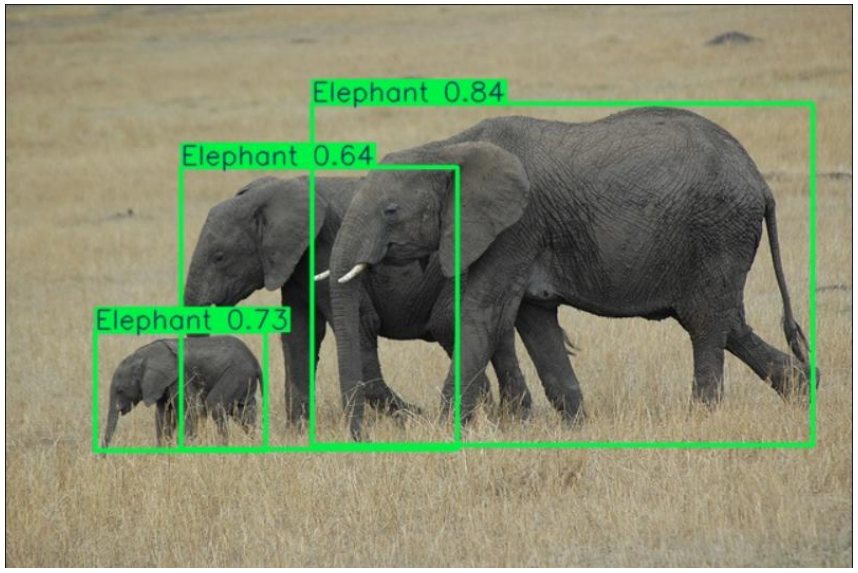
- Automates monitoring so suspicious events are identified in near real-time. Reduces average detection-to-alert time (enables quicker ranger dispatch).
- Fewer successful poaching incidents, higher survival of endangered species. Enables continuous species-level monitoring for population studies.
- Reduces manual labour for reviewing footage, allows rangers to focus on response.
- Time-stamped annotated media creates verifiable evidence for prosecution. Audit trail (model_version, timestamps) improves chain of custody reliability.
- Structured Detection data supports trend analysis. Directs patrol planning and resource allocation where it is most needed.
- Lowers long-term monitoring costs as compared to 24/7 human surveillance. Reduces wasted patrols by prioritizing verified alerts.
- Protects biodiversity that local economies depend on. Builds trust with stakeholders by showing measurable conservation activity.

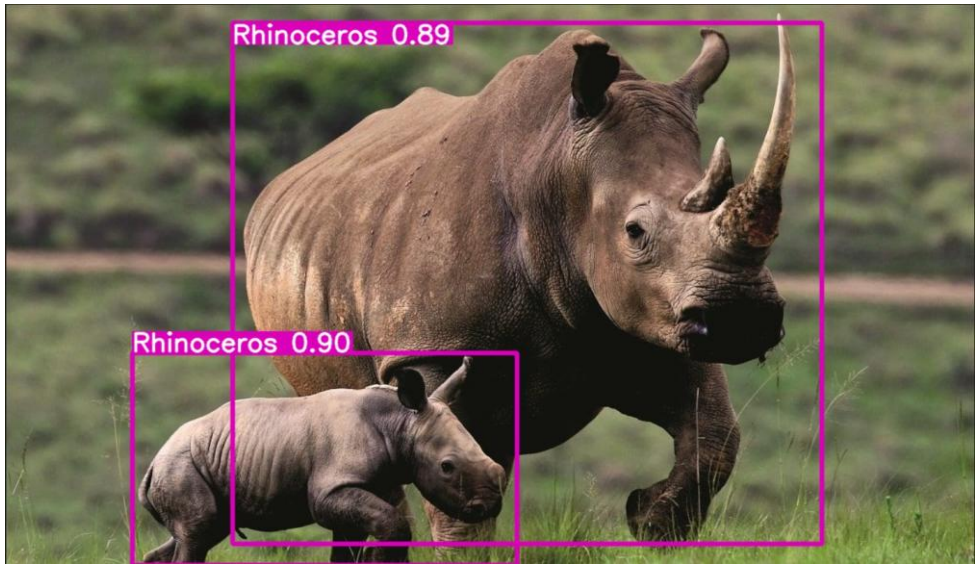
Prototype – Model & Prediction











Thank you