

TENDER - D

ANNEXURE - D (III)

REQUEST FOR PROPOSAL (RFP) FOR KERALA START-UP MISSION

Development, Deployment and Commissioning of AI-Based Coastal Drone Surveillance and Video Analytics Software

1. Introduction

Kerala Police proposes to develop and deploy a secure AI-based Coastal Drone Surveillance and Video Analytics Software Platform for strengthening aerial surveillance, maritime situational awareness, anomaly detection and intelligence generation across Coastal Police operations.

The proposed solution shall provide a centralized platform for receiving and analysing live and recorded drone video feeds, integrating drone telemetry and location information, applying AI/ML-based analytics, generating real-time alerts and presenting actionable information through a secure web-based monitoring dashboard.

The system shall be designed specifically for coastal surveillance applications, including monitoring of coastal areas, beaches, ports, harbours, waterways, vessels, suspicious activities and other events requiring aerial situational awareness.

2. Objectives

The primary objective of the project is to establish a secure and scalable AI-enabled platform capable of converting drone surveillance video and associated telemetry into actionable intelligence.

The solution shall:

- Provide a centralized platform for analysing live and recorded coastal drone video feeds.
- Integrate AI-generated overlays, alerts, event information and drone metadata.
- Detect and classify persons, vehicles, vessels, boats and other objects of operational interest.
- Identify suspicious or anomalous activities in coastal and maritime environments.
- Provide real-time GPS-tagged alerts and event information through an interactive monitoring dashboard.
- Enable synchronized visualization of drone video, telemetry and geographical location.

- Support integration between UAV platforms, AI analytics, GIS and existing police systems through APIs.
- Provide secure user access, data protection and audit mechanisms for operational and evidentiary requirements.
- Provide a scalable architecture capable of supporting future expansion of drones, analytics and operational locations.

3. Scope of Work

The successful bidder shall be responsible for the development, supply, deployment, integration, testing, commissioning and operationalization of the complete AI-based Coastal Drone Surveillance Software solution.

The scope shall include, but not be limited to:

- Development/provision of licensed AI-based coastal drone video analytics software.
- Integration of live and recorded video feeds from multiple UAV platforms.
- Integration of drone telemetry including GPS position, altitude, heading and speed, wherever available from the UAV system.
- Development and deployment of AI/ML models optimized for aerial and coastal surveillance.
- Detection, classification and tracking of objects and events of operational interest.
- Development of a centralized secure web-based monitoring and analytics dashboard.
- Integration of GIS/map-based visualization with drone location and detected events.
- Configuration of operational zones, alert thresholds and analytics parameters.
- Implementation of user management, role-based access control and audit logging.
- API integration capability with UAV command-and-control systems, GIS platforms and other authorized police systems.
- Deployment, configuration, testing and commissioning of the software.
- Training of designated Kerala Police personnel.
- Technical documentation and user manuals.
- Comprehensive technical support and maintenance for a minimum period of three years, with provision for extension.

4. Coastal Drone AI Analytics Requirements

The AI analytics engine shall be designed for processing aerial surveillance footage and shall provide the following minimum capabilities:

Sl. No.	Analytics Function	Minimum Requirement
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1	Object Detection & Classification	Detection and classification of persons, vehicles, boats, vessels and other configured objects with bounding-box overlays
2	Person Detection	Automated detection and counting of persons from aerial video
3	Vehicle Detection	Detection, classification and tracking of vehicles within the surveillance area
4	Vessel/Boat Detection	Detection, classification and tracking of boats and watercraft in coastal and maritime areas
5	Object Tracking	Continuous tracking of detected moving objects across video frames
6	Crowd Detection & Counting	Detection and counting of gatherings with configurable threshold-based alerts
7	Restricted/Geofenced Area Monitoring	User-defined surveillance zones and automated alerts when configured events occur within such zones
8	Intrusion Detection	Detection of unauthorized movement or entry into defined restricted surveillance areas
9	Suspicious/ Abandoned Object Detection	Identification of unattended or stationary objects with configurable time-based alerts
10	Loitering/ Abnormal Activity	Detection of prolonged presence or configured abnormal movement patterns
11	Object/Vessel Behaviour Analysis	Analysis of movement patterns and configurable abnormal behaviour indicators
12	Multi-Object Tracking	Simultaneous tracking of multiple persons, vehicles and vessels
13	Telemetry Association	Synchronization of detected events with available drone GPS, altitude, heading and speed data
14	Location-Based Alerts	Generation of alerts associated with geographical coordinates
15	Thermal/Night Analytics	Architecture capable of supporting thermal and night-vision video analytics
16	Event Recording	Recording and preservation of detected events, associated video segments and metadata

The AI analytics shall be configurable so that additional object classes, detection parameters and specialized coastal surveillance models can be incorporated in future.

5. Video and Data Processing Requirements

The software shall support processing of video obtained from the proposed coastal surveillance UAV systems as well as other compatible UAV platforms.

The minimum requirements shall include:

- Support for commonly used video formats including MP4, MOV, AVI and MKV.
- Support for live video streaming and recorded video analysis.
- Capability to process a minimum of 20 concurrent drone video feeds, expandable according to operational requirements.
- Synchronization of video, telemetry and geographical information wherever telemetry data is available.
- Support for HD/Full HD and higher-resolution video inputs.
- Capability to extract and store relevant event clips from live surveillance feeds.
- Support for retraining or fine-tuning AI models using authorized drone-captured datasets.
- Modular architecture for integration of specialized analytics, including thermal and night-vision data.
- Secure storage of analytical results, event metadata and associated video evidence.

6. Coastal Surveillance Monitoring Dashboard

The solution shall provide a secure, responsive and user-friendly web-based dashboard for centralized monitoring and management of drone surveillance operations.

The dashboard shall provide, at minimum:

- Live visualization of multiple drone video feeds.
- Simultaneous map/GIS and video visualization.
- Real-time display of drone location and flight information.
- Display of AI-detected objects and events as overlays.
- Real-time alert notifications.
- GPS/location-tagged event display.
- Search and filtering of historical events.
- Playback of recorded video and event clips.
- Display of drone telemetry wherever available.
- Configurable surveillance zones and geofences.
- Event history and analytics reports.
- User and role management.
- System health and operational status monitoring.

7. AI Alert and Event Management

The system shall generate configurable alerts based on detected objects, activities, geographical zones and predefined thresholds. Alerts shall contain relevant information such as event type, date/time, drone identification, geographical coordinates and associated video or image evidence, wherever available.

The authorized user shall be able to configure:

- Alert types.

- Detection thresholds.
- Geographical zones.
- Time-based conditions.
- Alert sensitivity.
- Priority/severity levels.
- Notification and escalation parameters.

All generated alerts and subsequent user actions shall be recorded in an audit trail.

8. GIS and Drone Telemetry Integration

The platform shall integrate available drone telemetry with video analytics to provide a geographical context to detected events.

The system shall support integration of:

- GPS coordinates.
- Drone altitude.
- Heading/direction.
- Ground speed.
- Flight status.
- Drone identification.
- Mission/flight information, wherever available.

The system shall provide map-based visualization of drone position, flight trajectory, surveillance area and detected events.

9. API and System Integration

The proposed solution shall have an open and modular integration architecture to facilitate future integration with authorized Kerala Police systems.

The system shall provide RESTful API capability for integration with:

- Drone Command & Control (C2) systems.
- UAV telemetry sources.
- GIS platforms.
- Police operational platforms.
- Authorized external data sources.
- Future AI and surveillance applications.

The APIs shall support secure authentication and controlled access to authorized data and functions.

10. Security, Access Control and Data Protection

Since the platform shall process sensitive surveillance information and potentially evidentiary video data, appropriate security controls shall be incorporated into the solution.

The system shall provide:

- Role-Based Access Control (RBAC).
- User authentication and authorization.
- Secure administrative access.
- Audit trails for user activities.
- Secure storage of surveillance data and analytics results.
- Secure communication between system components.
- Controlled access to live and archived video.
- Data backup and recovery mechanisms.
- Secure API authentication.
- Configurable user permissions for viewing, analysis, export and administration.

The solution shall be implemented in accordance with applicable Government of India requirements, policies and directions relating to cybersecurity, data protection, lawful surveillance and handling of digital information.

11. AI Model and Analytics Management

The proposed architecture shall support continuous improvement of AI analytics based on operational requirements and locally collected datasets.

The system shall provide capability for:

- Addition of new object classes.
- Model retraining/fine-tuning using authorized datasets.
- Dataset management.
- Model version management.
- Performance evaluation of AI models.
- Deployment of updated models without major modification of the core platform.

Any model training or modification shall be carried out under the authorization and supervision of the designated Kerala Police authority.

12. Deployment, Testing and Commissioning

The successful bidder shall deploy and commission the complete software solution at the location(s) designated by Kerala Police.

The implementation shall include:

- Software installation and configuration.

- Integration with designated drone systems.
- Configuration of video and telemetry inputs.
- Configuration of GIS/map services.
- Configuration of users and access privileges.
- AI analytics configuration.
- Dashboard deployment.
- Functional and performance testing.
- Security testing as applicable.
- Demonstration of live drone feed analytics.
- Acceptance testing and commissioning.

The system shall be considered operational only after successful demonstration and acceptance by the designated authority.

13. Training and Documentation

The successful bidder shall provide comprehensive training to nominated Kerala Police personnel covering system operation, administration and basic analytics management.

Training shall include:

- Dashboard operation.
- Live drone feed monitoring.
- AI event and alert management.
- GIS/map-based monitoring.
- Historical video and event analysis.
- User and access management.
- System administration.
- Basic AI model/data management, wherever applicable.
- Data export and reporting.
- Troubleshooting and system maintenance.

The bidder shall provide user manuals, administrator manuals, technical documentation, API documentation and other necessary operational documentation.

14. Warranty, Support and Maintenance

The bidder shall provide a minimum three-year comprehensive technical support and maintenance period from the date of successful commissioning.

The support shall include:

- Software bug fixing and corrective maintenance.
- Software updates and patches.
- AI model improvements/updates as agreed.

- Technical troubleshooting.
- Integration support.
- Performance monitoring.
- Security updates.
- Remote and on-site technical support, wherever required.
- Assistance during system expansion or integration with compatible UAV platforms.

The support period shall be extendable based on the requirements of Kerala Police.

15. Deliverables

The successful bidder shall deliver a complete and operational AI-based Coastal Drone Surveillance Platform, including:

- AI-based Coastal Drone Video Analytics Software.
- Centralized web-based monitoring dashboard.
- AI analytics and alert engine.
- Drone video and telemetry integration modules.
- GIS/map-based monitoring module.
- User and role management module.
- Event and alert management system.
- API/integration interface.
- AI model management capability.
- Required software licences.
- Installation and commissioning.
- User and administrator training.
- Technical and user documentation.
- System testing and commissioning report.
- Warranty/support documentation.

16. Acceptance Criteria

Acceptance of the solution shall be based on successful demonstration of the minimum functional and technical capabilities specified in this RFP.

The bidder shall demonstrate, using compatible coastal surveillance drone feeds:

- Live video reception and display.
- AI-based object detection and classification.
- Person, vehicle and vessel detection.
- Object tracking.
- Configurable coastal surveillance zones.
- Alert generation.
- GPS-tagged event visualization.
- Drone telemetry synchronization, wherever available.
- Historical video/event playback.
- Multi-feed monitoring.

- User access control and audit logging.
- GIS-based visualization.
- API/integration functionality.

The final system shall be accepted only after satisfactory completion of testing, demonstration and commissioning by the designated Kerala Police authority.