

TECH OFFER

Edge AI-based Drone System for Pipe Inspection and Monitoring



KEY INFORMATION

TECHNOLOGY CATEGORY:

Electronics - Embedded Systems

Infocomm - Artificial Intelligence

Infocomm - Video/Image Processing

Infocomm - Security & Privacy

TECHNOLOGY READINESS LEVEL (TRL): **TRL7**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO175213**

OVERVIEW

The Edge AI-based Drone System for Pipe Inspection and Monitoring addresses the need for efficient, accurate, and real-time pipeline infrastructure inspections. It leverages edge AI processing to detect defects, offering a significant advantage over traditional methods. Unlike conventional systems that rely solely on optical cameras, this solution integrates both optical and thermal imaging, enhancing the detection of various pipeline-related issues. The system's unique value proposition lies in its ability to process data locally on the drone, ensuring immediate issue detection and minimizing data breach risks by reducing the reliance on cloud processing.

The technology owner is seeking collaboration with SMEs specializing in drone manufacturing, AI and machine learning, thermal imaging, industrial inspection services, telecommunications and IoT, and data security, which offer complementary expertise for the development and commercialization of the technology.

TECHNOLOGY FEATURES & SPECIFICATIONS

The system comprises four major components:

- Notification system
- Object detection system
- Data storage system
- Network system

It utilizes an embedded Graphics Processing Unit (GPU) with YOLOv3 for real-time object detection. The cameras capture images at a resolution of 1024x768, operating at 8 frames per second. Notifications are sent via a Telegram bot, and detected objects are tagged with unique IDs to manage redundant alerts. The system supports remote management and can handle both optical and thermal imaging inputs, which are processed alternately to optimize resource use. Additionally, it features auto-zoom capabilities for detailed inspections and comprehensive data storage to safeguard information in case of drone malfunctions.

POTENTIAL APPLICATIONS

This technology can be employed across various industries, primarily in infrastructure maintenance and inspection. It is particularly suited for pipeline monitoring, where it can detect defects and help prevent potential hazards. The system can also be adapted for other industrial visual inspections, such as monitoring construction sites, agricultural fields, and security surveillance. Marketable products based on this technology include advanced inspection drones for utility companies, automated surveillance systems for critical infrastructure, and comprehensive monitoring solutions for industrial facilities.

MARKET TRENDS & OPPORTUNITIES

The market size for industrial inspection drones is growing rapidly, driven by increasing demand for advanced inspection solutions in utilities and public infrastructure maintenance. This IP is attractive due to its real-time detection capabilities, comprehensive data storage, and enhanced privacy features. The ability to provide immediate notifications and support remote management makes it a valuable tool for reducing inspection costs and improving maintenance efficiency.

UNIQUE VALUE PROPOSITION

- **Enhanced Inspection Capabilities:** Integrates optical and thermal imaging with edge AI processing for superior defect detection.
- **Real-Time Notifications:** Immediate alerts enable faster response to maintenance issues.
- **Improved Efficiency and Accuracy:** Provides detailed, real-time defect detection, significantly enhancing maintenance efficiency.
- **Local Data Processing:** Ensures enhanced privacy and security by minimizing data transmission to external servers.
- **Cost Reduction:** Lowers operational costs by reducing the need for manual inspections and enabling proactive maintenance.
- **Minimized Downtime:** Proactive detection helps prevent system failures, reducing downtime.
- **Remote Management:** Offers flexibility and control over inspection operations, improving overall efficiency.

