NUNTIUS HELICOPTER: A NEW DRONE IN CONSTRUCTION INDUSTRY

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SOSTEVAL-TEC

INVESTIGACIÓN DE SOLUCIONES AVANZADAS PARA UN SISTEMA AUTOMATIZADO INTELIGENTE PARA LA EVALUACIÓN DE LA SOSTENIBILIDAD, Y SU MEJORA, A LO LARGO DEL CICLO DE VIDA DE LA OBRA CIVIL.

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Agenda

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- Nuntius Helicopter Overview
- UAVs in Construction.
- UAV Networking and Classification
- Importance of 5G Communication
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- Q&A

1. INTRODUCTION

The construction sector, particularly in regions like Madrid, is rapidly expanding, driving the need for innovative solutions to enhance worker safety and site monitoring. Traditional methods are often costly and inefficient, necessitating the adoption of advanced technologies. This presentation introduces the Nuntius Helicopter, a 5G-enabled drone designed to revolutionize construction site management by providing real-time health care monitoring and data transmission.

2. Nuntius Helicopter Overview

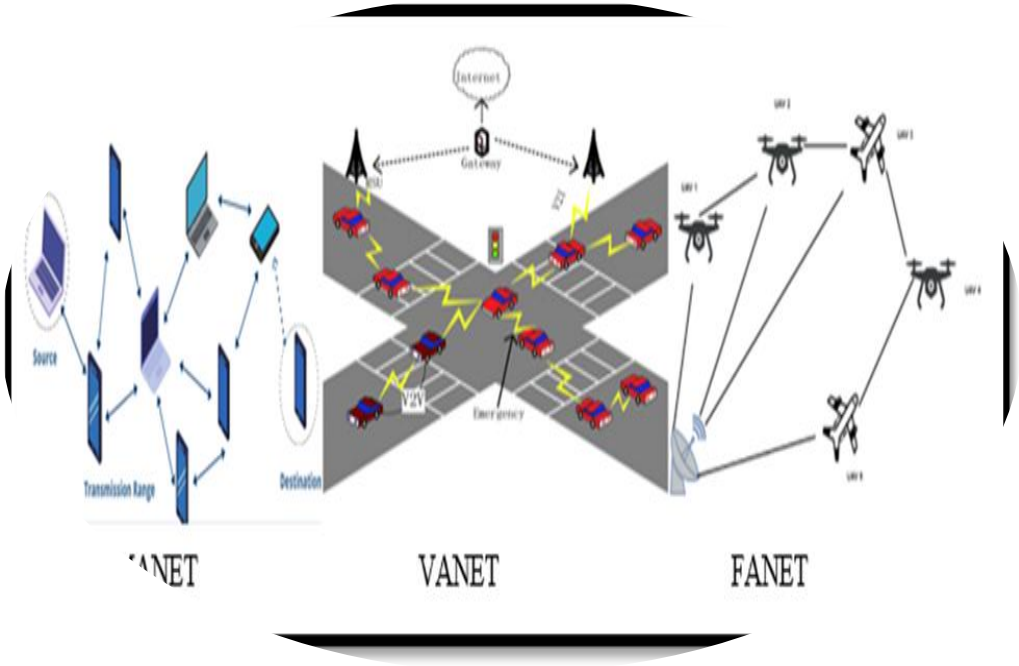
The Nuntius Helicopter is an advanced drone developed by Drone Hopper, equipped with an onboard PC, HD camera, and 5G communication capabilities. Designed for construction site monitoring, it provides real-time video streaming and data processing with high accuracy and zero latency. With a one-hour endurance, the Nuntius Helicopter offers a robust solution for enhancing worker safety and site management efficiency.

3. UAVs in Construction

Unmanned Aerial Vehicles (UAVs) are transforming the construction industry by providing efficient, real-time monitoring and data collection. They enhance safety by reducing the need for manual inspections and enable precise project management. UAVs like the Nuntius Helicopter bring significant advantages, including improved accuracy in health care monitoring and streamlined construction site operations.

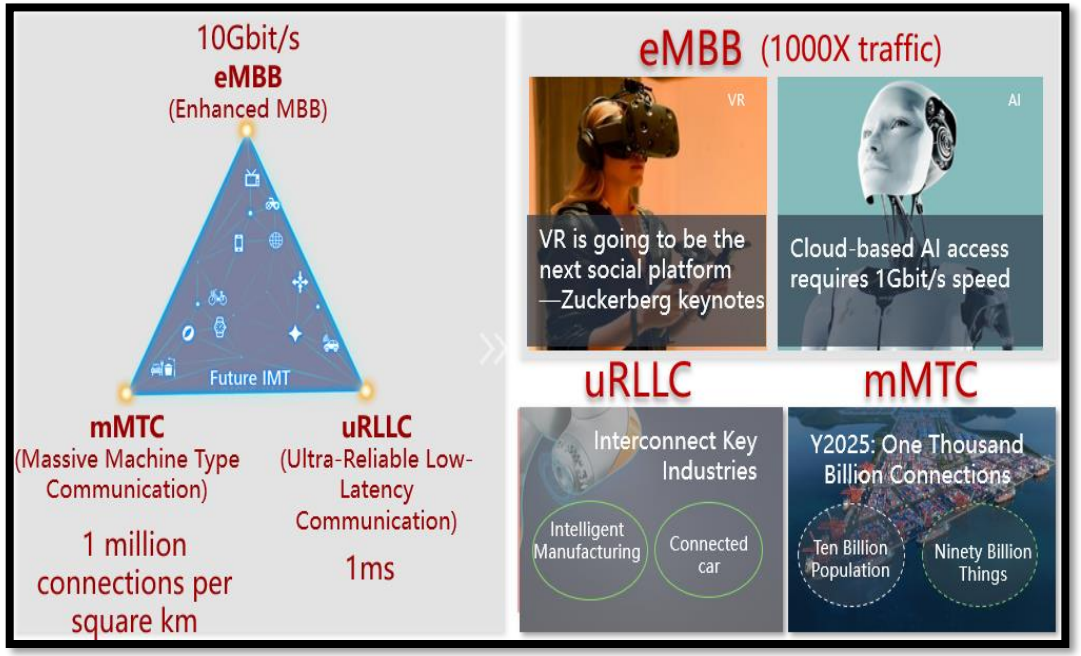
4. UAV Networking and Classification

UAV networking is a crucial aspect of drone operations, particularly in complex environments like construction sites. The Nuntius Helicopter operates within a Flying Ad-hoc Network (FANET), offering superior mobility and connectivity compared to other ad-hoc networks like MANET and VANET. This classification ensures high-performance communication and real-time data exchange, essential for effective site monitoring and management.



5. Importance of 5G Communication

- **High Bandwidth:** real-time 4K video streaming from UAVs.
- **Low Latency:** The ultra-low latency of 5G ensures immediate data transmission
- **Enhanced Reliability:** 5G's ultra-reliable and low latency communication (uRLLC)
- **Network Slicing:** 5G allows for network slicing
- **Scalability and Flexibility:** 5G can support a vast number of connected devices
- **Integration with Cloud and Edge Computing**

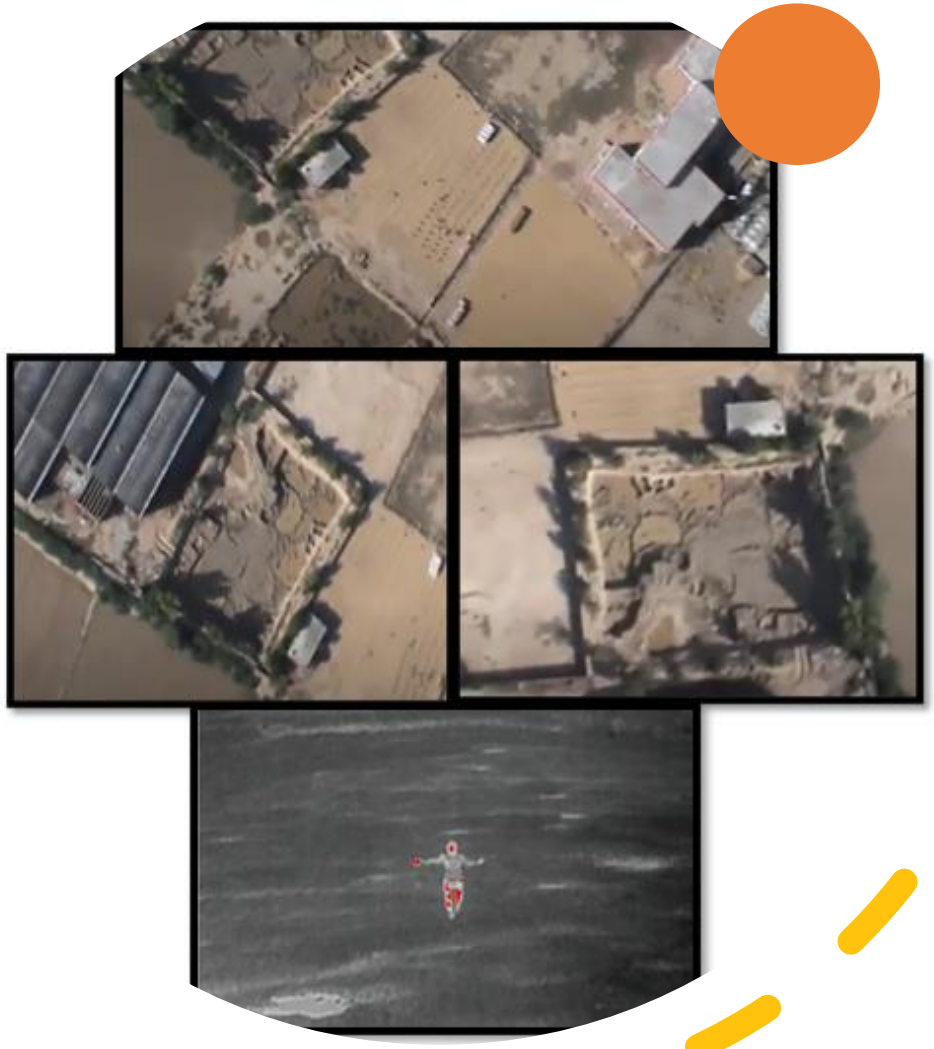


6. Proposed Scenario

- The proposed scenario involves deploying the Nuntius Helicopter equipped with 5G communication to monitor a construction site in real-time. The drone captures and transmits live video while assessing site conditions, including worker health metrics, to the Ground Control Station. Additionally, an emulated environment using Opnet simulator replicates the scenario to validate system performance under controlled conditions.
- measuring delay, throughput, and network reliability.

7. Real Test Results

- Seamless Video Streaming
- Stable Altitude Control
- Clear Zoom Functionality
- Health Monitoring
- High System Performance



8. Emulation Results

•**Routing Traffic Analysis**: The simulation showed that the routing traffic sent by the Nuntius Helicopter

was higher than the traffic received by the Ground Control Station by approximately 50 bits/sec.

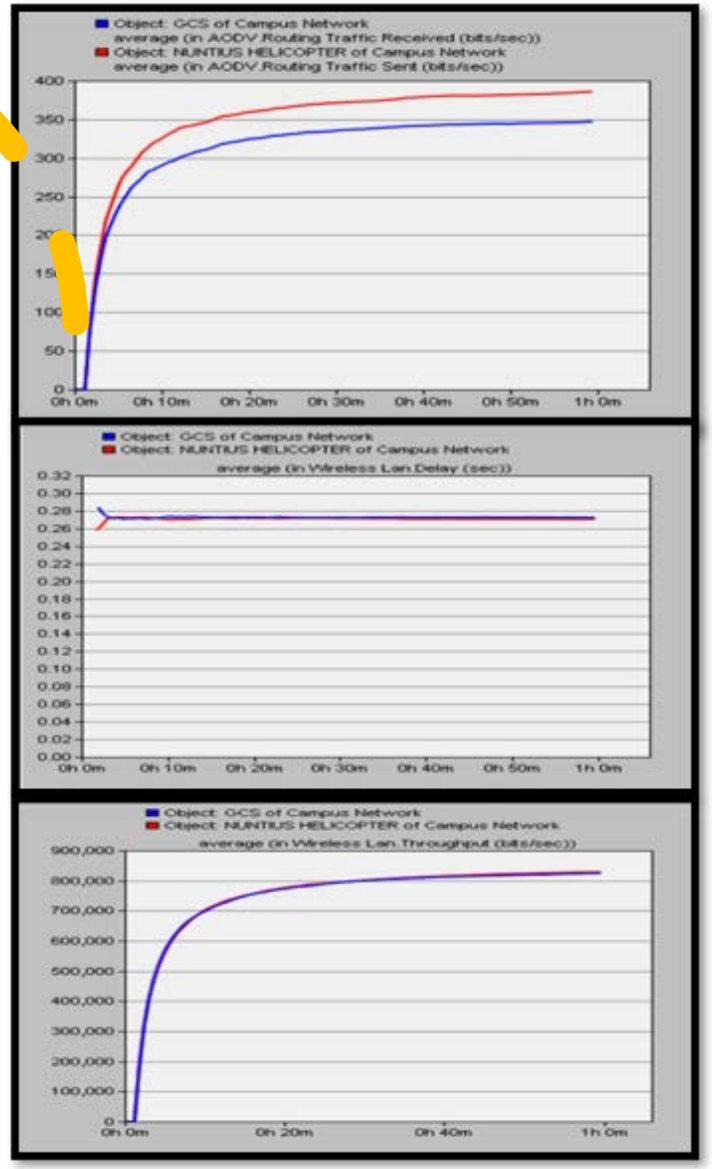
•**Minimal Wireless LAN Delay**: The emulation demonstrated almost no delay in the wireless

LAN communication between the Nuntius Helicopter and the Ground Control Station, indicating efficient

data transmission.

•**Equal Throughput**: The throughput for both the Nuntius Helicopter and the Ground Control Station

was found to be equal, confirming the system's ability to maintain consistent data rates during operations.



9. Conclusion and Future Implications

- **Conclusion**

1. **High System Performance:** The Nuntius Helicopter demonstrated excellent stability, real-time video transmission, and accurate data processing, proving its value for monitoring construction sites and ensuring worker safety.
2. **Efficient Real-Time Monitoring:** The use of 5G communication allowed for seamless video streaming and immediate response capabilities, improving the overall management of construction activities.
3. **Enhanced Worker Safety:** The drone's ability to monitor worker health metrics in real-time provides an early warning system, which can significantly reduce the risk of accidents and improve on-site safety.
4. **Cost and Time Efficiency:** By automating construction monitoring and health care, the system reduces manual inspection efforts and cuts operational costs while speeding up decision-making processes.

- **Future Implications:**

1. **Scalability for Larger Sites:** The Nuntius Helicopter system could be further optimized to cover larger construction areas or multiple sites simultaneously with additional UAVs.
2. **Advanced AI Integration:** Future iterations could incorporate AI algorithms for automated risk detection, anomaly reporting, and predictive maintenance of construction equipment.
3. **Broader Industry Applications:** The drone's system could be adapted for use in other industries, such as mining, agriculture, or infrastructure maintenance, where real-time monitoring and worker safety are crucial.
4. **Longer Endurance and Payload Capacity:** Future models could be designed with longer flight endurance and increased payload capacity to handle additional sensors or extended missions.
5. **Global Deployment:** As 5G networks expand globally, this system can be deployed in remote or less-connected regions, enhancing its applicability across different geographies and industries.

10. Q&A

ANY QUESTION

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