



ICAO

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Seventh Meeting of the Aerodromes Operations and  
Planning Sub-Group (AOP/SG/7)

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**Agenda Item 4: Provision of AOP in the Asia/Pacific Region**  
– **Planning & Design of Aerodromes**

**DEVELOPMENT OF INDIGENOUS SMART VISUAL DOCKING & GUIDANCE SYSTEM  
THROUGH STARTUP INITIATIVE**

(Presented by India)

**SUMMARY**

This paper presents specifications of LORA-WAN based indigenous S-VDGS system under Start-up initiative.

**1. INTRODUCTION**

1.1 Visual Docking Guidance Systems (VDGS) provide alignment and stopping guidance to an aircraft entering the stand. VDGS providing both azimuth and stopping guidance. The compliance requirements for VDGS are described in National Civil Aviation Regulation.

1.2 Airports Authority of India (AAI) has installed visual docking & guidance systems at airports across India through open purchase form available manufacturer. During this procurement it is felt that real time chocks-on & chocks-off information is not available in current systems and to integrate this with AOCC/Apron control, huge financial implication is involved. Since Parking charge & Passenger boarding bridge charge is major component of AAI's revenue therefore, accurate chocks-on & chocks-off time is a necessity. Accordingly, it was decided that AAI may explore to develop LORA-WAN based an indigenous Smart-VDGS (S-VDGS) under Start- up initiative.

**2. DISCUSSION**

2.1 SCOPE OF WORK: -

- (i) Indigenous development of Advanced Visual Docking Guidance System (AVDGS).
- (ii) Accurate detection of Chocks On/Off Time and its communication to AOCC/Dashboard in real time.
- (iii) Compliance with national requirement and ICAO Annex 14 A-VDGS Specifications.

2.2 LIMITATIONS OF EXISTING PRODUCT: -

- (i) Uses complex LASER based systems requiring heavy maintenance.
- (ii) High cost for calibration and lack support for newer aircraft types.
- (iii) High cost for integration into airport backend IT systems.
- (iv) Low resolution displays for docking guidance.
- (v) Minimal or no performance during dense fog.
- (vi) Can only operate in environment with LAN connectivity.
- (vii) Have no additional functionality other than docking guidance.

2.3 PROPOSED S-VDGS FEATURES: -

- (i) 3D LIDAR sensor for accurate aircraft ranging.
- (ii) HD Camera for clear apron visibility.
- (iii) Thermal Sensor for best harsh weather performance (fog, rain, and dust).
- (iv) High grade CPU enabling advanced artificial intelligence capability.
- (v) Large size 16M True Color high resolution outdoor LED display unit.
- (vi) Support for multiple communication interfaces (LAN, Wi-Fi, LPWAN and Cellular).
- (vii) Wired and wireless operator's panel for ease of monitoring and control.
- (viii) Provision to support PBB stands.
- (ix) Provision to support additional features related to ATC information display and other airport operations such as safety and security.

2.4 KEY HARDWARE COMPONENTS OF S-VDGS

- (i) **HW Control Platform:** High processing ultra slim fanless embedded computer platform to perform functions such as 3D sensor scanning, data processing & management, implementing complex algorithm, communication handling etc. of the S-VDGS system.
- (ii) **3D Lidar Sensor:** The 3D Lidar sensor uses a high scanning point density and wide aperture angle to reliably detect its environment across multiple layers. Special mirror technology ensures high scanning field stability. With the aid of multi-echo technology, the sensor scans through rain, dust, and fog, while simultaneously multiplying the point density. These properties are particularly useful for creating a 3D point cloud without any gaps, which can be used to tackle a whole host of demanding applications.
- (iii) **LED Outdoor Display with Display Controller:** Specifically designed for outdoor use with SMD LED display that offers outstanding performance and reliability. Ideal solution with professional dot correction technology provides superior color performance. It provides the best viewing experience with optimal color, brightness, and contrast at an optimal viewing distance of greater than 6m.
- (iv) **Thermal/Visual IP Network Camera:** High-definition IP network camera with Thermal imaging will provide excellent image quality in HDTV 1080p. This outdoor-ready, IP-65 rated camera features Forensic WDR and Optimized IR illumination to deliver sharp video even in challenging light or complete darkness.

- (v) **Temperature & Humidity Sensor:** Industrial grade temperature and humidity sensor which supports wide operating temperature range from -40°C to 80°C with 100% of humidity level.
- (vi) **4G Cellular Modem (Optional):** 4G LTE cellular modem enables the remote wireless connectivity functionality of S-VDGS control unit. In case of failure of local ethernet or Wi-Fi network connection, SVDGS control unit will establish the communication with central server via 4G LTE network.
- (vii) **LoRA Wireless Modem (Optional):** LoRA wireless modem feature a long-range wireless modem that provides ultra-long range spread spectrum communication and high interference immunity while minimizing current consumption. It operates on RF frequency band between 865 MHz to 867 MHz In case of unavailability or failure of all primary mode of communication, the S-VDGS control unit uses LoRA network to provide chock IN/OUT data of the aircraft to the central server.
- (viii) **Operator Panel:** 10.4” inch Touch Display Controller panel to provide complete access to the S-VDGS control unit. Operator can assign the docking instructions and schedule the docking in the S-VDGS control unit via the Operator Panel UI. It also equipped with emergency STOP button in case operator likes to abort the docking process at any given time.

2.5 BENEFITS TO BE ACHIVED: -

- (i) 3D Lidar Sensor provides much better performance in all weathers than traditional Laser scanning.
- (ii) High resolution, 16M color, super-size display provides excellent visual guidance to pilots from long distance
- (iii) Thermal Sensor allows performance in CAT III conditions.
- (iv) Wireless network communication for remote stands and airports.
- (v) AOCC/AODB interface for seamless airport scheduling and billing.
- (vi) Environment sensor for real-time weather information to pilots.
- (vii) Self-calibration feature for supporting all aircraft types without any installation limitations.

2.6 The product developed under this project is now ready for commercialization and deployment.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.

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