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FACTSHEET Intelligent Taxi Guidance Platform



Background

Today's surface operations are conducted in complex operating environments, relying on controllers transmitting detailed taxi instructions to pilots using Very High Frequency (VHF), and in limited instances Ultra High Frequency (UHF), radios.

Drivers

- Increased efficiency with surface communications over UHF/VHF radio
- Increased surface planning incorporating SWIM information

Project Description



The Intelligent Taxi Guidance Platform (ITGP) aims to improve how taxi instructions are exchanged between ground control (GC) and flight crews. This project coordinates and supports the formulation of concepts and engineering activities to develop a prototype that provides Digital Taxi Instruction (DTI) to the flight crew via automated methods, thereby reducing voice communications. To accomplish this, we will use data sharing capabilities via System Wide Information Management (SWIM) and Internet Protocol (IP) connectivity to communicate with the Flight crews using Electronic Flight Bag (EFB) applications. However, DTIs will not replace any current surface function; they are meant to enhance current operations.

The initial set of work included operational procedures for developing DTIs. The GC will develop and send taxi instructions through a control tower-based application, which can be displayed textually and



graphically on the flight deck EFB. DTI applications will connect over IP datalink to request, receive, and respond using predefined messages (e.g., "WILCO," "Unable"). These applications will use SWIM data to aid GCs and Flight crews in their taxi planning and execution.

Founded on the current development of a concept for ITGP capability, we are collaborating with NASA to explore the use of innovative and emerging technologies and to develop an add-on prototype system that performs speech recognition to transcribe voice communication of taxi instructions and relevant dialogue into text. Speech recognition presents a great potential for minimizing disruption to the current Air Traffic Control (ATC) operating routine. It seamlessly interfaces with other relevant operations through voice and digital means.

Status

In June 2022, the Proof-of-Concept Execution Demonstration successfully showcased three operational scenarios. One scenario for the DTI input methods includes selecting predefined taxi route instructions, typing custom instructions, or drawing route instructions using a finger or stylus on the airport map. The next work phase will focus on exploring voice-to-text as a fourth DTI input method. This will include developing specific vocabulary for surface movement activities, and further exploring surface mapping accuracy to monitor for conformity.

Outcomes

- A prototype that includes both GC and EFB applications to demonstrate DTI capabilities
- The prototype System for Speech Recognition to Support ITGP DTI development
- Operational scenarios and use cases that describe envisioned nominal and off-nominal operations
- Notional architecture that enables information exchange between stakeholders
- Maturation of the surface movement portion of the aviation-focused vocabulary supporting NLP
- Consistency with global exchange standards



