Executive Summary

The Taxi Management System project is the work of the computer science department of the University of Southern California's capstone design class, CSCI 477 (Design of Large Software Systems). This one-semester class was held in the Spring 2008 semester.

A runway incursion is when an airplane, vehicle, person or object on the ground creates a collision hazard with an airplane that is taking off or landing. Runway incursions are an increasing problem as there have been 410 occurrences already in 2008 as oppose to the 370 occurrences in the entire 2007 year. In this project we are reducing runway incursions by focusing on one of the major causes of incursions, being pilot error.

Our goals are to:

- Decrease the negative effects caused by poor visibility
- Assist pilots who are unfamiliar with the airport
- Improve the communication between pilots and air traffic controllers
- Assist the air traffic controller in making route planning decisions

The Taxi Management System (TMS) has four major components:

- ATC Graphical Airport Model: A touch screen panel with the layout of the runways and taxiways that acts as a user interface for the ATC. Incoming planes and outgoing planes will appear on the screen where the ATC can select them. Once a plane is selected, the ATC will draw a taxi path for the plane which will be communicated to the pilot via audio and visual feedback. The TMS will also suggest possible routes for the ATC to either use or disregard.
- Multi-Directional Runway Lighting: Our runway lighting system is comprised of arrays of lights in the shape of arrows embedded in the taxiways and runways. These arrows are located on the taxiways and runways just before every intersection. There are corresponding arrows for every direction a plane could proceed to from their current position at the intersection. The arrow of lights will guide the pilot from their initial position, a runway or gate, to their destination.
- Multi-Variable Taxi Path Database: Our database will collect real world data during every takeoff and landing. This data will be analyzed every 6 months to determine suggested routes to the ATC for each plane.
- Audio Feedback System: Our text to speech server will convert the path drawn by the ATC into an audio description of the path for the pilot and ATC to hear.

The Taxi Management System will be deployed in two phases:

- Phase 1: The first 6 months of operation will focus on the ATC drawing routes and the database collecting data from the routes for analysis. Path suggestion will not be possible in this phase.
- Phase 2: The ATC will have the option of selecting a route from suggested paths generated by our system or drawing their own path like in Phase 1. These paths are generated for each airport every 6 months by analyzing path data from the previous 6 months.