

Starway Dispatch

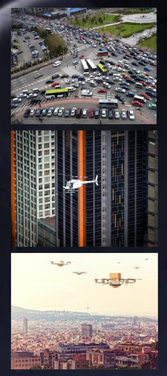
A Next-Generation LEO Space Traffic Management System

FORUM8

14th CPWC

AstroFlow

BACKGROUND



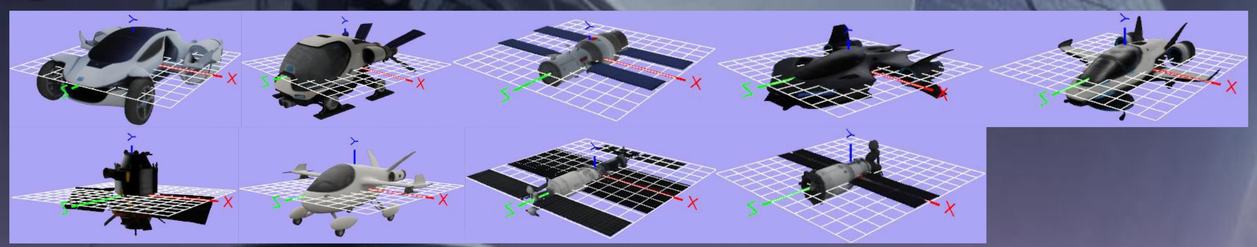
◯ Exhaustion of 2D resources:
The two-dimensional ground transportation network has reached its physical limit, and the marginal cost of expansion is increasing exponentially.

◯ Traditional ATC blind spot:
The current air traffic control system is unable to cope with the scheduling of low-altitude aircraft (eVTOL) flying among high-density, complex buildings in the future.

◯ Space collision avoidance technology:
There is a lack of real-time 3D collision prediction and millisecond-level response for heterogeneous aircraft Correction mechanism.

BASIC MODELING

◯ Infrastructure Design
The project closely simulates the Earth's surface to recreate the effects of a near-surface orbit and constructs a simulated model of an aircraft to represent future near-surface aircraft, simulating the flight of such aircraft in a near-surface orbit.



STARWAYDISPATCH: OVERALL ARCHITECTURE

◯ Module Architecture
The StarwayDispatch plugin employs a “perception-decision-execution” closed-loop control architecture and is deeply integrated into the UC-win/Road SDK framework.

SDK Interface Layer	Perception & Monitoring Layer	Decision-Making Layer	Execution Layer	UI & Interaction Layer
Hooks OnNewTransientObject OnTransientDeleted	**Density Assessment Engine** Density = Number / Road Length Calculates the utilization percentage (util%) for each route in real time	**Adaptive Scheduling** Search for the route with the lowest density across the entire field	**Three-stage controller** Ascend、Lateral、Descend	**Ribbon Integrated Console** Scenarios、Macro Micro、Rescue
Movement Override SetCallbackOn-DoMovement	**Fuzzy Traffic Condition** Traffic density data Smooth, Slow, Busy, Jammed	**Virtual Node Fallback** generate virtual lane-change points	**Interpolation Smoothing Algorithm** SmoothStep / Linear Interpolation	**Statistics Dashboard** 1,500+ units performance metrics
	Multi-End Synchronization Mechanism Ensures millisecond-level synchronization for F8main.cpp	**Safety Verification Logic** Perform obstacle avoidance and collision detection within a 40-meter radius		**Rule Config** Dynamically adjust density thresholds obstacle-avoidance radii

STARWAYDISPATCH: HARDWARE ARCHITECTURE

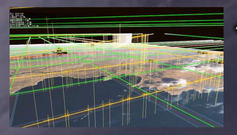
◯ Architecture Hardware Implementation and Environmental Architecture
The StarwayDispatch plugin is implemented based on a hardware runtime environment and physical architecture, enabling full utilization of high-performance computing resources. It is compatible with future real-world air traffic control hardware and supports engineering-grade deployment.

STARWAYDISPATCH: PLUGIN FEATURES

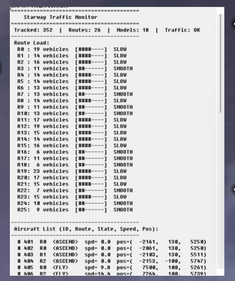
◯ Architecture Hardware Implementation and Environmental Architecture
The StarwayDispatch plugin offers high integration, rigorous simulation, and strong interactivity, enabling the management of low-altitude air traffic operations.

◇ Monitoring & Visualization
Density = Real-time count / Road length
3D Dynamic Road Condition Rendering
- ● Smooth：Unimpeded
- ● Slow：Light congestion
- ● Busy：Highly saturated
- ● Jammed：Severe traffic congestion

Cross-Device Data Synchronization



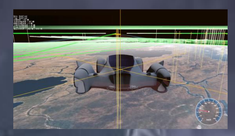
◇ Autonomous Scheduling
Full-Volume Background Flow Takeover
Virtual Intersection Matching Algorithm
Three-Stage Smooth Lane Change Control
Visual Scheduling Feedback



◇ Emergency Response & Rescue Module
Quick Search for Accidents
Real-Time Monitoring of Rescue Operations
Obstacle Avoidance Safety Verification



◇ Ribbon Integrated Interaction Console
Scenario Management
Macroeconomic Policy
Micro Guidance
Time Board



◇ Data Analysis and Dashboard Module
Route Load Distribution
Real-Time Flight List

FUTURE TASKS & IDEAS

◯ Air-Ground Collaborative V2X
Concept: Break air-ground information silos for holistic optimization of 3D transportation.
Task Objective: Link Starway scheduling engine with UC-win/Road ground signal system.
Technical Approach: When high-density vehicle clusters pass over intersections, the ground green light is automatically extended to reduce impacts of ground emissions on low-altitude flight environment. Meanwhile, real-time ground incident information is fed back to airspace to reroute aircraft.

