Mission Planning Components (MPC)

Collision Avoidance, Mission Planning, and Image Analysis

Kutta's Auto-Router*, Sensor Footprint*, RF Line-Of-Sight*, and Route & Area Nomination Algorithms can be combined to create a powerful mission analysis, image planning, and collision avoidance application. The result is the capability to effectively and efficiently plan a mission, avoid terrain, avoid obstacles, and gather information on whether or not the desired EO/IR imagery can be obtained – all in near-real-time.

*(See Reverse Side for Detailed Descriptions)

- Custom STANAG 4586 VSMs
- 2D/3D Flight Planning
- Battle Damage Assessment (BDA)
- Camera/Payload Controller
- Dynamic Re-Tasking
- Health Monitoring
- 2D/3D Sensor Footprint
- RF Line-of-Sight Analysis
- Air Traffic Management Tools
- Follow-Me Modes
- Search and Rescue Modes
- Auto-Router

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Technologies for earth and air

Mission Planning Components (MPC)

Auto-Routing

This Auto-Routing MPC will find the most efficient paths around obstacles in real-time. Kutta's auto-router has been proven in Monte-Carlo simulations to achieve routing around a randomized mix of 50 to 100 circles and polygons in under an average time of 0.12 msec on an Intel 1 GHz processor. Note: all flight planning modes work in conjunction with the integrated auto-routing algorithm. Kutta has shown this auto-router to run extremely well on a Intel Xscale 624 MhZ processor.

Radio-Frequency Line-of-Sight Analysis *(RF LOS)*

The Radio-Frequency Line-of-Sight MPC allows an operator to easily define the Radio-Frequency (RF) characteristics of the transmit and receive power of the Unmanned Aircraft System (UAS). Using a Digital Terrain Elevation Model (DTED), Kutta's efficient RF LOS algorithm determines the vertices of a polygon, where 100% RF coverage from the Ground Control Station (GCS) to the unmanned vehicle exist. The vertices of the resulting area are provided in modular fashion for display on mapping applications such as FalconView.

Sensor Footprint

This extremely efficient Sensor Footprint MPC gathers real-time input from the unmanned vehicle's position (latitude, longitude, altitude) and the pan, tilt, zoom parameters of an EO/IR payload to determine the sensor's actual projection onto the ground. Since the algorithm takes into account Digital Terrain Elevation Data (DTED), the sensor footprint can be overlaid in both 2D and 3D environments, offering exceptional situational awareness of where the sensor has pointed, where it is pointing, and where it is capable of pointing.

Autonomous Route & Area Survey

The Route Nomination MPC provides the capability to select a route or designate an area to survey. The algorithm determines an optimum flight plan that keeps the air vehicle (AV) within defined airspace restrictions, allows the AV to avoid terrain, and gather the designated imagery based on pertinent mission planning characteristics (i.e. dwell time, image overlap, object detection size, etc). It then outputs a STANAG 4586 compliant flight plan and a series of payload commands that can be sent to the AV for execution.

Airspace Management

This Airspace Management MPC allows a user to input Restricted Operating Zones (ROZs), fly zones, and flight corridors defined by airspace management authorities. Kutta's algorithm merges the zones and flight corridors with the RF LOS coverage to define a Safe Airspace Volume (SAV). The result provides a visual reference to ensure the unmanned vehicle's flight path remains within the defined SAV. Additional software can be purchased to ensure the unmanned vehicle stays within the bounded SAV.

STANAG 4586 - Data Link Interface & Vehicle Specific Modules (VSM)

Kutta licenses sophisticated OS Independent STANAG 4586 Vehicle Specific Modules (VSMs) for some of the most advanced Unmanned Aircraft System (UAS) auto-pilots on the market. The source code is very well maintained through multiple ongoing DoD programs. The VSM has been tested in hardware in-the-loop simulators as well as in flight tests with a STANAG-compliant Common UAV Control Station (CUCS). Kutta currently licenses the Data Link Interface (DLI) and the VSMs for Cloud Cap Piccolo's, Procures's Kestrel, and MLB's BAT 3. Please contact us to learn how our STANAG 4586 experts can build a customized VSM for your system.

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Auto-Routing
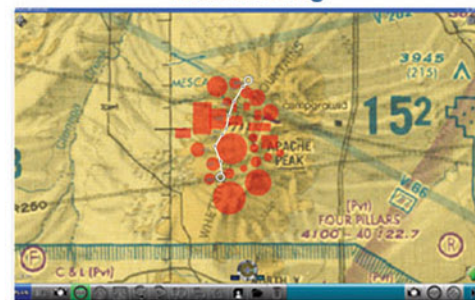
Inputs: Circular or polygon (convex or concave) no-fly zones, starting waypoint, goal waypoint. **Output:** Multi-waypoint path to achieve goal waypoint.
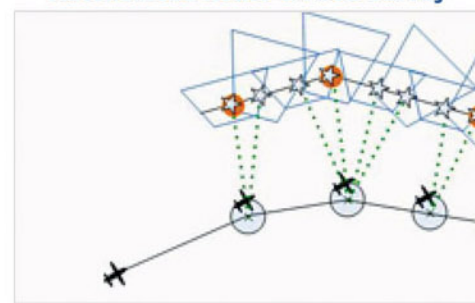
Radio-Frequency Line-of-Sight (RF LOS)

Inputs: Location of antenna, RF characteristics, environmental and terrain conditions, vehicle performance characteristics, DTED data. **Outputs:** Vertices of a polygon, STANAG 4586 private messages.
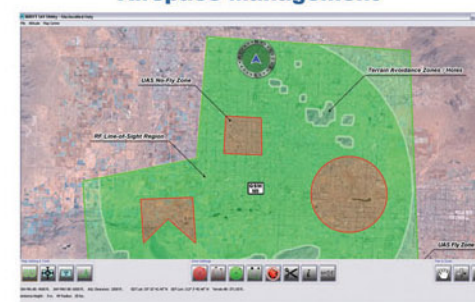
Sensor Footprint
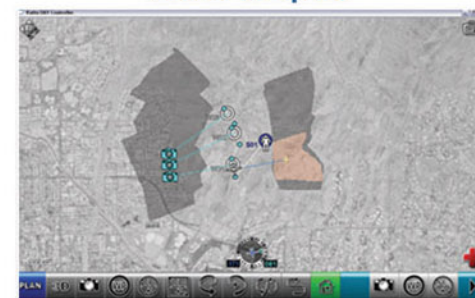
Inputs: Vehicle position and orientation, payload pan, tilt, zoom parameters, DTED, NIIRS rating. **Outputs:** Vertices of a polygon and polygon fill parameters.

Autonomous Route & Area Survey

Inputs: Select route or Points of Interest (POI) to survey. **Outputs:** Air Vehicle (AV) stare points, and loiter points.

Airspace Management

Inputs: Safe Airspace Zones (SAV), Restricted Operating Zones (ROZ), and Radio Frequency Light-of-Sight (RF-LOS) data. **Outputs:** Safe Airspace Volume with bounding points