

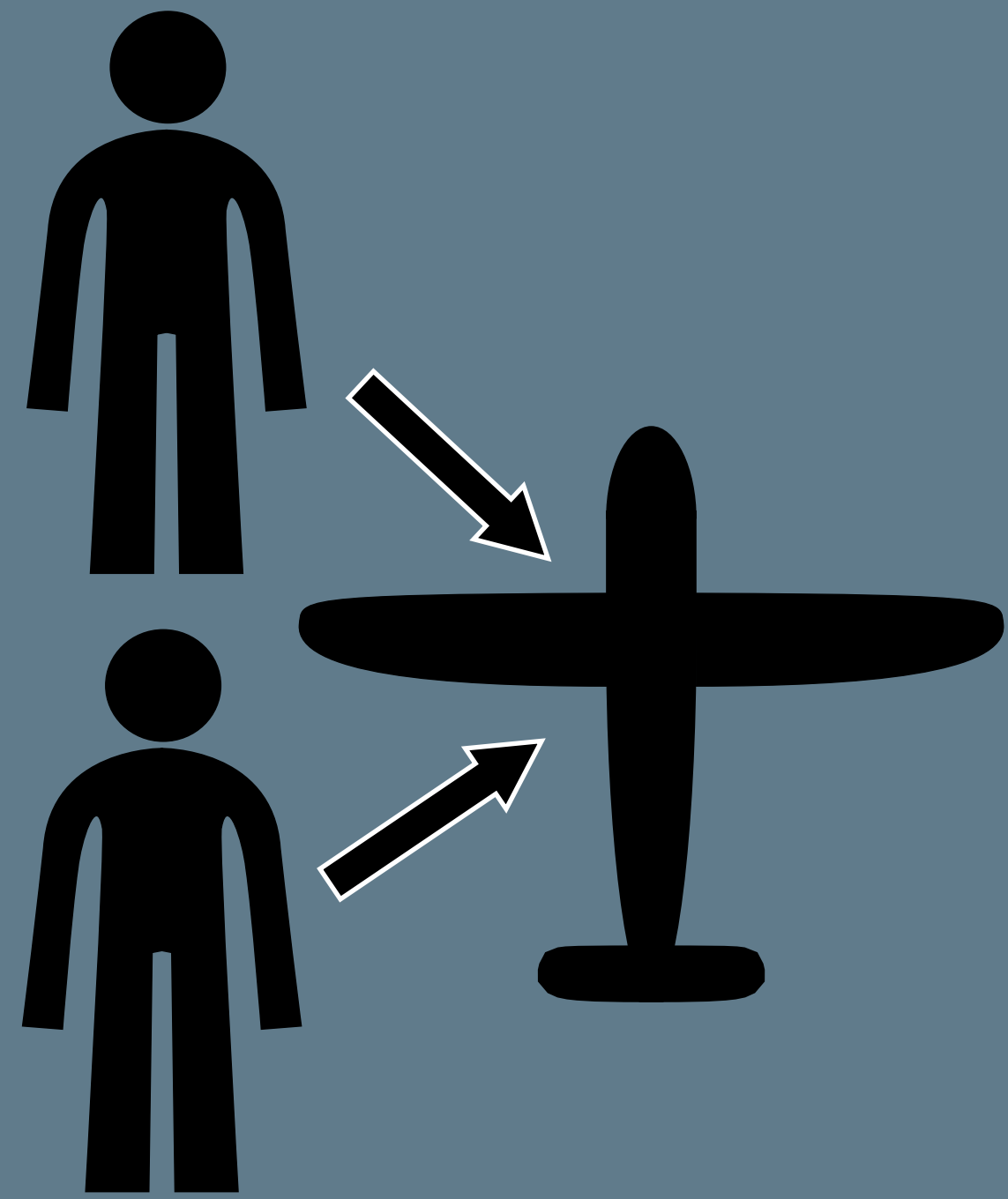
# BATTLESPACE: Advanced visualization and automation for enhanced control of Unmanned Aerial Vehicles

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Graduate Mentor: Tom Batkiewicz

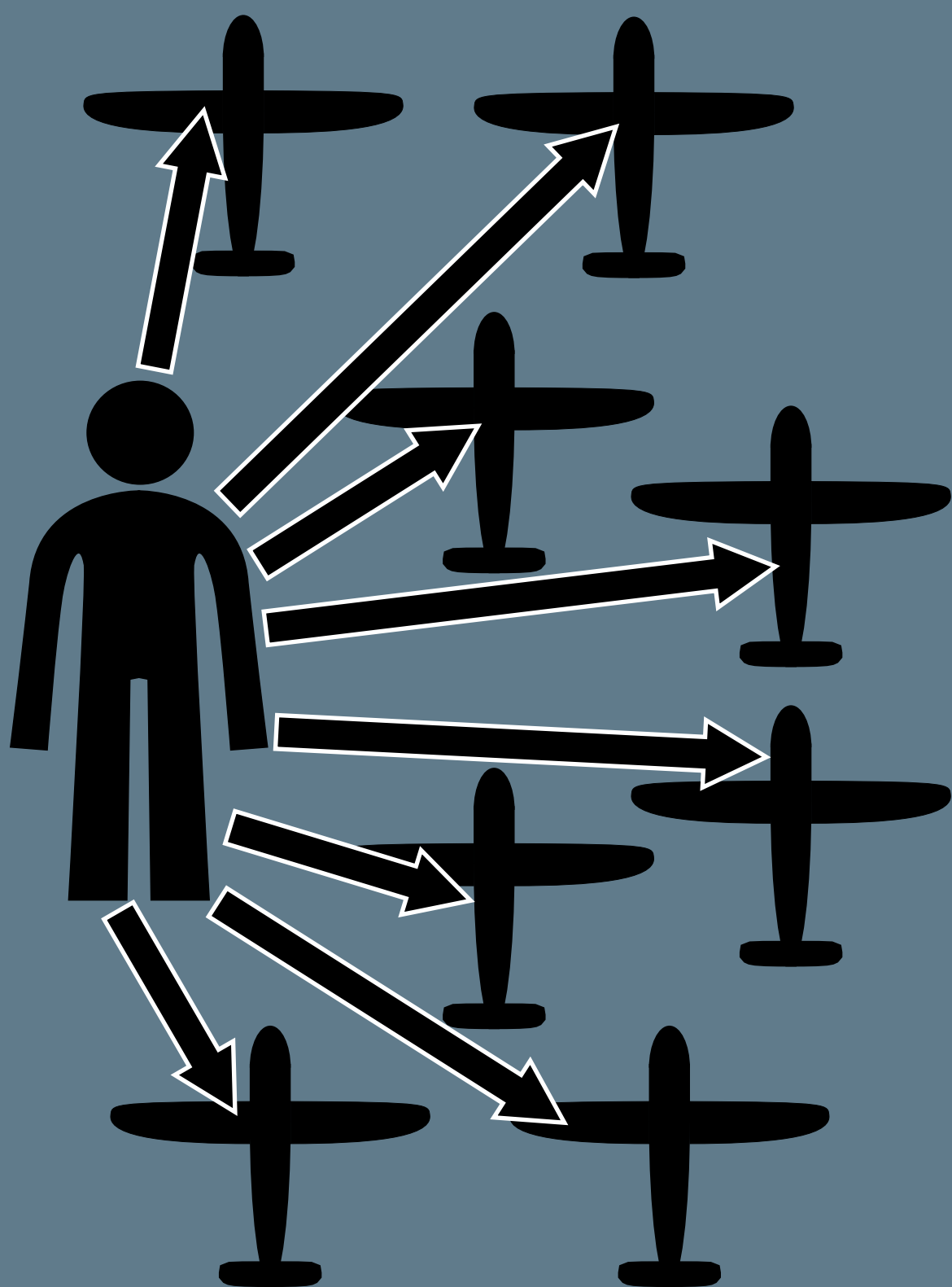
Faculty Mentor: Stephen Gilbert

## Current UAV Controls:



Current unmanned aerial vehecles (UAV) use a rudimentary control system. Each UAV requires a pilot and a payload operator. Navigation is done from two video screens. One is a map with the UAV's current location on it, the other is the video feed from the UAV's forward looking camera. This is a difficult and tedious way to operate a vehicle because the operator must generate a mental model of his craft and it's orientation on the battlefield. Operators must also take frequent breaks to prevent boredom and inattentiveness. Today's UAV pilots spend most of their time just keeping the UAV on track between mission objectives.

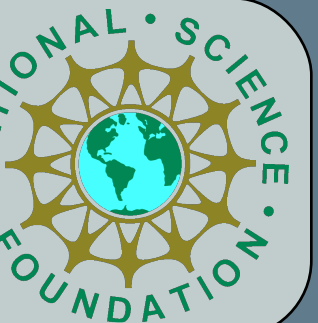
## The Future:



In the future, a single operator will control multiple UAVs simultaneously, acting less as a pilot and more as a commander. This will be possible through better visualization of aircraft and battlefield, automation of rudimentary tasks, and improved overall situational awareness. Being in direct command of several UAVs allows the operator to react faster to situational developments and closely coordinate vehicle movement. New technologies in computer graphics, flight controls, image recognition, and AI will automate much of the UAV squad's activity, while still keeping a human in control of important decisions.

# Our Project:

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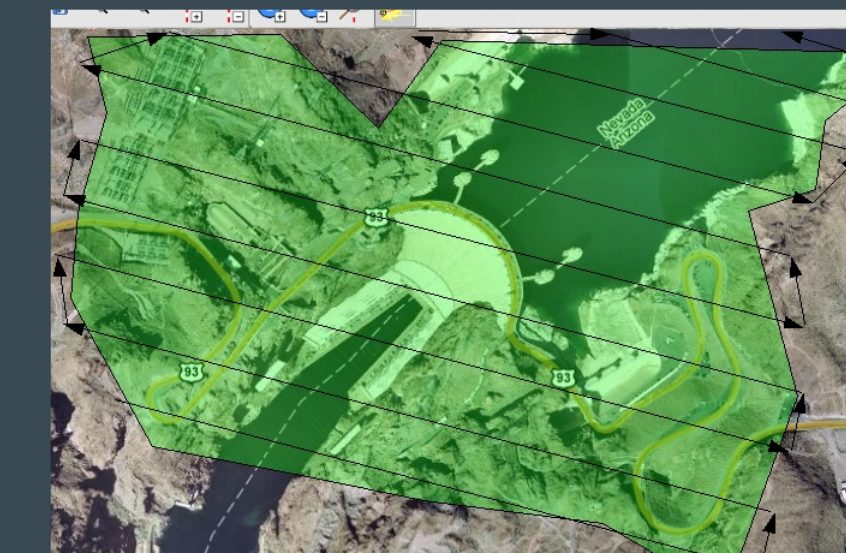


# Battlespace Taskmanager

This project was a continuation of *An Integrated Task Manager for Virtual Command & Control*, (Tom Batkiewicz, ISU 2006). The original program was a 2D desktop program capable of adding units, waypoints for unit travel, and firing commands into a mission scenario. This data can be saved as an XML file and loaded into *Battlespace*, an application for immersive visualization of combat scenarios. A person running *Taskmanager* could also connect to a *Battlespace* simulation session and modify the battle in real time.

Our objective this summer is to expand *Taskmanager*, giving it more refined tools for managing UAV behavior and a game play mode to demonstrate these new tools.

## Automation Features



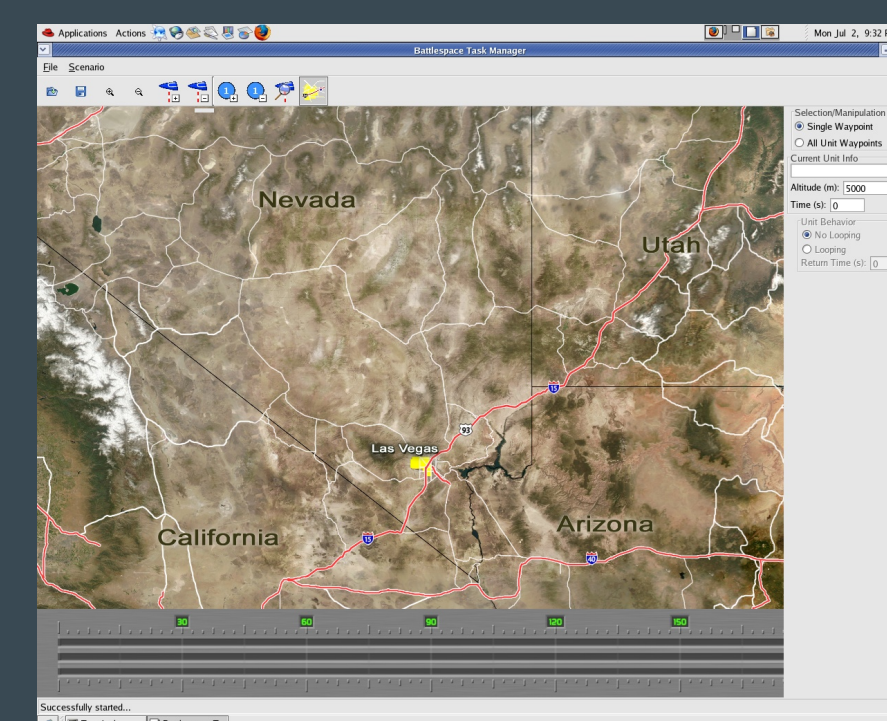
Surveillance missions will be made easier with the ability to define a target area and specify how the UAV will search across the area. (spiral, parallel track, direction, etc.)



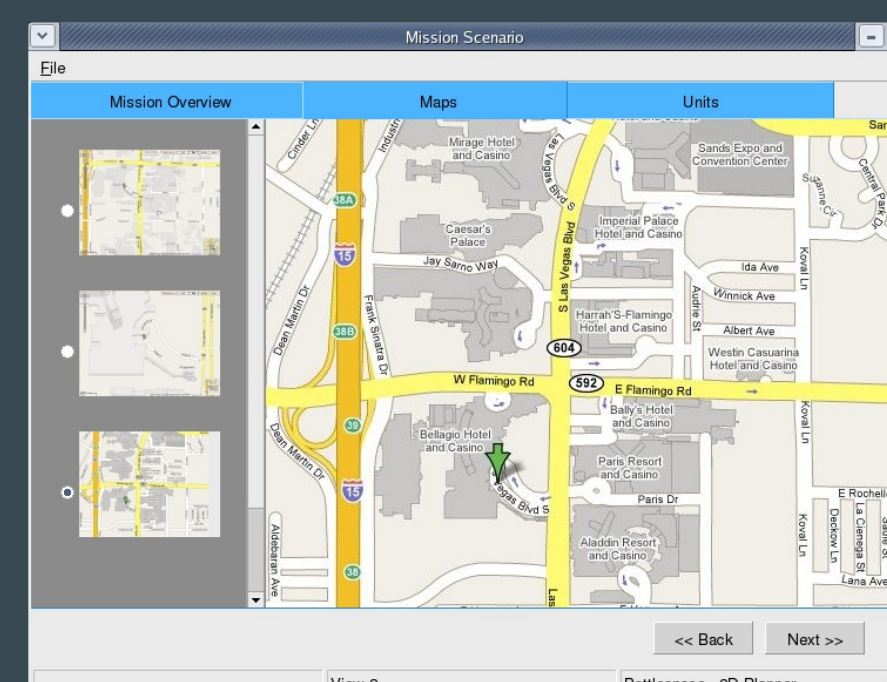
Alerts along the left side of the screen keep the operator informed of what his vehicles are doing.

Our image recognition prototype interface overlays the current video feed, search target, and aircraft vital stats onto the map near the vehicle in question.

## Screenshots



The original *Taskmanager* program, built with C++, OpenGL, and wxWidgets.



The newly added "Mission Scenario" window briefs the operator on what is to be accomplished when using gameplay mode.

## Information Management

Vehicles	Areas & Paths		Log
Callign	Fuel	Playload	Queue
HD-23	527	2xMeas	transit to 'LV Strip' (7:2)
		1xSensor	Mow 'LV Strip' (15:10)
find "man.jpg"			transit to 'Hwy 93' (3:1)
			Follow 'Hwy 93' (85:00)
			new destination:
Predator19	415	1xSensor	transit to 'Hwy East' (5:0)
find "truck.jpg"			transit to 'Hwy East' (25:00)
			new destination:
			(left click)
GH07		Hwy 93 : path	o 'McCarren' (6:0)
		Hwy East : path	o Carren' (37:30)
		Lake Meade : area	o NelsAFB (25:00)
		LV Strip : area	for reful
		McCarren : area	estination:
		C Sector : area	

All vehicles and their relevant status information are organized in this tabbed sidebar. Lists can be sorted by several criteria to keep the most relevant information accessible.

[illegible]

Once defined, navigation areas and paths would be saved in a sortable list for future reuse. Thus saving the operator time when completing future flight operations in the same area.