# Video Aided Navigation for Small UAVs

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**Small Unmanned Aerial Vehicles (UAVs) offer great potential to increase the war fighter's short term situational awareness. Small UAVs are low cost and light weight, offering soldiers the ability to rapidly deploy a dedicated surveillance asset, thereby immediately increasing their tactical advantage over nearby adversaries. While this short look ahead is invaluable in modern tactical environments, the effectiveness of a small UAV is highly dependent on the operator's ability to manage the vehicle's flight path while interpreting the video surveillance data received. In this paper, we will discuss a video tracking approach to reduce operator workload. First, the operator designates a target or location on the ground to track. A video tracker then follows that designation by specifying waypoints and sensor look angles to keep that location in the center of the field of view.**

## I.  Introduction

Small Unmanned Aerial Vehicles (UAVs) offer great potential to increase the warfighter's short term situational awareness. Small UAVs are low cost and light weight, offering soldiers the ability to rapidly deploy a dedicated surveillance asset and thereby immediately increase their tactical advantage over nearby adversaries. For instance, these devices could fly ahead of a convoy checking the route for potential improvised explosive devices (IEDs). While this short look ahead is invaluable in modern tactical environments, the effectiveness of a small UAV is highly dependent on the operator's ability to manage the vehicle's flight path while interpreting the video surveillance data received.

In this paper, we will discuss a video tracking system designed to reduce operator workload. The notional system is shown in Figure 1. The small UAV is launched and achieves flight altitude (several kilometers). The UAV transmits video to the ground station where an operator has manual control of the vehicle. Using the video stream, the operator can search for targets of interest. The video tracker automatically detects moving targets and presents them to the operator on a stabilized mosaic. The operator can then designate a target or location on the ground to
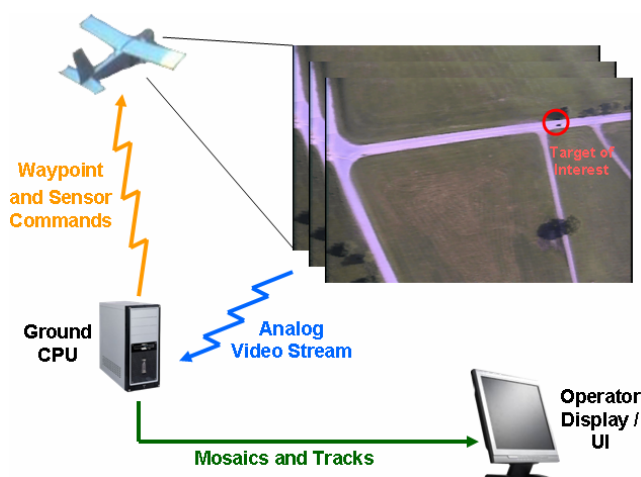


**Figure 1: Notional overview of the video tracking architecture. A user nominates targets of interest, and the video tracker automatically generates platform controls to keep the primary target in the view field.**