Detecting, Localizing and Tracking Wildfires Using an UAS

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The goal of the proposal is to develop a unique human-robot system which would enable generation of comprehensive situational awareness during natural and man-made disasters. Every year, natural and man-made disasters cost approximately $52 billion in US in the form of lives lost, impact on economy, and public and private property damaged. During the period of 2001 - 2010, the US witnessed a total of 596 incidents where presidential disasters were declared. The focus area of this proposal, wildland fires, has caused huge devastations on a very regular basis. Apart from short term socio--economic impacts, large wildland fires have smoke-related health impacts and long-term environmental impacts. Generating situational awareness, which relates to developing current situational picture and future predictions based on information obtained from available sources, becomes an important aspect of disaster management and its mitigation Therefore, unmanned vehicles are prime candidates for tasks involving risk and repetition. The simplified goal of this task is to process images and locate the wild land fire for tracking, reconnaissance, and localization purposes. Therefore the ability to accurately determine the location of a ground-based fire using aerial images would contribute to the success of these tasks. Hence, to low-altitude and low-velocity Might capabilities, UAVs allow significant advantage in solving the problem. The objective of this proposal is to develop image processing algorithms that will allow an Unmanned Aerial Vehicle to generate situational awareness during large wildfires and provide advantages in safety, cost, and ability to gather real-time data. The system, consisting of ground station software and a quadrotor UAV platform with onboard sensing and communication facilities, would allow real-time UAV control, data processing, and visualization. Integrating real-time UAV sensory data into effective fire-predictor software will allow an incident commander to make timely and informed decisions which can optimize the resource allocation process and save fives.

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