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UTM and D-NET: NASA and JAXA's Collaborative Research on Integrating Small UAS with Disaster Response Efforts

Natural disasters, such as flooding, wildfire, hurricane, tornadoes, earthquakes and tsunamis, pose challenges in preserving human life and minimizing the damages to a region. During catastrophic events, timely response of disaster relief personnel, an efficient deployment of resources in the recovery effort, and coordinated information sharing amongst different relief agencies can make a substantial difference in responding to those impacted by the disaster. Many relief activities currently utilize both ground personnel and manned airborne assets during different phases of the disaster response. Typically, multiple organizations support relief activities and this often creates logistics coordination challenges between agencies which can result in wasted time or resources. The Japan Aerospace Exploration Agency (JAXA) has been developing an "Integrated aircraft operation system for disaster relief (D-NET)", which assists collection and sharing of disaster information through the integrated operation of aircraft such as helicopters, aircraft, and satellites, for efficient and safe rescue operations by disaster relief aircraft. Due to the advancement in unmanned aircraft systems (UAS) technologies, public safety organizations have started incorporating small UAS (sUAS) as an asset in their disasters response activities. To address the airspace integration challenges of the influx of sUAS in the United States the National Aeronautics and Space Administration (NASA), under the UAS Traffic Management (UTM) project, has been engaged in research to enable large-scale commercial applications of sUAS operating in low altitude airspace. This paper presents the integration of D-NET, which incorporate sUAS in the planning, information sharing, and operation support of disasters response activities, and UTM, which provides airspace management to enable large scale high density operations. The integration of the DNET and UTM systems enables coordination, data sharing, and airspace management to improve the timeliness of the disaster response, enable relief organization to reduce cost and overhead by using UAS assets and still maintain airspace safety during the relief activities.

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UTM and D-NET: NASA and JAXA's Collaborative Research on Integrating Small UAS with Disaster Response Efforts

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Natural disasters, such as flooding, wildfire, hurricane, tornadoes, earthquakes and tsunamis, pose challenges in preserving human life and minimizing the damages to a region. During catastrophic events, timely response of disaster relief personnel, an efficient deployment of resources in the recovery effort, and coordinated information sharing amongst different relief agencies can make a substantial difference in responding to those impacted by the disaster. Many relief activities currently utilize both ground personnel and manned airborne assets during different phases of the disaster response. Typically, multiple organizations support relief activities and this often creates logistics coordination challenges between agencies which can result in wasted time or resources. The Japan Aerospace Exploration Agency (JAXA) has been developing an "Integrated aircraft operation system for disaster relief (D-NET)", which assists collection and sharing of disaster information through the integrated operation of aircraft such as helicopters, aircraft, and satellites, for efficient and safe rescue operations by disaster relief aircraft. Due to the advancement in unmanned aircraft systems (UAS) technologies, public safety organizations have started incorporating small UAS (sUAS) as an asset in their disasters response activities. To address the airspace integration challenges of the influx of sUAS in the United States the National Aeronautics and Space Administration (NASA), under the UAS Traffic Management (UTM) project, has been engaged in research to enable large-scale commercial applications of sUAS operating in low altitude airspace. This paper presents the integration of D-NET, which incorporate sUAS in the planning, information sharing, and operation support of disasters response activities, and UTM, which provides airspace management to enable large scale high density operations. The integration of the DNET and UTM systems enables coordination, data sharing, and airspace management to improve the timeliness of the disaster response, enable relief organization to reduce cost and overhead by using UAS assets and still maintain airspace safety during the relief activities.

I. Nomenclature

D-NET = Integrated Aircraft Operation System for Disaster Relief
JAXA = Japan Aerospace Exploration Agency
sUAS = Small Unmanned Aircraft System
NASA = National Aeronautics and Space Administration
UAS = Unmanned Aircraft System
UTM = UAS Traffic Management

II. Introduction

The National Aeronautics and Space Administration (NASA) of the United States and the Japan Aerospace Exploration Agency (JAXA) of Japan have embarked on a collaborative research plan to enable the integration

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