

GIS-Based Automatic Flight Planning of Camera-Equipped UAVs for Fire Emergency Response

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Abstract : Emerging technologies such as camera-equipped unmanned aerial vehicles (UAVs) are increasingly being applied in building fire rescue to provide real-time visualization and 3D reconstruction of the entire fireground. However, flight planning of camera-equipped UAVs is usually a manual process, which is not sufficient to fulfill the needs of emergency management. This research proposes a Geographic Information System (GIS)-based approach to automatic flight planning of camera-equipped UAVs for building fire emergency response. In this research, Haversine formula and lawn mowing patterns are employed to automate flight planning based on geometrical and spatial information from GIS. The resulting flight mission satisfies the requirements of 3D reconstruction purposes of the fireground, in consideration of flight execution safety and visibility of camera frames. The proposed approach is implemented within a GIS environment through an application programming interface. A case study is used to demonstrate the effectiveness of the proposed approach. The result shows that flight mission can be generated in a timely manner for application to fire emergency response.

Keywords : GIS, camera-equipped UAVs, automatic flight planning, fire emergency response

Conference Title : ICIC 2020 : International Conference on Infrastructure and Construction

Conference Location : Montreal, Canada

Conference Dates : June 17-18, 2020