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Understanding Evidence Dispersal Caused by the Effects of Using Unmanned Aerial Vehicles in Active Indoor Crime Scenes

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Abstract : Unmanned aerial vehicles (UAV's) are making a profound effect within policing, forensic and fire service procedures worldwide. These intelligent devices have already proven useful in photographing and recording large-scale outdoor and indoor sites using orthomosaic and three-dimensional (3D) modelling techniques, for the purpose of capturing and recording sites during and post-incident. UAV's are becoming an established tool as they are extending the reach of the photographer and offering new perspectives without the expense and restrictions of deploying full-scale aircraft. 3D reconstruction quality is directly linked to the resolution of captured images; therefore, close proximity flights are required for more detailed models. As technology advances deployment of UAVs in confined spaces is becoming more common. With this in mind, this study investigates the effects of UAV operation within active crimes scenes with regard to the dispersal of particulate evidence. To date, there has been little consideration given to the potential effects of using UAV's within active crime scenes aside from a legislation point of view. Although potentially the technology can reduce the likelihood of contamination by replacing some of the roles of investigating practitioners. There is the risk of evidence dispersal caused by the effect of the strong airflow beneath the UAV, from the downwash of the propellers. The initial results of this study are therefore presented to determine the height of least effect at which to fly, and the commercial propeller type to choose to generate the smallest amount of disturbance from the dataset tested. In this study, a range of commercially available 4-inch propellers were chosen as a starting point due to the common availability and their small size makes them well suited for operation within confined spaces. To perform the testing, a rig was configured to support a single motor and propeller powered with a standalone mains power supply and controlled via a microcontroller. This was to mimic a complete throttle cycle and control the device to ensure repeatability. By removing the variances of battery packs and complex UAV structures to allow for a more robust setup. Therefore, the only changing factors were the propeller and operating height. The results were calculated via computer vision analysis of the recorded dispersal of the sample particles placed below the arm-mounted propeller. The aim of this initial study is to give practitioners an insight into the technology to use when operating within confined spaces as well as recognizing some of the issues caused by UAV's within active crime scenes.

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