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## UAV SYSTEMS FOR DOCUMENTATION OF CULTURAL HERITAGE

Unmanned Aerial Vehicles (UAVs) equipped with a digital camera have become one of the most promising surveying techniques in last years. UAV platforms are used as measuring systems for various mapping and monitoring applications providing a low-cost alternative to the classical manned aerial photogrammetry especially while aiming at large scale mapping for areas of limited extent. Their capability of data acquisition with high resolution allows texture mapping on DSM (Digital Surface Model), 3D models and orthophotos. It is also possible to create mosaics, maps and drawings which can be used for image interpretation.

These data can be applied to several applications including 3D documentation of cultural heritage. This research discusses the potentials of UAVs in order to analyze, interpret and manage data collected from Ad Diriyah, one of the most important historical cities in KSA. The ruins of the old city of Ad Diriyah lay on either side of the narrow valley known as Wadi Hanifa, which continues southwards through Riyadh and beyond. Consisting almost entirely of mud-brick structures. The digital documentation of the site is important for monitoring, preserving, managing as well as 3D BIM modeling, and for virtual reality applications.



Old ruins in Ad Diriyah historical city

For this project, UAV systems provided as part of cooperation with the FalconViz, a Saudi registered company focused on 3D surveying and mapping by Unmanned Aerial Systems (UAS) with autonomous integration of planes, copters and 3D software solutions.



Hexacopter



Quadcopter



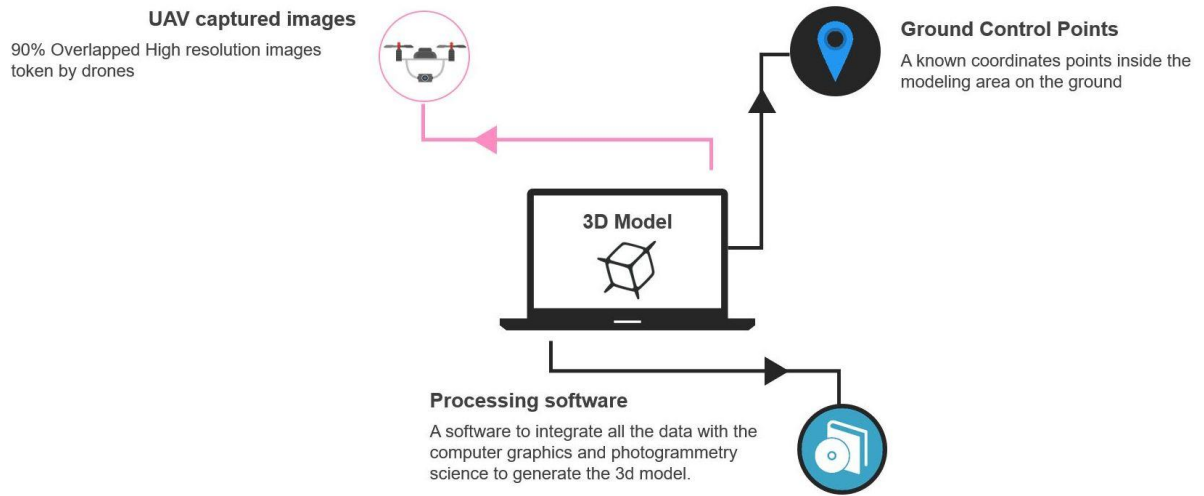
Heavy Lifting



Fixed Wing

FalconViz Drone System

The research will present the procedure of processing UAV data in order to create digital surface models and photo-realistic outputs of Ad Diriyah historical site.



Procedure of processing UAV data



Dense 3D point cloud of Ad Diriyah using UAV images