Integrated Vehicle Health Management and Unmanned Aviation

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ABSTRACT

Over the past decade the use of unmanned aerial systems (UAS) has increased in military, intelligence, and surveillance operations for dull, dirty and dangerous (DDD) missions. They have primarily been used at a time of war, and been pushed into service by programmes designed increase the capabilities of military organisations, with little thought of supportability or interaction with other air users. The increased use of UAS in war time and the ensuing media coverage has naturally led proposed use of UAS in a civilian context, being used for a wide range of non-military DDD missions: from land usage and crop monitoring; to the monitoring of nuclear power plants; to inspection of power lines.

But when considering the use of UAS this civilian context brings up important issues, such as: How can UAS be integrated into civil unsegregated airspace, and how will they react to other air traffic (manned and unmanned)? How can UAS be shown to be safe to get general public, especial with an increased level of autonomy? What technologies are needed to ensure the safe use of UAS? Is using a UAS more economical than using the manned equivalent? The list goes on.

Steps have already been taken to answer these issues, in the United Kingdom the Civil Aviation Authority (CAA) have produced guidance (CAP 722) for manufactures and operators of UAS, to allow them to build and operate UAS whilst developing a framework to fully integrate them into the civil airspace. In addition the CAA is working closely with industry-led consortium ASTRAEA (Autonomous Systems Technology Related Airborne Evaluation & Assessment) to help solve the issues of using UAS in civil airspace, and with the United States Federal Aviation Administration (FAA) having been set a 2015 deadline for full integration, hastening the need for solutions to be found.

The poster will take a holistic systems engineering view of the current situation in unmanned aviation and where Integrated Vehicle Health Management (IVHM) might be used (in whole or in part) to solve some of the issues mentioned above.

It will present reasons why you may wish to include IVHM in a UAS (e.g. cost, size, safety), the potential benefits (e.g. increased availability, reduced maintenance costs) and pitfalls (e.g. false positives) of implementing an IVHM on a UAS. It will also map how the IVHM (system of interest) interacts with the rest of the UAS (wider system of interest), how it relates to the issues the aviation industry have with UAS (environment) and the general public (wider environment).