Development of a Two-Tier Unmanned Air System for the MoD Grand Challenge

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Abstract

The Grand Challenge, an MoD competition designed to stimulate innovative solutions to the problem of autonomous threat detection in the urban environment, saw the development of a number of multi-platform systems with varying degrees of autonomy. The winning system, SATURN, employed a two-tier UAS in addition to an Unmanned Ground Vehicle.

This paper provides an overview of the challenge set down by the MoD, describes the architecture of the SATURN system devised in response to this challenge, and details how the two-tier UAS was developed to support the winning architecture. The appraisal includes a description of how requirements mapped to finished platforms, how rapid prototyping techniques were used to shorten the development cycle, and how safety considerations fed into the design at all stages of development. Challenges and their solutions are presented, and lessons learned are discussed, particularly in the context of autonomous threat detection from the air.

Biography

Ken Wahren is an engineer at Blue Bear Systems Research, heavily involved in the design and development of mini-UAVs.

Ian Cowling joined Blue Bear Systems Research Ltd in 2007 after completing his PhD at Cranfield University where he researched optimal guidance and control for a quadrotor UAV.

Dr Phill Smith is CEO of Blue Bear Systems Research Ltd.

Dr Yoge Patel is Managing Director at BBSR with experience in flight control and guidance for UAVs, MAVs and combat aircraft.

Dr Toby P. Breckon (BSc PhD AIS ARPS MIET) is lecturer in computer vision and image processing at the School of Engineering, Cranfield University. His research interests lie within the area of applied computer vision techniques for deployment in hazardous and dynamic environments.