

Autonomous UAV flight in the windy urban environment

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ABSTRACT

This paper considers the likely airflow through a typical urban environment and discusses the consequences of this flow on the guidance, navigation and control of a small UAV. Computational Fluid Dynamics modelling is carried out for the atmospheric flow around the simplified geometry of the Twinwoods Business Park. Seven equations Reynolds Stress Model (RSM) is used to resolve this turbulent flow for a range of predominant wind conditions and wind speeds obtained from the Met Office observations. This paper summarises the findings from this work and discusses how this information can be fed into a guidance, navigation and control (GNC) solution to increase flight persistence of a UAV, which is operating in either an automated or an autonomous mode.

BIOGRAPHY

Ian Cowling is a Senior Scientist at Blue Bear Systems Research with experience in guidance, navigation and control for UAVs and MAVs.

Shrikant Dudhe completed his MSc at Cranfield University in 2008 under the supervision of Evgeniy Shapiro.

Evgeniy Shapiro is a lecturer in the Fluid Mechanics & Computational Science (FMaCS) Group within the Department of Aerospace Sciences at Cranfield University.

Simon Willcox is a Principal Engineer at BBSR with experience in the design of miniaturised hardware for UAVs and MAVs, guidance, navigation and control and, software.

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