

Challenges, opportunities and developments on fault diagnosis and fault-tolerant control with applications to unmanned aerial vehicles

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In Unmanned Aerial Vehicles (UAVs)/Unmanned Aircraft Systems (UASs) are gaining more and more attention during the last few years due to their important contributions and cost-effective applications in several tasks such as surveillance, sense, search, rescue, geographic studies, military and security applications. On the other hand, health management, fault diagnosis, and fault-tolerant control of manned aerial vehicles have a long history since the initial research on self-repairing flight control systems in US Air Force and NASA begun in mid-1980s. However, due to safety concern of manned aerial vehicles to the pilot, experimental tests and further practical research and development have been limited. Benefited from the recent and significant advance and development of UAVs, development and application of *autonomous, fault-tolerant*, as well as *cooperative* control techniques have been emerged and developed quickly in recent years, since UAVs provide a cheap and operative experimental test bed for development, implementation, testing and validation of the newly developed *autonomous, fault-tolerant*, as well as *cooperative* guidance, navigation and control techniques.

In this talk, a brief review on the development of fault diagnosis and fault-tolerant control techniques in the manned aircraft systems will be presented firstly, then the challenges and opportunities on autonomy and fault-tolerant control of unmanned aircraft systems will be given secondly, and finally the latest developments and current research work in this active research and development area with applications to autonomous fixed-wing and rotary-wing UAVs will be introduced.

Biography

Youmin Zhang is an Associate Professor in the Department of Mechanical and Industrial Engineering at Concordia University, Canada. He has published 4 books, over 250 journal and conference papers. His comprehensive review paper published at Annual Reviews in Control on "Bibliographical Review on Reconfigurable Fault-tolerant Control Systems" has gained significant impact in the field worldwide. The paper has been ranked No. 1 in the "Most Cited Articles" published in the journal. He is a senior member of AIAA and IEEE, a member of the IFAC Technical Committee (TC) on Fault Detection, Supervision and Safety for Technical Processes, the AIAA InfoTech Aerospace Program Committee (PC) on Unmanned Systems, the IEEE Robotics and Automation Society TC on Aerial Robotics and Unmanned Aerial Vehicles, and the ASME/IEEE TC on Mechatronics and Embedded Systems and Applications (MESA). He is an Editorial Board Member and/or (Associate) Editor of 7 international journals (including the three new journals on unmanned systems) and IPC member of many international conferences.

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