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## Development of fully autonomous unmanned aerial systems

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In this talk, we aim to report some advanced unmanned aerial systems (UAS) developed in the Department of Electrical and Computer Engineering, National University of Singapore. Attention is particularly paid to UAS, which is capable of navigating through in cluttered indoor and outdoor GPS-denied environments, such as hostile buildings, sewer tunnels, radiation contaminated areas and inside forests. Topics under studied include dynamic modeling of an unmanned helicopter, advanced flight control system design, multi-sensory data fusion, real-time simultaneous localization and mapping, and dynamic path planning in unknown environments. We will also take this opportunity to highlight some techniques that we have recently developed for the 2017 International Micro Air Vehicles (IMAV) competition, which was held in Toulouse, France, September 18–21, 2017. The IMAV competition is a yearly event that aims at fostering key technologies for the development of micro-air vehicles. It provides an arena for research groups around the world to showcase their research achievements and to test their results in real environments. Besides the unmanned aerial systems capable of navigating fully autonomously in GPS-denied environments, we have also managed to achieve sophisticated cooperative control and task management of multiple unmanned aerial vehicles for heavy duty missions. Other topics on the development of unconventional hybrid aircraft, which has the capability of taking off and landing vertically and transiting to a fixed-wing mode for fast cruise flight will also be showcased in the talk.

## Biography

Ben M Chen is currently a Professor and Provost's Chair in the Department of Electrical and Computer Engineering, National University of Singapore. He is also serving as the Director of NUS ECE Control, Intelligent Systems and Robotics Area and Head of Control Science Group, NUS Temasek Laboratories. His current research interests are in unmanned systems, robust control, control applications and financial market modeling. He is an IEEE Fellow and has published more than 400 journal and conference articles and a dozen research monographs. He has served on the Editorial Boards of several international journals including IEEE Transactions on Automatic Control, Systems & Control Letters and Automatica. He currently serves as an Editor-in-Chief of Unmanned Systems. He has received a number of research awards nationally and internationally.

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