

TRACK 2: UAV
“DRONE DETECTION TRAJECTORY TRACKING BY COORDINATED IMAGED-BASED DYNAMIC 3D LOCALIZATIONS”

BY

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ABSTRACT

This paper describes the concept of 3 dimensional (3D) dynamic localization and trajectory tracking of the moving object by means of two or more monocular cameras. It is aimed for MBZIRC. The concept of this 3D dynamic localization and trajectory tracking is to combine the optical flow and 3D triangulation together.

First, we do optical flow of the static background to track the motion of the capturing cameras from the camera frame. The background velocity which is indeed from stationary scene will in turn give the velocity moving cameras in the global (inertial) frame. The additional 3D triangulation gives the information of the new camera position (x, y, z) and heading pose (ϕ, θ, ψ) . The moving object to be tracked can be identified either by using computer vision tool, e.g. blob detection or deep learning method (Convolutional Neural Network). The velocity of the tracked object in camera frame can be done by optical flow. Thereafter, the velocity of the tracked object in global frame can be obtained by simple subtraction of the camera velocity. Assume the camera frame rate is known, the 3D trajectory of the tracked object can also be obtained from integration.

The advantage of this camera-based 3D dynamic localization and trajectory tracking method is its ability to be deployed anywhere with minimal calibration and setup. Also, the observing cameras could also be moving (dynamic). Therefore, it is more flexible to use, especially in outdoor and dynamic situations.

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BIOGRAPHY OF SPEAKER


Dr Sutthiphong ‘Spot’ Srigrarom recently joined the Temasek Laboratories, National University of Singapore. Prior to NUS, he was an Associate Professor, Aerospace Systems, and Program Director Aerospace Engineering, University of Glasgow Singapore in partnership with Singapore Institute of Technology (UGS-SIT). His research work is mainly on unmanned vehicles platform and related systems. He has more than 40 publications on UAV-related topics. He was the chair of International Conference in Intelligent Unmanned Systems (ICIUS) in 2012. He has several UAV works in his lab ranging from flapping wings, tiltrotors, amphibious, multirotors, etc. His work is sponsored by HDB, LTA, PUB and several private sectors in Singapore and Thailand. He has supervised and co-supervised 4 PhD, 2 Master and more than 100 Bachelor degree students, since 2012. He and his students have been participating in several UAV design and competitions, and have won several accolades in both Singapore and Thailand.