Abstract

UAV Visual and Laser Sensors Fusion for Detection and Positioning in Industrial Applications [†]

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Recent developments in micro-electro-mechanical systems (MEMS) have greatly contributed to the availability of unmanned aerial vehicles (UAVs) and sensing technologies. The increasing maturity of these technologies has led to the development of novel real-world applications in industrial scenarios. Though historically, industry has been slow to adopt newer technologies, UAV-related technologies have produced interest in outdoor-based industries, especially for inspection and supervisory tasks in dangerous or inaccessible environments. One of the most common challenges is the detection, recognition and positioning of pipes in industrial environments, as this problem must be solved in several tasks where pose between the UAV and the pipe is required. Both vision and laser range finder (LRF)-based approaches present weaknesses and strengths: monocular vision cannot solve depth estimation in real-time, and it is weak against visual artifacts and disruptions, while LRFs present a slow rate and errors that are hard to reduce. In this work, the authors describe a sensor fusion architecture which enables the provision of real-time detection and positioning of a UAV with respect to industrial pipes, with the accuracy and rate of a vision-based system and the robustness of LRF sensors.