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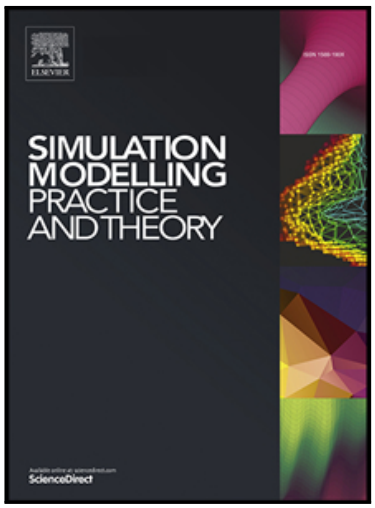

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ArduSim: Accurate and real-time multicopter simulation

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Abstract

As the popularity and the number of Unmanned Aerial Vehicles (UAVs) increases, new protocols are needed to coordinate UAVs when flying autonomously, and to avoid that these UAVs collide with each other. Directly testing such novel protocols on real UAVs is a complex procedure that requires investing much time, money and research effort. Hence, it becomes necessary to have the possibility to first test different solutions using simulation. Unfortunately, existing tools present significant limitations: some of them only simulate accurately the flight behavior of one UAV, while some other simulators can manage several UAVs simultaneously, but not in real-time, thus loosing accuracy regarding the mobility pattern of the UAV. In this work we address such problem by introducing ArduSim, a novel simulator that allows controlling in **soft real-time** the flight and communications of multiple UAVs, being the developed protocols directly portable to real devices. The contributions of this work include: (i) the ArduSim simulation platform, which allows realistic simulation and control of multiple UAVs simultaneously, offering functionalities not provided by existing alternatives; (ii) a model for the WiFi communications link between UAVs, based on real experiments, and that is integrated into ArduSim itself; and (iii)

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