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SPECIAL ISSUE ON:

Innovative radar detection, tracking and classification for small UAVs as an emerging class of targets

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Small Unmanned Aerial Vehicles (UAVs) are an emerging class of targets in our skies due to their proliferation in recent years, both supporting new capabilities and economic activities (inspections, professional filming, monitoring, delivery, search and rescue) and potentially enabling accidental or deliberate misuses (privacy violation, collision hazard, hostile reconnaissance, smuggling, weaponised UAVs). It should be noted that here we look at the many models of quadcopters, hexacopters, octocopters and fixed wing models of UAVs used by individuals and companies, rather than the much larger platforms available to state actors and armed forces.

There is considerable ongoing research on establishing the most suitable sensing technologies to monitor small UAVs, especially to prevent dangerous activities around sensitive assets such as airports, prisons, and events with large crowds. Radar can play an important role, thanks to its long-range and all-weather, days and night monitoring capabilities. However, significant challenges exist given the small size, low RCS, and high manoeuvrability of small UAVs, so that conventional radar techniques developed for detecting, tracking, and classifying larger aircraft and targets will not be suitable.

The aim of this Special Issue is to gather in a focused issue the latest research results from leading experts in this emerging area of radar systems and signal processing techniques for monitoring small UAVs.

Topics of interest include, but are not limited to:

- Detection algorithms for small UAVs and drones
- Characterisation of the RCS of small UAVs under different conditions (materials, shapes, radar frequency, and so on)
- Tracking algorithms for small UAVs
- Classification algorithms to distinguish different models of small UAVs
- Classification of small UAVs vs. false targets, e.g. large birds
- Application of artificial intelligence such as neural networks or reinforcement learning for classification and tracking of small UAVs
- Identification of payloads carried by small UAVs and possible inference of intent (friends vs. for classification)
- Passive radar techniques applied for surveillance of small UAVs as targets
- Fusion of information from radar sensors with electro-optics and acoustic sensors for surveillance of small UAVs
- Radar characteristics of swarms of small UAVs

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