
Smart cities concept

In the near future, more than two-thirds of the world's population is expected to be living in cities and hence, with the aim of being proactive and finding innovative and sustainable solutions, governments have made smart cities one of their priority areas of research.

Smart cities can be viewed as sustainable, inclusive and prosperous greener cities that promote a human-centric approach, fostering enabling smart information and communication technologies such as internet of things, cloud computing and big data and utilizing smart devices capable of sensing and communicating, such as unmanned aerial vehicles, to facilitate mobility, governance, utility and energy management. As unmanned aerial vehicles critically depend on sensors, antennas, and embedded software, they have quickly found their way into internet of things as smart ICT devices and their applications rapidly expanded beyond the military to more commercial ones ranging from photography/videography to disaster management, mapping, delivery, construction sites, and industrial plant inspection and other more demanding applications that require UAVs to operate in heterogeneous swarms in a shared low altitude airspace over populated areas.

However, as the number of these interconnected smart ICT devices continues to grow exponentially and as sensing, actuation, communication, and control become increasingly more sophisticated with the complexity of applications of UAVs, we are faced with a set of fundamental challenges in their regulation and management as such systems generate, process, and exchange large amounts of data, some of which is security-critical and privacy-sensitive data, which makes them attractive targets for attacks.

This, in turn, stresses the need for establishing globally harmonized regulations and internationally agreed-upon technical standards to keep up and govern the rapid technological advancements as well as ensure a fair and competitive economy without interfering with individuals' right to privacy.

One of the main obstructing barriers hindering the realization of such complex applications in smart cities is the lack of a resilient, scalable localization and tracking system that allows the interoperability and integration of UAV swarms in low altitude airspace.

In this context, we study the fundamental technical requirements and functions of a localization and tracking system and explore its relationship to and importance in:

1. addressing privacy and data protection concerns that could arise from UAV monitoring

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and surveillance applications;

2. collision avoidance and conflict resolution in highly populated residential areas;
3. optimizing path planning, flight scheduling and utilizing shared airspace;(transition)
analyzing the current standardization efforts for each of the three aspects in order to identify and prioritize future research questions with the aim of making a contribution towards narrowing the gap between research and technical standardization.

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