

Applications of networked micro-drones

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Micro-drones are already being put to use in a large number of areas: These small aircraft face extensive requirements when performing aerial observation tasks or when deployed in the field of disaster management. A newly developed concept summarizes these challenges.

"Today, micro-drones are already equipped with sensors such as cameras, which allow [data collection](#) for a specific area", Torsten Andre (Institute of Networked and Embedded Systems) explains. This is particularly useful in the event of a disaster, for example, when rescue teams need to be supplied with images of the affected area.

In such cases, it is common to deploy a number of micro-drones. This requires communication at several levels: Between the individual micro-drones (air-to-air), between the base station on the ground and the drone (ground-to-air), as well as between the drone and the [base station](#) (air-to-ground). In collaboration with other scientists, Torsten Andre has been working on developing a summary of the communication requirements that result from a network of this kind.

Andre describes the process: "We assign the requirements to separate [building blocks](#)." For this, the researchers draw upon their own knowledge as well as on previously conducted experiments. The underlying assumption is that this innovative form of system representation will prove helpful in specifying and implementing a range of application requirements.

The requirements can be represented in four building blocks: Firstly,

there is the "control" of the system by the user or by a coordinating centre, although this becomes less significant, the more autonomously the drones act. Secondly, aided e.g. by cameras, the system is required to "perceive" its environment. The results can take the form of images, videos or measurement data. Thirdly, the drones should independently work in mutual coordination, i.e. collaborate and prevent potential collisions. The fourth block is concerned with "connecting" the information between two separate points. In summary, the aim is to produce a system that can accomplish joint missions without requiring any human intervention.

Andre and his colleagues point out that further research and development effort is required in all of these areas, in order to ensure the ongoing improvement of the adaptation, heterogeneity, reliability and quality of micro-drone networks.

More information: Andre, T.; Hummel, K.; Schoellig, A.; Yanmaz, E.; Asadpour, M.; Bettstetter, C.; Grippa, P.; Hellwagner, H.; Sand, S. & Zhang, S.. Application-Driven. Design of Aerial Communication Networks. *IEEE Communications Magazine*, 52(5), 129-137.

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