Flight control and navigation for scalable and arbitrarily dimensioned UAVs and manned multicopters

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The developed flight control package (algorithms, libraries and hardware) developed by the authors can be used for the navigation and control of multicopter UAVs (see fig. 1) and manned multicopters (see fig. 2). The multicopters are scalable in respect to their purpose of use and their

- Size
- Payloads
- Sensors equipment

Possible scenarios are:

- 3D mapping and geosensing
- Film industry
- Search and rescue of people
- Agriculture UAV
- Facility management and monitoring UAV
- Wild-life protection
- Transport UAV
- Fire-Fighting air vehicles
- ABC sensing UAV for emergency event
- Environment-friendly and silent air taxis

Making use of further developments of the NAVKA R&D team, the UAV and manned aircrafts are equipped with automatic starting and landing. Further sensors carried by UAVs (cameras, laser scanners, radar and others) can be geo-referenced by using the navigation state-vector of the navigation. The mathematical model and concept of the navigation algorithms are open for the integration of further sensors, so indoor flights; flights in tunnels etc. can also be enabled.

Fig.1. UAV with 18 Propellers and a total weight of 25 kg; hard- and software developed at the HSKA

Fig.2. Volocopter VC200 by the e-volo GmbH (www.e-volo.com)

The main advantage of the developed flight control is the redundant sensor configuration, both for the navigation (mainly GNSS and MEMS sensors) and for control the configuration. The availability of the navigation state is essential for a safe flight control. Therefore the sensors are treated in the mathematical model, algorithms and software as being distributed in a redundant configuration on the aircraft; see [1] and [2].

References

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