Unmanned Aerial Vehicles (UAVs)

Contribution in the discussion

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The definition of UAV as presented in the FAI Sporting Code Section 12 appears to have well captured the UAV's essence of being through the combination of :

1. "without human on-board"
2. "designed for scientific research, commercial, governmental or military purposes", i.e. for purposes different from that of aero-models (entertainment and sport)

One might observe that the definition is not "measurable", as the purpose for which UAV are designed is arguable: any flying object can be sold as a "technological demonstrator" (scientific research). For instance a glider aero-model provided with an advanced boundary-layer suction system can be considered a tool for scientific research, but has nothing of the essence of a UAV.

It would be more substantial, easier to be evaluated and less arguable, to "link" the belonging to the "U " class to the presence on board of a "payload" that provides any kind of "useful" function by interacting with the environment. The level of interaction with the environment (perception) can be the discriminating issue for the UAVs.

As far as the weight classes are concerned a new one (or better two) should be added: from 0.05 to 0.5 Kg. and from 0.5 to 5 Kg. (Nano- and Micro- UAV). These two groups are the emerging classes. The lighter UAV are the only ones capable of flying indoors, and it is for them penalizing to be associated in the same class as those weighing "up to 5 Kg". In addition, for the smaller sizes, certain technical aspects become very significant (e.g. Reynolds No., structures stability, wave length (see compatibility with antennas minimum size etc.)

To deal with the subject of possible segregation and of cohabitation with sport aviation (collision avoidance) one might envisage the principle of "more or less heavy than a chicken". For those UAV lighter than a chicken one might apply the concept that "a bird can fly without any airworthiness certificate". If the mass of the UAV were comparable to that of a bird , there would not be reasons to penalize it , as the other aircraft are designed to survive a possible impact. (A further reason for differentiating the micro and nano UAV from others).

SC 12 Chapter 3 – Records

The records defined in the SC 12 mainly certify "muscular" performance (speed, height, distance), forgetting the true essence of UAV (see point 2 in the FAI definition of UAV: the purpose for which they are built). (It is like for a 100m runner to break a record for the most coloured track suit - a parameter that does not belong to a sphere characterizing for the runner, as the speed for a UAV).
Then what to do ?
There are a number of performances that could be the subject of records , e.g.: to identify xx objects of type yy in a minimum time, localize them with the highest precision.
One could consider the UAVs as a sub-class (the flying one) of Robots. In this case there are a number of international competitions for robots (including team competitions like soccer).

One such competition is the Robocup Rescue (http://ww.isd.mel.nist.gov/RoboCup2003/) which defines a standard for a disaster scenario , which robots must enter for localizing injured people. Something similar might be developed for flying robots. A too complicated task ?

In addition, still maintaining the present "muscular kind of performance", rotary wings and flapping wings UAV (a very rapidly growing family !) are not differentiated from fixed wing .

Segregation

This subject is of course the most critical one, as demonstrated by the huge effort dedicated by a number of international aeronautical bodies (e.g. FAA, ICAO, EASA etc.).
Until the overall reliability levels of UAV will reach values comparable with that of "manned" aircraft, that is probably for several decades, the only solution seems to be segregation.
At present, segregation appears to be applied, to a large extent, to small UAV's. A further reason for defining sub-classes for nano- and micro-UAVs, the first that will likely explode in a large scale, just because easily subject to be segregated.

Conclusions

Micro and Nano-UAVs are exploding in popularity throughout the world, also because they are economically affordable by universities, where the brilliant fantasy of the young students can largely contribute to their rapid growth. Interesting kinds of competitions , based on their capability to perform "intelligent" tasks can be easily organized, also very appealing for the public.
FAI should keep an open eye on this phenomenon, contributing to its development by defining proper subclasses below 5 Kg. (Micro and Nano-UAV).
The idea to add different kinds of performance for records, not necessarily those "muscular" (speed, height, distance) , should be considered, more in line with the FAI definition of UAV, that focuses on the purpose they are designed, different from just flying.