

Reviewer 1 of IFAC WC 2014 submission 2048

The results are not convincing enough please improve your paper the details see in the reviews.

Reviewer 2 of IFAC WC 2014 submission 2048

Comments to the author  
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The paper is written well but needs figures that will be readable in print form. In most cases some of the details are not large enough to make out. Some terminology should be clarified for the reader, such as sink polar.

The paper assembles various techniques and data that could be used to evaluate collaboration between multiple sail planes in soaring. Most of the techniques are existing in the literature, such as the Kalman filtering of the data, the nature of the thermal convection, and the capabilities of the batteries. It appears that batteries are actually tested with solar panels in a stationary experiment. The remainder of the work is in simulation using a simulation package called Condor. The behavior of the aircraft and the environment it encounters are provided by Condor, which is a well tested and accepted to represent these entities reasonably. Some matters are not explained, such as what is electric power doing. Is it powering the glider some time or is it only running the electronics? The necessity of combining the photovoltaic and the convective energy sources is touted but the interaction between the two is not explained, if there is interaction at all.

Some of the references given are dated, such as the reference on electronics packaging, dated 1995. The last 20 years has produced many changes.

Unfortunately the conclusions are not presented as to the feasibility of indefinite flight, apparently because the work has not completed to that extent. As the authors state at the beginning, the paper is a review but also presents some new ways of using the reviewed items.

Reviewer 3 of IFAC WC 2014 submission 2048

Comments to the author  
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The paper presents the initial development of convective thermal and solar energy harvesting capability integrated onboard of multiple cooperative gliders. The discussion details the key technologies required to integrate the energy harvesting into a cooperative mission

planning and execution environment.

The paper reads well and is interesting, but has some drawbacks that should be corrected to make it more readable

A) it is too long and details too many aspects of the overall system making it confused : the electric energy management subsystem (sec. 2.1) can be omitted or considerably shortened since I think these details are not necessary in a conference paper

B) Some parts of sec. 2.1 are rather obscure for readers that do not have a knowledge of the glider dynamics and guidance; e.g., what is the sink rate polar? Along the same lines, the results presented in Fig. 5 shall be better explained

C) Section 3 is titled “Cooperative algorithms” but it mainly describes the Bayesian mapping of the thermals; the cooperative algorithm is very simple ... all the glider go where the updraft has been detected; so I suggest to shorten this section

D) The simulation environment, on the contrary, gives a very concise presentation of the results; this section should be enlarged.

One minor comment: the authors refer the figures in the text as “Figure.n”, where n is the figure number. Please omit the dot and put a space in its place.

Reviewer 8 of IFAC WC 2014 submission 2048

Comments to the author

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The paper proposes a multiple cooperative glider system which utilises convective thermal and solar energy harvesting. It discusses the key technologies which is required to integrate the energy harvesting into a cooperative mission planning and execution environment. The discussed key technologies includes the characteristics of the electrical (PV solar and batteries) management system, detection of convective thermal center, and the collaborative sensing.

The results of the section 2.1 (the characteristics of the electrical PV solar and battery system) are easily predictable. It merely confirm these properties by the experiments.

The updraft detection in the section 2.2 and the guidance control to thermal center in the section 2.3 are interesting, but not new.

The cooperative algorithm which searches the thermal center

with multiple glider (main result) is new and useful, but the approach is conventional.

Reviewer 11 of IFAC WC 2014 submission 2048

Comments to the author

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The work reported in the paper is quite cutting edge however it appears that the work is still in its early stages thus the paper does not provide concrete results. I do think however that the paper will be greatly improved if it provided more literature review as a survey of existing methods so as to give context to the approach which is proposed