MARS EXPLORATION USING BIOMORPHIC FLYERS

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MARS imagery obtained by the Mariner, Viking and Pathfinder
Missions suggests existence of abundant liquid water (considered
essential for life as we know it) but it is not clear what went wrong
with the Martian climate to have turned it to the desert that it is
today. Getting to know closely and understand our sister planet
MARS is crucial to learn lessons for preserving and nurturing
humanity by avoiding a similar fate for Earth. This apart, of
course fundamental scientific curiosity, the lure of mining the
many resources on MARS, finding extant or extinct life and
perhaps someday establishing a human colony on MARS are other
clear motivators. Flight offers a means for covering large spans,
several hundred kilometers quickly to provide a close-up birds eye
view of the planetary terrain. Exploration that can just be dreamed
of today could be a reality if we could engineer a way to fly on
MARS and navigate through hard terrain to image/study sites of
interest. MARS offers a real challenge to conventional flight, due
to several reasons. Its rare atmosphere about a hundredth that on
Earth; lack of magnetic compassing for navigation, the limited
telemetric or navigational infrastructure yet in place, are all
challenges for successful flight on MARS. We are using the
principles found in successful, nature-tested, bioinspired
navigation mechanisms for example, to implement such specific
functions that are hard to accomplish by conventional methods on
MARS. We will describe a few example specific sites on MARS
whose exploration requires imperatively the ability of covering
several 100 kilometers and will illustrate how autonomous
biomorphic flyers can enable terrain following and imaging of
such new sites rich in science information.