Aerial Reconnaissance

Drone mapping complex landscapes in high fidelity

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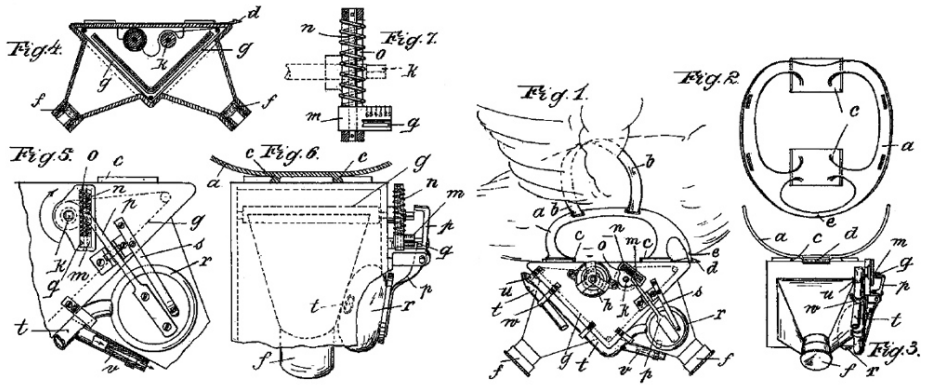
https://frameworks.ced.berkeley.edu/2017/aerial-reconnaissance/



The first drones: taxidermied exhibit and patent extracts of Julius Neubronner's 1908 pigeon camera (source: 2007. Des Pigeons Photographes? Musée suisse de l'appareil photographique Vevey)

In the early twentieth century, the amateur inventor Julius Neubronner designed a miniature camera and harness to be carried aloft by homing pigeons. Equipped with a timing mechanism and a mind of its own, each 'pigeon-cam' offered a single unpredictably framed image of the urban landscape. Although they literally captured the historically sought-after 'bird's-eye view', the age of mechanized aerial reconnaissance soon overtook Neubronner's pigeons. At the apex of this skyward progression, imaging satellites came to reveal large-scale patterns in the landscape that remained imperceptible from lower altitudes.

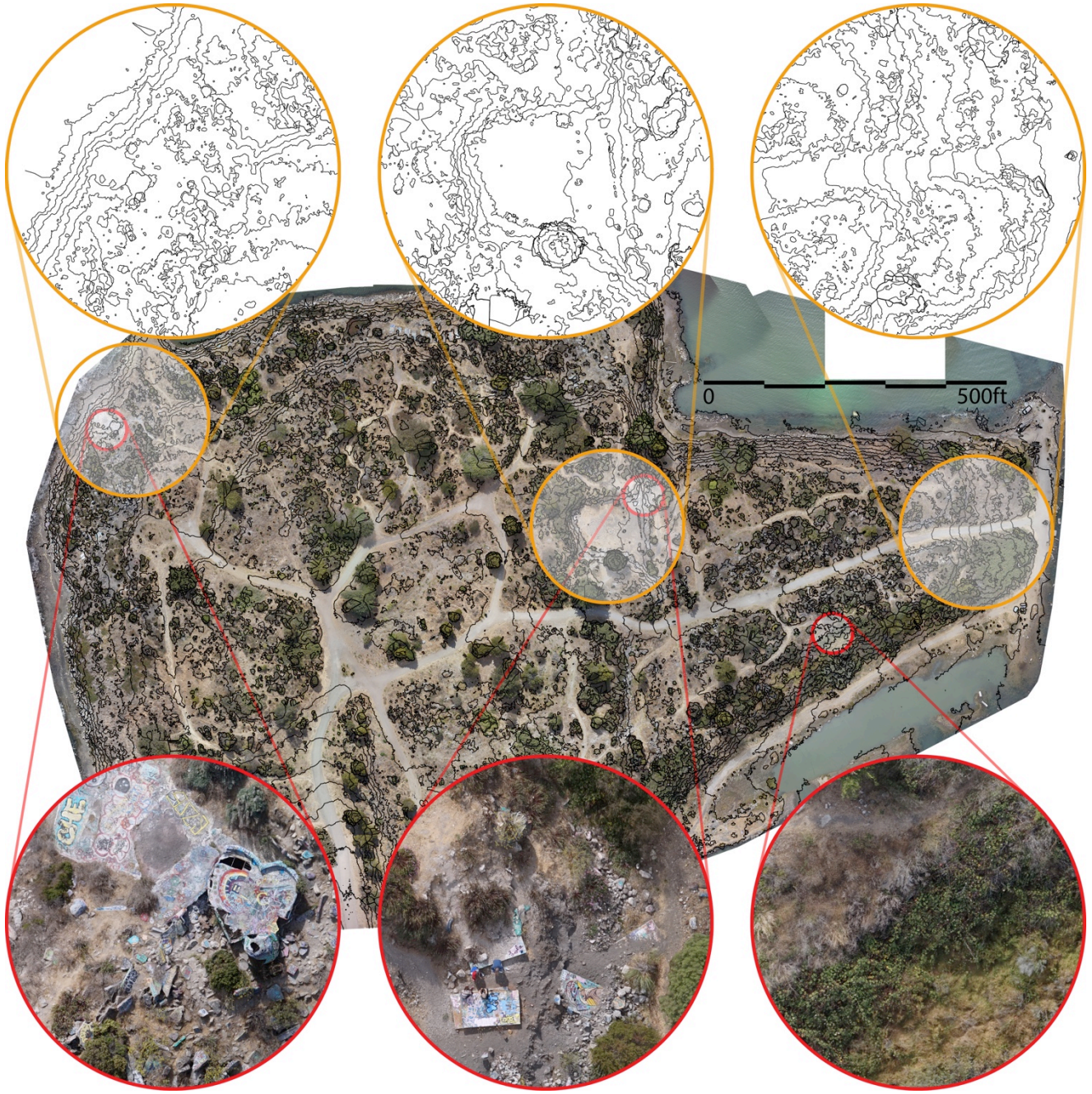
Satellite imagery proved instrumental for the discipline of landscape architecture, enabling us to see cities as complex ecological systems instead of just collections of buildings. But the satellite's perspective has also proven limiting, with the nuances and details that enrich the experience of landscape remaining camouflaged from orbit 400 miles above Earth. What's more, landscape architecture has become overly reliant on the convenience of online satellite-derived mapping applications, often at the expense of the long-held tradition of on-site fieldwork.

But this is starting to change. A century after Neubronner's invention, drones are now capable of undertaking aerial imaging at the close-in scale that camera-pigeons briefly captured. Equipped with automated piloting technology, the latest generation of consumer drones can be pre-programmed to systematically photograph landscapes of up to about 100 acres. Using sophisticated photogrammetry software, these images are composited into three-dimensional topographic models and detailed contour elevation maps. Compared to the fidelity of Google Earth and GIS maps, the results are proving to be astounding. For the first time in cartographic history, the landscape can be quickly

mapped down to a level of clarity comparable to the world, as we perceive from on the ground.

As one aspect of my broader research on landscape representation and mapping, we are using drones to map complex post-industrial wastelands and other culturally appropriated landscapes. Although often suggestive of fertile alternatives to traditionally designed public space, these types of landscapes have tended to remain invisible to satellite imagery and conventional survey techniques. The difficulty in capturing the qualities of such sites has contributed to their lessons remaining peripheral to established discussion regarding public space. But with drones now able to capture the nuances of these sites in high fidelity, advocating for the retaining or amplifying of these qualities becomes far more feasible.

With such detail now at our fingertips, we face the question of how to actually design with this information. Do drones deliver an information overload, whereby landscape architects become transfixed by site-mapping fidelity that surpasses the fidelity at which they are able to conceptualize form? My initial observations from coordinating a graduate design studio focusing on the Albany Bulb landfill site near the UC Berkeley campus suggest otherwise. Compared with earlier iterations of the



High fidelity drone mapping: imagery and contours of the Albany Bulb landfill site on San Francisco Bay, California (2016 © Karl Kullmann and 3DRobotics)

studio project, where students only had access to off-the-shelf satellite imagery and GIS data, design proposals that utilized drone mapping became noticeably more specific in their engagement with the complex qualities of the site.

My experience with drones in research and teaching has delivered another unexpected outcome. While we may think of new technologies as progressively insulating us from the outside world, drone mapping actually draws us out into the landscape. This could change in the future, but for the time being drone technology and regulations compel us to leave the climate-controlled convenience of the studio and head out to into the landscape that we wish to map. With our feet firmly planted on the site, the act of launching the drone upward from the ground literally reverses the downward zoom of satellite imagery. I anticipate that landscape architecture will be enriched by this return to the field from which it became progressively insulated in digital age.

Our systematic mapping of complex landscapes in high fidelity is only part of the drone story. As a social art, landscape architecture also has a vested interest in the cultural implications of the drone's near-ground perspective. Just as individuals turned camera phones back onto big brother and eventually back onto themselves, the use of drones used as appliances of personal vanity is likely to outstrip the use of drones as cartographic instruments. Whether we agree with it or not, drones are destined to become personal mirrors in the sky, enabling the public to see themselves positioned within the surrounding landscape. Landscape architecture has a vested interest in how this circumstantially imaged landscape is utilized and interpreted.

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