

The Future of Urban Airmobility Barriers and Prospects

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10 Questions

Ten questions concerning the use of drones in urban environments

Watkins S, Burry J, Mohamed A, Marino M  , Prudden S, Fisher A, Kloet N, Jakobi T, Clothier R

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<https://doi.org/10.1016/j.buildenv.2019.106458>

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Highlights

- Drones, considered by some as “the most disruptive technology in human history”, are increasingly being used in urban environments. The opportunities afforded by drones, including package delivery and ability to place sensors in hitherto inaccessible locations, are reviewed.

The Importance of Environment

Agricultural Environment



No clutter, no GPS, magnetometer or noise issues, no casualties,
cheaper, safer and less problems than helicopters

Agricultural Environment



No clutter, no GPS, magnetometer or noise issues, no casualties,
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Environmental Challenges in Cities

The Importance of Environment



Unregulated, Cluttered, Inexpensive



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Regulated, Uncluttered, Expensive



Opportunities Potential Savings in \$ and Time

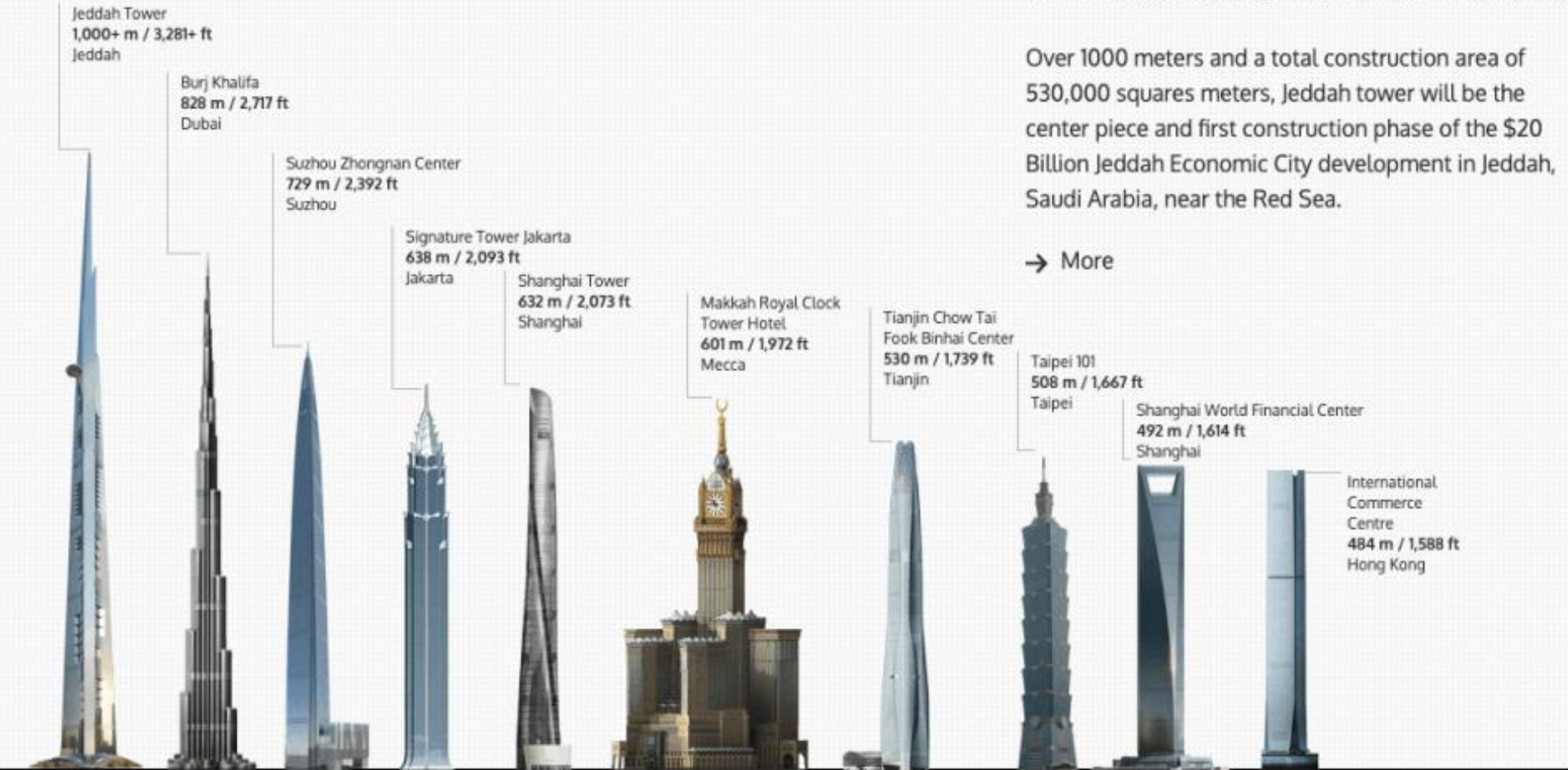


The Importance of Environment

THE WORLD'S TALLEST TOWER

Over 1000 meters and a total construction area of 530,000 squares meters, Jeddah tower will be the center piece and first construction phase of the \$20 Billion Jeddah Economic City development in Jeddah, Saudi Arabia, near the Red Sea.

→ More

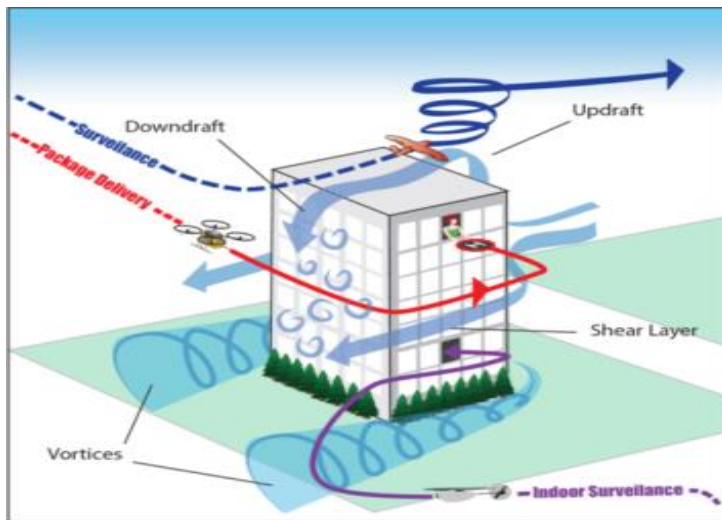


“By 2030 there will be 1.4 billion urban dwellers, so with city space at a premium, the only way may be up” “magnetic levitation lifts”

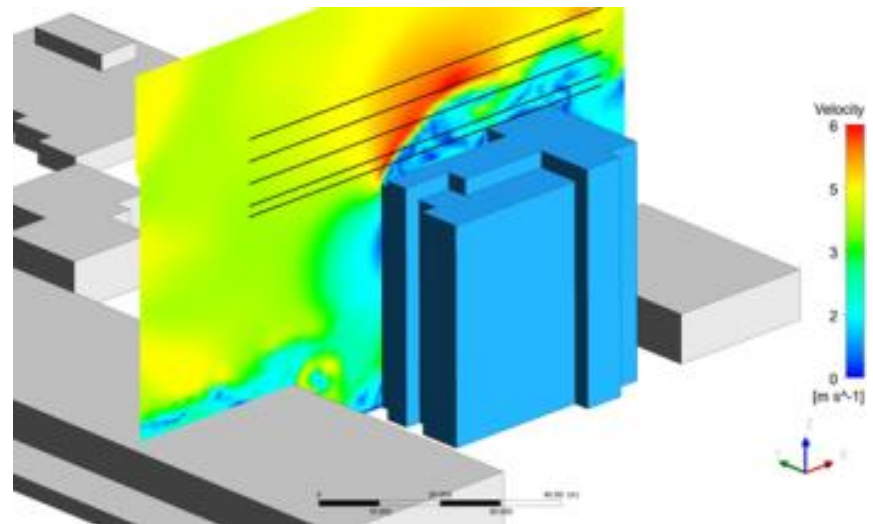
Numerical Flow Simulation

Simulating the complex flow-field in urban environments for energy harvesting applications

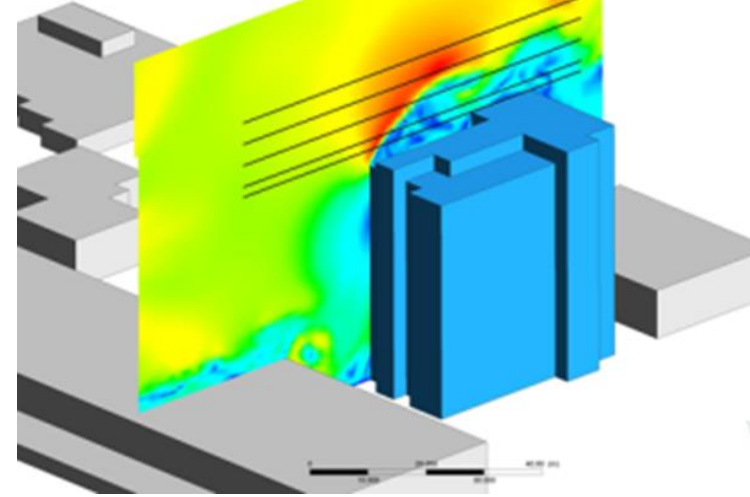
Potential Flight Paths



Snapshot of Flow from CFD



Flying Above Building



20 km/h wind



50 km/h wind



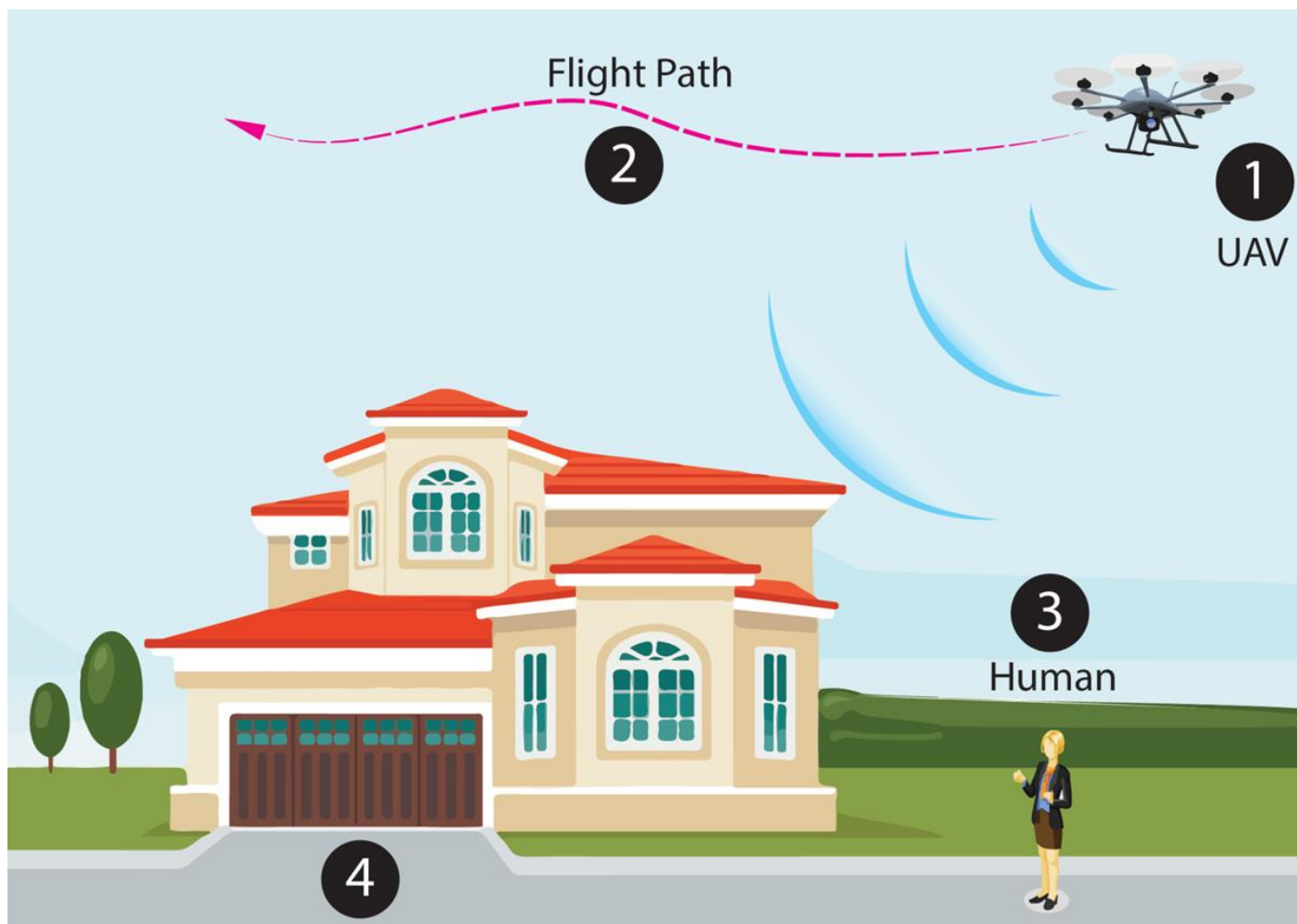
The Importance of Environment



Marley Likes Pizza



Aircraft Acoustic Impact



1. **Sound source (UAS)**

3. **Sound receiver (people)**

2. **Flight path planning**

4. **Propagation medium**

Regulated and Technically Successful BUT.....



Project Wing (Google's parent company) trialling drone delivery of pizzas, gelato, burritos, chocolate and coffee in the fringes of Canberra. Australia's aviation watchdog CASA had signed off on the scheme.

Noise and Context

Noise complaints were common among approximately 150 submissions to the ACT parliamentary committee reviewing Wing's Canberra trial earlier this year.

One contribution said "no-one can fully appreciate their obnoxiousness unless they have experienced them".

Another claimed the flights even woke them from sleep.

"The drones were ... accompanied by varying profoundly irritating sounds, such as high-pitched screaming, screeching, buzzing, whining, zooming".

Takeaways



Observations/thoughts

Environments varies widely and has big implications:

- Agriculture uses drones extensively
- Suburban environments have some area which are suitable, but wind, clutter and “noise” are challenging
- Acceptance and integration are challenges in cities
- Potential for deliveries in new high-rise cities
- Noise and context is very important

Part two: Research in biomimetics and noise

Observations/thoughts

Greatest challenge to the widespread use of drones is their acceptance and integration by broader society. [5] explores public acceptance.

Earning a “public license” for drone use involves addressing an array of psychological, social, economic, political, environmental and legal issues.

The relative significance varies greatly from country to country. In democratic societies, it is the greater public sentiment towards a technology that will ultimately determine the governance of the sector.

Whilst concern over safety is a key issue, other issues such as noise and visual pollution, privacy, technology misuse, and other societal impacts (e.g., potential job losses) are emerging as key factors determining public sentiment towards drone use in urbanised environments.

Summarised from Rao, B, Gopi, AG & Maione, R 2016, ‘The societal impact of commercial drones’, *Technology in Society*, vol. 45, pp. 83-90 and

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