NRI: FND: Investigating the Safety Challenges of Co-drones in Future Construction Workplaces
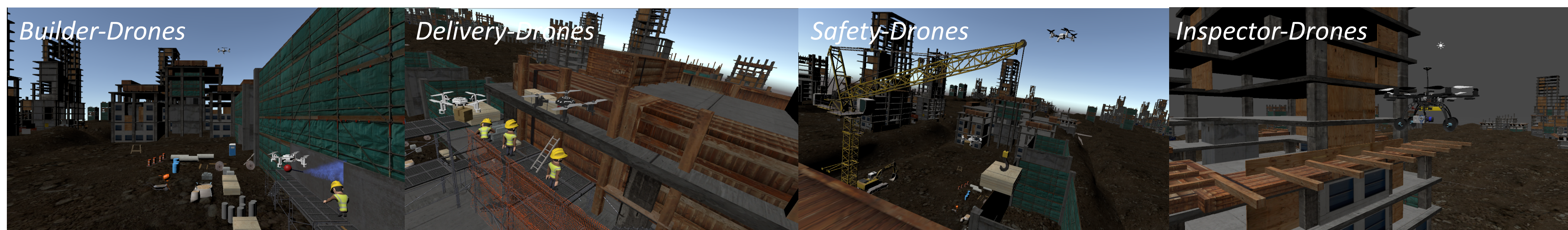
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What is the **Problem**?

- Construction is one of the most dangerous and least productive industries.
- In the past two decades, more than 28,000 U.S. construction workers have died at work. According to the U.S. Department of Labor, 971 construction workers were killed and over 200,000 injured in the US in 2017, accounting for 20.7% of workplace fatalities for all industries (Bureau of Labor Statistics 2017).
- The integration of drones in the construction jobsites raises novel occupational safety and health issues which, might make construction industry more dangerous than before.

Research Steps

1. Identify and evaluate the physical risks associated with the operation of drones in construction sites under different operating conditions.
2. Empirically evaluate the effects of drones on workers' attentional allocation and physical balance control performance in construction sites.
3. Empirically evaluate the psychological impacts of drones on construction workers.

Builder-Drones | Delivery-Drones | Safety-Drones | Inspector-Drones

Scientific Impact

- This project is the first effort to study the safety risks and challenges of human workers, working with or around co-drones on the construction sites.
- Our project will expand and extend our knowledge of societal impacts, and specifically the safety challenges of collaborative drones at the human-robot frontier using construction domain as one of the most dangerous industries that is experiencing a tremendous increase in the deployment of drones
- The proposed work will advance our knowledge about human and co-drone team interactions by revealing different means through which UAVs can affect workers' safety through a specific focus on fatal and non-fatal physical risks, the attentional costs, and the psychological impacts.
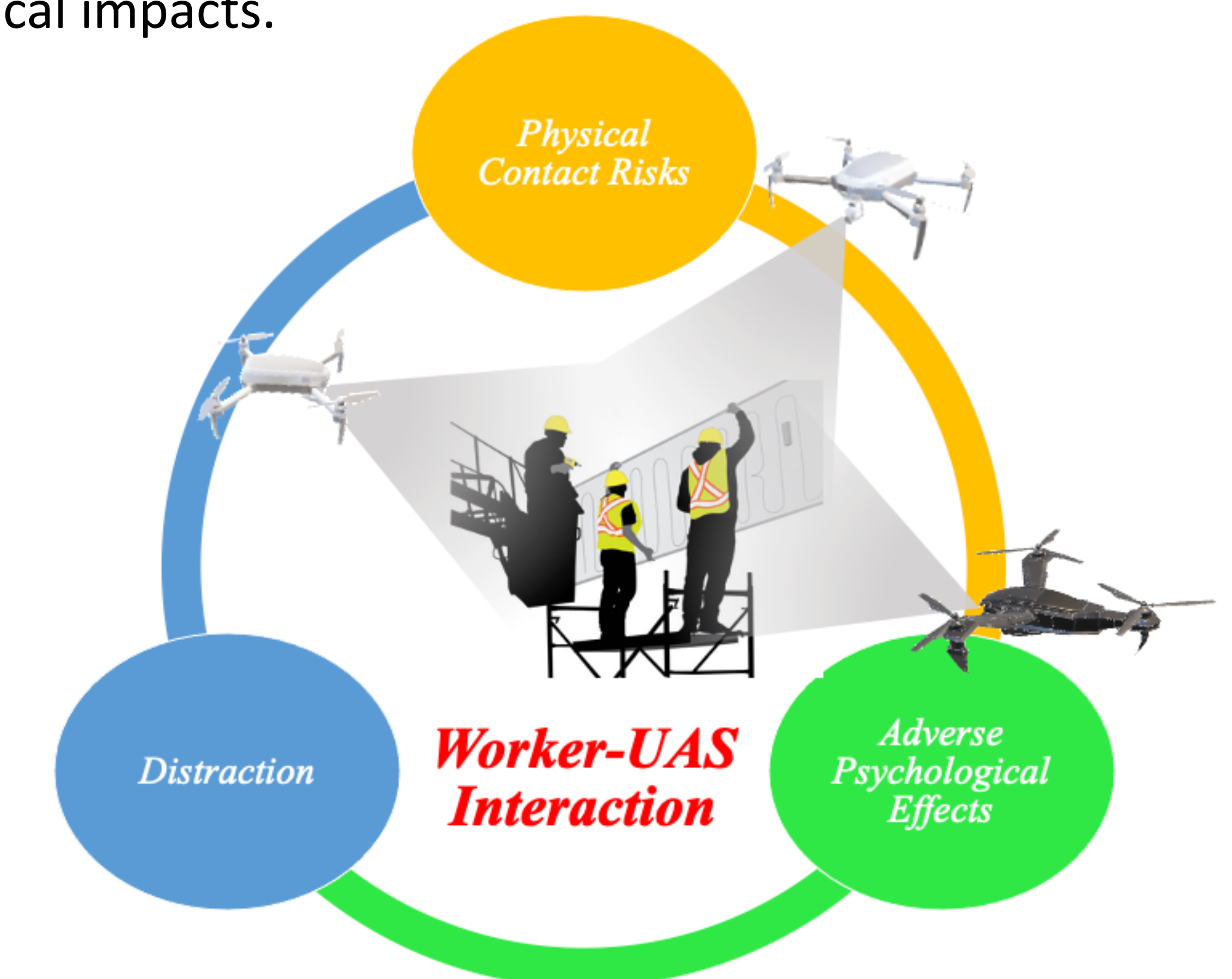

Broader Impact *(Science)*

- With the intent of understanding health and safety implications of construction crew collaboratively working with co-drones on the construction jobsites, this proposal will elicit fundamental knowledge in terms of human natural behavior that could be applicable to any drone populated work context

Broader Impact *(Integration of Research and Education)*

- In connection with this project, educational and outreach efforts are envisioned to be integrated into several courses, workshops, webinars, and outreach activities, conducted by the PIs
- This project will also provide the opportunity of project-based learning for undergraduate and graduate students as a part of worker safety and co-drone course module

Broader Impact *(Minority and Under-Representative Participation)*

- The PIs and their teams will participate in concentrated efforts to reach underrepresented groups and low-income students to further improve inclusion of all in STEM programs. Selected examples:
  - ACE (Architecture Construction Engineering) Mentor Program
  - UF CROP (College Reach Out Program)