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An Insect-Inspired Automatically Foldable Quadcopter

An insect-inspired quadcopter with automated folding/deployment and dual air/ground mobility enables efficient, low-energy exploration of disaster sites and restricted spaces, including areas of nuclear leakage.

Earthquakes and nuclear leaks can lead to massive amounts of damage to areas exposed to the disasters. Immediate action and exploration are vital to saving lives and minimizing commercial losses. Risk of rescue, however, is high, and human rescuers can lose their lives attempting to rescue victims. Therefore, robotic technologies have been incorporated into the rescue field, quadcopters being the primary method of choice, especially for Disaster Exploration and Evaluation (DEE). The drones, or UAVs, take photos and videos and relay them to rescuers for them to make decisions accordingly and save precious time and reduce risks. However, due to their size, quadcopters often have difficulty accessing narrow spaces created from disasters (collapsed walls or pipelines, collapsed buildings, etc.). There is need for a method of accessing hard-to-reach areas after disasters.

Researchers at Purdue University have developed an insect-inspired quadcopter for DEE. The insect-like quadcopter has two modes of mobility, namely, flying and walking. In addition, this technology is automatically foldable and deployable; it can fold and deploy its frame/propellers, much like an insect does with its wings. By integrating the folding frame and ground vehicle abilities, the quadcopter can explore and evaluate high areas and restricted spaces, doing so with fewer energy costs. The versatility of the device allows it to explore areas of nuclear leakage quickly and eliminate the danger and uncertainty of an individual approaching the spillage. No existing technologies can accomplish these capabilities up to date.

Advantages:

-Automatically foldable/deployable

-Land/air mobility

Technology ID

2017-DIAO-67925

Category

Aerospace & Defense/Autonomous Systems (UAVs & AVs)
Robotics & Automation/Autonomous Systems & Perception AI
GreenTech/Environmental Remediation & Pollution Control

Authors

Xiumin Diao
Jin Hu

Further information

Parag Vasekar
psvasekar@prf.org

View online

Potential Applications:

-Disaster exploration and evaluation

-Nuclear device detection

TRL: 3

Intellectual Property:

Provisional-Patent, 2018-05-28, United States | Utility Patent, 2019-05-24, United States

Keywords: insect-inspired quadcopter, foldable UAV, ground and air mobility, Disaster Exploration and Evaluation, DEE, robotic rescue technology, nuclear leak exploration, restricted space access, folding frame drone, dual-mode mobility