

Dragonfleye - Ultraminiature Cybernetic Insect Control Using Optogenetics

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Abstract

Research in ultraminiature cybernetic insect control using optogenetics has been recently undertaken at Draper Labs in Cambridge. Potential applications of the technologies underpinning DRAGONFLeye include guided pollination, payload delivery, reconnaissance, and even precision medicine and diagnostics. The smallest robotic aerial drones mimic insects in many ways, but none can match the efficiency and maneuverability of the dragonfly. The project challenges range from lightweight electronics packaging to optogenetic hardware techniques. In order to create guidable and controllable insects, the team is combining miniaturized navigation, synthetic biology and neurotechnology. The system is realized as a miniature electronics backpack worn by the dragonfly. One of the main features of this new capability is the development of a navigation system that can provide the position of the insect at all times without the use of heavy, bulky, or power-hungry hardware. In this talk, we discuss the project and show our current advancements demonstrated by the team in microelectronics integration to produce one of the world's smallest navigation systems.