Bio-mimetic optical sensor for real-time measurement of aircraft wing deflection

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Abstract

The project objective is to design, build, and demonstrate a prototype bio-mimetic (inspired by biology) sensor based on the common house fly eye for detecting aircraft wing deflection in real-time. The sensor makes use of a revolutionary optical sensor design resulting in significantly improved motion detection capabilities when compared with conventional optical sensors. The simple analog architecture allows for real-time target tracking. Current approaches to measuring wing deflection utilize strain measurement devices, accelerometers, or GPS solutions. While fiber optic based strain sensors are showing promise when compared with conventional strain sensors, significant issues related to calibrating measured strain with resulting deflections still remain. Existing optical sensor solutions are hindered by high computation costs, limiting their use in real-time applications. The proposed sensor would be a lightweight, low power alternative that could operate in real-time at high bandwidths.