

Optical Sensing Instrument for Quantitative Estimation of Physical Variables of Flying Animals: Case Study in Senegal

In this work, a fixed-platform of two-optical telescope system for real-time detection and characterizing of flying animals is used. The detection system is based on the elastic backscattering of sunlight. The optical setup consists of two receiving telescopes fitted with three types of sensors: a high-speed camera, a charge-coupled device spectrometer and four silicon quadrant photodiode detectors. When an insect passes through the device's field of view, the sunlight it reflects produces a time-varying signal which is recorded by these sensors. Analysis of the signal provides quantitative estimates of three characteristics of the insect: its scattering spectrum, its wing-beat frequency, and its scattering cross-section. This passive remote sensing technique appears practical for monitoring, detecting and characterizing insects in their natural habitats with minimal disturbance.