MINLU: a complete suite for autonomous monitoring of light pollution from drones

MINLU sensor suite has been designed to measure the luminous intensity of polluting sources and their spectral power density with a wavelength resolution which allows to identify the different lamp technology used in street lighting.
Thanks to its low mass and limited envelope MINLU can operate over a dedicated area from drones or balloons, achieving a spatial resolution better than 0.1 meter and allowing monitoring of time evolution of the luminosity for many hours.
The suite is completely autonomous: the imaging subsystem, which includes three cameras with dedicated filters and a spectrometer, is controlled by a Central Data Management Unit comprising all electronic boards for sensor conditioning, data acquisition, compression and storage. Telemetry stream including under sampled acquired images, position and attitude information is transmitted on ground through a Zigbee system while high resolution images are stored on on-board memory. Power is provided by rechargeable lithium batteries allowing continuous operation up to 4 hours.
Calibration activity of suite is currently ongoing in Illumination and Photometry laboratory , while test fights with drone will be conducted in March 2019.

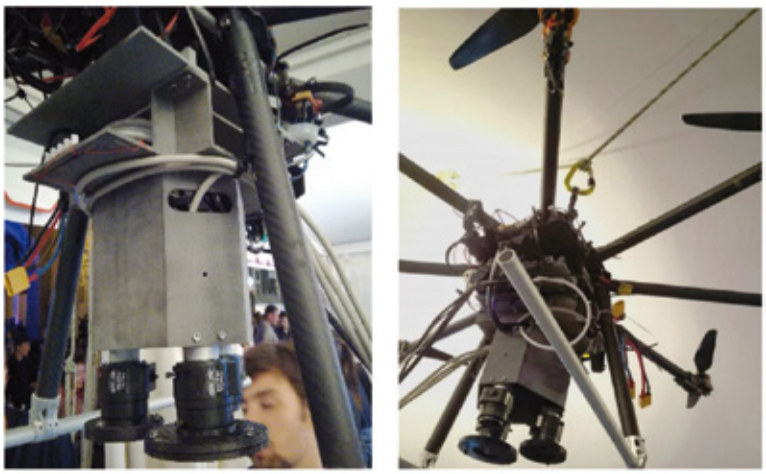

Figure 1. MINLU suite installed on octocopter drone

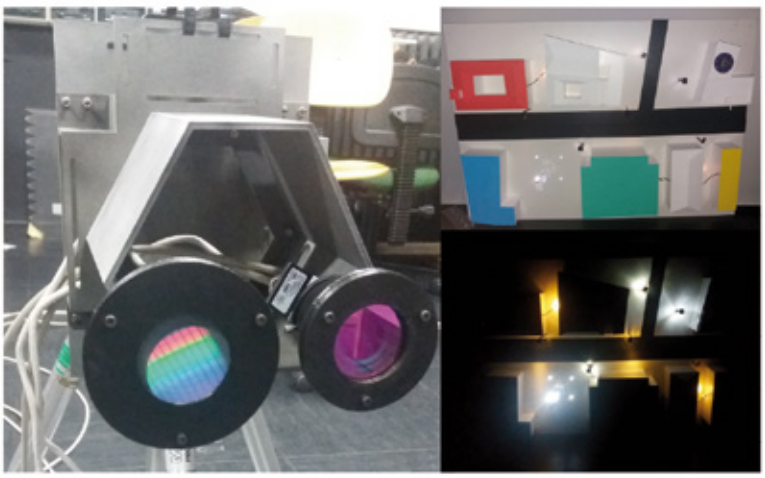

Figure 2. Calibration activity in Illumination and Photometry laboratory

Research topic:
Electrical systems engineering

DII research group

Space flight dynamics
Illumination & Photometry

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Main research topics:

- light pollution
- artificial lighting & urban monitoring
- remote sensing
- photometry & spectral analysis