Contribution ID: **82** Type: **Invited Talk**

Object detection by wide-field multi-camera optical systems followed by their tracking through narrow-field devices mounted on turrets

Friday, November 8, 2024 12:00 PM (20 minutes)

The paper is devoted to the development and research of hardware-software complex, computing methods and software for detecting missiles and UAVs using optical systems mounted on stationary platforms and support-rotating devices. The computational methods and software developed are designed to address the detection and tracking of target movement (trajectories) through optical systems, with an emphasis on adapting these methods to meet the evolving requirements of observation. The developed solutions enable the creation of an efficient multi-client network for detecting and monitoring various types of aircraft, including the ability to target them using laser systems mounted on support-rotating devices.
The development and research are based on computational methods from the CoLiTec and Lemur software, which has been implemented in the USA, Ukraine, Poland, Slovakia, Thailand, Argentina, and Kazakhstan. This software has facilitated the automated discovery of over 1,600 asteroids and 4 comets and is currently used for the automatic tracking of Earth's artificial satellites.
During the course of the work, several computational methods and software were developed and upgraded, including: transmission of images and streaming video; compensation for optical image distortion; identification of object types (circles/streaks) in frames; generation of typical forms in images when the form cannot be analytically determined; object detection using a matched filter (correlator) based on a non-analytically defined form; estimation of object position and brightness (fitting) with unknown shapes that cannot be analytically specified; detection of high-speed objects with unknown trajectories across a series of frames; and accumulation of image energy along unknown trajectories.
Methods and tools for generating and displaying the results of high-speed target detection, as well as methods and tools required for integration with automated support-rotating devices, were also developed.

Type of presence

Presence at Taras Shevchenko National University

Primary authors: Dr CHAIKOVSKYI, Andrii (Ternopil Ivan Puluj National Technical University); Dr MELENEVSKY, Dmytro (Taras Shevchenko National University of Kyiv); Dr BATURYNSKYI, Myroslav (Ivan Kozhedub National University of the Air Force); Prof. SAVANEVYCH, Vadym (Kharkiv National University of Radio Electronics); Mr VLASENKO, Volodymyr (State Space Agency of Ukraine)

Presenter: Prof. SAVANEVYCH, Vadym (Kharkiv National University of Radio Electronics)

Session Classification: Advanced Optical Systems: From Design to Construction