Innosuisse Project 48603.1 IP-ENG:
Reliable Wildlife Camera Trap
Based on 3D Time-of-Flight Technology

Project Summary (Public)

An innovative wildlife camera trap system based on 3D time-of-flight and complementary sensor technology has been developed. It allows researchers, conservationists and professional photographers/filmmakers to remotely monitor and photograph wildlife in a uniquely reliable, user-friendly and autonomous way.

A low-power 3D time-of-flight (ToF) sensor module with short wake-up time has been developed in order to provide high camera trap resolution. Power efficiency is achieved by a combination of a very-low-power passive infrared (PIR) sensor with the high-resolution 3D ToF sensor, which provides both high sensitivity and a low overall false triggering rate at the same time. As a core element of the camera trap's detection reliability, an advanced algorithm for reliable animal detection (lower figure) has been developed based on a sophisticated signal processing scheme. A complete modular framework has been produced for efficient algorithm development and automated algorithm testing. The fully automatic and cross-linked camera trap system with automated photo camera triggering has adaptive behaviour and allows efficient operation. The integration of a user-friendly and power-efficient wireless flash connection into the system has been demonstrated. A proof of concept for daylight-independent animal classification based on 3D ToF data and machine learning has been successfully provided for sample datasets with 10 animal classes.

The realized wildlife camera trap prototypes (upper figure) have been successfully validated in field tests in Switzerland, Norway, Kenya, Namibia, and Brazil. The present wildlife camera trap system and its technology deliver an unprecedented level of reliability and application performance at affordable costs and complexity.