TEAX gets the most out of thermal video from FLIR's Tau2 thermal imaging camera core.

ThermalCapture from TEAX Technology allows storing raw thermal video data on a standard USB stick directly onboard the UAV.

Unmanned Aerial Vehicles (UAV) have found their way into a wide array of applications, including law enforcement, firefighting, security work, surveillance monitoring and aerial thermography. And although the popularity of this technology is still increasing, obtaining high-quality video images from a UAV can sometimes be problematic due to bad video transmission. For German embedded systems specialist TeAx Technology however, this does not need to be a problem. Thanks to their ThermalCapture hardware and FLIR's Tau2 thermal core, thermal video can simply be stored onboard the UAV and viewed and post-processed afterwards.

TeAx Technology UG (www.teax-tec.de) was founded in February 2013 by Markus Ax and Stefan Thamke. The two founders were active during many years of research at the University of Siegen in various projects in the field of outdoor robotics. Both of them also gained extensive experience in the area of controlling UAVs over IP networks and the coordination of UAV swarms under real conditions.

"We had already experimented with thermal cameras on UAVs, more specifically with the FLIR Tau2," comments Stefan Thamke from TeAx. "However, we noticed that many times, video transmission from the UAV to the ground was not always 100 percent successful. Weather disturbances or other atmospheric disturbances can degrade the digital data image. You can see that when an image has stripes or missing links. We thought it would be a good idea to have local digital data storage on the UAV in addition to the video transmission. This way, the video does not lose quality because of the transmission and the raw material can be used for post-processing. There was no real compact and lightweight storage solution available


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on the market to do that. That's why we decided to build it."

Capture thermal video and store locally
ThermalCapture is a custom designed hardware solution that allows the user to store RAW data directly on a USB memory stick, together with additional information.
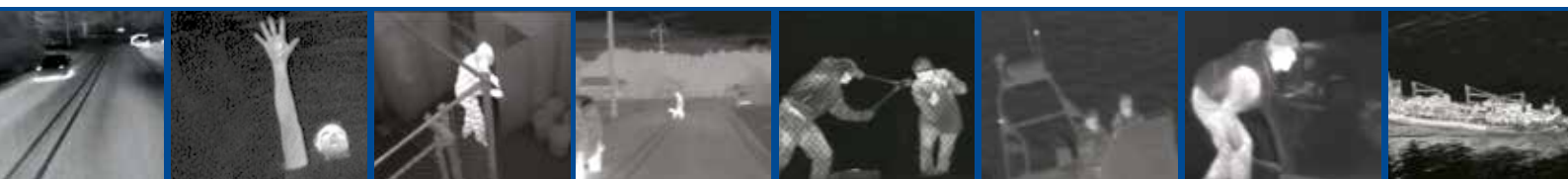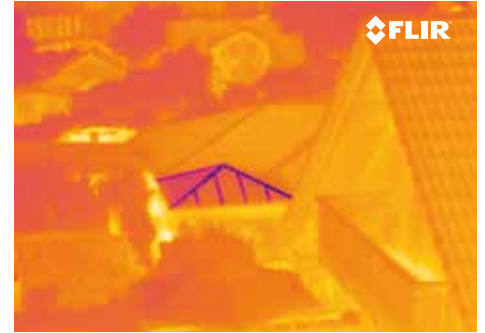
With this camera core, you have the image quality of a high-performance thermal imaging camera in a compact and lightweight format.

The custom built hardware fits nicely on the back of a FLIR Tau2 camera core and can be mounted together with the camera into existing holders. ThermalCapture is also able to enrich the raw data with additional information like position and time from GPS.

TeAx Technology offers a total solution combining the FLIR Tau2 core and the ThermalCapture hardware. But the hardware is also ideal for users that already have integrated a FLIR Tau2 core onto their UAV and want to expand their functionality with storage.

"For us, the FLIR Tau2 core is the ideal product, not only for its image quality, but first and foremost for its compactness and low weight, which makes it very easy to integrate onto a UAV. Another advantage of the FLIR Tau2 is its wide variety of available lens options and resolutions. There is a suitable solution for every budget. With this combined package, you can really have the image quality of a high-performance thermal imaging camera in a compact and lightweight (< 110g) format."
ThermalCapture supports the advanced radiometric option of FLIR Tau 2 cores. With this option enabled, you can do a temperature measurement for every individual pixel of the picture.

ThermalCapture allows for two modes of

The ThermoViewer software reads the raw data from the USB and converts it to black & white or color images.

operation. The video footage can either be obtained by continuous recording or by an external trigger, in fact the way a normal camera is operated.

Thermal imaging software
Almost equally as important as the ThermalCapture hardware, is TeAx Technology's software solution ThermoViewer. With this software package, it is possible to process the recorded raw data from the ThermalCapture module after the flight. ThermoViewer reads the raw data from the USB and converts it to black & white or color images.

Users who want to have fast results can use the auto-conversion feature. In this mode the ThermoViewer software determines the required parameters for each dataset and saves the result as a standard PNG image. "To obtain a good image, you normally have to find the lowest and highest temperatures and then interpolate. For inexperienced users this can be difficult and time-consuming. The ThermoViewer software takes that away."

Expert users can still choose to manually convert these parameters to obtain the most optimal result for every picture.

Enhanced thermal imaging performance
The fact that UAV users can now dispose of the raw video data, will allow them to see more and obtain more valuable information.

"It's amazing what you sometimes can get out of the raw data," comments Stefan Thamke. "For example, when you would look at a soldering iron in an indoor environment, with a thermal camera without having set the right parameters, the camera would probably focus on the

hot iron and leave the rest of the room black. By setting the right parameters on the raw data and by and selecting the correct viewing range, you might see the rest of the room appear again."

But while this is a fairly theoretical example, the same goes for more realistic industrial environments where sometimes you have to block out things that are very hot, but not important. Setting the right parameters on the raw data can help you do that.

"With UAV inspection of solar panels for example, the use of raw data can be very beneficial," comments Stefan Thamke. "Not all solar panels reflect in the same way. Some solar panel types reflect intensely, other will not. This will have an impact on the visibility of specific areas of the solar panel. By post-processing the raw video data, you can enhance the visibility of these areas again by setting the right parameters."
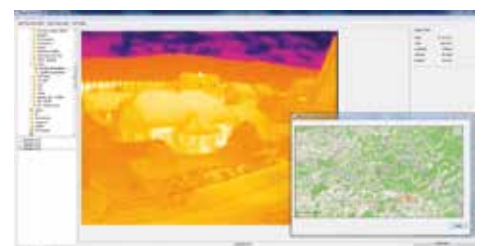
ThermalCapture is able to enrich the raw data with additional information like position and time from GPS.

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