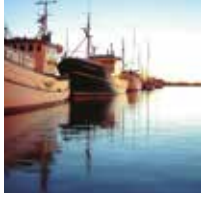




APPLICATION STORY

FLIR Tau® core for Baykar UAV helps enhance situational awareness

Manufacturers of Unmanned Aerial Vehicles (UAV) are continuously on the lookout for smaller, lighter and higher performance components that allow their technology to meet the increasingly higher demands of their customers. The same is true for Turkish UAV manufacturer Baykar who has been using FLIR camera cores for many years to provide their customers with clear vision and enhanced situational awareness day and night. Today, UAV technology from Baykar has already been chosen by many international customers, including the Turkish police, and the Turkish and Qatar armed forces.

The FLIR Tau thermal imaging core produces crisp thermal images of 640 x 512 pixels on which the smallest of details can be seen.

Baykar, Istanbul, Turkey, is a pioneer in the design, development, and production of innovative solutions for Turkey's aerospace and defense sector. The company has a multidisciplinary engineering team, whose activities span a multitude of domains from R&D to production and from system integration to subsystem development. Established in 1984 as a CNC precision machining supplier subcontractor, Baykar has since expanded its expertise by focusing on aerospace, robotics, and control systems specifically housed within its unmanned aerial systems.

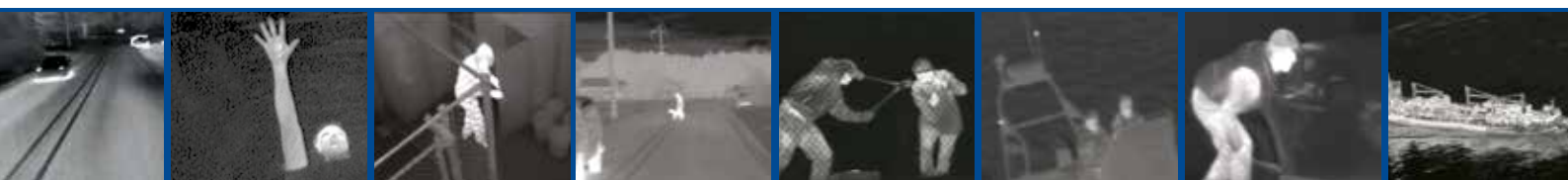
Today, Baykar's UAV solutions are used for a wide range of applications, including border protection, convoy protection, railway protection, base protection and surveillance & reconnaissance.

Smaller, lighter

"We have been using FLIR's thermal camera cores with our UAV systems for over 5 years now," comments Haluk Bayraktar, engineering manager at Baykar. "The company won its first big tender for a UAV system in 2005. In 2006, we started working with FLIR cores, together with FLIR distributor Fematek, to offer our customers a thermal imaging option. These customers required a compact and ruggedized thermal camera core, which at the time was an ideal match for the FLIR Photon core."

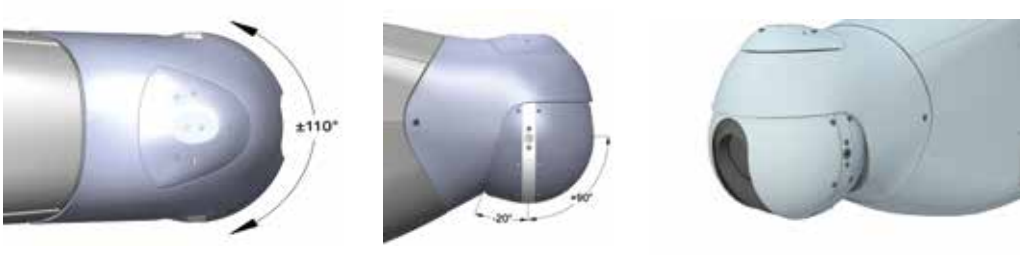
Haluk Bayraktar, engineering manager at Baykar: "We have been working with FLIR cores since 2006, to offer our customers a thermal imaging option."

"These UAV systems used a one-axis gimbal, allowing for up and down movement of the camera. Although successful, we received a request from an end-user to provide for a more flexible two-axis camera. This was



possible for us, but the design of a two-axis solution would also require more space. To compensate for this, we needed to look for an even more compact and lighter thermal camera core. Luckily, we found that with the FLIR Tau."

The FLIR Tau thermal imaging core produces crisp thermal images of 640 x 512 pixels on which very small details can be seen. The core contains a virtually maintenance-free, uncooled Vanadium Oxide (VOx) focal plane array (FPA) and is able to detect extremely small temperature differences of 50 mK. Its small size (44.5 x 44.5 x 30.0 mm), low weight (72 grams) and low power consumption (900 mW) make it the ideal core for mounting under a UAV for any application.



The two-axis gimbal required Baykar to look for a more compact core. The FLIR Tau® fully met these requirements.

Mini UAV

The FLIR Tau with 25 mm lens has been integrated into the Bayraktar Mini Unmanned Aerial Vehicle, which is a complete smart robotic field-proven solution for short-range reconnaissance and surveillance applications. 200 units of this UAV have already been deployed on the field since 2007, which has amounted to a total of more than 50,000 flight sorties. The UAV can be controlled within a range of 15 kilometers and can remain fully operational up to a 1,000 meter height.

Real-time situational awareness

From the UAV ground station, operators can watch the FLIR thermal video images in real time. Mosaic and stabilization software has been developed by Baykar in order to increase the quality of the thermal video footage provided by the UAV. During operation, aerial surveillance video footage is often subject to many distortions due to vibrations, sudden impacts from air currents and fast movement of the UAV. This can make it harder or sometimes impossible for operators to have an understanding of their environment. In order to overcome these effects, stabilization software is filtering out image vibrations and mosaic software is stitching consecutive images as the camera turns or as the UAV moves. This provides a broader situational awareness.

The mosaic software processes every incoming video frame and matches it with the previous one. Its main advantage compared to similar applications worldwide is its ability to work on CPU in real time and near real time speed accurately. The user is also able to use this image in order to scan a region or determine its viewing location with respect to other objects.

Full image control

"Initially, we equipped the Bayraktar Mini UAV with an automatic image adjustment option," comments Haluk Bayraktar. "However, we experienced that this option made it very difficult to detect temperature differences and see persons on the ground. Therefore, we decided to integrate an interface between the camera and the ground station, which allows operators to make manual adjustments and play with the sensitivity of the camera in order to achieve the best image results."

Cost-effective

The capabilities of thermal imaging technology have increased dramatically in the last decade. Thermal imaging used to be a very expensive technology for military users only. Today, more and more people are discovering the technology and the benefits it has to offer.

"Thermal imaging camera cores get smaller, cheaper and more performing every day," says Haluk Bayraktar. "This makes it easier and more flexible for us to integrate the camera in our UAV solutions. In the future, I am sure that we will see higher image resolutions, even up to full HD. This will make our UAV systems even more cost-effective and performing."

The mosaic software is stitching consecutive images as the camera turns or as the UAV moves, providing a broader situational awareness.

For more information about thermal imaging cameras or about this application, please contact:

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