

Bildverarbeitung - Kombination der Bilder einer optischen und einer Infrarot-Kamera

Infrared imaging is a powerful and important tool in many fields of science and technology. Possible applications are the detection of heat losses in buildings or the broad field of medical diagnostics.

The standard approach to obtain thermal information about any given object is to combine an optical and a thermal image of this object. The Flir One is an infrared camera which does exactly this. It is developed for use with smartphones and is commercially available. It contains an optical and infrared camera. It is connected to the smartphone with a micro-USB. The resolution of the optical camera of the Flir One is limited (640x480). The goal of this work is to use the smartphone's high resolution optical camera instead of the optical image sensor that the Flir One camera is shipped with. This should lead to high-resolution thermal imaging at very low cost. The overlay of the optical and the infrared image is realised with an Android app that runs on the smartphone. In order to achieve high-quality results a search algorithm was developed that optimally merges the optical and the infrared image. Various field tests illustrate that employing the smartphone camera instead of the built-in optical camera can significantly improve the image quality. In addition, this algorithm allows to measure the distance to the object of interest. Various tests revealed that distances of up to 5 meters can be determined with an accuracy of some centimeters. Based on the above findings a medical app was designed in collaboration with a plastic surgeon. The app is designed for the field of plastic surgery, in which the Flir One is already in use. Various improvements are achieved compared to the standard app that was used for this purposes so far. The quality is improved by using the optic images of the smartphone cam. The accuracy of the match with the optical Flir image is improved for short distances (<1 meter).



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Overlay of the smartphone image and
the infrared image of the Flir One