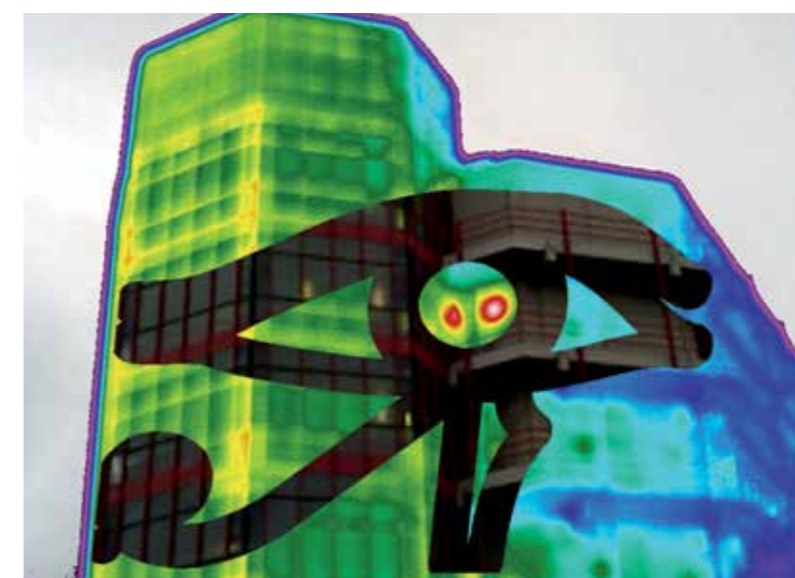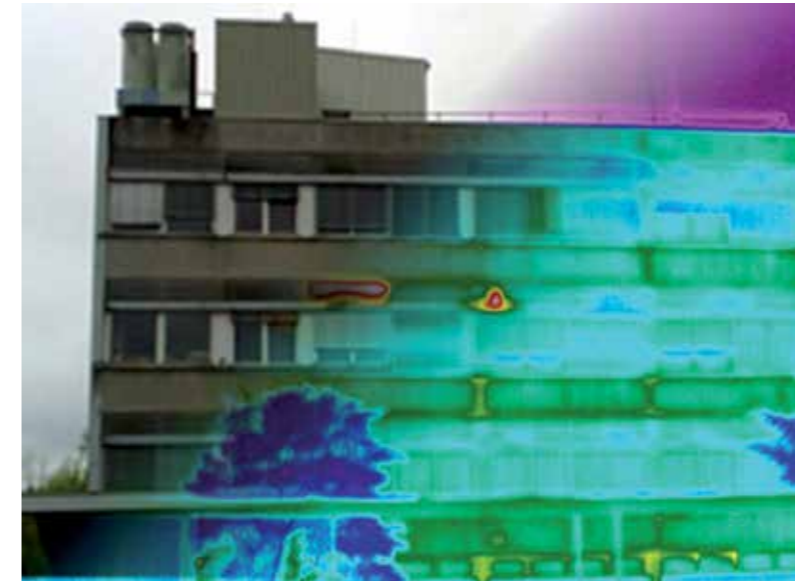# Thermoscan - Energy Efficiency Improvement Of Buildings With Large Area High Resolution Thermography

In times of increasing energy costs, the thermal insulation of houses becomes a central and important role. Especially older buildings have a high potential for savings. Thermal bridges like shutter boxes, warped window frames or humid walls cause a loss of heat. To economize thermal energy these points need to be detected. Very suitable for this task are infrared cameras. Those systems create pseudocolor images that reflect the surface temperatures of objects in the scene. One main disadvantage is the poor optical resolution. Even expensive professional units have less than one mega pixel which is low compared against current visual cameras.

To create more detailed images we merge multiple single shots into one high resolution picture. This will be achieved by recording parallel the scene with a thermal and a visual RGB-camera in a fixed setup. Visual images contain more information. These are used to build the main overall picture in a stitching operation. Those stitching operations are also used and well-known in the panorama functions of digital cameras or smartphones. With the calibration parameters of both cameras the thermal data can be projected on the high resolution overall picture. This yields the opportunity to create helpful effects like alpha-blending between thermal and visual image.

For our camera setup we used light-weight systems that can be mounted on our multicopter aerial vehicles and allow us to make recordings of objects or views that can not be made from the ground. This could be the roof of a building in bird's-eye view. Another interesting application is the inspection of photovoltaic plants. Defective solar modules result in local hot spots that can be easily seen in the thermal image. The project Thermoscan is sponsored by RWE AG.

I Project Management and Execution

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