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THERMAL INFRARED INSPECTION OF ROOF INSULATION USING UNMANNED AERIAL VEHICLES

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Abstract. UAVs equipped with high-resolution thermal cameras provide an excellent investigative tool used for a multitude of building-specific applications, including roof insulation inspection. We have presented in this study a relative thermographic calibration algorithm and a superpixel Markov Random Field model to address problems in thermal infrared inspection of roof insulation using UAVs. The relative thermographic radiometric calibration algorithm is designed to address the autogain problem of the thermal camera. Results show the algorithm can enhance the contrast between warm and cool areas on the roof surface in thermal images, and produces more constant thermal signatures of different roof insulations or surfaces, which could facilitate both visual interpretation and computer-based thermal anomaly detection. An automatic thermal anomaly detection algorithm based on superpixel Markov Random Field is proposed, which is more computationally efficient than pixel based MRF, and can potentially improve the production throughput capacity and increase the detection accuracy for thermal anomaly detection. Experimental results show the effectiveness of the proposed method.

[Conference paper](#) (PDF, 1661 KB)

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