

Multi-Frame Super-Resolution Thermal Imaging

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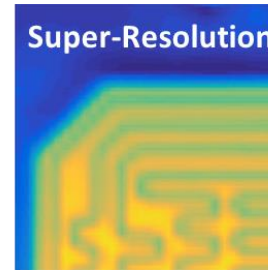
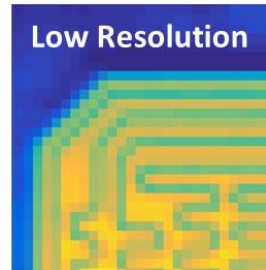
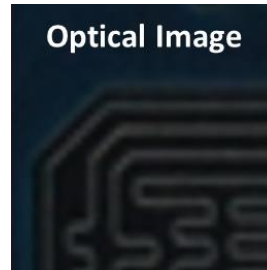
Students: Aditya Chandramohan and Sara K. Lyons

OBJECTIVE

Provide a simple means for users to improve the measurement resolution and expand the measurement capabilities of an existing infrared camera.

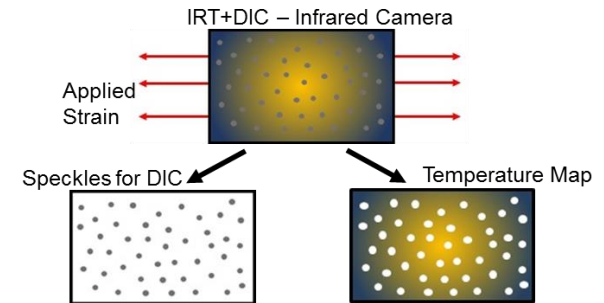
APPROACH

- Use multiframe super-resolution processing to enhance emissivity maps of an electronics package
- Demonstrate the feature size resolution improvement and uncertainty due to super-resolution
- Apply super-resolution techniques to deforming samples develop simultaneous temperature and strain measurements



Comparison with optical image demonstrates the improved feature capture and reduced aliasing in the super-resolution image.

A single super-resolution thermography image (left) is used to simultaneously measure the temperature profile (center) and the strain through particle tracking (right).



IMPACT

- Multiframe super-resolution imaging allows for high-resolution thermal measurements of electronics packages
- Multiframe super-resolution infrared images allow for single-camera, single-surface one-shot mapping of deformation and temperature on a heated surface

SELECTED PUBLICATIONS

- Chandramoha, A., Lyons, S.K., Weibel, J.A., Garimella, S.V., "Error Reduction in Infrared Thermography by Multiframe Super-Resolution"
- Lyons, S.K., Chandramoha, A., Weibel, J.A., Garimella, S.V., "Simultaneous Measurement of Temperature and Strain in Electronic Packages using Multiframe Super-Resolution Infrared Thermography and Digital Image Correlation" (in preparation)