

Thermal Analysis with FLIR Cameras and MATLAB

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Agenda

- Thermal imagery and typical applications
- Working with thermal images
- Using MATLAB with FLIR Cameras
 - Sensor Fusion with a FLIR camera
 - Object Detection / Tracking
 - Emissivity Correction
 - Camera Calibration
- Summary / Q&A

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FLIR Systems

The World's Sixth Sense

Surveillance



- Airborne systems
- Maritime systems
- Land systems
- Border surveillance
- Tactical vision
- Command & Control software

Instruments



- Building inspection cameras
- Electrical/mechanical cameras
- Lab/R&D cameras
- Test & measurement tools
- Firefighting cameras

OEM & Emerging



- Thermal camera cores & components
- Intelligent Traffic
- Personal Vision Systems
- Mobile

Maritime



- Multifunction displays
- Instruments
- Sonar
- Radar
- Thermal cameras

Security



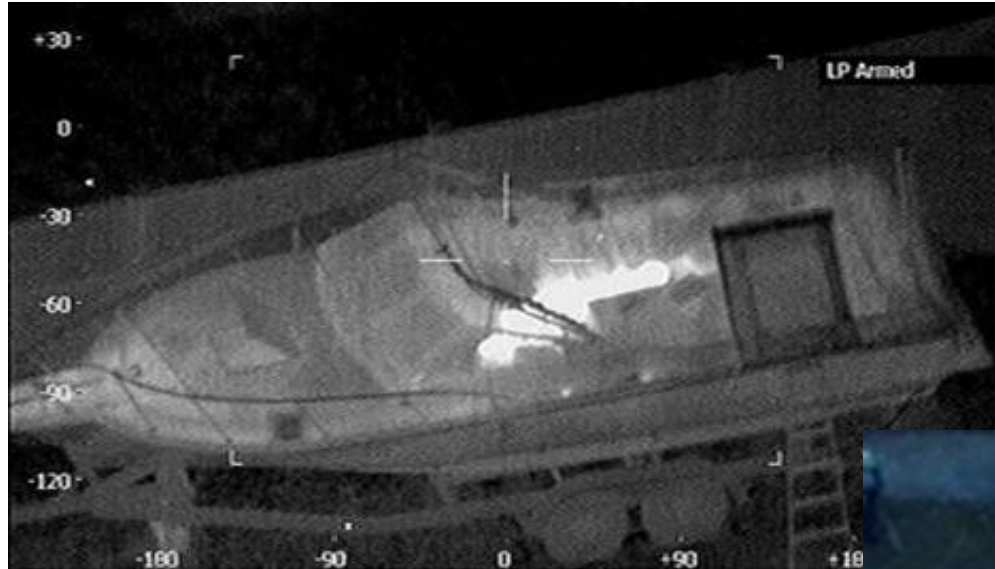
- Thermal security cameras
- Visible-light security cameras
- DIY security systems
- Software and analytics

Detection

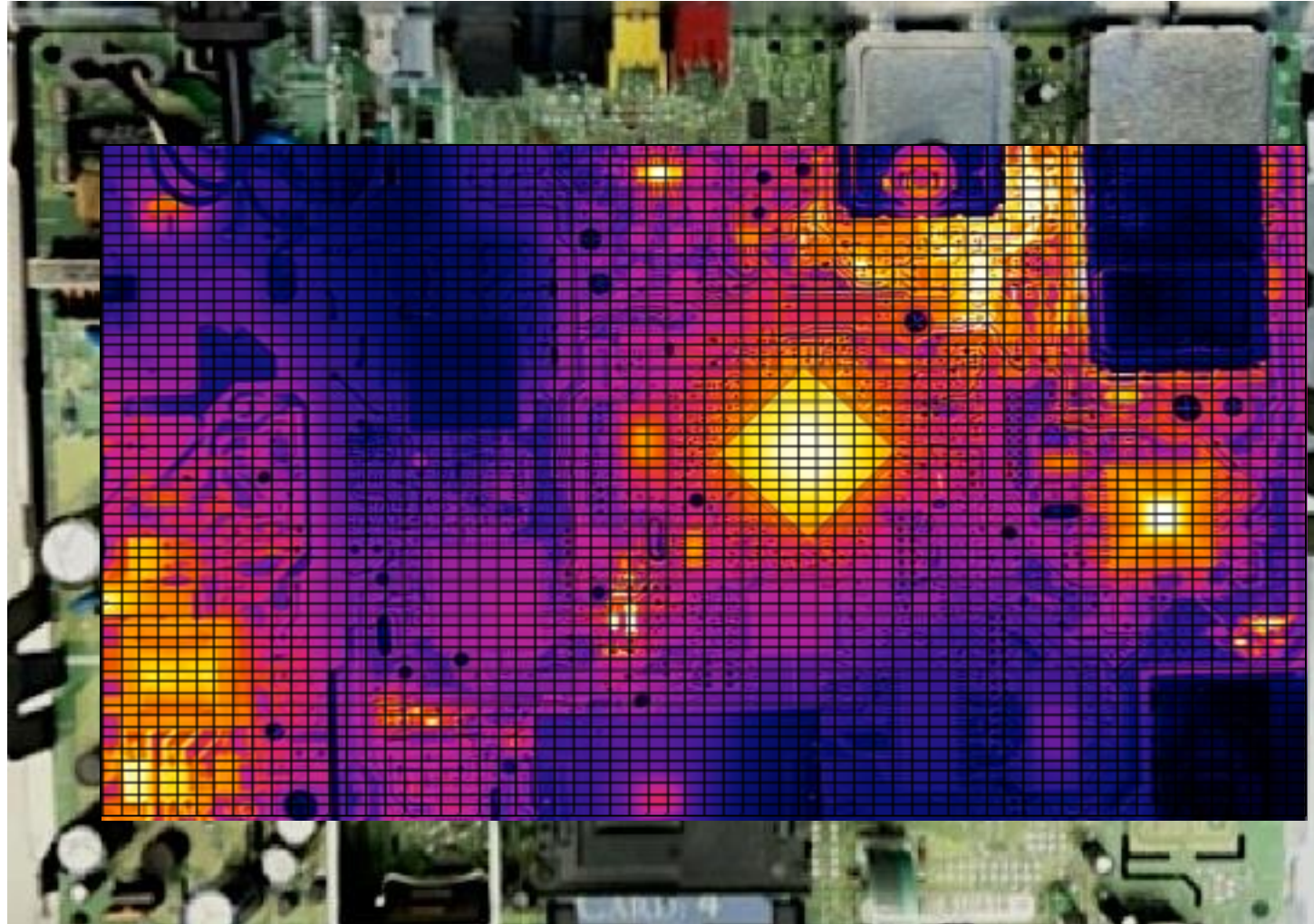


- Radiation detectors
- Explosives detectors
- Chemical-biological threat detectors
- Mass spectrometry systems

The FLIR Thermal Infrared Advantage



The FLIR Thermal Infrared Advantage



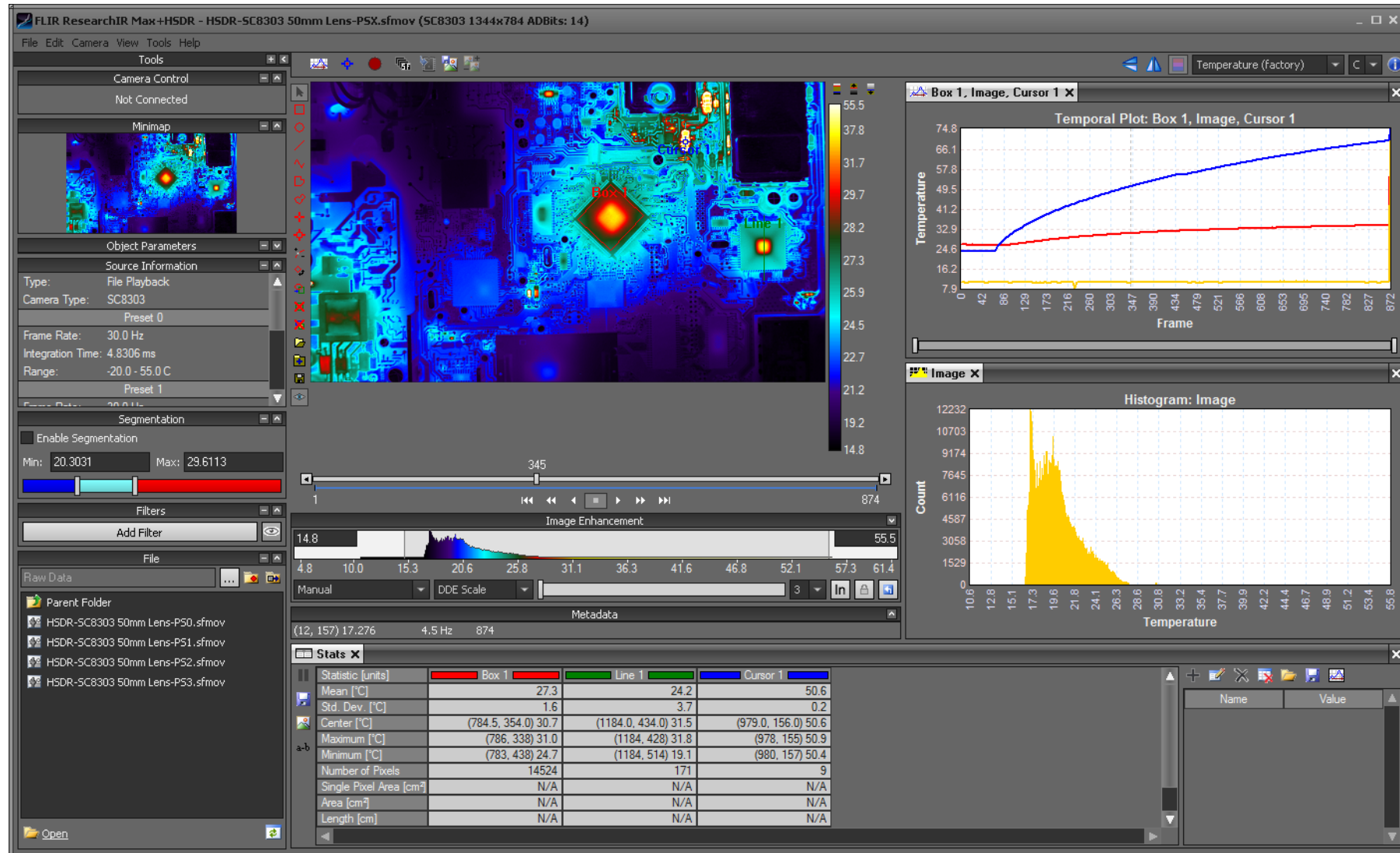
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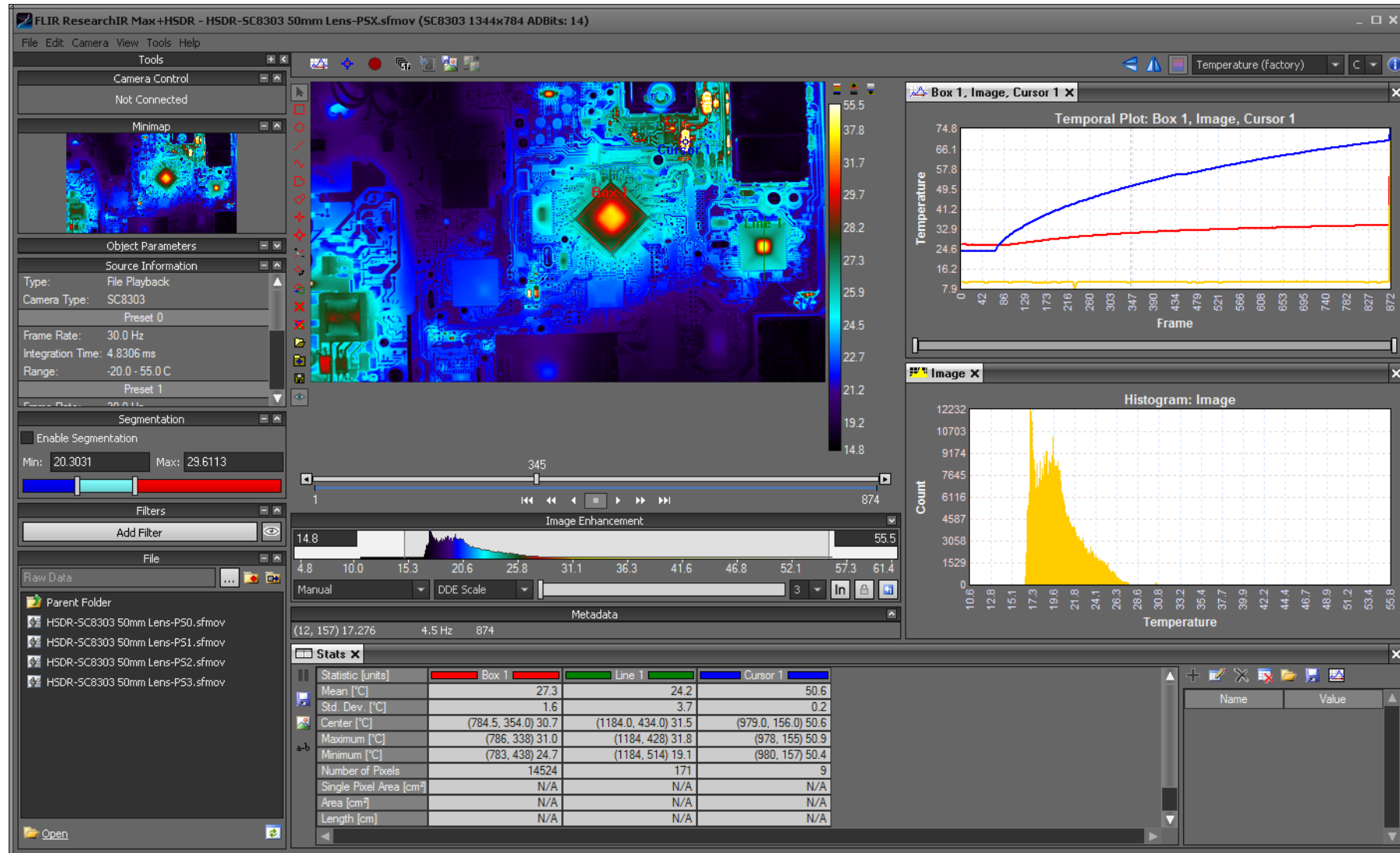
Making Thermal Measurements



FLIR ResearchIR Recording & Analysis Software

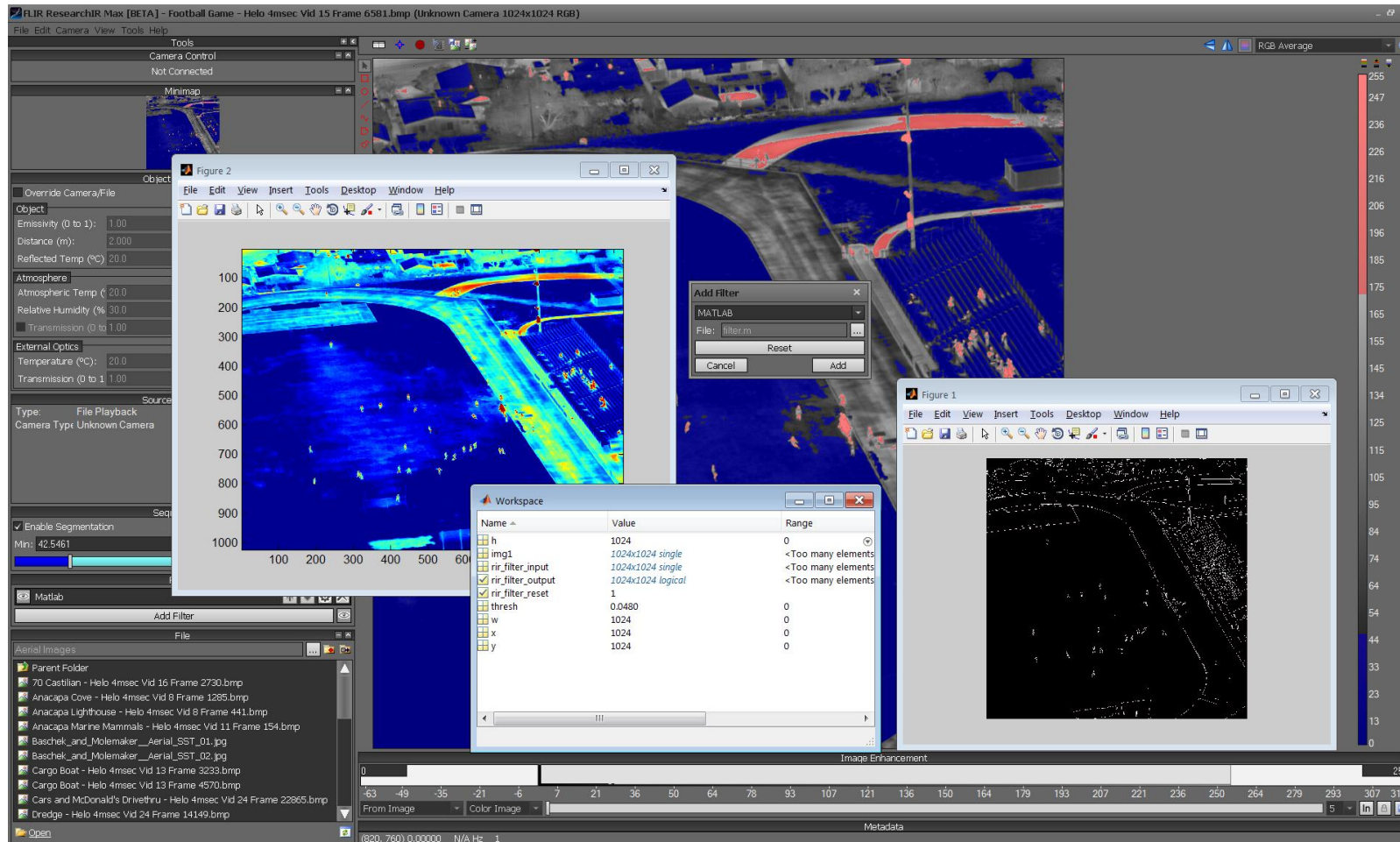


FLIR ResearchIR Recording & Analysis Software

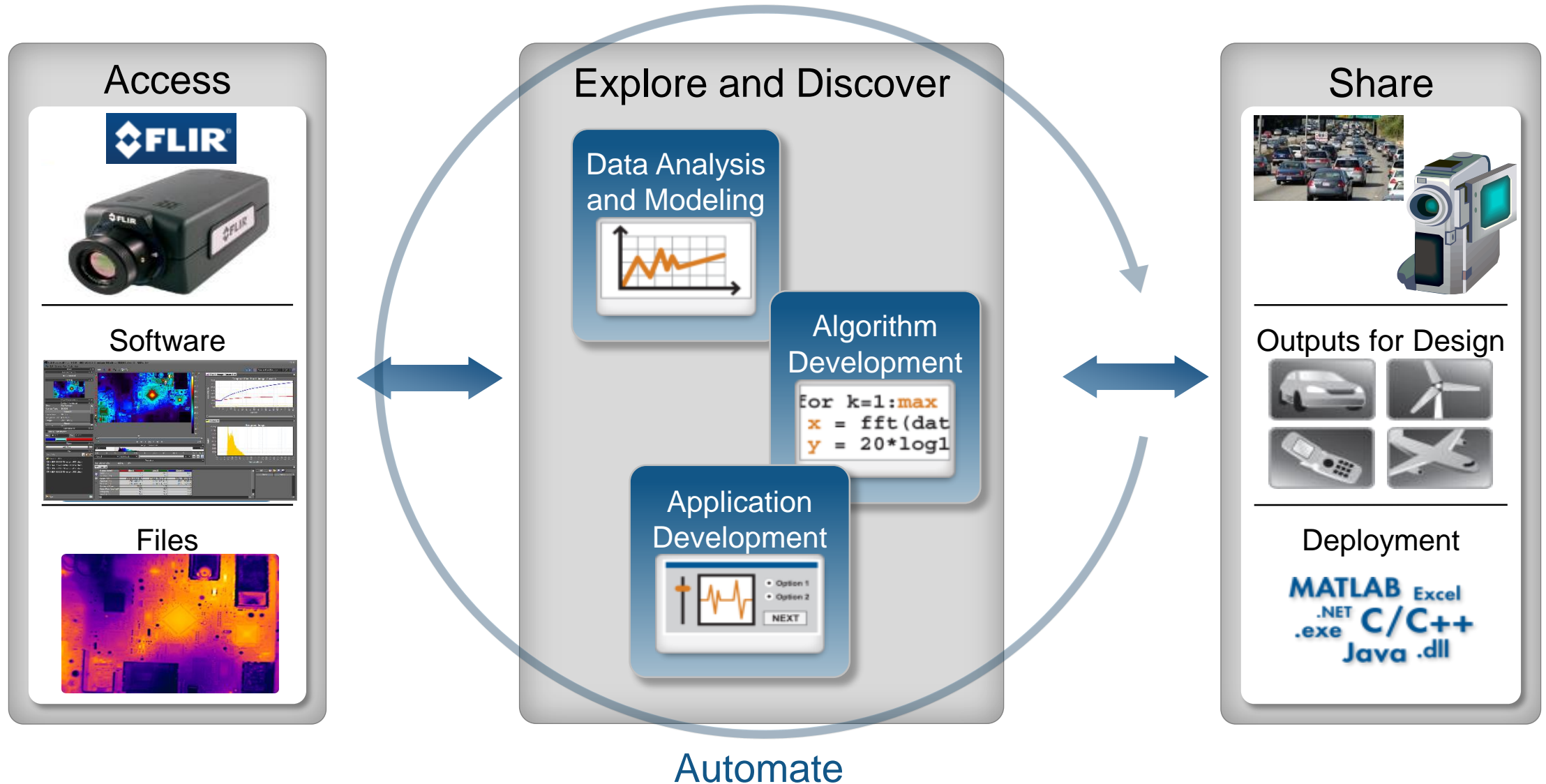


Off the shelf solutions for R&D/Science

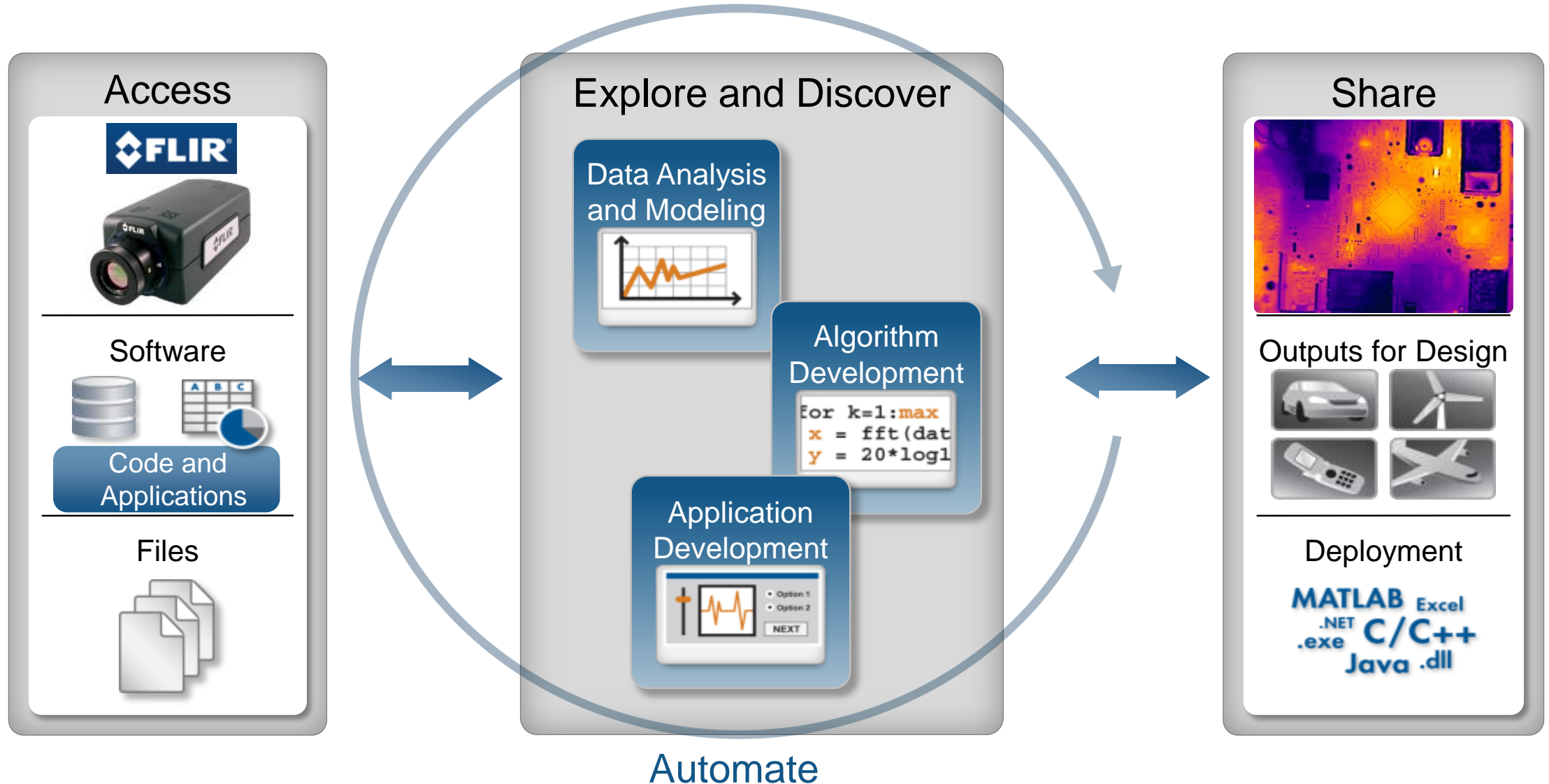
... Accelerated with MathWorks!



Workflow: The Thermal Vision Processing



Workflow: Thermal Image and Video Processing



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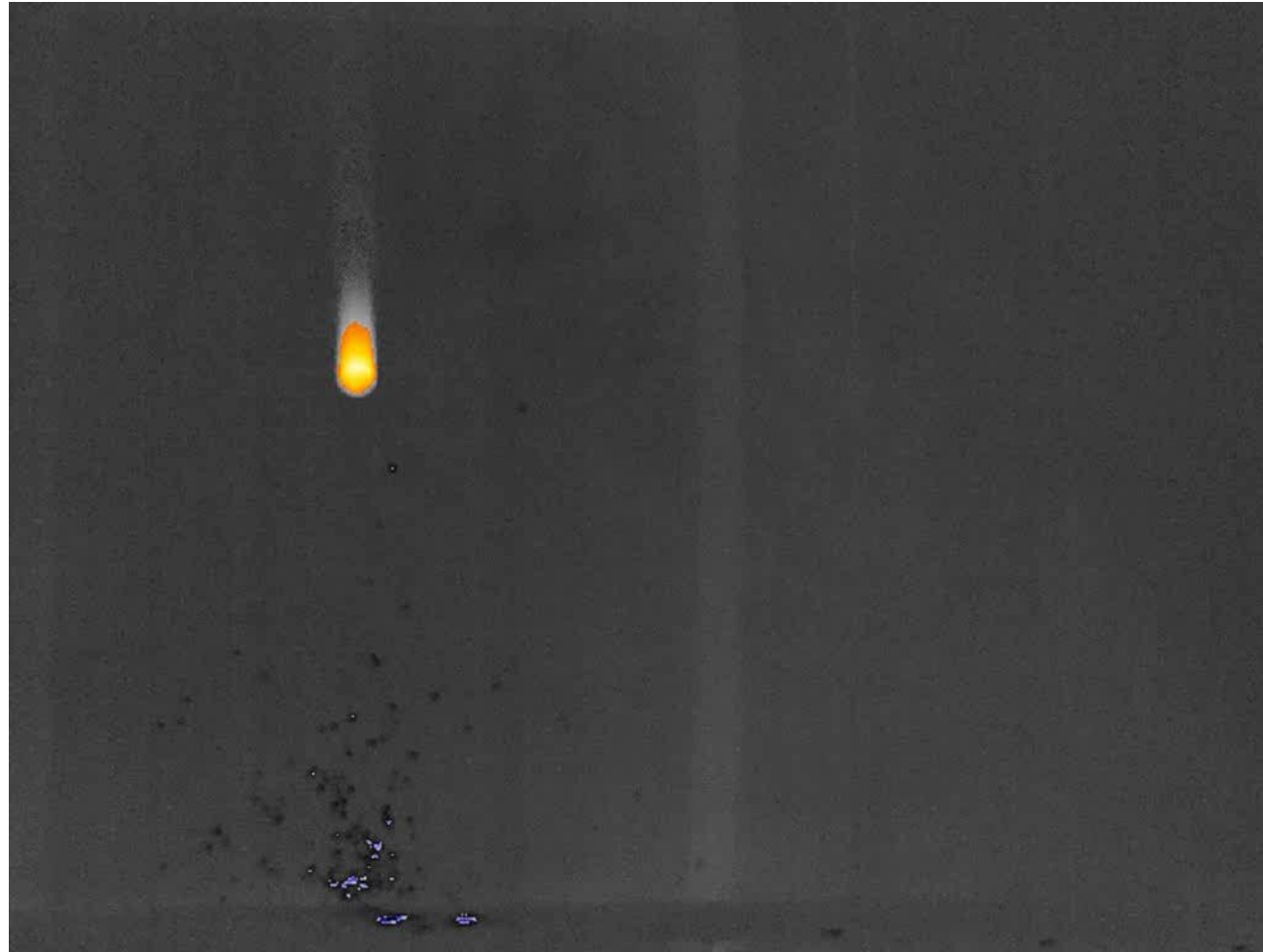
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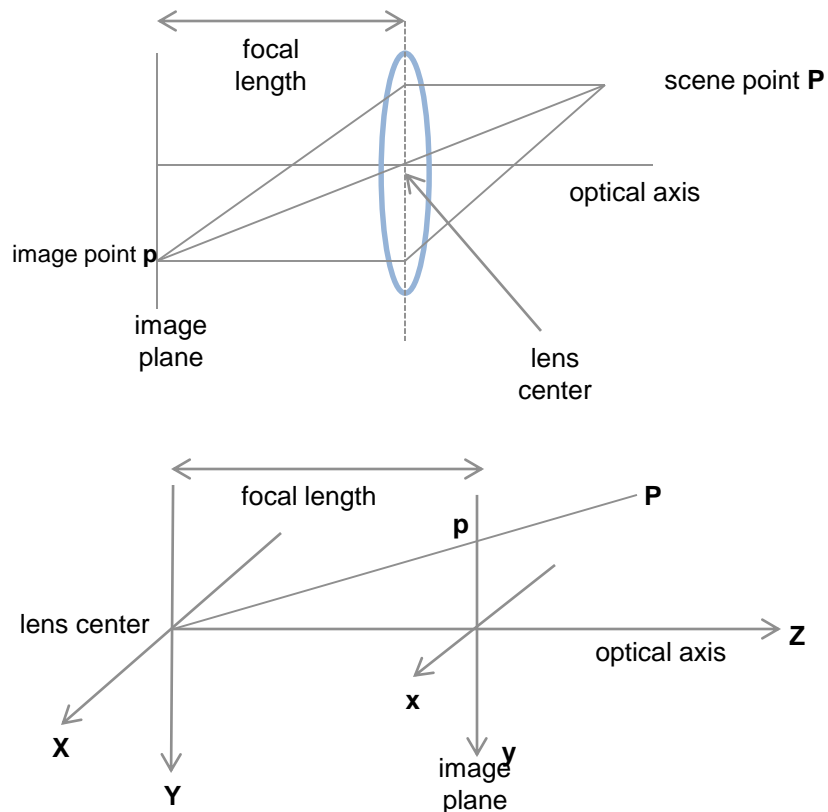
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Detecting and Tracking Thermal Objects

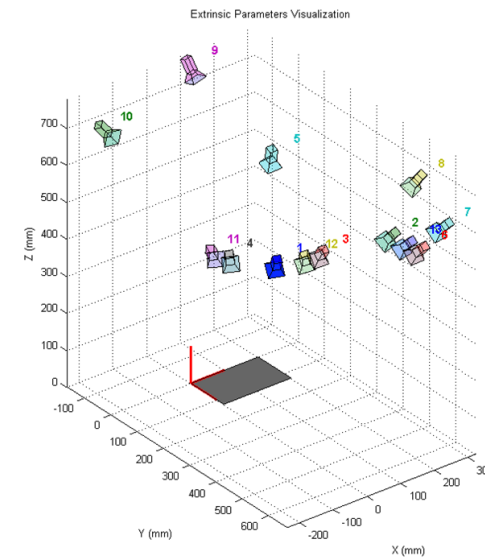


Camera Calibration

Intrinsic Parameters: Focal length, optical center, lens distortion coefficients, pixel scaling factors

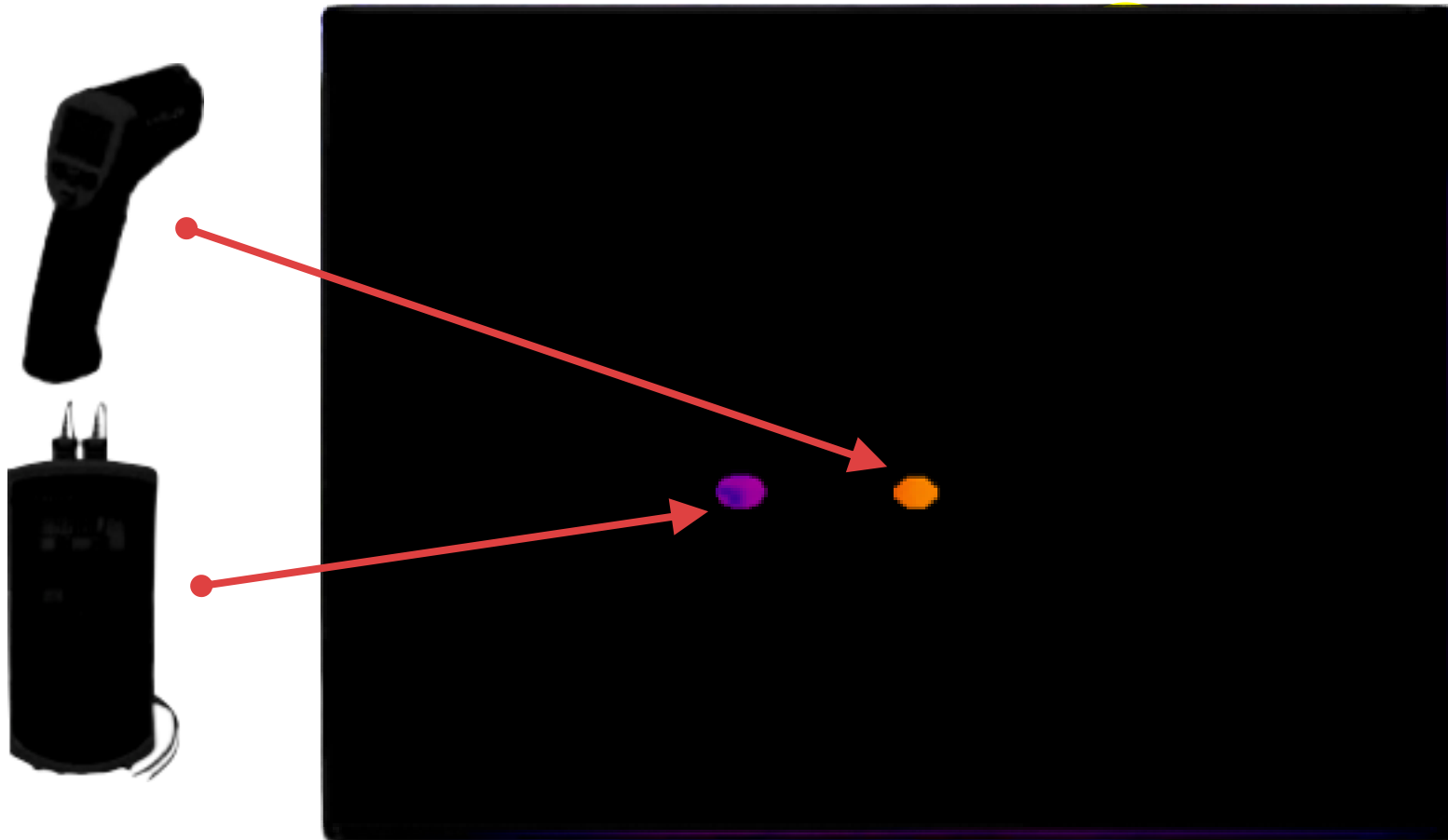


Extrinsic Parameters: Cameras location in space in relation to a fixed object.



Show pattern-centric view

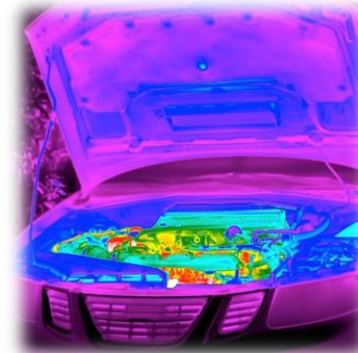
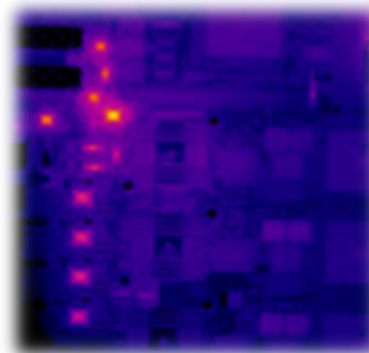
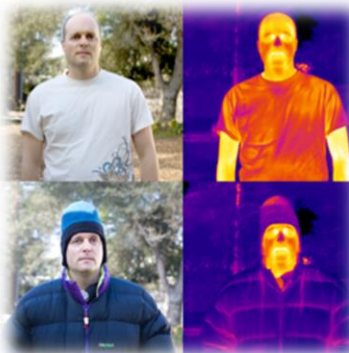
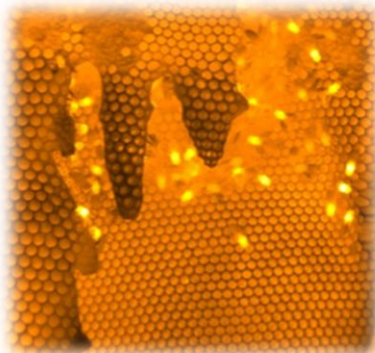
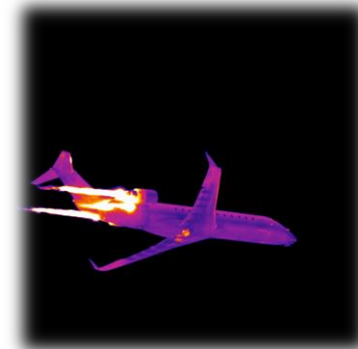
The FLIR Thermal Infrared Advantage



A Case Study

The FLIR Thermal Infrared Advantage

- Know where to measure - Eliminate the guesswork
- Non-contact measurement
- Measure temperature on thousands of spots
- +/- 2% accuracy temperature measurement
- Close-up measurement (down to $<200\mu\text{m}$ spot size)
- Contrast on targets beyond what visible offers
- Easy to interpret results



Thank you

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Questions

