

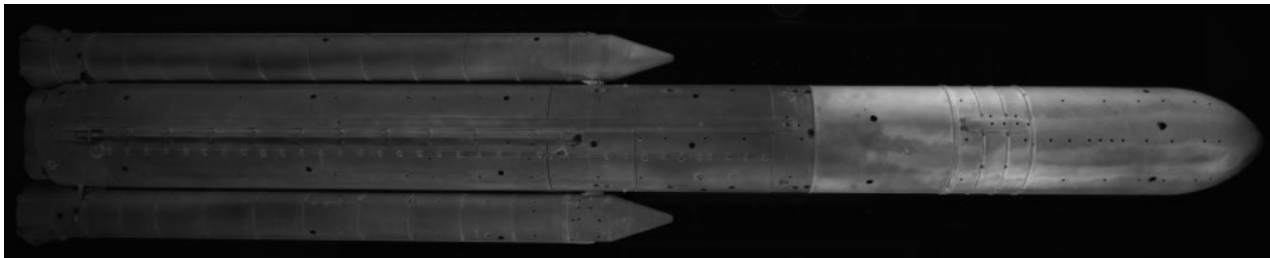
Unsteady Pressure Sensitive Paint Camera Calibration Improvements

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Increased Test Complexity

- Unsteady Pressure Sensitive Paint (uPSP) applications have been greatly increased in complexity
 - Large field of view
 - More run sequences
 - More frames per run sequence
- Requires improved algorithms for camera calibration



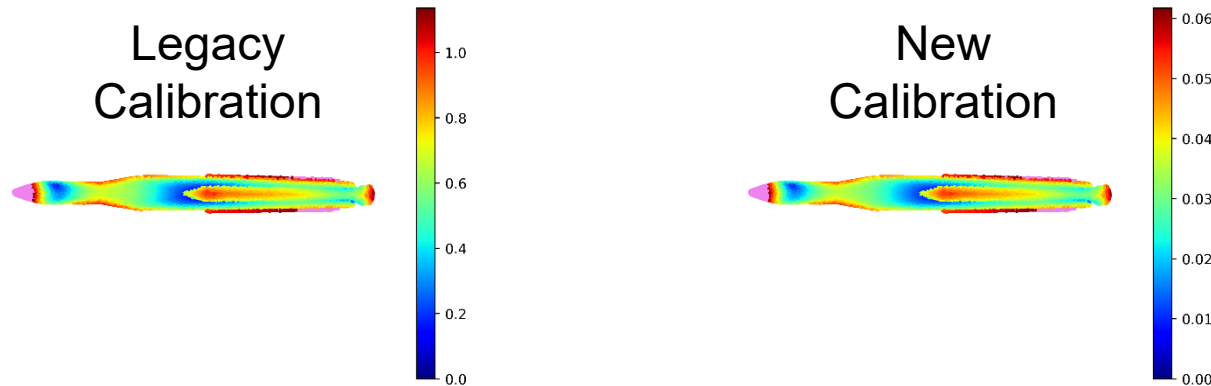
Internal Calibration – New Procedure

- Previous board was large
 - Typically good for internal calibration
- However, with large models it is cumbersome and difficult to manipulate



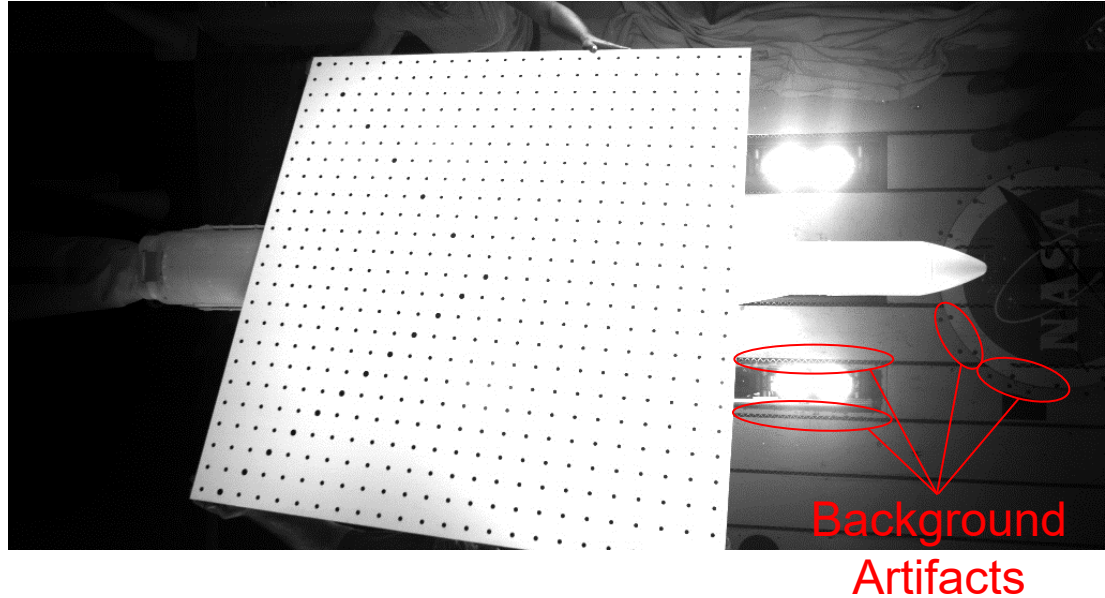
Internal Calibration – New Procedure

- Replace large board with smaller, more manageable one
- Improve and standardize procedure
 - Reduces node-to-pixel mapping uncertainty from >1 pixel to <0.1 pixels



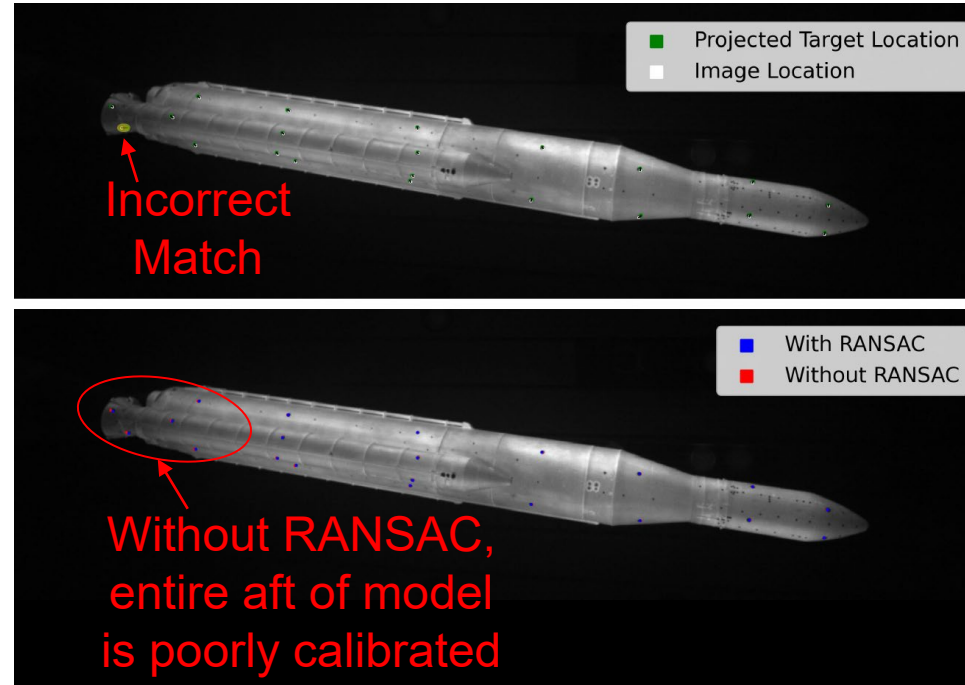
Internal Calibration – New Software

- We used Calib.io's Calibrator software
 - Uses well-established algorithms
 - Very robust against false positives
 - Data quality visualizations
 - Parameter uncertainty



External Calibration – RANSAC

- RANdom Sample Consensus (RANSAC) for Perspective-n-Point (PnP) problem
- Ensures external calibration is good even if a few 3D-to-2D correspondences are bad



Conclusion

- Glad to be able to share some of the improvements implemented for camera calibration
- Small changes like these have outsized effects on the overall performance of the system
 - Reduced uncertainty
 - Better theoreticals
- Hope to share ongoing developments soon!



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