



## Anthony R. Hinson

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### OVERVIEW

Seeking an algorithm development and/or software development position in image processing, computational geometry, or photogrammetry.

Currently hold active TS/DoD security clearance.

Spent last 10 years developing photogrammetric and image processing algorithms for multiple imaging systems academically and commercially. Strong software development background in C, C++, C#, VB, and Matlab. Worked on several small-scale and production-level software packages over the last 8 years. 10+ years experience in 3d modeling and animation.

### TECHNICAL EXPERTISE



#### Photogrammetry

- **Mensuration and Geodesy:** RPC Mensuration and corrections. Have worked with UTM, WGS-84, geodetic, geocentric, and topographic coordinate systems and conversions.
- **Rectification:** Designed epipolar, georectification, orthorectification algorithms.
- **Elevation Estimation:** Created terrain models using disparity mapping techniques and RPC data.
- **Data Formats:** Parsing and using NITF images and support data (classified and unclassified TREs).
- **Projection Models:** Orthographic, perspective, pushbroom.
- **Registration:** Feature based image-to-image and image-to-point registration techniques and RPC recalculation.



#### Image Processing

- **Image Enhancement:** Histogram equalization, unsharp masking, Gaussian filters, etc.
- **Kernel-Based Processing:** Convolution filters, edge detectors, morphological operators.
- **Interpolation:** Bilinear, bicubic, nearest neighbor, and irregular interpolation techniques.
- **Other Techniques:** Hough image transforms, watershed segmentation, thresholding.



#### Computational Geometry

- **Geometric Systems:** Projective geometry, homogeneous coordinate systems, Plücker lines, splines, intersections of spatial objects.
- **Parametric:** Parametric modeling of curvilinear features, surfaces, and volumes. Bezier curves and surfaces.
- **Geometric Boolean Operations:** Designed union, intersection, difference, and subtraction algorithms for planar and volumetric objects.
- **Spatial Transforms:** Translation, rotation, projection, shearing, etc using projection matrices.



#### General Algorithm Development

- **Correlation:** Normalized cross-correlation, optimized sum of absolute differences, rank and census methods, etc.
- **Regression:** Linear, polynomial, and multidimensional surface approximation techniques.
- **Other algorithms:** Multivariate Gaussian, matrix manipulation and linear algebra techniques.
- **Linear Algebra:** Matrix solving techniques, matrix inversion, eigenvalue/eigenvector analysis.



#### Software Development

- **Development Experience:**
  - C# / .NET (7 years)
  - C (3 years)
  - C++ (1 year)
  - Matlab (5 years)
  - Visual Basic (3 years)
  - XML (3 years)
- **Tool Development:** Have built many engineering tools incl: NITF viewer, NITF search tool, byte reader, convolution
- **Software Libraries:** Written libraries for matrix manip., image processing, XML, text analysis, computational geometry, generic unit testing libraries.
- **Optimization:** Have optimized managed code, algorithms (procedural and kernel based).

PROFESSIONAL EXPERIENCE



**Systems Engineer Staff** – Lockheed Martin  
*JASSM Program*

**6/08 – Pres.**  
*Orlando, FL*

Worked as an algorithm and software developer for missile mission planning software. Served as satellite imagery SME for the group and was technical liaison with government customer, NGA, and other LM divisions. Designed and implemented several large-scale tools for the program, including:

- Boolean Tool Suite: Created a geometric Boolean tool suite to union, intersect, difference, and subtract surfaces and volumetric objects.
- N-Side Pitched Roof Building Extractor: Tool deciphered shape of complex pitched roof buildings by analyzing the footprint of the building and roof structure. Built a solid object representing the full building from primitive pieces using geometric Boolean operations.
- Mensuration Recalculation: Designed algorithm to resample satellite imagery and calculate new rational polynomial coefficients for mensuration to support mission planning requirements.
- Linear Approximation of Pushbroom Display: Designed algorithm to calculate a 4x4 camera quad to approximate the non-linear appearance of pushbroom satellite imagery for OpenGL display. Transform included spatial transforms for coordinate system orientation and shear, horz and vert translation, and rotations.



**Systems Engineer Sr** – Lockheed Martin  
*Strike Weapons IRAD*

**3/06 – Pres.**  
*Orlando, FL*

Served as lead systems engineer and principal investigator for IRAD evaluating commercial satellite imagery for weapon targeting. Work included algorithm development, software design in C#, and supplying analysis documentation to the government. Task areas included:

- Imagery Evaluation: Evaluated image quality, geolocation accuracy, performance with proprietary targeting algorithms.
- Rectification: Developed algorithms and software for georectifying and epipolar rectifying satellite imagery. Mensuration equations, pixel sampling, and dynamic range were updated when required.
- Mensuration: Used RPC equations to track geodetic location in imagery and determine imaging geometry (Azimuth, Elevation, GSD, etc.) Used mensuration algorithms to render and correlate geodetic wireframe models with image content.
- Disparity: Designed algorithms and software for real-time elevation extraction from stereo imagery using disparity models.



**Systems Engineer** – Lockheed Martin  
*Spectral Exploitation Project*

**12/03 – 3/06**  
*Valley Forge, PA*

Worked as a systems engineer on a government funded contract, developing and evaluating image processing algorithms. Development activities encompassed:

- Formulation. Worked with senior engineer on the mathematical formulation of algorithms for image-to-image registration, photogrammetry, and image understanding.
- Prototyping and Revision. Algorithms prototyped and revised in Matlab and C#.
- Final Development. Algorithms coded in C# and inserted into simulator.
- Demonstration. Gave regular technical demos to management and customers.



**Research Assistant** – University of Florida  
*Center for Intelligent Machines and Robotics*

**1/00 – 5/03**  
*Gainesville, FL*

Worked on cooperative design projects centered on autonomous vehicles. Work included: programming Windows, Linux, and microcontroller systems, designing and prototyping mechanical objects. Research project entailed the conception and creation of a visual, monocular-based vehicle positioning system.

EDUCATION



**M.S. in Mechanical Engineering**  
*(Minor in Electrical Engineering)*

*Univ. of Florida*  
*August 2003*

- Specialization in machine vision for vehicle tracking
- Thesis title: Planar Vehicle Tracking Using a Monocular Based Multiple Camera Visual Position System



**B.S. in Mechanical Engineering**

*Univ. of South Florida*  
*December 1999*