

**RICHARD H. VOLLMERHAUSEN**

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Lake Mary, Florida, 32746



**TECHNICAL EXPERIENCE**

- Fifty years experience in design and analysis of military electro-optical systems, including air-to-air missile seekers and a wide variety of imaging technologies.
- Developed and validated fundamental improvements in the target acquisition performance models used by the military. The improved models accurately predict the effect of imager blur, noise, contrast, and sampling on an observer's ability to interpret imagery. These improvements accurately model sampled imagers and the performance benefits of digital image enhancement.
- Extensive experience in the design, conduct, and analysis of perception experiments, both in-flight on helicopters and in the laboratory.
- Systems analyst on numerous military electro-optical systems.

**EDUCATION**

B.S. in Physics from Arizona State University in 1965

M.S. in Physics from Arizona State University in 1969

PhD in Electrical and Computer Engineering (Photonics) from the University of Delaware in 2013

**MILITARY SERVICE**

I was drafted in April, 1969 and received an Honorable Discharge as a 1<sup>st</sup> Lieutenant in August, 1971.

**PATENTS**

Eleven patents on air-to-air missile seekers and electro-optical imagers.

## **PUBLICATIONS**

### **Books**

*Analysis and Evaluation of Sampled Imaging Systems*, R. Vollmerhausen, D. Reago, and R. Driggers, SPIE Tutorial Series, 2010.

*Sampled Imaging Systems*, R. Vollmerhausen and R. Driggers, SPIE Tutorial Series, April 2000.

*Electro-Optical Imaging: System Performance and Modeling*, Chapters 12, 25, and 26, Edited by Lucien Biberian, SPIE, 2000.

*Digital Optical Measurement Techniques and Applications*, Chapter 1, edited by Pramod Rastogi, Artech House, Boston, 2015.

*Wiley Encyclopedia of Electrical and Electronics Engineering*, Vol. 8, Ed. John G. Webster, "Helicopter Night Pilotage," Richard H. Vollmerhausen, 1999.

### **Refereed Journal Publications**

1. Richard H. Vollmerhausen, "Night Vision Integrated Performance Model; impact of a recent change on the model's predictive accuracy," *Optics Express* 24(21), 2016.
2. Richard Vollmerhausen, "Design of finite impulse response deconvolution filters," *Appl. Opt.* **49**, 5814-5827 (2010)
3. Richard H. Vollmerhausen, "Predicting the effect of gain, level, and sampling on minimum resolvable temperature measurements," *Optical Engineering* 48, 076401,(2009)
4. Richard H. Vollmerhausen, "Representing the observer in electro-optical target acquisition models," *Opt. Express* **17**, 17253-17268 (2009)
5. Richard H. Vollmerhausen, Ronald G. Driggers, and David L. Wilson, "Predicting range performance of sampled imagers by treating aliased signal as target-dependent noise," *J. Opt. Soc. Am. A* **25**, 2055-2065 (2008) Erratum," *J. Opt. Soc. Am. A* **26**, 2418-2418 (2009)
6. Richard H. Vollmerhausen, Steve Moyer, Keith Krapels, Ronald G. Driggers, Jonathan G. Hixson, and Aaron L. Robinson, "Predicting the probability of facial identification using a specific object model," *Appl. Opt.* **47**, 751-759 (2008)
7. Richard Vollmerhausen and Aaron L. Robinson, "Modeling target acquisition tasks associated with security and surveillance," *Appl. Opt.* **46**, 4209-4221 (2007)
8. Richard Vollmerhausen, Eddie Jacobs, and Ronald Driggers, "New metric for predicting target acquisition performance," *Opt. Eng.* **43**, 2806,9(2004)
9. R. Vollmerhausen, R. Driggers, and B. O'Kane, "The Influence of Sampling on Recognition and Identification Performance," *Optical Engineering* Vol. 38, No. 5, May, (1999)
10. R. Vollmerhausen, "Helicopter Night Pilotage," in *Encyclopedia of Electrical and Electronics Engineering*, Edited by John G. Webster, Wiley, New York, (1999)
11. R. Vollmerhausen, R. Driggers, and B. O'Kane, "Character Recognition as a Function of Spurious Response," *J. Opt. Soc. Am. A*, Vol. 16, No 5, May, (1999)
12. R. Vollmerhausen, R. Driggers, C. Webb, and T. Edwards, "Staring Imager Minimum Resolvable Temperature Measurements Beyond the Sensor Half Sample Rate," *Optical Engineering*, Vol 37, No 6, June, (1998)
13. Richard L. Espinola, Eddie L. Jacobs, Carl E. Halford, Richard Vollmerhausen, and David H. Tofsted, "Modeling the target acquisition performance of active imaging systems," *Opt. Express* **15**, 3816-3832 (2007)

14. Kobi Buskila, Shay Towito, Elad Shmuel, Ran Levi, Natan Kopeika, Keith Krapels, Ronald G. Driggers, Richard H. Vollmerhausen, and Carl E. Halford, "Atmospheric Modulation Transfer Function in the Infrared," *Appl. Opt.* **43**, 471-482 (2004)
15. "Atmospheric Modulation Transfer Function in the Infrared," Kobi Buskila, Shay Towito, Elad Shmuel, Ran Levi, Natan Kopeika, Keith Krapels, Ronald G. Driggers, Richard H. Vollmerhausen, Carl E. Halford, *Applied Optics* Vol 43, Issue 2, 471-483, Jan. 2004.
16. Fifty-percent probability of identification comparison for targets in the visible and infrared spectral bands," John O'Connor, Ronald Driggers, Richard Vollmerhausen, Nicole Devitt, Jeff Olson, *OPT. ENG.* Vol 42, 2003.
17. "Impact of speckle on laser range-gated short wave infrared imaging system target identification performance," Ronald G. Driggers, Richard H. Vollmerhausen, Nicole Devitt, Carl Halford, and Kenneth J. Barnard, *Optical Engineering*, Vol 42, no 3, pp. 738-746, March 2003.
18. Steve Moyer, Ronald G. Driggers, Richard H. Vollmerhausen, Nicole Devitt, Carl Halford, and Kenneth J. Barnard, "Information differences between subbands of the mid-wave infrared spectrum," *Opt. Eng.* 42, 1906, (2001)
19. M. Mirotznik, W. A. Beck, D. Prather, R. Vollmerhausen, and R. Driggers, "Optical absorption modeling of thermal infrared detectors by use of the finite-difference time-domain method," *Opt. Lett.* **26**, 280-282 (2001)
20. "Target Identification Performance as a Function of Temporal and Fixed Pattern Noise," Ronald G. Driggers, Richard Vollmerhausen, and Keith Krapels, *Optical Engineering*, March, 2001, vol. 40, no. 3, pp. 443-447.
21. "Target Acquisition Performance Modeling of Infrared Imaging Systems: Past, Present, and Future," James A. Ratches, Richard Vollmerhausen, and Ronald Driggers, *IEEE Sensors Journal*, Invited paper to the Inaugural Edition, Vol.1, No 1, June 2001.
22. "Optical absorption modeling of thermal infrared detectors by use of the finite-difference time-domain method," Mirotznik, M.; Beck, W. A.; Prather, D.; Vollmerhausen, R.; Driggers, R., *Optics Letters*, 2001, vol. 26, no. 5, pp. 280-282.
23. "Minimum Resolvable Temperature Difference (MRT): Procedure Improvements and Dynamic MRT," K. Krapels, R. Driggers, R. Vollmerhausen, C. Halford, *Infrared Physics and Technology*, Feb 2001.
24. "Atmospheric Turbulence Modulation Transfer Function for Infrared Target Acquisition Modeling," Keith Krapels, Ronald G. Driggers, and Richard H. Vollmerhausen, *Optical Engineering*. 40, Sept 2001.
25. "Performance Comparison of Rectangular (Four Point) and Diagonal (Two Point) Dither in Undersampled Infrared Focal Plane Array Imagers," K. Krapels, R. Driggers, R. Vollmerhausen, C. Halford, *Applied Optics*, Vol 40, No 1, Jan 2001. pg 71-84.
26. "Target identification performance as a function of low spatial frequency image content," Driggers, Ronald G.; Vollmerhausen, Richard H.; Krapels, Keith A., *Optical Engineering* 39(09), 2458-2462, 09/2000.
27. "Sampled Imaging Systems," R. Driggers, R. Vollmerhausen, and C. Halford, Guest Editorial for *Optical Engineering Special Issue on Sampling*, Vol. 38, No. 5, May, 1999.
28. "Targeting and Intelligence Electro-Optical Recognition Modeling: A Juxtaposition of the Probabilities of Discrimination and the General Image Quality Equation," R. Driggers, P. Cox, J. Leachtenauer, R. Vollmerhausen, and D. Scribner, *Optical Engineering*, Vol 37, No 3, March, 1998.

**Plus one hundred SPIE and SID conference papers.**