CURRICULUM VITÆ

Jonathan D. Ellis, PhD

Associate Professor of Mechanical Engineering
University of Rochester

ACADEMIC VISION

Precision technology permeates daily life in the form of smartphones, automobiles, consumer electronics, computing technology, healthcare systems, and airplanes, to name a few. These products incorporate many precision engineering concepts in the design, manufacture, assembly, and quality control steps to bring them to fruition. These precision engineering concepts are: 1) design for function and performance; 2) understand multi-disciplinary systems, methodologies, and metrology; and 3) qualify error budgets and uncertainty estimates to ensure specifications are met.

The goal of the PRECISION INSTRUMENTATION GROUP is to design, create, and demonstrate novel precision systems to usher in the next generation of technology. Research in the Precision Instrumentation Group focuses on real-world challenges where novel solutions can be offered, particularly in areas like standards-level metrology, high precision positioning systems, biological scanners, optical metrology, and advanced manufacturing. These research endeavors should result in technology pioneered within the group to permeate precision systems in commercial industries. The Precision Instrumentation Group focuses on performing the multidisciplinary system design, building prototype systems, qualifying technology, and, finally, spinning off technology so that it can be commercialized and launched into industry.

Student mentorship is the fundamental backbone of academia, both by nurturing the student's curiosity and by shaping the student's future career. Research in an exciting, stimulating, and challenging environment can provide opportunities for students to learn from a multitude of sources, including their fellow peers, senior students, their faculty advisor, and the community at large. The Precision Instrumentation Group is a multi-disciplinary community with ties to mechanical, optical, and electrical engineering. Students in the group research high-impact fields, create novel solutions to today's multidisciplinary challenges, produce professional, technologically relevant results, and communicate effectively when disseminating their work.

EMPLOYMENT

ASSOCIATE PROFESSOR with tenure	7/2017-

JAMES P. WILMOT ASSISTANT PROFESSOR	7/2015-6/2017
ASSISTANT PROFESSOR OF MECHANICAL ENGINEERING AND OF OPTICS	7/2011-6/2017

University of Rochester; Rochester, NY USA
Hajim School of Engineering & Applied Sciences
Department of Mechanical Engineering
Affiliations: *Center for Freeform Optics*, *R.E. Hopkins Center for Optical Design & Engineering*

CO-FOUNDER & DIRECTOR OF RESEARCH	2014-

Clerio Vision, Inc.; Rochester, NY USA

PHD RESEARCHER	2/2007-12/2010

Delft University of Technology; Delft, The Netherlands
Precision & Microsystems Engineering: Mechatronic System Design

RESEARCH ASSISTANT	8/2005-2/2007

University of North Carolina at Charlotte; Charlotte, NC USA
Center for Precision Metrology

INSTRUMENTATION ENGINEER	5/2005-8/2005
UNDERGRADUATE RESEARCH ASSISTANT	8/2004-5/2005

InSituTec Incorporated; Concord, NC USA
Supervised by: Dr. Shane C. Woody (InSituTec) & Prof. Stuart T. Smith (UNC Charlotte)

EDUCATION

DOCTORATE OF PHILOSOPHY, MECHANICAL ENGINEERING	12/2010

Delft University of Technology; Delft, The Netherlands
Dissertation: *Optical Metrology Techniques for Dimensional Stability Measurements*
Advisors: Prof. ir. Robert H. Munnig Schmidt & ir. Jo W. Spronck

MASTER OF SCIENCE, MECHANICAL ENGINEERING	5/2007

University of North Carolina at Charlotte; Charlotte, NC USA
Thesis: Reducing Frame Stiffness Dependency in Nanoindentation
Advisors: Prof. Stuart T. Smith & Prof Robert J. Hocken

BACHELOR OF SCIENCE, MECHANICAL ENGINEERING	5/2005

University of North Carolina at Charlotte; Charlotte, NC USA
GPA: 3.6/4.0; *Cum Laude*

PUBLICATIONS

BOOKS

4   Butler SC, Ricci MA, **Ellis JD**. *SPIE Spotlight: Optical Methods for Point-to-Point Metrology*, SPIE Press (currently contracted)

3   **Ellis JD**, Smith ST, Badami VG. *ASPE Handbook: Flexures*, ASPE Press (currently contracted)

2   **Ellis JD**. *Field Guide to Displacement Interferometry*, SPIE Press 2014 (print ISBN: 978-0-8194-9799-4, ebook: 978-0-8194-9800-7)

1   **Ellis JD.** *Optical Metrology Techniques for Dimensional Stability Measurements*, PhD Thesis, Delft University of Technology (print ISBN: 978-94-91104-06-0)

JOURNAL PUBLICATIONS

30   Lu C, Burnham-Fay ED, Ellis JD, Schmitz TL, Tarbutton JA. Periodic Error Compensation in Fiber-coupled Heterodyne Interferometry. Procedia Manufacturing 2017; **10**: 674-682 [www]

29   Wozniak KT, Gearhart SM, Savage DE, DeMagistris M, **Ellis JD**, Knox WH, Huxlin KR. Comparison of Refractive Index Change via Non-Invasive Femtosecond Laser Processing in Human and Cat Corneas. *Journal of Biomedical Optics* 2016; (accepted – in press)

28   Gillmer SR, Abdolrahim N, Wayson SE, Winans JD, Fang DZ, DesOrmeaux JPS, Getpreecharsawas J, **Ellis JD**, Fauchet PM, McGrath JL. Predicting the failure of ultrathin porous membranes via bulge test. *Thin Solid Films* 2016; **631**:152-160 [www]

27   Corsetti JA, Green WE, **Ellis JD**, Schmidt GR, Moore DT. Simultaneous interferometric measurement of CTE and dn/dT of optical materials. *Optical Engineering* 2016; **55**(29):8145-8152 [www]

26   Wang C, Burnham-Fay ED, **Ellis JD**. Real-time FPGA-based Kalman filter for constant and non-constant velocity periodic error correction. *Precision Engineering* 2016; (accepted-in press) [www]

25   Wang C, **Ellis JD.** Data age error compensation for non-constant velocity metrology. *IEEE Transactions on Instrumentation and Measurement* 2016; **65**(11):2601-2611 [www]

24   Yu X, Zhang T, **Ellis JD.** Absolute air refractive index measurement and tracking based on variable length vacuum cell. *Optical Engineering* 2016; **55**(6):0641112 [www]

23   Yu X, Gillmer SR, Woody SC, **Ellis JD.** Development of a compact, fiber-coupled, six degree-of-freedom measurement system for precision linear stage metrology. *Review of Scientific Instruments* 2016; **87**(6):065109 [www]

22   Lu C, Troutman JR, Schmitz TL, **Ellis JD**, Tarbutton JA. Application of the continuous wavelet transform in periodic error compensation. *Precision Engineering* 2016; **44**:245–251 [www]

21   Yu X, Gillmer SR, **Ellis JD.** Beam geometry, alignment, and wavefront aberration effects on interferometric differential wavefront sensing. *Measurement Science & Technology* 2015; **26**(12): 125203 [www]

20   Gandara-Montano GA, Ivansky A, Savage DE, **Ellis JD**, Knox WH. Femtosecond laser micromachining of freeform gradient index microlenses in hydrogel-based contact lenses. *Optical Materials Express* 2015; **5**(10):242830 [www]

19   Zhao Y, Schmidt G, Moore DT, **Ellis JD.** Absolute thickness metrology with sub-micrometer accuracy using a low coherence distance measuring interferometer. *Applied Optics* 2015; **54**(25):7693–7700 [www]

18   Gillmer SR, Yu X, Wang C, **Ellis JD.** Robust high dynamic range optical roll sensing. *Optics Letters* 2015; **40**(11):2497–2500 [www]

17   Wang C, **Ellis JD.** Dynamic Doppler frequency shift errors: measurement, characterization, and compensation. *IEEE Transactions on Instrumentation and Measurement* 2015; **64**(7):1994–2004 [www]

16   Savage DE, Brooks DR, DeMagistris M, Xu L, MacRae S, **Ellis JD**, Knox WH, Huxlin KR. First Demonstration of Ocular Refractive Change using Blue-IRIS in Live Cats. *Investigative Ophthalmology & Visual Science* 2014; **55**(7):4603–4612 [www]

15   Echter MA, Roll CD, Keene AD, Ellis JD. Carrier fringe analysis algorithms for three degree of freedom optical probing, *Precision Engineering* 2014; **34**(4):893–902 [www]

14 Brooks DR, Brown NS, Savage DE, Wang C, Knox WH, **Ellis JD**. Precision large € field scanning system for high numerical aperture lenses and application to femtosecond micromachining of ophthalmic materials. *Review of Scientific Instruments* 2014; **85**(6): 065107 [www]

13 Gillmer SR, Smith RCG, Woody SC, **Ellis JD**. Compact € fiber-coupled three degree-of-freedom displacement interferometry for nanopositioning stage calibration. *Measurement Science & Technology* 2014; **25**(7): 075205 [www]

12 Zhu M, Li Y, **Ellis JD**. Polarization model for total internal reflection-based retroreflectors. *Optical Engineering* 2014; **53**(6): 064101 [www]

11 **Ellis JD**, Baas M, Joo K, Spronck JW. Errors in correction algorithms for periodic nonlinearity in displacement measuring interferometers. *Precision Engineering* 2012; **36**(2):261–269 [www]

10 **Ellis JD**, Voigt D, Spronck JW, Verlaan AL, Munnig Schmidt RH. Frequency Stabilized HeNe Gas Laser with 3.5 mW from a single mode. *Precision Engineering* 2012; **36**(2):203–209 [www]

9 **Ellis JD**, Meskers AJH, Spronck JW, Munnig Schmidt RH. Fiber coupled displacement interferometry without periodic nonlinearity. *Optics Letters* 2011; **36**(18):3584–3586 [www]

8 Voigt D, **Ellis JD**, Verlaan AL, Bergmans RH, Spronck JW, Munnig Schmidt RH. Towards interferometry for dimensional drift measurements with nanometer uncertainty. *Measurement Science & Technology* 2011; **22**:094029 (5pp) [www]

7 Joo K, **Ellis JD**, Spronck JW, Munnig Schmidt RH. Real-time wavelength corrected heterodyne laser interferometry. *Precision Engineering* 2010; **35**(1):38–43 [www]

6 **Ellis JD**, Joo K, Buice ES, Spronck JW. Frequency stabilized three mode HeNe laser using nonlinear optical phenomena. *Optics Express* 2010; **18**(2):1373–1379 [www]

5 Joo K, **Ellis JD**, Buice ES, Spronck JW, Munnig Schmidt RH. High resolution heterodyne interferometer without detectable periodic nonlinearity. *Optics Express* 2010; **18**(2):1159–1165 [www]

4 Joo K, **Ellis JD**, Spronck JW, Munnig Schmidt RH. Design of a folded, multi-pass Fabry-Perot interferometer using a He-Ne laser for displacement metrology (Technical Design Note). *Measurement Science & Technology* 2009; **20**(10):107001 (5pp) [www]

3 **Ellis JD**, Joo K, Spronck JW, Munnig Schmidt RH. Balanced interferometric system for stability measurements. *Applied Optics* 2009; **48**(9):1733–1740 [www]

2 Joo K, **Ellis JD,** Spronck JW, van Kan PJM, Munnig Schmidt RH. A simple heterodyne laser interferometer with sub-nm periodic errors. *Optics Letters* 2009; **34**(3):386–388 [www]

1 **Ellis JD**, Smith ST, Hocken RJ. Alignment uncertainties in ideal indentation styli, *Precision Engineering* 2008; **32**:207–214 [www]

IN REVIEW & REVISION

3 Wang C, Zhong F, Ellis JD. Two-dimensional straightness measurement based on optical knife-edge sensing. *Review of Scientific Instruments* 207 (under review)

2 Wozniak KT, Elkins N, Brooks DR, Savage DE, DeMagistris M, MacRae S, **Ellis JD**, Knox WH, Huxlin KR. Contrasting the Impact of LIRIC and LASIK on Keratocyte Viability in Cat Cornea. *Experimental Eye Research* 2017; (under review)

1 Ricci MA, Butler SC, **Ellis JD**. Design of a compact homodyne displacement measuring interferometer with tip and tilt sensitivity. *Precision Engineering* 2016; (in revision)

CONFERENCE PROCEEDINGS

69   Zhao Y*, Schmidt GR, **Ellis JD**, Moore DT. Low-coherence interferometer measuring absolute thickness and topography with high accuracy. *OF&T-Optical Fabrication & Testing,* 09-13 July 2017, Denver, CO USA (accepted)

68   Corsetti JA*, Green WE, **Ellis JD**, Schmidt GR, Moore DT. Measurement of linear coefficient of thermal expansion and temperature-dependent refractive index using interferometric system. *OF&T-Optical Fabrication & Testing,* 09-13 July 2017, Denver, CO USA (accepted)

67   **Ellis JD***, Brooks DR, Wozniak KT, Gandara-Montano GA, Fox EG, Tinkham KJ, Butler SC, Zheleznyak LA, Buckley MR, Funkenbusch PD, Knox WH. Manufacturing of gradient index lenses for ophthalmic applications. *OF&T-Optical Fabrication & Testing,* 09-13 July 2017, Denver, CO USA (accepted)

66   Brooks DR*, **Ellis JD**. Curved image plane objective for femtosecond micro-modification of contact lenses. *IODC-International Optical Design Conference,* 09-13 July 2017, Denver, CO USA (accepted)

65   **Ellis JD***, Brook DR, Butler SC, Zheleznyak LA, Gandara-Montano GA, Wozniak KT, Knox WH. Scalability in contact lens manufacturing to improve the refractive performance and user comfort. *ASPE Spring Topical Meeting: Precision Engineering & Optics*, 24-25 April 2017, Tucson, AZ USA

64   Zheleznyak LA, Gandara-Montano GA, Huxlin KR, **Ellis JD**, Yoon G, Knox WH. First demonstration of human visual performance through refractive-index-modified ophthalmic devices written in hydrogels. *ARVO,* 7-11 May 2017, Baltimore, MD USA

63   Browar AEM, Shusteff M, Panas RM, **Ellis JD**, Spadaccini CM. Overview and comparison of spatial light modulator calibration methods. *31st ASPE Annual Meeting*, 23-28 Oct 2016, Portland, OR USA

62   Wang C*, Yu X, Gillmer SR, **Ellis JD**. Straightness measurement based on knife-edge sensing. *31st ASPE Annual Meeting*, 23-28 Oct 2016, Portland, OR USA

61   Green WE, Corsetti JA, Schmidt GR, Moore DT, **Ellis JD**. Development of a Michelson interferometer capable of measuring the thermal properties of optical materials. *31st ASPE Annual Meeting*, 23-28 Oct 2016, Portland, OR USA

60   **Ellis JD***, Gandara-Montano GA, Brooks DR, Wozniak KT, Gearhart SM, Zheleznyak LA, Funkenbusch PD, Knox WH, Huxlin KR, IRIS- a new paradigm in laser refractive correction, *Frontiers in Optics*, 17-21 Sept 2016, Rochester, NY USA (invited presentation)

59   Wozniak KT, Elkins N, Brooks D, Savage D, DeMagistris M, MacRae S, Hindman HB, **Ellis JD**, Knox WH, Huxlin KR. Differential impact of LIRIC and femto-LASIK on keratocyte viability in cat cornea, *ARVO 2016*, 1-5 May 2016, Seattle, WA USA

58   Ricci MA, Butler SC, Wang C, **Ellis JD**. 3 axis homodyne displacement measuring interferometer probe for freeform optics. *30th ASPE Annual Meeting*, 1-6 Nov 2015, Austin, TX USA

57   Wang C, **Ellis JD**. Real-time periodic error correction for heterodyne interferometers using Kalman Filters. *30th ASPE Annual Meeting*, 1-6 Nov 2015, Austin, TX USA

56   Yu X, Gillmer SR, Howard SC, Woody SC, **Ellis JD**. Compact six degree-of-freedom interferometer for precision linear stage metrology. *30th ASPE Annual Meeting*, 1-6 Nov 2015, Austin, TX USA

55   Lu C, **Ellis JD**, Schmitz TL, Tarbutton JA. Improvement of a periodic error compensation algorithm based on the continuous wavelet transform. *30th ASPE Annual Meeting*, 1-6 Nov 2015, Austin, TX USA

54   Gillmer SR, Head ST, Theisen MJ, Brown TG, **Ellis JD**. Systems-level integration for focused beam scatterometry, *30th ASPE Annual Meeting*, 1-6 Nov 2015, Austin, TX USA

53   Butler SC, Ricci MA, Wang C, Wei Q, **Ellis JD**. Homodyne displacement measuring interferometer probe for optical coordinate measuring machine with tip and tilt sensitivity. *Proc. SPIE* **9633:**96332E (2015)

52   Burnham-Fay ED*, Jacobs-Perkins D, **Ellis JD**. Interferometric strain measurements with a fiber optic probe. *Proc. SPIE* **9576:** 95760F (2015)

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