Pranay Seshadri, PhD

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Links: Google scholar, Turing, Researchgate

Professional Experience:

- **2018 - Present:** Group Leader, Data Centric Engineering, The Alan Turing Institute.
- **2016 - Present:** Founder, Effective Quadratures, `www.effective-quadratures.org`.
- **2016 - Present:** Research Associate, Department of Engineering, University of Cambridge.
- **2011 - 2015:** Research Assistant, Department of Engineering, University of Cambridge.
- **2013:** CFD Researcher, Design Systems Engineering, Rolls-Royce plc.
- **2008 - 2012:** Research Assistant, Alfred Gessow Rotorcraft Center, University of Maryland.

Education:

- **2016:** PhD in Computational Engineering, University of Cambridge, Cambridge, U.K.
- **2012:** MS in Aerospace Engineering, University of Maryland, College Park, U.S.A.
- **2009:** BS in Aerospace Engineering, University of Maryland, College Park, U.S.A.

Honors and awards:

- Visiting Lecturer, The Von Karman Institute for Fluid Dynamics, Belgium, October 2018.
- Visiting Professorship, University of Cagliari, Sardinia, Italy, April 2018.
- EPSRC Knowledge Transfer Fellowship, 2016.
- Visiting Fellowship, Center for Turbulence Research, Stanford University, 2013
- Best Master's Research, A. James Clark School of Engineering, University of Maryland, 2011.
- Best Master's Research, Department of Aerospace Engineering, University of Maryland, 2011.
- AHS Design Competition, 1st Place winner (Team Excalibur), 2011.

Current research projects:

- The Alan Turing Institute: *Polynomial regression, splines and neural networks.*
- The Alan Turing Institute: £33,750 *Dimension reduction in design and manufacturing.*
- Rolls-Royce plc: £193,628 *Improved engine uncertainty assessment tool.*

Past research projects:

- Rolls-Royce plc: £85,761 *Engine uncertainty assessment tool.*
- EPSRC Knowledge Transfer Fellowship: £35,000 *De-sensitizing fan aerodynamics.*
- Rolls-Royce plc: £8,146 *3D turbomachinery design and optimisation.*
- Rolls-Royce plc: £3,000 *Industrial contribution towards a summer project.*
- Rolls-Royce plc: £6,000 *Mesh adaptation and uncertainty analysis.*

Professional services:

- Reviewer for ASME Turbo Expo 2019, 2018, 2016, 2015.
- Director for Cambridge Linear Algebra Seminar Series, `www.cambridge-class.org`.
- Journal reviewer for:
  - Journal of Computational Physics
  - Computer Methods in Applied Mechanics Engineering
  - Journal of Engineering Mechanics
  - The Aeronautical Journal

Teaching (Cambridge):

- **Thermofluids 2P4**: Michaelmas 2018, Michaelmas 2016
- **Linear Algebra 1P7**: Lent 2018, Lent 2017
- **Mathematical methods 3M1**: Lent 2018, Lent 2017
- **Structures 1P2**: Michaelmas 2014

Journals and pre-prints:

1. Seshadri, P., Thorne, G., Simpson, D., Parks, G., 2018. *Supervised learning engine temperature measurements part I: Deterministic modeling and averaging.* (under Rolls-Royce review), to be submitted to ASME Journal of Turbomachinery.
2. Seshadri, P., Thorne, G., Simpson, D., Parks, G., 2018. *Supervised learning engine temperature measurements part II: Non-deterministic modeling and sampling uncertainty.* (under Rolls-Royce review), to be submitted to ASME Journal of Turbomachinery.
3. Ghisu, T., Cambuli, F., Puddu, P., Mandas, N., Seshadri, P., Parks, G. T., 2018. *Numerical evaluation of entropy generation in Wells turbines.* Meccanica, 53(4), pp. 3437-3456. Paper.
4. Ghisu, T., Puddu, P., Cambuli, F., Mandas, N., Seshadri, P., Parks, G. T., 2018. *Discussion on 'Performance analysis of Wells turbines using the entropy generation minimization method'.* Renewable Energy, 118, pp. 386-392. Paper.

5. Seshadri, P., Shahpar, S., Constantine, P. G., Parks, G. T., Adams, M. 2018. *Turbomachinery active subspace performance maps.* ASME Journal of Turbomachinery, 140 (4), 041003, pp. 1-11. Paper.

6. Yuchi, S., Seshadri, P., Shahpar, S., Parks, G. T., 2018. *Supporting multi-point turbomachinery dimension reduction via polynomial variable projection.* (under review) AIAA Journal of Propulsion and Power. Paper.

7. Seshadri, P., Iaccarino, G., Ghisu, T., 2018. *Quadrature strategies for constructing polynomial approximations.* (to appear) Uncertainty Modeling for Engineering Applications, Springer.

8. Seshadri, P., Yuchi, S., Parks, G. T., 2018. *Dimension reduction via Gaussian ridge functions.* (under review) SIAM/ASA Journal on Uncertainty Quantification. Preprint arXiv:1802.00515.

9. Seshadri, P., Narayan, A., Mahadevan, S., 2017. *Effectively subsampled quadratures for least squares polynomial approximations.* SIAM/ASA Journal on Uncertainty Quantification, 5(1), pp. 1003-1023.

10. Seshadri, P., Parks, G. T., 2017. *Effective-Quadratures (EQ): Polynomials for computational engineering studies.* The Journal of Open Source Software, 2 (11).

11. Seshadri, P., Constantine, P. G., Iaccarino, G., Parks, G. T., 2016. *A density-matching approach for optimization under uncertainty.* Computer Methods in Applied Mechanics and Engineering, 305, pp. 562-578.

12. Seshadri, P., Parks, G. T., Shahpar, S., 2015. *An aerodynamic analysis of a robust redesigned modern aero-engine fan.* Preprint arXiv:1604.02345.

13. Seshadri, P., Parks, G. T., Shahpar, S., 2015. *Density-matching for turbomachinery optimization under uncertainty.* Preprint arXiv:1510.04162.

14. Seshadri, P., Parks, G. T., Shahpar, S., 2015. *Leakage uncertainties in compressors: The case of rotor 37.* AIAA Journal of Propulsion and Power, 31(1), pp. 456-466.

15. Seshadri, P., Benedict, M., Chopra, I., 2013. *Understanding micro air vehicle flapping-wing aerodynamics using force and flow field measurements.* AIAA Journal of Aircraft, 50(4), pp. 1070-1087.

16. Seshadri, P., Benedict, M., Chopra, I., 2012. *A novel mechanism for emulating insect wing kinematics.* Bioinspiration and Biomimetics, 7(3), 036017.

Invited talks:

1. Von Karman Institute, Brussels, October 17th, 2018. *Polynomial uncertainty quantification in the age of A.I.*

2. The Alan Turing Institite, September 5th, 2018. *Data-centric engineering in aero-engines.*

3. University of Cambridge, May 16th, 2018. *Uncertainty quantification in thermofluids.*

4. University of Cagliari, Italy, April 16th, 2018. *Fan 3D aerodynamic design.*

5. University of Cagliari, Italy, April 12th, 2018. *Dimension reduction investigations in turbomachinery: Applications to manufacturing.*

6. Then Alan Turing Institute, March 27th, 2018. *On dimension reduction investigations in turbomachinery.*

7. University of Liverpool, February 27th, 2018. *Dimension reduction investigations in turbomachinery: Opportunities for uncertainty quantification and design under uncertainty*

8. NAFEMS (Online), April 24th, 2017. *Turbomachinery active subspace performance maps.*

9. SIAM Computational Science & Engineering Conference, Atlanta, March 1st, 2017. *Effective quadratures: Least squares polynomials for parametric studies.*

10. Stanford University, October 24th, 2016. *On fan aerodynamics with manufacturing variations with active subspaces.*

11. Stanford University, October 31st, 2016. *Effective Quadratures: Polynomials for Computational Engineering Studies.*

Present post-docs and students

1. Jonny Mak (Postdoctoral Fellow, The Alan Turing Institite): *A study on polynomial regression for tackling problems in big data.*

2. Nicholas Wong (PhD student, University of Cambridge. Co-advised with Geoff Parks): *Dimension reduction algorithms and pedigree rules for better manufacturing in turbomachinery.*

Past students

1. Nicholas Wong (Master's Thesis, University of Cambridge, 2018): *On polynomial approximations via compressive sensing: coefficient computation and exploitation with applications to turbomachinery manufacturing tolerances.*

2. Henry Yuchi (Master's Thesis, University of Cambridge, 2018): *Multi-point turbomachinery active subspace performance using polynomial variable projection with applications to fan aerodynamic design.*

3. Irene Virdis (Visiting Master's Student, University of Cambridge, 2018): *A study on the Nataf, Rosenblatt and principal component transforms on correlated input uncertainties in turbine aerodynamics.*