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# Dr Peter Gardner MA, MSc, PhD, FIET, SMIEEE

Head of School
Reader in Microwave Engineering

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## About

Peter Gardner is Reader in Microwave Engineering at the University of Birmingham. He has over 120 publications on various aspects of microwave engineering research. He teaches microwave engineering and communication systems engineering at Honours and Masters levels at Birmingham, and he regularly delivers course in microwave design at the CPD centre in Oxford University. He supervises a group of PhD students working in microwave amplifier and antenna research. He has held major research grants from numerous sources, including EPSRC, The Highways Agency, BAE Systems and Nokia.

## Qualifications

- Fellow IET, 2013
- Member IET 2002
- Senior Member IEEE 2000
- PhD UMIST 1992
- MSc UMIST 1990
- BA (Physics) Oxford University 1980 (and Subsequent MA)

## Biography

Peter Gardner graduated in Physics from the University of Oxford in 1980 with first class honours. He gained eight years of industrial experience in research and development of active microwave components for Ferranti International, Poynton, Cheshire and later as an independent consultant. In 1989 he returned to academic research, joining the Dept. of Electrical Engineering and Electronics at UMIST as a Research Associate. In the course of his work there he obtained an MSc in 1990 and PhD in 1992. He joined the School of Electronic and Electrical Engineering at Birmingham in 1994, as a lecturer, where he has built up a range of research activities in the broad area of microwave engineering, whilst also making major contributions to teaching and administration.

## Teaching

- Advanced Communication Systems (Level H)
- Principles of Communication Engineering (Level M)
- RF and Microwave Engineering (Level M)

## Postgraduate supervision

- Novel high efficiency, high linearity transmitters for microwave communication systems
- Reconfigurable antennas for future radio systems
- Measurement systems for active and reconfigurable antennas

## Research

His current research interests are in active and passive microwave components, including:

- Active and adaptive antennas for cognitive radio and other applications
- Microwave amplifiers and transmitter linearization techniques
- Micromachined antennas and beamformers

## Other activities

- Member of IET and Senior Member of IEEE

- Reveiwer for IEEE Trans on MTT, AP.
- Reviewer for IET Electronics Letters and Microwaves, Antennas and Propagation
- Conference paper reviewer for IEEE AP-S, EuMC, LAPC

## Publications


1. Hamid, M.R., Gardner, P., Hall, P.S and Ghanem, F. “Vivaldi Antenna with Integrated Switchable Band Pass Resonator.” Accepted for publication in IEEE Trans. Antennas and Propagation.
2. Hamid, M.R., Gardner P., Hall, P.S. and Ghanem, F., “Multi-mode Vivaldi Antenna.” IET Electronics Letters, Vol 46, Issue 21, pp. 1424-1425. 2010 (Accompanied by a special invited feature article.)
3. Hamid, M.R., Gardner, P and Hall, P.S. “Switched Band Vivaldi Antenna,” IEEE Trans. Antennas and Propagation. Vol. 59, Issue 5. Pp. 1472-1480. 2011
4. M. Thian, V. Fusco and P. Gardner, “Power-Combining Class-E Amplifier With Finite Choke”. IEEE Trans. Circuits and Systems. Vol 58 Iss. 3. Pp. 451-457. 2011
5. Hamid, M.R., Gardner, P., Hall, P.S., Ghanem, F., “Reconfigurable Vivaldi antenna.” Microwave and Optical Technology Letters. Vol. 52, Issue 4, April 2010, Pages: 785–787,
6. Rahim, S.K.A. and Gardner, P., “Adaptive antenna on cascaded Butler Matrices system,” Microwave and Optical Technology Letters. Vol. 52, Issue 4, April 2010, Pages: 847–849.
7. M. Thian and P. Gardner, “Envelope-Tracking Based Doherty Power Amplifier,” International Journal of Electronics, Taylor and Francis. 97: 5, Pages 525 - 530. 2010
8. Hamid, M.R.; Hall, P.S.; Gardner, P.; Ghanem, F.; “Switched WLAN-wideband tapered slot antenna,” Electronics Letters. Vol: 46 , Issue: 1. Page(s): 23 – 24. 2010.
9. Hamid, M.R.; Hall, P.S.; Gardner, P.; Ghanem, F.; “Switchable filtering in Vivaldi antenna,” IET Electronics Letters, Vol 46 , Issue: 7. Page(s): 477 – 478. 2010. (Selected by the Editor for highlighting in the “In-brief” section of the issue.)
10. Murad, N.A.; Lancaster, M.J.; Gardner, P.; Ke, M.L.; Wang, Y.; “Micromachined H-plane horn antenna manufactured using thick SU-8 photoresist,” Electronics Letters, Vol. 46 , Issue: 11. Page(s): 743 – 745. 2010.
11. Kelly, J.R.; Hall, P.S.; Gardner, P.; Ghanem, F.;”Integrated narrow/band-notched UWB antenna,” IET Electronics Letters, Vol. 46 , Issue: 12, Page(s): 814 – 816. 2010
12. Hu, Z.H.; Song, C.T.P.; Kelly, J.; Hall, P.S.; Gardner, P, “Wide tunable dual-band reconfigurable antenna,” Electronics Letters Vol. 45 , Issue: 22. Page(s): 1109 – 1110. 2009.
13. M. Thian, M. Xiao and P. Gardner, “Digital Baseband Predistortion Based Linearised Broadband Inverse Class-E Power Amplifier.” IEEE Trans Microwave Theory and Techniques, Volume: 57 , Issue: 2, Page(s): 323 – 328. 2009.
14. M. Xiao and P. Gardner, “Characterisation, analysis and injection of two-tone third-order intermodulation products in an amplifier,” IET Microwaves, Antennas and Propagation. Vol. 3 , Issue: 3, Page(s): 443 – 455. 2009
15. Bull, S., Mabbott, A., Gardner, P., Jackson, T., Lancaster, M., Quigley, S. & Childs, P.A. (2008). Supporting Interaction Preferences and Recognition of Misconceptions with Independent Open Learner Models, in W. Neijdl, J. Kay, P. Pu & E. Herder (eds), Adaptive Hypermedia and Adaptive Web-Based Systems, Springer-Verlag, Berlin Heidelberg, 62-72.
16. Sharul Kamal Abdul Rahim and P. Gardner. “Dual butler matrix active antenna system.” Microwave and Optical Technology Letters Vol. 49, Issue 12, Pages: 3004-3007 Dec 2007.
17. Sharul Kamal Abdul Rahim and P. Gardner. “ SNR measurement in a beamforming network.” Microwave and Optical Technology Letters Volume 49, Issue 12, Pages: 2968-2973. Dec 2007.
18. Chan, K.M., Lee, E., Gardner, P. and Dodgson, T.E., "Differential aperture coupling technique for passive and active integrated antenna design" IET Microwaves, Antennas & Propagation, Volume 1, Issue 2, April 2007 pp. 458 – 464
19. Ee Lee, Kin Meng Chan, Gardner, P. and Dodgson, T.E "Active Integrated Antenna Design Using a Contact-Less, Proximity Coupled, Differentially Fed Technique," IEEE Transactions on Antennas and Propagation Vol 55, Issue 2, Feb. 2007 pp. 267 - 276
20. Chan, K.M., Lee, E., Lee, T.Y., Gardner, P. and Dodgson, T.: "Aperture-coupled, differentially-fed planar inverted F antenna," Electronics Letters Vol. 42, Issue 11, 25 May 2006 pp. 608 - 609
21. Lee K.C. and Gardner P., "Adaptive neuro-fuzzy inference system (ANFIS) digital predistorter for RF power amplifier linearization" IEEE Transactions on Vehicular Technology, Vol 55, Issue 1, Jan. 2006 pp. 43 - 51
22. Kimber D. and Gardner P., “High-Q Class E power amplifier analysis using energy conservation," IEE Proc.-Circuits Devices Systems, Vol. 152, Issue 6, Dec. 2005. pp. 591 – 596
23. Kimber D. and Gardner P., “Drain AM Frequency Response of the High-Q Class E Power Amplifier.” IEE Proc.-Circuits Devices Systems, Vol. 152, Issue 6, Dec. 2005. pp. 752 – 756
24. Xiyuan Wang, Yingjie Di, Gardner, P., Ghafouri-Shiraz, H.: "Frequency transform synthesis method for cross-coupled resonator bandpass filters," IEEE Microwave and Wireless Components Letters, IEEE Vol 15, Issue 8, Aug. 2005 Page(s):533 - 535
25. Y Di, P Gardner, H Ghafouri-Shiraz : "Methods for Measuring the RF Half-wave Voltage of LiNbO3 Optical Modulators," Microwave and Optical Technology Letters, Vol 46, No. 5, pp 440-443. 2005
26. Steven Gao and Peter Gardner, “Integrated Antenna/Power Combiner for LINC Radio Transmitters,” IEEE Trans. Microw. Theory Tech., vol MTT 53 no. 3, March 2005. pp. 1083-1088.
27. Kimber, D. and Gardner, P., “Class E power amplifier steady-state solution as series in 1/Q,” IEE Proc.-Circuits Devices Systems, Vol. 151, Issue 6, Dec. 2004. pp. 557 – 564
28. Lee, T.Y.; Gardner, P.; “Air-spaced beamforming patch antenna array,” Electronics Letters , Vol. 40 , No. 12, June 2004, pp. 714 – 715
29. Lee, K.C.; Gardner, P.; “Neuro-fuzzy approach to adaptive digital predistortion,” Electronics Letters, Vol. 40, No. 3, Feb. 2004. pp. 185 – 187


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