P. Vijay Kumar

EDUCATION

Ph.D.	1983	Electrical Engineering-Systems, University of Southern California
M. Tech	1979	Electrical Engineering, IIT Kanpur
B. Tech	1977	Electronics and Electrical Communication Engineering, IIT Kharagpur

APPOINTMENTS

2021-present	Distinguished Emeritus Professor, Electrical Communication Engineering, IISc
2003-2021	Professor, Electrical Communication Engineering, IISc
2018- 2020	Visiting Professor, EE-Systems, USC
2010- 2017	Adjunct Research Professor, EE-Systems, USC
2012-2014	Chairman, ECE Department, IISc
1994-2003	Professor, EE-Systems, USC
1989-1994	Associate Professor, EE-Systems, USC
1983-1989	Assistant Professor, EE-Systems, USC

RESEARCH INTERESTS:

Algebraic coding theory, including codes for low-latency communication, codes for distributed storage, space-time codes for multiple-antenna communication, algebraic-geometric codes and low-correlation sequences.

AWARDS AND HONORS

1. Spreading Codes Adopted by the Indian Regional Navigation Satellite System, 2021.

   - A family of low-correlation sequences, known as the Interleaved Z_4-linear (IZ4) family of spreading codes designed by P. V. Kumar along with scientists D. Dharmappa and S. Mishra of the Indian Space Research Organization (ISRO) will be incorporated by ISRO into the new, (civilian) L1-band, standard positioning service signal of the Indian Regional Navigation Satellite System (IRNSS), also known as NavIC (Navigation with Indian Constellation). Sequences in the family serve to distinguish the signals transmitted by the different satellites. For details, please see:
   - `https://www.isro.gov.in/digital.html#:~:text=by%20ISRO%20and-,IISc,-NavIC%20%28Navigation%20with`
   - `https://iisc.ac.in/designing-the-iz4-family-of-spreading-codes-for-the-navic-l1-signal/`
   - The IZ4 design was presented at the *Fifteenth Meeting of the International Committee on Global Navigation Satellite Systems (ICG-15)* organized by the United Nations Office for Outer Space Affairs, Sep. 27-Oct. 1, 2021 as well as at ISIT 2021.
   - Joint IISc-ISRO Indian Patent No. 383332, was granted, Nov. 30, 2021.

2. Prize Paper Award, IEEE Information Theory Society, 1995.

- A. R. Hammons, P. V. Kumar, A. R. Calderbank, N. J. A. Sloane and P. Sole, "The Z/sub 4/-linearity of Kerdock, Preparata, Goethals, and related codes," in IEEE Transactions on Information Theory, vol. 40, no. 2, pp. 301-319, March 1994, doi: 10.1109/18.312154. This paper settled a long-standing mystery in coding theory that was also reported upon in the media:
  - Barry Cipra, "Nonlinear codes straighten up – and get to work," *Science*, pp. 658-659, Oct. 29, 1993.
  - John J, Keller, "Keeping data error-free along the phone lines," *Wall Street Journal*, Dec. 27, 1993.
  - Barry A. Cipra, "Coding theorists wring linearity out of nonlinear codes," *Siam News*, Feb. 1994.
  - Barry Cipra, "Straightening out nonlinear codes," *What's Happening in the Mathematical Sciences* , pp. 37-40, vol. 2, 1994.
  - Ivars Peterson, "Policing digits: New keys for keeping digital data straight," *Science News*, March 12, 1994.
  - Chappell Brown, "Coding scheme aids wireless design," *Electronic Engineering Times*, Nov. 22, 1993.

3. Low-Correlation Sequence Family Adopted into the 3G WCDMA Standard, 2001.

   - The low-correlation CDMA sequence family $S(2)$ introduced in:
     P. V . Kumar, T. Helleseth and A. R. Calderbank, A. R. Hammons, Jr., "Large Families of Quaternary Sequences with Low Correlation," *IEEE Trans. Inform. Theory*, March 1996, was part of the 3G, WCDMA, global cellular telephony standard.

4. IEEE Data Storage Best Paper Award, 2011/12.

   - K. V. Rashmi, Nihar B. Shah and P. Vijay Kumar, "Optimal Exact-Regenerating Codes for Distributed Storage at the MSR and MBR Points via a Product-Matrix Construction" *IEEE Transactions on Information Theory*, Vol. 57, No. 8, August 2011 (IEEE Data Storage Best Paper/Best Student Paper Award of 2011/2012).

5. DCOSS Best Paper Award, 2008

   - N . E. Venkatesan, T. Agarwal and P. V. Kumar "On the average case communication complexity for detection in sensor networks," presented at the *4th IEEE International Conf. on Distributed Computing in Sensor Systems (DCOSS '08)*, Santorini Island, Greece, June 11 - 14, 2008. Best Paper Award (Algorithmic Track).

6. Invited Plenary Talk at ISIT 2014.
   (IEEE Information Theory Symposium on Information Theory, 2014, Hawaii)

7. Fellow, IEEE, 2002.
   (for contributions to the theory of error-correcting codes and low-correlation sequence design)

8. Fellowship in the Indian Academies:

   - Fellow, Indian Academy of Sciences, 2017.
   - Fellow, Indian National Science Academy, 2017.
   - Fellow, Indian National Academy of Engineering, 2014.

9. Other Fellowships

   - J. C. Bose National Fellowship, 2017-2022.
     - The JC Bose fellowship is awarded by the Science and Engineering Research Board of the Department of Science & Technology, Government of India, to active scientists in recognition for their outstanding performance).
   - NetApp Faculty Fellowship
     - The NetApp Advanced Technology Group established the NetApp Faculty Fellowship program to fund innovative research on data storage and related topics. The goals of this program are to encourage leading-edge research in storage and data management and to foster relationships between academic researchers and engineers and researchers at NetApp. (Oct. 2011-April 2012 and May 2013-Nov. 2014.)

- Y. C. Cheng Engineering Fellowship, University of Hong Kong (2009-2010).
  - The Fellowship is awarded each year to a distinguished scholar in Engineering to enable the scholar to visit the Faculty of Engineering, University of Hong King for a period of one to three weeks for the purpose of delivering a distinguished lecture and interacting with staff at the Faculty.

10. USC-School-of-Engineering Senior Research Award, 1994
    (for seminal contributions to coding theory)

11. Tata Chem Chair Professor, IISc, 2013-2015.
    (Instituted by Tata Chemicals Limited in the areas of Chemical, Materials and Electrical Sciences).

12. Prof. Rustum Choksi Award, IISc, 2013.
    (for Excellence in Research in Engineering)

13. ACCS-CDAC Award, 2018
    (the Award by the Advanced Computing and Communications Society and the Center for Development of Advanced Computing, fosters the development and dissemination of the theory and applications of Computing and Communications sciences. The 2018 award was given jointly to V. Kamakoti and P. Vijay Kumar)

14. IEEE Information Theory Society:
    - Chair, Conference Committee (2019-21)
    - Member, Board of Governors, (2013-2015), (2019-2021), (2025-27)
    - Fellows Committee, (2004-2009), (2015-2017)
    - TPC Co-Chair, ISIT 2015, Hong Kong.

PATENTS

Indian Patents (Granted)

1. P. Vijay Kumar, Dileep Dharmappa and Sugandh Mishra, "Method and System for Generating Spreading Codes Based on Interleaved Z4-Linear Sequences for Navigation Systems, " Patentees: IISc, ISRO, Indian Patent No. 383332, granted, Nov. 30, 2021.

2. K. V. Rashmi, N. B. Shah and P. Vijay Kumar, "Distributed Storage System and a Method Thereof," Patentees: IISc, Indian Patent No. 309305, granted, March 15, 2019.

3. A. Sjana, P. V. Kumar, S. Krishnan, B. Amrutur, J. Sebastian, M. Hegde, S. V. R. Anand, A. Kumar, R. Subramanian, "An Intrusion Detection System and a Method Thereof," Patentees: IISc, Indian Patent No. 329897, granted, Jan. 22, 2020.

US Patents (Granted)

1. K. V. Rashmi, Nihar B. Shah and P. Vijay Kumar, " A Distributed Storage System and a Method Thereof," United States Patent no. 8,631,269, filed May 18, 2011, issued January 14, 2014.

2. Arvind Keerthi, Madabasi Govindarajan, P. Vijay Kumar, John Choma and Abhijit Shanbhag, "Pre-Distortion Apparatus," United States Patent no. 7,844,014, issued, Nov. 30, 2010.

3. P. V. Kumar, R. Omrani, J. Touch, A. Willner, P. Saghari,, "Code cycle modulation in optical code division multiple access systems," United States Patent 7,616,618, filed Nov. 2005, issued Nov. 10, 2009.

4. P. Vijay Kumar and Marcus H. Pendergrass, "A method and an apparatus for generating a large number of codes having desirable correlation properties," United States Patent no. 6,912,240, filed Nov. 2001, issued June 28, 2005. (patent relating to signal design for ultra-wideband communication filed by Time-Domain Inc.)

5. P. V. Kumar, K. Swaminathan, P. Gupta and K. Ganesan, "High Performance Error Control Coding in Channel Encoders and Decoders," United States Patent no. 5,666,370, September 9, 1997. (this patent relates to work in 1992-93 by author as a consultant for Hughes Network Systems, Germantown, relating to the design of a quaternary error-correcting code for the half-rate TDMA IS-54 cellular communication standard)

PUBLICATIONS

MONOGRAPH

1. Vinayak Ramkumar, S. B. Balaji, Birenjith Sasidharan, Myna Vajha, M. Nikhil Krishnan and P. Vijay Kumar (2022), "Codes for Distributed Storage", (invited monograph (267 pages)) *Foundations and Trends in Communications and Information Theory*, Vol. 19: No. 4, pp 547-813, May 2022.

EDITED BOOKS

1. Jong-Seon No, Hong-Yeop Song, Tor Helleseth and P. Vijay Kumar (Editors), *Mathematical properties of Sequences and other Combinatorial Structures*, Kluwer Academic Publishers, 2003.

2. T. Helleseth, P. V. Kumar and K. Yang, (Editors) *Sequences and Their Applications - SETA '01*, Proc. of SETA '01, Springer, 2002.

3. A. Pott, P. V. Kumar, T. Helleseth and D. Jungnickel, (Editors) *Difference sets, sequences and their correlation properties*, Nato Science Series, Series C: vol. 542, Kluwer academic press, 1999.

BOOK CHAPTERS

1. V. Ramkumar, M. Vajha, S. B. Balaji, M. N. Krishnan, B. Sasidharan and P. Vijay Kumar, "Codes for Distributed Storage," invited chapter in the *Concise Encyclopedia of Coding Theory*, edited By W. C. Huffman, J-L Kim, P. Solé, Chapman and Hall/CRC, 2021.

2. T. Helleseth and P. V. Kumar, "Pseudonoise Sequences", chapter in 3rd edition of the *Mobile Communications Handbook*, edited by Jerry D. Gibson (CRC and IEEE Press), Aug. 2012.

3. G. Garg, P. V. Kumar and T. Helleseth, "Low-Correlation Sequences,' invited chapter in *Advances in Wireless Communications*, (Eds. V. Tarokh), Springer, 2009.

4. P. V. Kumar, M. Win, H-F. Lu, C. Georghiades, "Error-Control Coding Techniques and Applications," invited chapter in the handbook, *Optical Fiber Telecommunications IV*, edited by Ivan P. Kaminow and Tingye Li, Spring 2002.

5. T. Helleseth and P. V. Kumar, "Sequences with Low Correlation", chapter in *Handbook of Coding Theory*, edited by V. Pless and C. Huffman, Elsevier Science Publishers, 1998.

6. T. Helleseth and P. V. Kumar, "Pseudonoise Sequences", chapter in *Mobile Communications Handbook*, edited by Jerry D. Gibson (CRC and IEEE Press), 1996,

   - (also reproduced in *Communications Handbook*, edited by Jerry D. Gibson (CRC and IEEE Press), 1997)

7. P. V. Kumar "Error-Correcting Codes", chapter in *Space Communication and Nuclear Scintillation*, edited by Nirode Mohanty, van Nostrand Rheinhold, 1990.

JOURNAL PAPERS

1. M. Vajha, V. Ramkumar, M. N. Krishnan and P. Vijay Kumar, "Explicit Rate-Optimal Streaming Codes With Smaller Field Size," in *IEEE Transactions on Information Theory*, vol. 70, no. 5, pp. 3242-3261, May 2024.

2. P. V. Kumar, D. Dharmappa and S. Mishra, "Interleaved Z_4-Linear Sequences With Low Correlation for Global Navigation Satellite Systems," in *IEEE Transactions on Information Theory*, vol. 70, no. 3, pp. 2224-2253, March 2024.

3. M. Vajha, S. B. Balaji and P. Vijay Kumar, "Small-d MSR Codes With Optimal Access, Optimal Sub-Packetization, and Linear Field Size," in *IEEE Transactions on Information Theory*, vol. 69, no. 7, pp. 4303-4332, July 2023.

4. S. B. Balaji, Myna Vajha, and P. Vijay Kumar , "Lower Bounds on the Sub-Packetization Level of MSR Codes and Characterizing Optimal-Access MSR Codes Achieving the Bound," *IEEE Trans. on Information Theory*, Vol. 68, No. 10, Oct. 2022, pp.6452-6471.

5. S. B. Balaji, Ganesh R. Kini , and P. Vijay Kumar , "A Tight Rate Bound and Matching Construction for Locally Recoverable Codes With Sequential Recovery From Any Number of Multiple Erasures," *IEEE Trans. on Information Theory*, Vol. 66, No. 2, Feb. 2020, pp.1023-1052.

6. M. Nikhil Krishnan, Deeptanshu Shukla, and P. Vijay Kumar, "Rate-Optimal Streaming Codes for Channels With Burst and Random Erasures," *IEEE Trans. on Information Theory*, Vol. 66, No. 8, Aug. 2020, pp.4869-4891.

7. M. Nikhil Krishnan, V. Ramkumar, M. Vajha and P. Vijay Kumar, "Simple Streaming Codes for Reliable, Low-Latency Communication," in *IEEE Communications Letters*, vol. 24, no. 2, pp. 249-253, Feb. 2020.

8. N. Prakash, V. Lalitha, S. B. Balaji and P. Vijay Kumar, "Codes With Locality for Two Erasures," in *IEEE Transactions on Information Theory*, vol. 65, no. 12, pp. 7771-7789, Dec. 2019.

9. M. Nikhil Krishnan, Myna Vajha, Vinayak Ramkumar, Birenjith Sasidharan, S. B. Balaji, P. Vijay Kumar, "Erasure Coding for Big Data,", *Advanced Computing and Communications*, Volume 3, Issue 1, March 2019, pp. 1-6.

10. Balaji S B, M. Nikhil Krishnan, Myna Vajha, Vinayak Ramkumar, Birenjith Sasidharan, P. Vijay Kumar, "Erasure coding for distributed storage: an overview," *Sci China Inf Sci*, vol. 61, October 2018, pp. 1-45.

11. G. Gong, T. Helleseth and P. V. Kumar, "Solomon W. Golomb—Mathematician, Engineer, and Pioneer," in *IEEE Transactions on Information Theory*, vol. 64, no. 4, pp. 2844-2857, April 2018, doi: 10.1109/TIT.2018.2809497.

12. M. N. Krishnan, B. Puranik, P. V. Kumar, I. Tamo and A. Barg, "Exploiting Locality for Improved Decoding of Binary Cyclic Codes," in IEEE Transactions on Communications, vol. 66, no. 6, pp. 2346-2358, June 2018.

13. K. V. Rashmi, N. B. Shah, K. Ramchandran and P. V. Kumar, "Information-Theoretically Secure Erasure Codes for Distributed Storage," in *IEEE Trans. Inform. Th.*, vol. 64, no. 3, pp. 1621-1646, March 2018.

14. Birenjith Sasidharan, N. Prakash, M. Nikhil Krishnan, Myna Vajha, Kaushik Senthoor, P. Vijay Kumar, "Outer Bounds on the Storage-Repair Bandwidth Tradeoff of Exact-Repair Regenerating Codes," *Int. J. Information and Coding Theory*, Vol. 3, No. 4, pp. 255-298, 2016.

15. Chao Tian, B. Sasidharan, Vaneet Aggarwal, Vinay A. Vaishampayan and P. Vijay Kumar, "Layered, Exact-Repair Regenerating Codes Via Embedded Error Correction and Block Designs," *IEEE Trans. Inform. Th.*., vol. 61, No. 4, April 2015, pp. 1933-1947.

16. Govinda M. Kamath, N. Prakash, V. Lalitha and P. Vijay Kumar, "Codes with Local Regeneration and Local Error Correction, *IEEE Trans. Inform. Th.*, vol. 60, no. 8, August, 2014, pp. 4637-4660.

17. K. Sreeram, S. Birenjith, and P. Vijay Kumar, "DMT of Parallel Path and Layered Networks under the Half-Duplex Constraint," *IEEE Trans. Inform. Th*, vol. 59, no. 6, June 2013, pp. 3875 - 3891.

18. V. Lalitha, N. Prakash, K. Vinodh, P. Vijay Kumar and S. Sandeep Pradhan, "Linear Coding Schemes for the Distributed Computation of Subspaces," *IEEE J. Sp. Areas in Comm*, *Special Issue on In-Network Computation: Exploring the Fundamental Limits*, April 2013, pp. 678-690.

19. Swaprava Nath, N.E. Venkatesan, Anurag Kumar, P. Vijay Kumar, "Theory and Algorithms for Hop-Count-Based Localization with Random Geometric Graph Models of Dense Sensor Networks," *ACM Transactions on Sensor Networks*, vol. 8, issue 4, Sep. 2012, pp. 35:1-35:38.

20. Nihar B. Shah, K. V. Rashmi, P. Vijay Kumar and Kannan Ramchandran, "Interference Alignment in Regenerating Codes for Distributed Storage: Necessity and Code Constructions," *IEEE Trans. Inform. Theory*, vol. 58, no. 4, April 2012, pp. 2134-2158.

21. Nihar B. Shah, K. V. Rashmi, P. Vijay Kumar and Kannan Ramchandran, " Distributed Storage Codes with Repair-by-Transfer and Nonachievability of Interior Points on the Storage-Bandwidth Tradeoff, " *IEEE Trans. Inform. Theory*, vol. 58, no. 3, Mar. 2012, pp. 1837-1852.

22. Reza Omrani, Gagan Garg, P. Vijay Kumar, Petros E Elia, Pankaj Bhambhani, " Large Families of Asymptotically Optimal Two-Dimensional Optical Orthogonal Codes," *IEEE Trans. Inform. Theory*, vol. 58, no. 2, Feb. 2012, pp. 1163-1185.

23. K Sreeram, S Birenjith, P V Kumar, "DMT of Multihop Networks: End Points and Computational Tools," *IEEE Trans. Inform. Theory*, vol. 58, no. 2, Feb. 2012, pp. 804-819.

24. K. V. Rashmi, Nihar B. Shah and P. Vijay Kumar, "Optimal Exact-Regenerating Codes for Distributed Storage at the MSR and MBR Points via a Product-Matrix Construction," *IEEE Transactions on Information Theory*, vol.57, 8, August 2011, pp. 5227-5239.

25. K. Vinodh, V. Lalitha, N. Prakash, P. V. Kumar and S. Pradhan, "Distributed Function Computation over Fields and Rings via Linear Compression of Sources," *Journal of the Indian Institute of Science*, special issue on *Algebra*, vol.91, Jan-March 2011, 181-205.

26. U. Raviteja, I. Sharanappa, B. Vanamali and P. V. Kumar, "Algebraic approaches to Space-Time Code Construction for Multiple-Antenna Communication," *Journal of the Indian Institute of Science*, special issue on *Algebra*, vol.91, Jan-March 2011, pp. 155-179.

27. N.E. Venkatesan, Tarun Agarwal, V. Lalitha, and P. Vijay Kumar, "Distributed intrusion detection in the presence of correlated sensor readings: Signal-space and communication-complexity view-point," *Ad-Hoc Networks*, Elsevier, vol. 9, 6, August 2011.

28. (invited paper) K. Vinodh, N. Prakash, V. Lalitha, P. Vijay Kumar, "DMT of Wireless Networks: An Overview," special issue on "Coding and Modulation for Cooperative Communications" *Journal of Communications*, Vol 5, No 4 (2010), pp. 265-281.

29. The SmartDetect Project Team, "Wireless sensor networks for human intruder detection," *Journal of the Indian Institute of Science*, Special issue on Advances in Electrical Science, vol. 90, no. 3, pp. 347-380, July-September 2010 (invited).

30. K. V. Rashmi, Nihar B. Shah and P. Vijay Kumar, "Network Coding," *Resonance*, vol. 15, no. 7, pp. 604-621, Jul. 2010.

31. Petros Elia, K. Vinodh, M. Anand and P. Vijay Kumar, "D-MG Tradeoff and Optimal Codes for a Class of AF and DF Cooperative Communication Protocols," *IEEE Trans. Inform. Theory*, vol. 55, 7, July 2009, pp. 3161-3185.

32. S. A. Pawar, K. R. Kumar, P. Elia, P. V. Kumar and B. A. Sethurman, "Space-Time Codes Achieving the DMD Tradeoff of the MIMO-ARQ Channel," *IEEE Trans. Inform. Theory*, vol. 55, 7, July 2009, pp. 3101-3114.

33. M. Anand and P. Vijay Kumar,"Low Correlation Sequences over a QAM Constellation," *IEEE Trans. Inform. Theory*, vol.54, No. 2, Feb 2008, pp. 791-810.

34. Petros Elia, B. A. Sethuraman, P. Vijay Kumar, "Perfect Space-Time Codes for Any Number of Antennas, " *IEEE Trans. Inform. Theory*, Nov 2007, vol.52, No.11, pp. 3853 - 3868.

35. Oscar Moreno, Reza Omrani, P. Vijay Kumar, and Hsiao-feng Lu, "A Generalized Bose-Chowla Family of Optical Orthogonal Codes and Distinct Difference Sets," *IEEE Trans. Inform Theory*, May 2007, vol.53, No.5, pp. 1907-1910.

36. Petros Elia, FrŽedŽerique Oggier and P. Vijay Kumar, "Asymptotically Optimal Cooperative Wireless Networks with Reduced Signaling Complexity," *IEEE Journal on Selected Areas in Communication*, *Special Issue on Cooperative Communications and Networking*, vol. 25, No 2, Feb 2007, pp. 258-267.

37. Petros Elia K.Raj Kumar, Sameer.A Pawar, P.Vijay Kumar Hsiao-feng Lu,"Explicit, Minimum-Delay Space-Time Codes Achieving the Diversity Multiplexing Gain Tradeoff ", *IEEE Trans. Inform Theory*, Sep. 2006, vol. 52, No. 9, pp. 3869-3884.

38. John E. McGeehan, S. M. R. Motaghian Nezam, P. Saghari, Alan E. Willner, Reza Omrani, and P. Vijay Kumar, "Experimental Demonstration of OCDMA Transmission Using a Three-Dimensional(Time-Wavelength-Polarization) Codeset," *Journal of Lightwave Technology*, Vol. 23, No. 10, Oct. 2005, pp. 3282-3288.

39. P. Saghari, R. Omrani, A. E. Willner, and P. V. Kumar, "Analytical Interference model for 2-Dimensional (Time-Wavelength) Asynchronous O-CDMA Systems Using various Receiver Structure", *Journal of Lightwave Technology*, vol. 23, pp. 3260-3269, Oct. 2005.

40. Hsiao-feng Lu and P. V. Kumar, "A Unified Construction of Space-Time Codes with Optimal Rate-Diversity Tradeoff," *IEEE Trans. Inform. Theory*, vol. 51, No. 5, May 2005, pp.1709-1730.

41. F. N. Castro, P. V. Kumar, O. Moreno and K. W. Shum, "Improvements on the Chevalley-Warning, Ax-Katz, Deligne, and Serre bound for singular and nonsingular varieties", *Proceedings of the London Mathematical Society*, vol. 88, 2004, pp. 545-564.

42. Hsiao-feng Lu, P. V. Kumar and Enhui Yang, "On the Input-Output Weight Enumerators of Product Accumulate Codes", *IEEE Communications Letters*, Vol.8 , Issue: 8 , Aug. 2004, Pages:520 - 522

43. Hsiao-feng Lu and P. V. Kumar, "On Orthogonal Designs and Space-Time Codes," *IEEE Comm. Letters*, Vol. 8, No. 4, April 2004, pp. 220-222.

44. D. J. Shin, P. V. Kumar and T. Helleseth, "An Assmu-Mattson-Type Approach for Identifying 3-Designs from Linear Codes over Z_4," *Designs, Codes and Cryptography*, vol. 31, pp. 75-92, 2004.

45. H-f. Lu, Y. Wang, P. V. Kumar and K. M. Chugg, "Remarks on space-time codes including a new lower bound and an improved code," *IEEE Transactions on Information Theory*, Volume: 49 , Issue: 10 , Oct. 2003, Pages:2752 - 2757.

46. H-f. Lu and P.V. Kumar, " Rate-diversity tradeoff of space-time codes with fixed alphabet and optimal constructions for PSK modulation," *IEEE Transactions on Information Theory*, Volume: 49 , Issue: 10 , Oct. 2003, Pages:2747-2751.

47. C. Xing, P. V. Kumar and C. Ding, "Low-correlation, large linear span sequences from function fields," *IEEE Trans. Information Theory*, Volume: 49 , Issue: 6 , June 2003 Pages:1439 - 1446.

48. Dong-Joon Shin, P. Vijay Kumar, Tor Helleseth: 3-Designs from the Z4-Goethals Codes via a New Kloosterman Sum Identity. Des. Codes Cryptography 28(3): 247-263 (2003)

49. D. Shin, P. V. Kumar and T. Helleseth, "5-designs from the lifted Golay code over Z4 via an Assmus-type approach, " *Discrete Mathematics*, 241 (2001) special issue dedicated to the 65th birthday of Professor Helge Tverberg.

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52. T. Helleseth, P. V. Kumar and H. Martinsen, "A new family of ternary sequences with ideal two-level autocorrelation functions, " *Designs, Codes and Cryptography*, vol 23, July 2001, pp. 157-166.

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55. A. Chang, P. Gaal, S. W. Golomb, G. Gong, T. Helleseth and P. V. Kumar, "On a conjectured ideal autocorrelation sequence and a related triple-error correcting code, " *IEEE Trans. Inform. Theory*, pp. 680-687, March 2000.

56. K. Yang, Y. Kim, and P. V. Kumar, " Quasi-Orthogonal Sequences for Code-Division Multiple Access Systems," *IEEE Trans. Information Theory*, pp. 982-993, May 2000.

57. T. Helleseth, P. V. Kumar and K. Yang, "An infinite family of 3-designs from the Preparata code," *Designs, Codes and Cryptography*, Vol. 15, pp 175-181, 1998.

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59. P. V. Kumar and T. Helleseth, "An Expansion for the coordinates of the trace function in Galois rings," *Applicable Algebra in Engineering, Communication and Computing*, Vol. 8, No. 5, pp. 353-362, 1997.

60. P. V . Kumar, T. Helleseth and A. R. Calderbank, A. R. Hammons, Jr., "Large Families of Quaternary Sequences with Low Correlation," *IEEE Trans. Inform. Theory*, vol. 42, pp.579-591, March 1996.

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62. A. Shanbhag, P. Vijay Kumar and T. Helleseth, "Upper bound for a hybrid sum over Galois rings with applications to aperiodic correlation of some q-ary sequences," *IEEE Trans. Inform. Theory*, vol. IT-42, pp. 250-254, Jan. 1996.

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203. P.V. Kumar, "On the Existence of Square Dot-Matrix Patterns Having a Specific 3-Valued Periodic-Correlation Function," presented at the *1985 IEEE Int. Symp. on Inform. Theory*, June 23-28, Brighton, England.

204. P.V. Kumar, "Bent Functions - Their Properties and Applications," *Proc. of the Int. Conference on Computers, Systems and Signal Processing*, Bangalore, India, December 10-12, 1984.

205. P.V. Kumar, "Frequency-Hopping Code Sequences Having Large Linear Span," *1984 IEEE Global Telecommunications Conference Record*, pp. 989-993, November 26-29.

206. P.V. Kumar and R.A. Scholtz, "Bounds on the Linear Span of Bent Sequences," presented at the *1983 IEEE Int. Symp. on Inform. Theory*, September 26-30, St. Jovite, Canada.

INVITED TALKS

Plenary/Keynote Talks

1. P. Vijay Kumar, " Streaming Codes", invited plenary talk at the *International Conference on Signal Processing and Communications (SPCOM 2020)*, Bengaluru, July 20-23, 2020.

2. P. Vijay Kumar, "Codes for Big Data: Error-Correction for Distributed Storage," *Storage Developers Conference*, Bengaluru, May 25-26, 2017.

3. P. Vijay Kumar, "Codes for Big Data: Error-Correction for Distributed Storage, " *22nd National Conference on Communications (NCC 2016)*, Indian Institute of Technology Guwahati, March 6, 2016.

4. P. Vijay Kumar, " Codes for Distributed Storage – Asking More of an Old Friend, " *IEEE Information Theory Symposium on Inform. Th*, June 29 - July 4, 2014, Honolulu, Hawaii.

5. P. Vijay Kumar, "Low-Correlation Sequences for CDMA," *Indian Institute of Science Colloquium*, October 7, 2008.

6. P. Vijay Kumar "Cooperative Diversity in Fading Wireless Networks Through Distributed Space-Time Codes," *13th National Conference on Communications (NCC 2007)*, January 26-28, 2007, Indian Institute of Technology, Kanpur.

7. A. R. Hammons, Jr., P. V. Kumar "On a Recent Four-Phase Sequence Design, " *Second IEEE Int. Symp. on Spread-Spectrum Techniques and their Applications*, Yokohama, Nov. 29- Dec.2 1992.

Tutorial Talks

1. P. Vijay Kumar, Nikhil Krishnan, Myna Vajha and Vinayak Ramkumar, "Streaming Codes," invited talk presented at the *National Communications Conference (NCC 2021)*, I.I.T. Kanpur, July 27-30, 2021.

2. P. Vijay Kumar, "Codes for Big Data: Error-Correction for Distributed Storage," *2017 Advanced Seminar on Cryptography and Coding Theory*, Chinese Academy of Sciences, Beijing, June 13, 2017.

3. P. Vijay Kumar, "Codes for Distributed Storage," *2017 Spring School on 5G and Internet of Things*, Paris-Saclay University, May 2-5, 2017.

4. P. Vijay Kumar, "Codes for Big Data: Error-Correction for Distributed Storage," *2017 IEEE Australian Information Theory School (AusITS)*, Canberra, January 16-17, 2017.

5. P. Vijay Kumar, " Codes for Distributed Storage, " *2016 European School of Information Theory*, Chalmers University of Technology, Gothenburg, Sweden, April 4-8, 2016.

6. P. Vijay Kumar and Neelesh B. Mehta, "Cooperative Communications: Theory and Practice," *Eighth International Conference on Signal Processing and Communications (SPCOM 2010)*, Indian Institute of Science, Bangalore, July 18, 2010.

7. P. Vijay Kumar, "Coding for Wireless Networks," *TENCON 2008*, November, 18-21, 2008, Hyderabad.

8. V. U. Reddy and P. Vijay Kumar, "MIMO Communication", *Managing Complexity in a Distributed World (MCDES) 2008* (An IISc Centenary Conference), May 27-31, 2008, IISc Bangalore.

9. V. U. Reddy, Surendra Prasad and P.Vijay Kumar, "The Capacity-Reliability Tradeoff in Space-Time Communications" on the topic of *Multi-Antenna Wireless Communications*, *International Conf. Wireless Personal Comm. (ICPWC)* 2005, New Delhi, India. Jan 23-25.

10. P. Vijay Kumar and B. Sundar Rajan, "Space-Time Codes," *Tenth National Communications Conference (NCC 2004)*, Indian Institute of Science, Bangalore, Jan. 30-Feb. 1, 2004.

Other Invited Talks

1. P. Vijay Kumar, "Streaming Codes for Low-Latency Communication," *Qualcomm Academia Lecture*, May 28, 2020.

2. , P. Vijay Kumar, "Erasure Coding for Distributed Storage: An Overview," *Workshop on Codes, Sequences and Designs*, Kalamata, Greece, Aug. 1-4, 2019.

3. P. Vijay Kumar, "Recent Results on Codes for Distributed Storage," *Mini-Symposium on Algebraic Coding for Storage Applications, Biennial Conference in Applied Algebraic Geometry*, the Society for Industrial and Applied Mathematics, Atlanta, Georgia, July 31st - August 4th, 2017.

4. P. Vijay Kumar, "Codes for Distributed Storage," *Technion Computer Engineering Conference on Coding for Storage and Information Systems*, Technion, Israel, June 21-22, 2017.

5. P. Vijay Kumar, "Codes for Distributed Storage," *2017 Symposium on Coding Theory*, Beijing, June 9-13, 2017.

6. S. B Balaji, Ganesh R. Kini and P Vijay Kumar, "A Tight Rate Bound and Matching Construction for Locally Recoverable Codes with Sequential Recovery," *Information Theory and Applications Workshop*, La Jolla, California, Feb. 12-17, 2017.

7. P. Vijay Kumar, " The Evolution of Coding Theory to Ensure Reliable Distributed Storage," *104th Indian Science Congress, Science and Technology for National Development*, Sri Venkateswara University, Tirupati, January 3-7, 2017.

8. P. Vijay Kumar, "Coding for Distributed Storage - An Overview, " *One-Day Meeting on Private Information Retrieval, Distributed Storage and Network Coding*, Department of Mathematics, , Royal Holloway University of London, Egham, Surrey, July 8, 2016.

9. S. Birenjith, K.Senthoor and P. Vijay Kumar, "On Outer Bounds for the Storage-Repair-Bandwidth Tradeoff of Exact-Repair Regenerating Codes," *Fundamental Inequalities and Lower Bounds Workshop*, Institut Henri Poincaré, Paris, France, Feb. 15-26, 2016.

10. S. B. Balaji, K. P. Prasanth, P. Vijay Kumar, "Codes with Locality for Multiple Erasures Having Short Block Length, " *Information Theory and Applications Workshop*, La Jolla, California, Jan. 31 - Feb. 5, 2016.

11. P. Vijay Kumar, "Coding for Big Data: Error-Correction for Distributed Storage," *Bombay Information Theory Seminar (BITS 2016)*, IIT Bombay, Mumbai & TIFR, January 2, 2016.

12. Birenjith Sasidharan, Gaurav K. Agarwal and P Vijay Kumar, "Codes for Distributed Storage-Recent Results," *Workshop on Coding: From Practice to Theory*, The Simons Institute for the Theory of Computing, University of California, Berkeley, Feb. 9-13, 2015.

13. S.B. Balaji, Birenjith Sasidharan, Gaurav K. Agarwal and P Vijay Kumar, "On partial maximum recoverable codes with locality," *Information Theory and its Applications Workshop*, San Diego, Feb 1-6, 2015.

14. P. Vijay Kumar, "Error-Correcting Codes for Big Data," *Department of Computing and Information Systems, University of Melbourne*, December 1, 2014.

15. P. Vijay Kumar, "Codes for Distributed Storage - Asking More of an Old Friend," *Department of Electrical Communication Engineering, Indian Institute of Science*, Oct. 31, 2014.

16. P. Vijay Kumar, "Error-Correcting Codes for Big Data," *Department of Chemical Engineering, Indian Institute of Science*, Sep. 18, 2014.

17. G. Kamath, N Prakash, V Lalitha and P Vijay Kumar, "Codes with Local Regeneration," presented at the *Information Theory and its Applications* Workshop, Feb. 10-15, 2013, San Diego.

18. Govinda M. Kamath, N. Prakash, V. Lalitha, "Codes with Local Regeneration," *Trends in Coding Theory*, Centro Stefano Franscini at Monte Veritá in Ascona, Switzerland, Oct. 28 to Nov. 2, 2012.

19. G. Kamath, N Prakash, V Lalitha and P Vijay Kumar, "Optimal linear codes with local-error-correcting capability," presented at the *Information Theory and its Applications* Workshop, Feb 5-10, 2011, San Diego.

20. P. Vijay Kumar , "Explicit Constructions of Regenerating Codes for Distributed Storage," *Workshop on Coding Theory*, *Schloss Dagstuhl - Leibniz Center for Informatics*, Germany, Nov. 13-18, 2011.

21. Invited participant of the First NSF-sponsored Indo-US Workshop on Developing a Research Agenda in *Pervasive Communications and Communications Collaboration (PC3)*, I.I.T. Delhi India, March 9-11, 2011.

22. K. V. Rashmi, Nihar B. Shah and P. Vijay Kumar, "Optimal exact-regenerating codes for distributed storage at the MSR and MBR Points via product-matrix construction," *Information Theory and its Applications* Workshop, University of California, San Diego, Feb 6-11, 2011.

23. P. Vijay Kumar, "Algebraic Approaches to Reliable Source Compression and Distributed Storage", *International Conference on Commutative Algebra and Algebraic Geometry (CAAG)*, December 6-10, 2011, Indian Institute of Science, Bangalore.

24. Nihar B. Shah1, K.V. Rashmi, P. Vijay Kumar, Kannan Ramchandran, "Regenerating Codes for Distributed Storage Networks," *3rd International Workshop on the Arithmetic of Finite Fields*, (WAIFI 2010), Istanbul, Turkey, June 27-30, 2010.

25. K. V. Rashmi, N. B. Shah, P. V. Kumar and K. Ramchandran, "Explicit and Optimal Codes for Distributed Storage," *2010 Information Theory and its Applications Workshop*, University of California, San Diego, Jan. 31- Feb. 5, 2010.

26. P. Vijay Kumar, "A PIR-based Intrusion Detection Algorithm," *Workshop on Sensing for Intrusion Detection with Wireless Sensor Networks*, IISc Bangalore, April 16, 2009.

27. P. Vijay Kumar, talk on "Sequences," *Workshop on Sequence Design and Its Applications in Communications and Cryptography*, Melbourne, December 4-6, 2008.

28. K. Sreeram , S. Birenjith, P. Vijay Kumar, "Multi-hop Cooperative Wireless Networks: Diversity Multiplexing Tradeoff and Optimal Code Design," *Information Theory and Applications* Workshop , UCSD, Feb 2008.

29. P. Vijay Kumar, "Meeting Welch Outside the Circle," presented at the *Helleseth Symposium*, on the Occasion of Tor Helleseth's 60th Birthday, Nov. 21-22, 2007, Bergen, Norway.

30. Invited speaker at the NSF Workshop: *Bridging the Gap between Wireless Networking Technologies and Advances at the Physical Layer*, August 27, 2007.

31. Reza Omrani, Pankaj Bhambhani and P. Vijay Kumar, " Sequences for Phase-Encoded Optical CDMA, " *Sequences, Subsequences, and Consequences, International Workshop (SSC 2007)*, Los Angeles, CA, USA, May 31 - June 2, 2007.

32. P. Vijay Kumar, K. Vinodh, M. Anand, P. Elia, "Diversity-Multiplexing Gain Tradeoff and DMT-Optimal Distributed Space-Time Codes for Certain Certain Cooperative Communication Protocols: Overview and Recent Results," *Information Theory and Applications Workshop*, UCSD, Feb 2007.

33. P. Vijay Kumar "Cooperative Diversity in Fading Wireless Networks Through Distributed Space-Time Codes," 13th *National Conference on Communications (NCC 2007)*, January 26-28, 2007, Indian Institute of Technology, Kanpur.

34. P. Vijay Kumar, Petros Elia and K. Vinodh, "Efficient Space-Time Codes from Cyclic Division Algebras," *Miltiary Communications Conference (MILCOM 2006)*, Washington DC, 2006, Oct. 23-25.

35. Reza Omrani, P. Vijay Kumar: Codes for Optical CDMA *SETA 2006*, pp.34-46.

36. P. Vijay Kumar, "Achieving the D-MG and DMD Tradeoffs of MIMO Fading Channels, " *Workshop on Information Theory & Applications*, University of California San Diego, La Jolla, CA, Feb. 6-10, 2006.

37. P. Vijay Kumar, Petros Elia and K. Vinodh, "Efficient Space-Time Codes from Cyclic Division Algebras," *Miltiary Communications Conference (MILCOM 2006)*, Washington DC, 2006, Oct. 23-25.

38. P. Vijay Kumar, "Sequence Design for Optical CDMA," invited talk delivered at the *International Conference on Sequences and their Applications*, Sept. 24-28, 2006.

39. P. Vijay Kumar, "Achieving the D-MG and DMD Tradeoffs of MIMO Fading Channels, " *Workshop on Information Theory & Applications*, University of California San Diego, La Jolla, CA, Feb. 6-10, 2006.

40. P. Vijay Kumar, "The Diversity-Multiplexing Gain Tradeoff of Space-Time Codes," Proc. *Eleventh National Communications Conference (NCC 2005)*, Indian Institute of Technology, Kharagpur, Jan. 28 - 30, 2005, pp. 3-7.

41. P.Vijay Kumar, "Space-Time Codes Achieving the Diversity-Multiplexing Gain Tradeoff," invited talk presented at WCC 2005, March 14-18, 2005, Bergen, Norway.

42. P. V. Kumar, "Rate-diversity tradeoff of space-time codes and optimal constructions," (joint work with Hsiao-feng Lu) DIMACS Workshop on Coding and Information Theory, Dec. 15-18, 2003, Rutgers.

43. H. Stichtenoth, K. Shum, I. Aleshnikov, P. V. Kumar and Deodalikar, V. "An $N[log(N)]^3$ Algorithm for the Construction of Algebraic-Geometric Codes better than the Gilbert-Varshamov Bound, " *DIMACS Workshop on Codes and Complexity*, Rutgers University, NJ, December 4-7, 2001.

44. H. Stichtenoth, K. Shum, I. Aleshnikov, P. V. Kumar and Vinay Deolalikar, "A low-complexity algorithm for constructing AG codes better than the Gilbert-Varshamov bound, " *Workshop on Mathematical Foundations*, Coding Theory and Data Integrity Program, Institute for Mathematical Sciences, National University of Singapore, July 16-20, 2001.

45. P. Vijay Kumar, "On the Generalized Distributive Law," presented at the Workshop on Coding Theory at the Institute for Experimental Mathematics, University of Essen, Essen, Germany, June 27-29, 2001.

46. P. Vijay Kumar, "An introduction to algebraic geometric codes," invited talk given at Silicon Automation Systems, (SASKEN), Bangalore, Dec. 12, 2000.

47. K. Shum, I. Aleshnikov, P. Vijay Kumar and H. Stichtenoth, " An Order N3 Complexity Algorithm for Constructing Generator Matrices for AG Codes that Beat the G-V Bound," *Thirty-Eighth Annual Allerton Conference on Communication, Control, and Computing*, Allerton House, Monticello, Illinois Oct. 3 - 6, 2000.

48. P. Vijay Kumar "Pseudorandom code sets for multiple access" invited short talk at the *Ultra-Wideband Radio Workshop*, Solvang, CA, May 25-28, 1999.

49. P. Vijay Kumar, "Recent developments on ideal autocorrelation sequences," invited talk presented at the *Irving Reed Symposium*, Los Angeles, November 1998.

50. P. Vijay Kumar, "Sequences with low correlation and large linear span," invited talk presented at the *Summer Program: Coding and Cryptography*, held at the *Institute for Mathematics and its Applications*, Minnesota, July 6-18, 1998.

51. P. Vijay Kumar, "Z_4-Codes and Sequences," invited talk presented at the the *NATO Advanced Study Institute Programme* on *Difference Sets, Sequences and their Correlation Properties*, Aug. 2-14, Bad Windsheim, Germany, 1998.

52. A. Chang, T. Helleseth and P. Vijay Kumar, "Further results on a conjectured 2-level autocorrelation sequence," invited talk presented at the *36th Annual Allerton Conference on Communication, Control and Computing*, Allerton, IL, September 23-25, 1998.

53. P. Vijay Kumar, "An overview of recent developments on ideal autocorrelation sequences, " invited talk presented at the *International Conference on Sequences and their Applications*, Singapore, Dec. 14-17, 1998.

54. P. V. Kumar, "PN Sequences in Galois Rings", Kon-kuk University, Seoul, Korea, April 30, 1997.

55. P. V. Kumar, "Survey of recent trends algebraic geometric codes," Hanyang University, April 28, 1997.

56. P. V. Kumar, "Lectures on Algebraic Geometric Codes," a series of roughly a dozen lectures given in Spring 1997 at the Department of Computer Science and Automation in the Indian Institute of Science, Bangalore, India.

57. P. V. Kumar, "On Z_4-Linear codes and exponential sums over Galois rings," California Institute of Technology, Spring 1996.

COURSES TAUGHT

Courses Taught at IISc (2003-present)

Semester	Taught at	Course Number	Subject
Aug. 2003	IISc	E2 201	Information Theory
Jan. 2004	IISc	E2 203	Advanced Digital Communication (co-taught with B. Sundar Rajan)
Fall 2004	USC	EE 595	Algebraic Coding Theory
Fall 2004	USC	EE 599	Space-Time Codes
Jan. 2005	IISc	E2 203	Advanced Digital Communication
Aug. 2005	IISc	E2 205	Error-Correcting Codes
Jan. 2006	IISc	E9 271	Space-time Codes
Aug. 2006	IISc	E2 211	Digital Communications (co-taught with Vinod Sharma)
Aug. 2006	IISc	E2 231	Network Coding (co-taught with B. Sundar Rajan)
Jan. 2007	IISc	E2 207	Information Theory and Coding II (co-taught with Rajesh Sundaresan)
Fall 2007	USC	EE441	Linear Algebra
Jan 2008	IISc	E2 208	Topics in Information and Coding Theory (new course)
Aug. 2008	IISc	E2 205	Error-Correcting Codes
Jan 2009	IISc	E2 208	Topics in Information and Coding Theory
Aug. 2009	IISc	E2 205	Error-Correcting Codes
Jan 2010	IISc	E2 208	Topics in Information and Coding Theory
Aug. 2010	IISc	E2 205	Error-Correcting Codes
Aug. 2011	IISc	E2 205	Error-Correcting Codes (co-taught with Navin Kashyap)
Jan. 2012	IISc	E2 208	Topics in Information and Coding Theory
Aug. 2012	IISc	E2 205	Error-Correcting Codes
Aug. 2013	IISc	E2 205	Error-Correcting Codes
Aug. 2014	IISc	E2 205	Error-Correcting Codes
Aug. 2015	IISc	E2 205	Error-Correcting Codes
Fall 2016	USC	EE 599	Error-Correcting Codes for Distributed Storage (3-unit course taught over 7-weeks)
Jan. 2017	IISc	E2 331	Advanced Course in Coding Theory
Aug. 2017	IISc	E2 201	Information Theory
Spring 2018	USC	EE 503	Probability for Electrical and Computer Engineers
Spring 2019	USC	EE 503	Probability for Electrical and Computer Engineers
Aug. 2019	IISc	E2 205	Error Correcting Codes
Spring 2020	USC	EE 503	Probability for Electrical and Computer Engineers
Aug. 2020	IISc	E2 205	Error Correcting Codes (joint with Prof. Navin kashyap)
Jan. 2021	IISc	E2 208	Topics in Information Theory and Coding

Courses Taught at USC (1992-2003)[1]

Semester	Taught at	Course Number	Subject
Spring 1992	USC	EE568a	Error-Correcting Codes
Fall 1992	USC	EE441	Linear Algebra
Spring 1993	USC	EE441	Linear Algebra
Fall 1993	USC	EE599	Mobile Communications (new)
Spring 1994	USC	EE441	Linear Algebra
Fall 1994	USC	EE568b	Error-Correcting Codes
Spring 1995	USC	EE441	Linear Algebra
Fall 1995	USC	EE595	Algebraic Coding Theory
Fall 1995	USC	EE441	Linear Algebra
Spring 1996	USC	EE441	Linear Algebra
Fall 1996	IISc	-	sabbatical, IISc (Dept of Computer Science & Automation)
Spring 1997	IISc	-	sabbatical, IISc (Dept of Computer Science & Automation)
Spring 1998	USC	EE441	Linear Algebra
Fall 1998	USC	EE 595	Algebraic Coding Theory
Spring 1999	USC	EE 568	Error-Correcting Codes
Fall 1999	USC	EE 599	Topics in Cryptography
Spring 2000	USC	EE 568	Error-Correcting Codes
Spring 2000	USC	EE441	Linear Algebra
Fall 2000	USC	EE 595	Algebraic Coding Theory
Spring 2001	USC	EE 568	Error-Correcting Codes
Summer 2002	USC	EE 599	Space-Time Codes
Fall 2002	USC	EE 599	Error-Correction for Fiber Optics
Spring 2003	USC	EE 568	Error-Correcting Codes

[1]Teaching data for period Fall 1983 through Fall 1991 not currently available.

STUDENTS

Awards Received by Research Students Supervised at IISc

- Govinda M. Kamath received the *Professor SVC Aiya Medal and Meemamsi Awards* for best ME student (Electrical Communication Engineering Department), Indian Institute of Science, 2012.
- Nihar B. Shah received the *Professor SVC Aiya Medal Award* for best ME student (Electrical Communication Engineering Department), Indian Institute of Science, 2010.
- Avik Ray, received the *Professor SVC Aiya Medal Award* for best ME student (Electrical Communication Engineering Department), Indian Institute of Science, 2009.
- K. Sreeram, (jointly supervised by Anurag Kumar and P. Vijay Kumar) received the *Professor SVC Aiya Medal Award* for best ME student (Electrical Communication Engineering Department), Indian Institute of Science, 2008.
- K. Vinodh, received the *Prof. F. M. Mowdawalla Medal Award* for best MSc (Engg) Thesis (Division of Electrical Sciences), Indian Institute of Science, 2008.
- Sameer A. Pawar, recipient of the *Prof. F. M. Mowdawalla Medal Award* for best MSc (Engg) Thesis (Division of Electrical Sciences), Indian Institute of Science, Nov. 2006.

Awards Received by PhD Students Supervised at USC:

- Petros Elia and K. Raj Kumar, recipent of the *2006 Best (Student) Research Paper Award*, EE-Systems Department, University of Southern California
- Vinay Deolalikar, recipient of the *1999 Best (Student) Research Paper Award*, EE-Systems Department, University of Southern California

CONFERENCE ORGANIZATION

- TPC Co-Chair:
  - ISIT Hong Kong, June 14-19, 2015
  - SPCOM 2010, IISc, Bangalore, July 18-21, 2010

    The 2010 version of SPCOM was widely regarded as being very successful and has resulted in a rejuvination of the SPCOM conference series, one of the top conferences in India in its area.
  - ITW Workshop, Information Theory for Wireless Networks, July 1 - 6, 2007 Bergen, Norway.
  - NCC 2004, IISc, Bangalore, Jan. 30 - Feb. 1, 2004
  - SETA 2001, Bergen, Norway, May 13-17, 2001
- General Co-Chair:
  - COMSNETS 2014, Bangalore, Jan. 10-14, 2014
  - mHealth India Workshop, IISc, Bangalore, April 28, 2009.
  - AAECC 2007, Bangalore, Dec. 17-20, 2007
- Workshop or Workshop-Session Co-Organizer:

  - IMI-Workshop on Algebra and Coding Theory, IISc, Bangalore, Nov. 21 - Dec. 08, 2005
  - IMI-Mini-Symposium on Coding Theory, IISc, Bangalore, Nov. 21 - Dec. 08, 2005
  - Oberwolfach Workshop on Coding Theory, Germany, Dec. 7-13, 2003 (with G. van der Geer and H. Stichtenoth), 2003
  - Oberwolfach Workshop on Coding Theory, Germany, April 30-May 5 (with G. van der Geer and H. Stichtenoth), 2000
  - Nato Advanced Study Institute Program Workshop on *Difference sets, sequences and their correlation properties*, Aug. 2-14, Bad Windsheim, Germany, (with A. Pott, T.Helleseth and D. Jungnickel), 1998
  - Session on "Advances in MIMO and Cooperative Communication," ITW Workshop, Cairo, Jan. 6-8, 2010
  - Session at the IEEE Information Theory Workshop, Longyearbyen, Norway, July 6-12, (with Tor Helleseth) 1997

- Chairmen of the *IEEE Information Theory Society* , Los Angeles Council, 1987-1988.

- On the Technical Program Committee of
  - ISIT Melbourne (virtual), July 12-20, 2021
  - ISIT Vail, June 17-22, 2018
  - ISIT Aachen, Germany, June 25-30, 2017
  - ISIT Barcelona, Spain, July 10-15, 2016
  - NCC, I.I.T. Kanpur, Feb 28-March 2, 2014
  - ISIT Honolulu, Hawaii, June 29-July 4, 2014
  - SPCOM IISc, Bangalore, July 22-25, 2012
  - ISIT MIT Cambridge, July 1-6, 2012
  - ISIT Austin, June 13-18, 2010
  - ISIT Seoul, June 28-July 3, 2009
  - ISIT 2009, Nice, June 2007
  - ISIT Adelaide, Sep. 4-9, 2005
  - ISIT Chicago, June 27-July 2, 2004
  - SPCOM IISc, Bangalore, Dec. 11-14, 2004
  - SETA Seoul, October 24-28, 2004

BOOK REVIEWS

1. *Algebraic Function Fields and Codes*, by Henning Stichtenoth, Springer, 1991, *IEEE Transactions on Information Theory*, March 1996.

2. *Error Control Coding: Fundamentals and Applications*, by Shu Lin and Daniel J. Costello, Jr., by P.V. Kumar, *IEEE Communications Magazine*, vol. 21, no. 6, pp. 48-49, September 1983.

Table 1: Current and Past PhD Students

No.	NAME	GRADUATED FROM AND DATE	CURRENTLY AT
1	Jong-Seon No	USC, 1988	Professor and IEEE Fellow, Seoul National University, Korea
2	Habong Chung	USC, 1988	Professor, Hong-ik University, Korea
3	Chao-Ming Liu	USC,1988	Senior Research Scientist, Peraton Labs
4	Serdar Boztas	USC, 1990	Associate Professor, RMIT University, Australia
5	Ara Patapoutian	USC, 1991	Technologist, Seagate
6	Roger Hammons	USC, 1992	Retired from Appl. Phy. Lab and ECE Dept. John Hopkins
7	Kyeongcheol Yang	USC, 1992	Professor, Pohang Univ. Sci and Tech., Korea
8	Abhijit Shanbag	USC, 1996	President & CEO, Graymatics, Inc.
9	Dong-Joon Shin	USC, 1998	Professor, Hanyang University, Korea
10	Vinay Deolalikar	USC, 2001	Formerly at HP Research Laboratories
11	Ken Shum	USC, 2002	Associate Professor, CUHK Chinese University of Hong Kong
12	Hsiao-Feng Lu	USC, 2006	Professor, National Chung-cheng University, Taiwan
13	Petros Elia	USC, 2006	Professor, Eurecom Institute
14	Reza Omrani	USC, 2007	Senior Data and Signal Processing Engineer at Tesla
15	K. Vinodh	IISc, 2013	Senior Staff Software Systems Engineer Synaptics Inc., Bengaluru
16	N Prakash	IISc, 2014	Cloud Software (Research) Architect at Intel Labs, Oregon
17	U. Raviteja	IISc, 2017	Technopreneur-in-Residence ARTPARK, Bengaluru
18	L. Vadlamani	IISc, 2015	Asst. Prof., IIIT Hyderabad
19	Tarun Choubisa	IISc, 2017	Founder, Seed-to-Sapling Education, Bengaluru
20	S. Birenjith	IISc, 2018	Research Fellow, Monash University
21	Balaji S. B.	IISc, 2019	Senior Technical Lead NXP Semiconductors, Bengaluru
22	Nikhil Krishnan	IISc, 2020	Assistant Professor IIT Palakkad
23	Myna Vajha	IISc, 2021	Assistant Professor IIT Hyderabad
24	Vinayak Ramkumar	PostDoc	Israel and US
25	Shobhit Bhatnagar	in progress	IISc
26	R. Gayathri	in progress	IISc
27	Srivathsa Acharya	in progress	IISc
28	Jeffrin Prabhu	in progress	IISc

Table 2: Masters Students at IISc

No.	NAME	GRADUATION DATE	CURRENTLY AT
1	Sameer Pawar	MSc 2005	Facebook, Santa Clara
2	K. Raj Kumar	MSc 2007	Principal Engineer/Manager, Qualcomm, Bangalore
3	M. Anand	MSc 2007	Senior Applied Scientist, Amazon, Bengaluru
4	K. Vinodh	MSc, 2007	Senior Staff Software Systems Engineer Synaptics Inc., Bengaluru
5	S. Mohan Rao	ME 2007	Staff Engineer, Qualcomm Hyderabad
6	Pankaj Bhambhani	ME 2007	Principal Engineering Manager Microsoft, Hyderabad
7	Mallikarjuna Reddy	ME 2007	Scientist, RCI, DRDO, Hyderabad
8	Deepak Sharma	MSc 2007	New Delhi
9	K. Sreeram	ME 2008	Co-Founder, EigenLayer, Seattle
10	N. E. Venkatesan	ME 2008	Res. Scientist, Intel, Oregon
11	S. Birenjith	MSc (Engg)	Research Fellow, Monash University
12	N. Naveen	MSc 2009	
13	R. N. Krishna Kumar	ME 2008	
14	Avik Ray	ME (2009)	Applied Scientist, Amazon San Francisco
15	S. Ramanathan	MSc (Engg) (CSA) (2010)	PhD student, George Mason University
16	Abu Sajana	MSc (Engg) (2010)	Senior Fusion Engineer Nvidia, Gothenberg
17	Nihar Shah	ME (2010)	Asst Prof, Carnegie-Mellon
18	K. V. Rashmi	ME (2010)	Asst Prof, Carnegie-Mellon
19	Sharanappa C Ijeri	ME (2011)	Staff SW Engineer, Broadcom, Inc.
20	Vanamali Bhat	ME (2011)	Senior Staff Engineer, Qualcomm, Bengaluru
21	K. Govinda (2010-12)	ME	Scientist, 10X Genomics, Pleasanton CA
22	Christo Thomas (2010-12)	ME	Post Dov at Virgina Tech, Blacksburg, VA
23	S. Vikas (2011-13)	ME	
24	Aswath V. S. (2011-13)	ME	Staff Engr, Broadcom
25	Kaushik Senthoor R. (2012-14)	M.Tech	PhD student, IITM
26	Siddhant Raman (2012-14)	ME	Sen. Engr., Qualcomm, India
27	Praneeth Allidona (2013-15)	ME	DRDO
28	Tony Gracious (2013-15)	ME	PhD Studnet, IISc
29	Gaurav Agarwal (2013-15)	ME	Senior SW Engineer Google, Mountain View
30	K. Prasanth (2014-16)	ME	Qualcomm
31	Vinayak Ramkumar (2015-17)	M.Tech (Res)	PhD, IISc
32	Ganesh Kini (2015-17)	M. Tech	PhD student, UCB
33	Bhagyashree Puranik (2015-17)	M. Tech	PhD student, UCB
34	Anantha Narayanan (2016-18)	M.Tech (Res) in progress	IISc
35	Biswadip Chakraborty	M.Tech (2021)	Qualcomm, Bengaluru
36	Nikhil Dande	M.Tech (2021)	Qualcomm, Bengaluru
37	Gayathri Reddy	M.Tech (2023)	Qualcomm, Bengaluru
36	Arijit Dey	M.Tech (2023)	UCLA PhD
36	Ankita Mahanto	M.Tech (2024)	Samsung, Bengaluru
37	R Narayanan	M.Tech(Res) in progress	IISc

Table 3: Sponsored Projects at IISc

Agency	Grant No.	PI	Co-PI/(Other)	Period	Funding
Streaming Codes for Low-Latency Communcation					
MeitY	Part of Umbrella 5G Project	Neelesh Mehta PI (IISc)	P. Vijay Kumar (Investigator)	August 2021 - July 20, 2024	₹ 33 Lakhs (PVK share)
Streaming Codes for Reliable Low-Latency Communication					
SERB	J C Bose Fellowship	P. Vijay Kumar		Marr. 15, 2018-March 15, 2022	₹ 42 Lakhs
Efficient Codes and New Coding Models for Distributed Storage					
UGC	Indo-Israeli	P. Vijay Kumar PI (India)	Yuval Cassuto PI (Israel)	Nov. 21, 2014 - Nov. 20, 2017	₹ 105 Lakhs
A Research Program to Advance the Frontiers of Communications, Control, Signal Processing & Computation (total funding for 23 sub-projects across the IISc campus)					
DRDO	Umberella Project (23 mini-projects)	P. Vijay Kumar (Convenor)	N. Kashyap S. Bhatnagar (Co-Convenors)	Oct. 29, 2014 - Oct. 28, 2018	₹ 781 Lakhs
NetApp Faculty Fellowship: Bandwidth-and-Access-Efficient Codes for Distributed Storage					
NetApp	CSIC	P. Vijay Kumar		May 2013 to Nov. 2014	₹ 13.5 Lakhs
Wireless Sensor Networks for Protecting Wildlife and Humans (funded under the aegis of the Indo-US Pervasive Communication and Computing Collaboration (PC3) program) (partners on the Indian side: IISc, IIIT Allahabad and WII; on the US side: OSU and Cornell University))					
DeitY NSF		Anish Arora (PI, US) Carla Gomes (Co-PI)	P. Vijay Kumar PI (India) M. Radhakrishna (IIITA, Co-PI) Anurag Kumar (IISc) K. Ramesh (WII)	July 2012 - Sep. 2015	₹ 81 Lakhs
NetApp Faculty Fellowship: Distributed Storage Codes for Content Distribution					
NetApp	CSIC	P. Vijay Kumar		Nov. 2011 to May 2013	₹ 12 Lakhs
A Continued Program for Advanced Research in Mathematical Engineering - with a focus on Communications, Control and Signal Processing (total funding for multiple sub-projects across the IISc campus)					
DRDO		P. Vijay Kumar (PI, prepared and submitted proposal)	Vinod Sharma (Convenor, conducted all activities)	2006-2011	₹ 387 Lakhs
Network Coding for Cellular and Wireless Mesh networks					
Motorola		P. Vijay Kumar (PI)	Anurag Kumar (Co-PI)	2006-2008	₹ 11.57 Lakhs
Wireless Ad Hoc Sensor Networks - A Proposal for Research and Demonstration (joint project involving about 14 faculty across the IISc Campus)					
DRDO		Anurag Kumar (PI)	P. Vijay Kumar (Co-PI)	Sep. 2006 - Aug. 2009	₹ 271 Lakhs
Study and Design of a High Data Rate Secure Link for Airborne Applications,					
DRDO		P. Vijay Kumar (PI)	A. Chockalingam (Co-PI)	2003-2005	₹9.98 Lakhs

Table 4: Sponsored Projects (1991-2005)

Agency	Grant No.	PI	Co-PI/(Other)	Period	Total Funding
ITR Collaborative Research: Achieving the Rate Diversity Tradeoff in Space-Time Codes					
NSF	CCR-0326628	P. Vijay Kumar	Zhen Zhang	Sep. 15, 2003 to Aug. 31, 2008	$420,000
Secure Communication Over LANs Using Optical CDMA Technology: A Unified Architecture/Coding/System/Device Approach					
DARPA		Alan Willner	J. Bannister, D. Dapkus P. V. Kumar, J. O'Brien	Oct. 1, 2002 - May 31, 2004	
ITR: Space Time Spreading and Coding					
NSF	CCR-0082987	Keith Chugg (Co-PI)	P. Vijay Kumar (Co-PI)	Sep 1, 2000 - Aug 31, 2004	$474,716
Topics in Pseudonoise Sequence Design and Error-Correcting Codes					
NSF	CCR-0073555	P. Vijay Kumar		Sep. 1, 2000 to Aug. 31, 2004	$384,582
On The Construction of Long and Efficient Algebraic Geometric Codes					
NSF	9714626	P. Vijay Kumar		May 15, 1998 to April 30, 2002	$ 175,000
Topics in Signal Design and Signal Analysis for Wireless Communication					
NSF	9612864	P. Vijay Kumar		Sep.1, 1997 to Aug. 31, 2001	$ 270,000
Quaternary Codes and Connections with Binary Codes,Sequences and Lattices					
NSF	9305017	P. Vijay Kumar		July 1, 1994 to June 30, 1997	$ 278,180
Algebraic Decoding Techniques by Using Grobner Bases					
NSF	9305017	Irving S. Reed (PI)	P. Vijay Kumar (Co-PI)	Aug. 15, 1994 to July 31, 1997	$ 306,181
Design and Study of Signature Sequences For CDMA					
NSF	9016077	P. Vijay Kumar		April 1, 1991 to Sep. 30, 1994	$ 223,816

[1] Information on sponsored projects in the period 1983-1990, not available.