

Detailed CV of U. Sripati Acharya, Professor, E&C Department, NITK, Surathkal

U. Sripati Acharya

Professor, Department of Electronics and Communication Engineering

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Education:

July'1999-October'2004: Ph.D. from the Dept. of Electrical. Communication Engineering, Indian Institute of Science, Bangalore, India.

August1990-January 1992: Master of Technology (M.Tech) in Digital Electronics and Advanced Communication from Karnataka Regional Engineering College, Surathkal, India.

August 1985-June 1989: Bachelor of Engineering (B.E) in Electronics and Communication Engineering from Manipal Institute of Technology, Mangalore University, India.

Research Interests:

Theory and Applications of Error Control Codes, Wireless Communication, Analog and Digital Communication, Free Space Optic Communication, Consumer and Professional Electronics.

Courses Taught in the past four years (2010 onwards) at UG and PG levels:

Electromagnetic Waves, Antennas and Propagation, Detection and Estimation Theory, Error Control Coding, MIMO Wireless Communication, Mathematical Foundations for Communication Engineering and Microwave Engineering.

I have also served as the instructor for Basic Communication Laboratory, Advanced Communication Laboratory and Product Design Laboratory.

Positions held:

February 17, 2012 to present, Professor, National Institute of Technology, Karnataka, Surathkal, India.

February 17, 2008-February 16, 2012, Associate Professor, National Institute of Technology, Karnataka, Surathkal, India.

February 17, 2005-February 16, 2008, Assistant Professor, National Institute of Technology, Karnataka, Surathkal, India.

February 17, 2000-February 16, 2005, Senior Lecturer, National Institute of Technology, Karnataka, Surathkal, India.

February 17, 1995-February 16 2000, Lecturer, National Institute of Technology, Karnataka, Surathkal, India.

November 1992-February 16, 1995, Temporary Lecturer (under World Bank Project IMPACT)

May 1992-October 1992, R&D Engineer, MIRC Electronics, Mumbai.

July'1989- August 1990, Assistant Lecturer, National Institute of Technology, Karnataka, Surathkal, India.

Teaching Experience at NITK:

I have taught a number of courses in the domains of Applied Mathematics, Digital Communications, Error Control Coding, Wireless Communications, Electromagnetic Waves, Antenna Design and Microwave Engineering in the past four years. I have also actively participated in the development of Basic Communication Laboratory, Advanced Communication laboratory and product Design Laboratory in the past four years. In the product design laboratory for E&C students (developed jointly with Dr. Laxminidhi T), we had guided the students through the design and prototyping of a 500 VA UPS system. We had divided the design into the inverter block, the battery charger module, the change over circuit and the overload trip. We had emphasized various safety issues that had to be taken care of and also discussed the ergonomics and functionality of the product (providing various LEDs for functionality and fault monitoring). I am providing details of the courses taught and Laboratories set up by me at NITK (year wise) during the past four years in the table below.

Innovation in teaching: A device to demonstrate transfer of energy through free space (designed and fabricated by my project students Mr. Arjun Yadiki and Mr. Prashanth Malani from the 2010 batch) was used to demonstrate the principles of electromagnetic radiation by antennas and the concept of antenna directivity during the teaching of courses on Electromagnetic Wave Propagation and Antennas and Propagation.

Details of Courses Taught in the past Four years:

Electromagnetic Wave Propagation	July-November 2010	UG
Mathematical Foundations for Communication Engineering	July-November 2010	PG/UG elective
Basic Communication Lab	July-November 2010	UG
Error Control Coding	January-April 2011	PG/UG elective
MIMO Communication Systems	January-April 2011	PG/UG elective
Advanced Communication Lab	January-April 2011	UG
Antennas and Propagation	July-November 2011	UG
Mathematical Foundations for Communication Engineering	July-November 2011	PG/UG elective
Basic Communication Lab	July-November 2011	UG
Error Control Coding	January-April 2012	PG/UG elective
Detection and Estimation Theory	January-April 2012	PG/UG elective
Advanced Communication Lab	January-April 2012	UG
Antennas and Propagation	July-November 2012	UG
Error Control Coding	January-April 2013	PG/UG elective
Microwave and Optical Engineering (jointly with Prof. M Kulkarni)	January-April 2013	PG/UG elective
Antennas and Propagation	July-November 2013	UG
MIMO Communication Systems	January-April 2014	PG/ UG Elective
Error Control Coding	July-November 2014 (on-going)	PG/UG elective

Project and Thesis (Dissertation) Supervision : B.Tech. / M.Tech. (2012-14 batches)

Level	Title of Project / Thesis	Name of the Students	Remarks
B.Tech.	1. Design and Fabrication of a jig to test large capacitors (up to 400 Farads) for capacity and equivalent series resistance for use in Wind mills used for electricity generation. (Industry specified project)	Mr. Abhimanyu Srivastava Mr. Amar Sneh Mr. Shishir Saurabh Ms. Shruthi S H	Industry Specified project.
	2. Design of an encoder/ decoder pair for improved BCH codes (designed as part of PhD work in E&C Department) used in Flash Memories.	Mr. Suhas Rohit Pai Mr. Yashwant Marathe Mr. Nagaraj J Bhat Mr. Vinodh Patil H	Problem is an offshoot of Research work (Ph.D.) level conducted in the department.
	3. Design, Analysis and Link Budget Computation for Free Space Optic Link from Ground Station to Satellite in Geo-Synchronous orbit.	1. Mr. Yashas M.S 2. Mr. Mrinal Vibhav Arun 3. Ms. Preeti Shivakumar	Problem specified by LEOS, ISRO.

M.Tech.	1. Design and Analysis of a terrestrial FSO link 2. Design and performance evaluation of Encoders for Chaotic Modulation Systems. 3. Design and performance evaluation of Decoders for Chaotic Modulation Systems. 4. Design and performance evaluation of Encoders for Stream Cipher Systems. 5. Design and performance evaluation of Decoders for Stream Cipher Systems.	Mr. Raghavendra M A N S Mr. Gyan Praksh Mr. Karthik Kasu Mr. Balakrishna Mattadi Mr. Bandi Ravikumar	
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M.Tech (Research)	Wireless Optical Communication Link between Geo-synchronous satellite and Ground Station using Coherent Detection and Appropriate Modulation Technique	Mr. Jignesh Jokakhar D (jointly with Prof. M. Kulkarni)	The problem statement of this thesis was jointly specified by the senior scientists of the LEOS laboratory of ISRO and the thesis supervisors from the E&C department.
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Sample Course and Evaluation plans, Question papers (Quiz, Mid-semester, End Semester) and Student feedback forms are placed in Appendix-A.

Research supervision:

Number of Ph. D completed: 6

Number of Ph. D. in progress: 02

Number of M.Tech (Research) completed: 01

Number of masters students guided (in last three years): 10

Details of Research Guidance:

In this section, I am providing some details of the research scholars who have worked with me/ are currently working with me.

1. Mr. Ganesh Aithal (jointly with Prof. K. N Hari Bhat, Ex-Professor, NITK, Surathkal)

Title of thesis: Algebraic Structure based on Mixed Radix System and Chinese Remainder Theorem for the generation of Key sequences and their applications in Stream Cipher systems.

(Degree awarded)

2. Mr. Prashantha Kumar H

Title of thesis: Decoding Algorithms for Linear Block Codes based on Tree Structure and their applicability to Wireless and Storage Systems.

(Degree awarded)

3. Mr. Rajesh Shetty K

Title of thesis: Design and Construction of Algebraic codes for Enhancing Information Integrity in Data Storage Systems.

(Degree awarded)

4. Mrs. Rajeshwari Itagi (jointly with Prof. K. P Vitthal, EE department)
Title of thesis: Application of Error correction codes for enhancing data integrity in power line channels.
(Degree awarded)

5. Mr. Lwaa Abdulameer (jointly with Prof. M. Kulkarni)
Title of thesis: Analysis and Design of Reliable and Secure Chaotic Communication Systems for Optical and Wireless Links.
(Reports have been received. Corrections suggested by the referees are being carried out and preparations are being made for conduction of final viva-voce examination).

6. Mrs. Geeta Prakash (jointly with Prof. M. Kulkarni)
Title of thesis: Rate-less codes for transmission over Free Space Optics using stochastic models based on scintillation theory and their application to Optical Wireless Sensor Networks.
(Thesis Submitted)

7. Mr. Gautham Simha (On-going)
Mr. Simha will give his proposal seminar in the first week of July in the area of Wireless Communication. He will work on research problems concerned with the improving the energy efficiency and spectral efficiency of MIMO communication systems.

8. Mr. Raghavendra M.A.N.S (On-going)
Mr. Raghavendra will give his proposal seminar in November. He is conducting the literature survey. The exact domain of his work has not been finalized. Details of papers published:

Published Research Papers (Journals):

1. Geetha Prakash, Muralidhar Kulkarni, U. Sripati, Mahesh Nayak Kalyanpur, "Classification of FSO Channel Models Using Radial Basis Function Neural Networks and Their BER Performance With Luby Transform Codes", International Journal of Artificial Intelligence, ISSN 0974-0635, Vol 9, No A 12, Autumn October 2012, pp 67-75.

2. Lwaa Faisal Abdulameer, Jokhakar Jignesh D., U. Sripati and Muralidhar Kulkarni, "BER Performance Enhancement for Secure Wireless Optical Communication Systems Based on Chaotic MIMO Techniques", Nonlinear Dynamics, An international Journal of Nonlinear Dynamics and Chaos in Engineering Systems, (SPRINGER), DOI: 10.1007/s11071-013-1044-z., September 2013.

3. Lwaa Faisal Abdulameer, Jokhakar Jignesh D., U. Sripati and Muralidhar Kulkarni, "BER Performance Enhancement for Secure Wireless Communication Systems based on DCSK- MIMO Techniques under Rayleigh Fading Channel", Radioelectronics and Communications Systems", (SPRINGER) Vol. 56, No. 10, pp. 481-492, September 2013.

4. Lwaa Faisal Abdulameer, Jokhakar Jignesh D., U. Sripati and Muralidhar Kulkarni "Anti-Jamming Performance of Communication Systems based on Chaotic Modulation and MIMO Schemes over AWGN Channels, European Journal of Scientific Research, Vol. 102, Issue, pp. 462-473, May 2013.

5. Prashantha Kumar H, Sripati U, Rajesh Shetty K, Shankarananda B, "Soft Decision Fano Decoding of Block Codes over Discrete Memoryless Channel Using Tree Diagram", Journal of Electrical Engineering, Slovakia, Vol. 63, No.1, ISSN: 1335-3632, pp. 59-64, Jan-Feb 2012.

6. Rajesh Shetty K, Ramakrishna, Prashantha Kumar H, Sripati U, "Design and Construction of BCH Codes for Enhancing Data Integrity in Multi Level Flash Memories", International Journal of Information and Communication Technology (IJICT-Inderscience Publishers) Vol. 4, No. 1, ISSN: 1466-6642, pp. 40-60, March- 2012.

7. Prashantha Kumar H, Sripati U, Rajesh Shetty K, Shankarananda B, "Stack Decoding of Linear Block Codes for Discrete Memoryless Channel Using Tree Diagram", ICTACT Journal on Communication Technology, Vol. 3, Issue 1, ISSN: 0976-0091, pp. 498-503, March-2012.
8. Prashantha Kumar H, Sripati U, Rajesh Shetty K and B. Shankarananda, "Enhancing the Error Correcting Capability of Imai- Kamiyanagi Codes for Data Storage Systems by Adopting Iterative Decoding Using a Parity Check Tree", IETE Journal of Research, July-Aug 2012 issue (Vol. 58, Issue 4, pp. 270-276, July-Aug 2012).
9. H. Prashantha Kumar, U. Sripati and K. Rajesh Shetty , "High-speed and parallel approach for decoding of binary BCH codes with application to Flash memory devices", International Journal of Electronics, Taylor and Francis, December 2011. <http://dx.doi.org/10.1080/00207217.2011.643498>
10. Ganesh Aithal. K N Hari Bhat and U Sripati Acharya, "High speed and secure Encryption schemes based on Chinese Remainder Theorem for storage and transmission of medical information", Journal of Mechanics in Medicine and Biology, March 2010.

Published Research Papers (Conferences) (last four years):

1. Lwaa Faisal Abdulameer, Jokhakar Jignesh D., U. Sripati and Muralidhar Kulkarni, "BER Performance Enhancement for Secure Wireless Communication Systems based on Chaotic- MIMO Techniques", SPIE, International conference on Communication and Electronics System Design, 2013.
2. Lwaa Faisal Abdulameer, Jokhakar Jignesh D., U. Sripati and Muralidhar Kulkarni," On the Security of Free Space Optics based on Reconfigurable Chaotic Technique", SPIE International Conference on Communication and Electronics System Design, 2013.
3. Jokhakar Jignesh D., U. Sripati, M. Kulkarni, "Performance of QPSK Modulation for FSO Geo-Synchronous Satellite Communication Link under Atmospheric Turbulence." Annual International Conference on Emerging Research Areas (AICERA 2013), June 2-6, 2013, Amal Jyothi College of Engineering, Kanjirapally, Kottayam, India.
4. Jokhakar Jignesh D., U. Sripati, M. Kulkarni, "Performance Enhancement of Optical QPSK systems with Coherent reception for High speed Links." International Conference on Advances in Computing, Communications and Informatics (ICACCI-2013), August 22-25, 2013, SJCE, Mysore, India.
5. Prashantha Kumar H, Sripati U, Rajesh Shetty K, B. Shankarananda, "Iterative Decoding of Hsiao Codes Using a Parity Check Tree", presented at the International Conference on Advanced Computing and Communications (ICACC), 3-4 May, 2010, Amal Jyoti College of Engineering, Kottayam.
6. Rajesh Shetty K, U. Sripati, Prashantha Kumar H, B. Shankarananda, "Design of Construction of Codes for MIMO Block fading Channels", presented at the International Conference on Advanced Computing and Communications (ICACC), 3-4 May, 2010, Amal Jyoti College of Engineering, Kottayam.
7. Ganesh Aithal, K. N Hari Bhat, U. Sripati, "Implementation of Stream Cipher System based on representation of integers in Residue Number System", presented in 2nd International Advance Computing Conference (IEEEIACC-2010) held on 19-20th February 2010 at Thapar University, Patiala.
8. Prashantha Kumar H, U Sripati, Shankarananda B and Rajesh Shetty K, "Stack Decoding of Extended Hamming Codes for Single Hop Wireless Networks using tree diagram", presented in International Conference on Recent Advances in Electrical Sciences, ICRAES'10" January 8-10, 2010.

9. Govinda Kamath, Abhijit Kini, Yogesh S, U. Sripathi, M. Kulkarni, `` Performance Analysis of Energy Efficient Asymmetric Coding and Modulation Schemes for Wireless Sensor Networks''), presented at the 5th edition of the IEEE International Symposium on Wireless Pervasive Computing held in Modena, Italy between May 5-7, 2010.

10. Prashanth Malani, Yadiki Arjun, U. Sripathi, ``A Cost Effective System for Wireless Power Transmission'', presented in International Conference on Industrial and Information Systems-2010 (ICIIS-2010), 29th July to 1st August 2010, National Institute of Technology Karnataka, Surathkal.

Sponsored project undertaken:

1. Title of project: Secure Turbulence Resistant Free Space Optical FSO links for Broad Band Wireless Access Networks.

Project Outlay: Rs. 120 lakhs, Project duration: 3 years

Sponsoring Agency: Department of Information Technology, New Delhi

Coordinators: Dr. U. Sripathi, Professor, Dr. M. Kulkarni (Professor and Head), E&C Department, NITK, Surathkal.

Status: Completed

2. Title of the Project: Uncoordinated, Secure and Energy Aware Access in Distributed Wireless Networks (jointly with IIT Bombay, TIFR Mumbai, and IIT Durgapur)

Sponsoring Agency: Information Technology Research Academy, Media Lab Asia

Project Outlay: Rs. 20.25 Lakhs (for NITK)

Duration: Three years (December 2013-December 2016)

Status: Under progress

Consultancy Work Undertaken:

1. Design and Commissioning of Simulators for the Indian Railway Signaling System (for both Single Line and Double Line Operation)

Sponsoring Agency: Konkan Railway Institute of Staff Training (KRIST)

Duration: 2007-09

Task Undertaken: Design and Fabrication of simulators to train railway personnel on the Indian Railway Signaling system. This work involved the design of a simulator (in Java) that could the actions of the signaling system prevalent on the Indian railways and design of a panels (with a microcontroller interface) that is a replica of the signaling panel in the Station master's office. These panels (separate for single line and double line operations) were interfaced to a computer running the simulator. This allows the trainee to be trained on the system to handle all kinds of tasks usually encountered while regulating railway traffic. It is use in the Konkan Railway Institute of Staff Training since 2009. This system was built with the help of enthusiastic and concrete contributions of our undergraduate students (ECE, EE) from the 2005-09 batch. I heartily thank them for this wonderful work which has possibly contributed to safer travel on the Indian Railway network because of better training offered to their Signaling and Operating staff.

2. Technical Consultancy during procurement of Currency Note sorting machines to Public Sector Banks.

Sponsoring Agencies: Corporation Bank, Syndicate Bank, Vijaya Bank

Task Undertaken: In this assignment (jointly with Dr. T Laxminidhi), I have served as an advisor and technical expert to leading public sector banks during the procurement of machines for currency note processing and fake note detection. In the course of this work, we have assisted the banks in the drafting of tender documents, examination of the received bids and also developed testing procedures to test the speed, repeatability and fake note detection capabilities of these machines. We assist the banks in ensuring that the currency note sorting machines being procured by them for use in their currency chests/ branches meet the requirements set forth for these machines by the Reserve bank of India (RBI) and are capable of working consistently and reliably.

R&D Projects undertaken within the institute for the benefit of Research Scholars:

I have designed a number of instruments to facilitate the experimental work of research scholars working in Physics, Chemistry and Mechanical Engineering departments. In many instances, these instruments were not available off the shelf or were very costly/ had to be imported/ or would have taken a long time to procure. My aim in designing these instruments was to help and encourage our research scholars in doing accurate experimental work. This work has also fostered many friendly relationships with colleagues in other departments in addition to giving me exposure to some research work being conducted in these departments. A few notable examples are cited below:

1. Design and Construction of an 'Instrument for measurement of Breakdown voltage of pressure sensors' for use of research scholars in the Nanotechnology lab of Microelectronics department, A.I.T, Bangkok, Thailand.
2. Design and implementation of an actuator system to excite PVDF films with various voltages (20-300 V) over a range of frequencies (50 Hz-20 KHz).
3. Design of a test rig to characterize the electrical characteristics of Organic LEDs (OLEDs) (jointly with Dr. Laxminidhi T).
4. Design and implementation of a signal conditioner and amplifier for measurement of signals picked up from PVDF films.

Books Published:

Have contributed additional learning material to the text book 'Digital and Analog Communication Systems, Eighth edition' by Leon Couch, (Publisher: Pearson).

Industry Interaction:

The R&D project entitled, "Secure Turbulence Resistant Free Space Optical (FSO) Links for Broadband Wireless Access Networks", was granted to NITK, Surathkal in July 2010 with the aim of achieving the following objectives:

1. To conduct performance analysis, simulation and modelling of Free Space Optic (FSO) links (at fixed wavelength) and study their suitability for deployment as a suitable solution to Free Space Optical downlink from satellite to ground station.
2. To study, design and develop terrestrial single hop FSO link for applications like inter base-station communication/ backhaul.
3. To design and synthesize suitable electronic coding techniques as applicable to improve information integrity of the FSO link under adverse weather conditions.
4. To conduct research and impart training to students at Ph.D, Masters and Undergraduate levels in various aspects of FSO communication.
5. To conduct workshops to disseminate information on various aspects of FSO communication to the engineering and scientific community in India.

It was mandatory to seek linkages with industry and specify workable solutions to problems being faced by the section of Communication industry using FSO links. Therefore, we interacted with various end users of FSO technology with the aim of identifying and proposing solutions to the problems being faced by them. Brief details of these interactions have briefly described below.

The members of the project team visited the Light Wave and Electro-optics Laboratory (LEOS) of the Indian Space Research Organization (ISRO) to explore areas of mutual interest. We were asked to undertake a study to explore the feasibility of establishing a FSO link between a satellite in geosynchronous orbit and a ground station. The specifications of the link were provided by ISRO. This task was taken up and the following problems were addressed.

- Computation of the link budget for this link.
- Determination of the optimum modulation scheme for this system and computation of the transmit power levels on board the satellite for a BER of specified by ISRO.
- Determination of the optimum detectors to be used in this application and a method to overcome the speed limitation of these detectors.
- Determining the environmental parameters associated with the optimum location of the earth station.

- Specifying suitable channel coding schemes for protecting the integrity of information during its travel from the satellite to the ground station.
- Specifying a scheme employing DWDM to simplify the synchronization and multiplexing requirements of the link.

A brief report of the work done to achieve these objectives is given as Appendix B with this document.

In order to understand the problems associated by practical terrestrial FSO links, the members of the project team visited Indian Telephone Industries (ITI), Bangalore and had several discussions with the senior members of Transmission R&D group. We were given the task of evaluating the link budget for terrestrial FSO links under different environmental conditions and suggesting possible coding and Multiple Input Multiple Output (MIMO) schemes to enhance the integrity of communication. We have made the necessary computations and have evaluated the minimum transmission power required for reliable communications under different environmental conditions. We have also evaluated the possibility of using simple Space Time Block Codes (STBC) to improve the link quality and have shown (with simulation) that reliable FSO communication (BER~10⁻⁶) can be achieved under conditions of light fog. These results have been communicated to Transmission R&D group at ITI, Bangalore.

A brief report of the work done to achieve these objectives is given as Appendix C with this document.

To realize the third objective, we have designed the hardware blocks (both encoder and decoder) of a BCH (31,16), three bit error correcting code with an interleaver (to improve burst error correction capability) on the Nexys 4 FPGA board. This has been interfaced with an indoor FSO link and errors have been induced by heating the volume of air between the transmitter and receiver (to enable beam wander and scintillation). It has been observed that this causes errors to manifest in the receiver. It has been demonstrated that these errors are effectively corrected by the channel code. A similar exercise involving the RS (255,235) code with ten symbol (each symbol is 8 bits wide) error correcting capability has been simulated for the purpose of implementation on the FPGA board. This work when complete, will result in the realization of a very powerful channel code on an FPGA platform that can be used to correct many possible error patterns (both burst and random) that can occur on the FSO channel.

A brief report of the work done to achieve these objectives is given as Appendix D with this document.

To realize the fourth objective, two Ph.D students and several M.Tech and U.G students were recruited to work on various research problems in this field. Both of the research students have completed their work.

Ph.D students: Mrs. Geeta Prakash and Mr. Lwaa Faisal

M.Tech students: Mr. Jignesh Jokakhar, Mr. Raghavendra M.A.N.S, Mr. Gyan Prakash, Mr. Sri Harsha

B.Tech students: Mr. Apexit Shah, Ms. Krithi K. N, Ms. Pallavi K

Details of Patents applied for:

1. Myagmarbayar Nergui, U. Sripati Acharya, ``Reducing the effect of channel noise while transmitting or storing a watermarked image'', filed on 25-03-2009 at the Patent Office, Chennai.

2. U.Sripati Acharya, K. Rajesh Shetty, Prashantha Kumar H., ``Design and Construction of Algebraic Codes for Enhancing Data Integrity in Flash Memory Devices'', filed on 10-09-2009 at the Patent Office, Chennai.

3. U.Sripati Acharya, K. Rajesh Shetty, Ramakrishna K R, Prashantha Kumar H., `Design and Construction of BCH Codes for Enhancing Data Integrity in Multi Level Flash Memories', filed on 11-01-2011 at the Patent Office, Chennai.

Professional Training Received/ Summer / Winter Schools attended in the last four years:

1. Attended a short term course on `OFDM based next generation Wireless Standards' organized by the department of Electrical Engineering, IIT Kanpur during May 17th to 19th, 2010.

2. Participated in the workshop on 'Strategies to attain Excellence in Impact Making Research and Development' organized by NIT Calicut during November 3 and 4, 2012.

3. Participated in a National workshop on 'ABET Accreditation Process' organized by Anurag group of Institutions, Hyderabad jointly with Indo US Collaboration for Engineering Education (IUCEE) during 9th to 11th February, 2012.

Services rendered to Institute:

In addition to my academic and research activities, I have strived to serve NITK in administrative capacities as well. One current important assignment is that of Co-coordinator of TEQIP-II program (jointly with Prof. Ravi Kiran Kadoli). I have provided some details of my responsibilities in this position below. I have also assisted NITK in the procurement of major infrastructure items such as class room audio systems and telephone exchange. Some details are provided below.

Continuing Education Programs/ Short Term Courses/Workshops/Seminars etc. organized (Last 4 years):

Title of Program	Period	Funding Agency
Workshop on 'Guided and Free Space Optical Communication'	August 16-20, 2012	AICTE
Workshop on English Language Training and Personality Development for M.Tech students of E&C Department	December-2012 to January 2013	TEQIP-II
Induction Training program for newly recruited faculty members of NITK	July 1 to 4, 2013	TEQIP-II
Workshop on 'Emerging Trends in Optical Communication Systems & Networks' (ETOCNS-2013)	September 5-7, 2013	TEQIP-II
Workshop on 'Research Topics in Information Theory':	29 th and 30 th of March 2014	TEQIP-II/ ITRA
Workshop on Computer Skill Development for the non-teaching staff of the institute.	Several three day courses were held during June-July 2014 to cover all the desirous staff of NITK	TEQIP-II
Finishing School for students of Third semester M.Tech (E&C, E&E and Mechatronics stream) of NITK, Surathkal. (Details given below)	On-going	TRQIP-II

A summer school conducted mainly by experts from Industry with a goal to enhance the employability of our PG students by imparting English Language and Communication Skills, Interpersonal skills, team working skills and enhanced competency in topics having high employability potential. This finishing school has commenced on August 12, 2014. This finishing school has been designed with the aim of providing inputs to students by experts from Industry/ Academia in domains having high employability potential to our PG students so as to enable them to get good core sector jobs in Indian industry. This program is being conducted with support from TEQIP-II program.

Experience in Administrative positions:

As Co-coordinator and Nodal Officer (Academic) of the TEQIP-II program, I am taking care of various academic and R&D initiatives for improving the quality of education in NITK, Surathkal. The following initiatives and tasks have been completed by me in this position.

- Framing policies of TEQIP-II with respect to facilitating foreign travel for research interaction by faculty, training to be imparted to supporting staff, conduction of workshops, seminars, training programs in NITK and peer mentoring programs for students.

- Commissioning of the scheme of Half Time Teaching Assistants (HTTAs) and Post Graduate Research Assistants (PGRAs) supported by TEQIP-II project. Under this scheme, sixteen PG students and four Ph.D students have been appointed. They have been given the mandate to assist their respective departments in the conduction of academic and outreach activities while completing their studies.
- Conduction of workshops to enhance the employability of the PG students of NITK by conducting workshops to train them in the effective use of the English language, improve their communication and interpersonal skills and strengthening their grasp over subjects with high employability potential.
- Facilitating the conduction of number of workshops/ conferences/ seminars across departments to improve the promote interaction with experts from India and abroad with the aim of improving the quality of research as well as the quality of teaching-learning process at NITK.
- I along with Dr. Laxminidhi T have played a major role in the conduction of a workshop for disseminating information on NBA accreditation process in NITK. A number of faculty members from other NITs also participated in this workshop.

I have facilitated (along with Dr. M R Arulalan and Dr. Laxminidhi T) the setting of a peer mentoring program in the institute in which sixth semester students of the E&C discipline have served as mentors to the students of the second semester for the Elements of Electronics and Communication course. In this program, each section of the second semester was broken up into several groups of about 10-12 students with a mentor being assigned to each group. The mentor was given the responsibility of giving inputs to help the students of his/ her group attain a better understanding of the subject. A token honorarium of Rs. 400 per hour of engagement has been fixed and will be paid to the senior students after their return from vacations in July. This program has been very well received by the first year students as well as their mentors. We are planning to extend this program to cover more subjects during the odd semester (July-November 2014).

I am a member of the Board of Studies of BVB College of Engineering, Hubli.

Work on Energy Efficient MIMO Wireless Communications being carried out in the E&C Department of NITK, Surathkal.

A brief description of Current Research work being carried out in the area of Wireless Communication by my research group.

The Wireless Communication Industry has employed Multiple Input Multiple Output (MIMO) techniques to improve the Capacity and Reliability of modern cellular networks. Many of the services taken for granted today depend critically on developments in this field that have happened in the past two decades. The emphasis in MIMO research in the immediate past has been on improving the Capacity, reliability of Wireless Channels and reducing the computational complexity of encoding/ decoding algorithms. The topic of energy efficiency has not been given much importance. However, in view of the large number of customers using these services and the consequent energy consumption, it has become imperative to ensure that energy consumption by base stations and mobile terminals be reduced in the interest of reducing global warming and protection of the environment.

A key issue in current wireless communication research is to strike an adaptive compromise between wireless network's area spectral efficiency and energy efficiency. This research requires that issues concerning Spectral efficiency as well as Energy efficiency as pertaining to Wireless Communications be understood and addressed. Conventionally, the conflicting requirements of good spectral efficiency and channel reliability have been met by harnessing Multiple transmit and Multiple receive antennas. Such systems are referred to as Multiple Input Multiple Output (MIMO) communication systems. MIMO systems normally use multiple antennas at the transmitter, receiver, or both. The employment of multiple transmit and receive antennas allow the link designer to employ multipath scattering phenomenon in wireless channel to combat signal fading and hence increase the communication performance. Unfortunately, this method suffers from the drawback of poor energy efficiency and very high complex receiver design. This is primarily because all the antennas are simultaneously active at the same point of time. This has motivated the research community to examine alternatives which can yield high spectral efficiency with better energy efficiencies as well as lesser transmitter/ receiver complexity. One new promising approach that has attracted the attention of researchers is called `Single Radio Frequency large scale

MIMO Communications' also referred to as Spatial Modulation (SM). This architecture is capable of facilitating energy efficient as well as spectrally efficient communication. A recent practical demonstration at the University of Edinburgh demonstrated that spatial modulation with MIMO has the potential to outperform many of the spectral efficient modulation schemes currently in use. A lot of current research work in Wireless Communications is directed towards efficient harnessing of Spatial Modulation to synthesize spectrally and energy efficient modulation/ coding/ demodulation schemes. This has motivated us to undertake a critical look at various open research problems in this domain with a view to address a few of them. Unresolved problems in the domain of Spatial Modulation and Detection strategies for MIMO systems include the employment of designing a reduced complexity sphere decoder, new faster sphere decoding algorithms for MIMO systems that even reduce the transmit energy requirement, use of non-binary channel codes with high spectral efficiencies, and the use of the frequency domain (possibly employing some form of CDMA) in addition to the spatial domain in order to improve reliability, spectral efficiencies as well as energy efficiencies in a wireless channel.

Two research scholars (at Ph.D.) and one student at Master's level have started to address various unsolved problems in this domain. We will be addressing issues of efficient code design, Channel estimation, simulation and prototyping indoor wireless systems using USRP boxes to validate the performance of the algorithms and codes designed by us.

Concluding Comments:

I first joined NITK as an Assistant Lecturer in 1989 immediately after my graduation. Since then, I have served NITK in many capacities. I have taught courses at UG, PG and pre-PhD levels. Six research scholars have completed their dissertations under my guidance. I have also served as a Nodal Officer and have currently been vested with the responsibility of the Co-coordinator of the TEQIP program. I have completed several assignments in these positions. I (jointly with Dr. Laxminidhi T) have brought consultancy income of about Rs. 44 Lakhs to the institute in the past four years. I have also been able to get two sponsored projects with a total outlay of Rs. 140 Lakhs to the department in the last four years. These projects have allowed the department to procure several high end equipment and software and also provided faculty and students to work closely with R&D labs on industry relevant problems. I hope to continue with my research work, R&D activities in close coordination with Indian industry and administrative responsibilities for the betterment of academic environment of NITK.

U. Sripati,
August 17, 2014