RÉSUMÉ

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EDUCATION:

- **Lead Assessor Training Certificate** August 1992
  Program conducted by **Confederation of Indian Industries, India**
- **Doctor of Philosophy in Electrical Engineering** 1984 - 1988
  University of Missouri-Columbia, USA: Advisor – Dr Richard G. Hoft; Power/Machine Electronics; Digital Signal Processing applications; digital measurement system; FEM Analysis; System Modeling
- **Master in Business Administration** 1984 - 1987
  University of Missouri - Columbia, USA - Thesis: Human Resource Mgmt. for 'Innovating Organizations'
- **Master of Science in Electrical Engineering** : GPA 4.0 / 4.0 1982 - 1984
  Wayne State University, USA - Power Systems and Residential Solar Energy Systems
- **Bachelor in Electrical Engineering** : First Class (Hons) 1968 - 1974
  Jadavpur University, India - Automatic Control [Stood first in order of merit in BEE (Pt-I)]
- **Overseas Cambridge School Certificate** : Grade I 1964 - 1967
  Raffles Institution, Singapore - Science [Distinctions in Physics, Chemistry & Mathematics]
- **Primary School Leaving Certificate** 1958 - 1963
  Rosyth School, Singapore

WORK EXPERIENCE: (**Institution/location,** ***last designation*** & dates of joining/leaving)

- **Alagappa University, Karaikudi, India:** ***Visiting Professor*** February to June 2005
  Worked with **Dr. Kanniappan**, Vice Chancellor to set up the '**Center for Rural Development**'; conceived an "IT-Enabled Community Center" (ITECC) for **Total Community Development.**
- **Colorado State University, Fort Collins, USA:** ***Affiliate Professor*** since December 2004
  Worked with the ***Late*** **Prof. Emeritus Maurice L. Albertson** – co-founder of the Peace Corps movement – as a Faculty Affiliate in the Civil Engineering Department; Develop **Renewable Energy, Appropriate Technology** and **Participatory programs** in association with **'Village Earth'**, a non-profit 501(c)(3) organization under CSU.
- **Techna Institute, India:** ***Sr. Faculty Member*** May 2001 – May 2002
  Teach the University of London's 'Distance Education' courses in the fields of Management, Software Engineering & Information Systems; Member of the company's Software Quality Assurance team.
- **ADA Software & Services, India:** ***Management Representative (MR)*** May 1997 – October 2006
  Head of Softlution, Trivandrum Unit [July 2005 – June 2006]; responsible for maintaining the company's **'Quality Assurance Systems'** & implementation of ISO 9000 Standards; **Program Manager** – ERP software development; Promote **OMG Standards** & **Model Driven Architecture (Modeling 2006)** in South Asia and Singapore.
- **Society for Appropriate Rural Tech. for Sustainability, India:** ***Secretary*** since October 2003
  ARTS is a tax-exempt/80G non-profit NGO and the implementing partner of Sankalpa Trust, to implement knowledge-based, rural development & sustainable livelihood initiatives in renewable energy, shelter and ICT.
- **Sankalpa Trust, India:** ***Managing Trustee & Secretary*** since January 2000
  A non-profit NGO that promotes environment-friendly technologies, primary education, sustainable development & livelihood initiatives for renewable energy technologies (RETs) and shelter products & services—and in general—the socio-economic development of village-based communities using Information & Communications Technologies (ICT), and has initiated the 'Total Rural Development (TRD) Project" [http://www.sankalpacmfs.org/trd/]
- **Q Tronix Pvt. Ltd., India:** ***Managing Director*** since December 1993
  Design, development & manufacture of renewable energy products and applications; Solar Photovoltaic systems; Power and machine electronics; Microprocessor-based systems
- **Total Consulting Group, India:** ***Principal Consultant*** since June 1993
  Consultancy in the fields of **Quality Management** (TQM, ISO 9000 Standards, QFD, KAIZEN, Statistical Process Control and statistical methods, Quality Costs); **Renewable Energy Technologies** (RET); Systems development. Digital Imaging & Software Content Mgmt.; Project Mgmt.; e-Commerce application development
- **Prudential Power, India:** ***Advisor*** February 1996 – April 1997
  Project planning, design and technical management of various Renewable Energy Technologies, including Wind Power, Solar Photovoltaic, Solar thermal systems, Micro-hydro power systems, Biomass gasification systems.
- **FICCI Quality Forum, India :** ***Quality Counselor*** May 1995 – April 1997
  Conduct management development programs and restructure / reorganize 'Quality Systems' to align with ISO 9000 Standards; introduce TQM methodologies and conduct Quality Audits.

- **VXL Landis & Gyr Ltd., India :** ***General Manager*** June 1990 – May 1993

Responsibilities included management and control of companywide activities in 'Quality Assurance', 'R&D' and 'Production' of meters and metering equipment.
I was responsible for the implementation of the company's TQM program / compliance with ISO 9000 Standards in the manufacture of metering products at the Calcutta factory.

- **Bhartia Cutler Hammer Ltd., India :** ***Marketing Manager*** June 1989 – May 1990

'Applications Engineering' for motor controlgear and switchgear products at Faridabad; 'Marketing & Strategic Planning' - New Projects (electronic relays); 'Corporate Planning'.
I was responsible for the codification project towards the computerization of the company's manufacturing, commercial and marketing operations.

- **University of Missouri – Columbia, USA :** ***Post-Doctoral Fellow*** May – November 1988

Worked for the Electronics Systems Div. of **Square D Co.**, Cedar Rapids, IOWA, USA, a leading 'FORTUNE 500' control and switchgear company, to design and formulate the algorithms and simulate/test the critical sub-systems of a unique digital power monitoring and control system product.
The device provides for remote data communication, system status, power quality monitoring, automatic load shedding & power factor correction, amongst several other features.

- **Jay Engineering Works, India :** ***Manager R&D*** August 1974 – August 1982

Responsible for the design and development of domestic and industrial fans; management of cost reduction/value engineering projects; special assignments in Quality Assurance, Production and Market Research.

GRANT WRITING EXPERIENCE:

- I have twenty years of experience in writing educational, scientific, technical and social programs oriented grant proposals, in which I have either been the Principal Investigator or Co-Principal Investigator.
- The fields in which I have written grant proposals correspond to those areas that have been covered under my work experience at Colorado State University, Sankalpa Trust, ARTS, ADA Software, Q Tronix & TCG.

WORK EXPERIENCE IN INFORMATION TECHNOLOGY:

- Design and architecture of **Enterprise Resource Planning (ERP)** software using **Model Driven Architecture (MDA)** and the software **component factory** approach;
- **Reengineering** of **Legacy Systems** using **Architecture Driven Modernization (ADM)**;
- **Quality Assurance** of software systems through the development cycle **(ISO 9000 Standards)**;
- **Object-oriented Analysis & Design (OOAD)** & **Modeling** using **'UML'** and **'OMG Standards'**;
- **Technical writing** and **Documentation services; Digital imaging** and **Content Management**;
- **CORBA / IIOP** architecture for interoperability across globally networked IT systems.

SOFTWARE PROJECT MANAGEMENT EXPERIENCE:

- Design/implementation of a **'Product Configurator'** as a cartridge for **'Intershop 3'** shopping mall;
- Design and implementation of a **'Full Text Search Engine'** for a web publishing application;
- **'Workflow Modeling'** and design, in accordance with Workflow Management Coalition (WfMC) standards;
- Design and implementation of a **'Vocabulary Games'** software application;
- Design of a **Website** for a large, multi-unit and diversified financial institution;
- Reengineering AS/400 **ERP** application for running on native 'green screen' and on 'Windows' platform.

SKILLS ACQUIRED IN THE FIELD OF INFORMATION TECHNOLOGY:

- **Finite Element Method** of analysis; Borland's Delphi 4 for **application development**;
- AutoCAD R14 and bCAD for **3D modelling** and **engineering management applications**;
- Adobe products (PhotoShop, Illustrator, Premier and PageMaker), Macromedia Director, Fractal Painter & Bryce for **digital imaging**, **multimedia content generation & software**;
- **Other applications** : HTML, Javascript, MicroCap V and CM40 for electronic circuits and simulation; MS Office (Word, PowerPoint and Excel); Macintosh Hypertext; SPSS; FORTRAN; SPICE; CSMP; Matlab ...

PUBLICATIONS:

- ***'Digital Measurement of the Efficiency of Inverter-Induction Machines'*** - 1987 IEEE-IAS Conference held at Denver, Colorado in 1986.
- ***'FEM Analysis of Inverter-Induction Motor Rotor Conduction Losses'*** - 1987 IEEE/PES Winter Conference at New York.
- ***'Integrating CRM and QFD to create a collaboration platform for innovation in product design'*** - Hawaii International Conference on Business, June 2002.

HONORS:

- **Wayne State University:** Graduate-Professional Scholarship (1983); Represented WSU at the American Power Conference, Chicago in 1983.
- **Jadavpur University:** University Blue (1974); P N Roy Medal for scoring the highest marks in Power Systems Engineering (III); Prizes and scholarships for ranking within the top three positions.

WORK EXPERIENCE IN THE SOCIAL SECTOR:

Collaboration with VSSU and Switch ON, India: since January 2010

Work with Mr. Kapilananda Mondal, CEO & Founder of Vivekananda Sevakendra-O-Sishu Uddyan (VSSU) and Mr. Vinay Jaju, CEO of Environment Conservation Society (Switch ON)— to demonstrate the socio-economic and environmental sustainability of livelihoods programs and renewable energy technologies based on distributed energy paradigm—for village-based communities and rural households in India, in general, and the people in the South 24 Parganas/Sunderbans area in particular.

We have signed a 'Memorandum of Understanding' under the banner of the coalition of Moral Forces for Sustainability (cMFS), posted at [http://www. sankalpacmfs.org/cmfs/01coa/mou/mou_vssu_son_arts.pdf].

Collaboration with Society for Development Initiatives, Bangladesh: since November 2008

Work with Mr. Shamsul Haq, Executive Director of Society for Development Initiatives (SDI), Dhaka, Bangladesh—to collaborate in sustainable livelihoods projects and in the application of appropriate technologies in energy and shelter projects, especially in the rural areas of the Sundarbans.

We have submitted a BD Taka 10 million 'Micro-TRD' project to Palli Karma-Sahayak Foundation (PKSF), Bangladesh—for 6,000 households in a village-based community at Sandip Island, Bangladesh, as a demonstrative model for holistic rural development. Please see [http://www.sankalpacmfs.org/trd/] for details of the TRD Project.

USAID's Methane-to-Markets Partnership Initiative: October 2006 to September 2008

Project Director/PI for USAID project entitled *'Building a Plug-Flow Biogas Digester (PFBD) at Baidyapur Village, District Nadia, West Bengal, India as a demonstrative model for USAID's M2M Partnership Initiative.'*

This 2-year ~US$95k project is in technical collaboration with (a) Dr H N Chanakya of **IISc Bangalore**, (b) Prof Emeritus Maurice Albertson of **Colorado State University** and (c) Prof Ali Ansari, Chairman – **EWB-India**.

Eco Kiln a.k.a. Vertical Shaft Brick Kiln (VSBK) Project: August 2006 to July 2008

Co-Principal Investigator for a **Dept of Science (GOI)** funded project entitled '*Building a model VSBK at Baidyapur Village, WB for the economical, energy efficient and environment friendly manufacture of bricks'*.

This 2-year ~Rs 15 Lakhs project with CER benefits is in technical collaboration with **Development Alternatives**, New Delhi, and is a flagship project for creating sustainable shelter products and habitats for the rural poor.

Total Rural Development (TRD) Project: [http://www.sankalpacmfs.org/trd/] since August 2004

Principal Investigator for a circa US$25 million/seven year project, which is based on a three-tiered model to promote (a) Asset-based & market-creation approaches for building 'Private-Public Partnerships' (PPPs); (b) Process and object oriented focus—to build reusable models for holistic rural development, and (c) The growth of an ethics and morality of self-development.

The Prime Minister's Office & Planning Commission of India had approved a unique version of the TRD project for the Auroville bio-region—in Tamil Nadu—in the hope that it becomes the model for the rest of the country. The TRD concept is being actively proposed for implementation in India—including West Bengal, Assam, Jammu, Uttaranchal and Gujarat—and internationally as well, in Bangladesh, Sri Lanka and Nigeria.

In March 2006, I was invited to meet with the President of India, Dr. A P J Kalam at the Rashtrapathi Bhavan, New Delhi, to discuss with him a proposal for the new paradigm for rural development entitled "*Convergence of Rural Development Paradigms at Sivaganga District, Tamil Nadu*", that I had sent to him in January 2006.

Environmental Economics Research: June 2001 – Dec 2003

Principal Investigator for a **World Bank** funded IGIDR research project entitled *'Study of the Economic and Environmental Impact of **Biomass Gasification Based Power Plants**'*.

The policy recommendations from this Rs. 1 million project were used as inputs by the **Government of India** to frame policy decisions for the development of **biomass-based** strategies for **rural electrification**.

Sankalpa Research Center: [http://www.sankalpacmfs.org/src/] since August 2003

Presently, Sankalpa's rural development programs are showcased at '*Sankalpa Research Center*' at Village Baidyapur, District Nadia, West Bengal, [http://www.sankalpacmfs.org/src/] where we have established models for disseminating appropropriate technologies. The work was started with a 'Sustainable Development Center' at Santiniketan in 2002 to experiment with the '*Sankalpa Pyramidal Model for Rural Development*', and also at other distributed locations in West Bengal and Tamil Nadu, as follows:

- **Livelihoods Center:** Promote sustainable livelihoods, such as handmade paper and jute products, shelter products, energy and IT-enabled products and services; 'Direct-to-Home' vegetable delivery service;
- **Building Center:** Demonstration of environment-friendly social housing, including ***Eco Kiln*** (aka VSBK), ***Micro-concrete Roofing Tiles***, , **Ferroconcrete Doors & Windows** and **Compressed Earth Block;**
- **Renewable Energy Center**: Demonstration of biomass **gasification** and **biomethanation** technologies for rural electrification; briquetting; improved *chulha*; *Solar Photovoltaic* and *Solar Thermal* systems; food-driers.
- **IT Enabled Community Center: *Internet*** and ***IT-enabled services*** & ***telemedicine***; in general, creation of self-employment, sustainable livelihood opportunities and provisioning of a ***'Learning Center'***.

We have signed a 'Memorandum of Understanding' with **Development Alternatives** (a premier NGO in New Delhi, India) – under the leadership of **Dr. Ashok Khosla -** to collaborate in the development of technologies and promotion of products, processes and services in programs relating to environmental management, shelter, agriculture, water, energy, recycling, small-scale industry and such other fields of common interest.

At **IISc Bangalore: Prof H S Mukunda**, Advisor—World Bank project; **Dr H N Chanakya** for biodigesters. We have interacted with (a) **Dr Ashok Jhunjhunwalla** at **IIT Madras/n-Logue** to implement CORDECT (WLL) technology for **rural Internet connectivity** and **IT-enabled services**; (b) **Dr Saravanan** of **Anna University**, **Madras** to replicate the **Biomass-based Cold Storage Systems** for rural applications (c) **Prof A G Rao** of IIT Bombay to develop bamboo artefacts (d) **Prof S P Mukherjee**, of IAPQR for quality management.

WORK EXPERIENCE IN SOCIAL AND APPROPRIATE TECHNOLOGY PROJECTS:

Year	Field	Description of Work/Experience
2010	Aquaponics/ Aquaculture Sustainable livelihoods, food security	Proposed project for Workshop on 'Design and Implementation of Aquaponics Systems', submitted to Indo US Science and Technology Forum, in collaboration with Dr. Nathaniel R. Storey, University of Wyoming, Laramie. Project objectives: We propose to conduct a one-day 'Seminar' in Kolkata, which will focus on design, development, implementation and monitoring & evaluation of the effectiveness of aquaponics/aquaculture systems; followed by the techno-commercial 'Workshop' over four working days at VSSU, at Village Ullon, Laxmikantapur in District 24 parganas (South), West Bengal.
2010	Spirulina Project (micronutrients as a food supplement) Livelihoods generation for women	Ongoing project at VSSU, Laxmikantapur, 24 Parganas (South) near the Sunderbans, for growing Spirulina as a micronutrient food supplement for the poor—especially children—in village-based communities, in conjunction with biomethanation, for absorption of biogas CO2 for enhancing the productivity of spirulia; monitoring & evaluating the outcome. Project objectives: [http://www.sankalpacmfs.org/src/01liv/01liv.html#8] a) Demonstrate, develop and evaluate Spirulina production processes in diverse climatic and resource input conditions; b) Promote gender issues and employment opportunity for women.
2010	Biomethanation end use strategies	Proposal submitted to US EPA to evaluate Methane capture from biomethanation of biomass waste and CO2 in biogas to produce Spirulina and fish for an integrated village-based energy, health and waste management system. Project objectives: [http://www.sankalpacmfs.org/src/wp/Concept_Integrated_Bio_Spi.pdf] a) Reduce GHG emissions and capture methane as a renewable and clean source of energy from agricultural and kitchen/food waste, using tried and tested technologies; b) Use the by-products from biomethanation for vermicomposting, fish aquaculture and using the CO2 in biogas to enhance the productivity of Spirulina micronutrient, so that the 'waste' by-product of each process is recycled as raw material inputs for the other.
2009	Passive cooling Absorption cooling Refrigeration system without electricity; Livelihoods Appropriate technology	Ongoing project at *Sankalpa Research Center* for design, production, dissemination and evaluation of a novel 'Pot-in-Pot' (PiP) vegetable cooler based on evaporation principle—with Society for Development Initiatives (SDI) Bangladesh. Project objectives: [http://www.sankalpacmfs.org/src/wp/pip.pdf] a) To 'refrigerate' vegetables and perishables without consuming electricity or conventional fuels. b) Use Finite Element Method (FEM)/ State Variable approach for functional performance optimization and usability simulation.
2009	Eco Kiln (VSBK) Shelter technologies	'Training Center' and technology transfer workshops for disseminating sustainable village-based shelter technologies for the rural people in West Bengal and the North Eastern region of India, and evaluate the effectiveness of the social housing program. [http://www.sankalpacmfs.org/src/wp/Concept_EcoKiln.pdf] The budget includes a provision for operating the Eco Kiln for demonstrating the operations and management of the Eco Kiln, and other sustainable shelter demonstration projects.
2008	Total Rural Development (TRD) Project Holistic approach 'Process oriented' 'Object oriented' Information & Communications Technologies (ICT)	R&D project for holistic rural development—in collaboration Development Alternatives and other coalition partners—to build, operate and evaluate a 'Rural Convergence Program' (RCP), to promote asset-based, market creation, process centric and object oriented approaches for holistic community development, and to deliver knowledge-based products and services to the targeted beneficiaries. Project objectives: [http://www.sankalpacmfs.org/trd/wp/trdglobal.pdf] Overcome local barriers to socio-economic development through Public-Private Partnerships (PPP), using knowledge-based products and services as tools for empowerment; Use process oriented and scientific approaches for community building and monitoring and evaluation of the effectiveness of the RCP; Adopt a reusable and modular structure for a software driven approach for realizing the change processes.

Year	Field	Description of Work/Experience
2007	Solid Oxide Fuel Cells Biomethanation strategies Distributed energy paradigm	R&D project at *Sankalpa Research Center* to evaluate the use of fuel cells to convert biogas into electricity for clean air and long-term rural energy security—in collaboration with Central Glass & Ceramic Research Institute (CGCRI), Calcutta and CE-CRI, Karaikudi, Tamil Nadu. Project objectives: [http://www.sankalpacmfs.org/src/wp/ConceptNote_SOFC.pdf] c) Demonstrate and evaluate the use of fuel cells to directly convert the biogas produced in village-based PFBDs into electricity; d) Promote healthier air quality and reduce GHG emissions.
2007	Biomass energy Gasification Rural energy security Distributed energy system CDM	Ongoing project at *Sankalpa Research Center* to build, operate and evaluate a model 20kWe biomass gasification based power plant (BGBPP)—in association with GP Green Energy, Calcutta. Project objectives: [http://www.sankalpacmfs.org/src/02ene/02ene.html#7] (a) Create awareness of biomass as a sustainable source of renewable energy that is an alternative to fossil fuels; (b) Preserve bio-diversity and reduce GHG emissions; (c) To study and evaluate the impact on fuel properties of mixing producer gas and methane-rich biogas from adjoining PFBD.
2006	Methane-to-Markets partnership GHG emissions reduction Rural energy security Distributed energy system	Ongoing project at *Sankalpa Research Center* to build, operate and evaluate a 60 Nm^3/day Plug Flow Biogas Digester (PFBD) at Baidyapur Village, Nadia, WB as USAID's Methane-to-Markets Partnership Initiative. Project objectives: [http://www.sankalpacmfs.org/src/02ene/02ene.html#4] a) Conduct localization and commercialisation of the PFBD model for generation of methane powered energy services to rural and semi-urban areas, using different kinds renewable resources as inputs; b) Develop a decentralized energy system based on methane gas to serve domestic and commercial needs; c) Develop methods and systems for cost recovery through user fees.
2006	Energy conservation GHG emissions reduction/CDM Energy efficient homes	Ongoing project at *Sankalpa Research Center* to build, operate and evaluate a model Eco Kiln/Vertical Shaft Brick Kiln (VSBK) at Village Baidyapur, Nadia, West Bengal, for the economical, energy efficient and eco-friendly manufacture of bricks. Project objectives: [http://www.sankalpacmfs.org/src/03she/03she.html#8] a) Perform localization and adaptation work for the eastern India. b) FEM analysis/State Variable approach for performance optimisation; c) Promote shelter technologies, such as MCR Tiles, FC Doors and Windows, CEBs and energy-efficient low-cost homes.
2006	Biomass energy – Energy briquettes	Ongoing project at *Sankalpa Research Center,* Village Baidyapur, Nadia, to build, operate and evaluate a model energy briquetting plant, for energy security & sustainable livelihoods.
2006	Knowledge Center Community building ICT	R&D project to build, operate and evaluate an IT Enabled Community Center (ITECC) at *Sankalpa Research Center*, Nadia. Download [http://www.sankalpacmfs.org/src/wp/itecc.pdf] for details or visit: [http://www.sankalpacmfs.org/src/04ite/04ite.html]. Project objectives: To build a) A 'Learning Center' for capacity building programs; b) A 'Telemedicine Center' to improve the health of the community, c) A platform to network with the global community.
2006	Biomass-based refrigeration systems	R&D project at *Sankalpa Research Center* to build, operate and evaluate a model 20kWt/3-TR biomass based cold storage system (BBCSS) for rural applications—in collaboration with Dr. Saravanan of Anna University. For details, please download [http://www.sankalpacmfs.org/src/wp/bbg_cold_storage.pdf]. Project objective: To create an awareness of BBCSSs as a viable and established technology, and use of renewable biomass thermal energy instead of fossil fuels/grid electricity for refrigeration.
2004	Rural electrification; Distributed energy systems;	Proposal for design, development and evaluation of a novel low-cost, multi-fuel Mini Electric Generator (MEG) for domestic and commercial use in global rural communities—ongoing *Sankalpa Research Center* R&D project. Project objectives: a) Improve the quality of life of rural and remote households; b) Generate electrical/thermal energy for sustainable livelihoods; c) Generate reliable sources of energy for farmers/small industries.

Year	Field	Description of Work/Experience
2003	Solar Thermal Systems	Proposal to build, operate and evaluate a 10,000 liters per day hot water system for Apollo Hospitals (In technical consultation with Tata BP Solar).
2003	Solar Photovoltaic	Study report to evaluate the socio-technical and socio-cultural aspects of 'Solar Home Systems'. *- In consultation with Tata BP Solar. for market research and analysis.*
2003	Biomass gasification (thermal use)	Ongoing project at *Sankalpa Research Center* to build a model biomass-based gasifier system for a crematorium, which reduces fuelwood consumption by almost 75%. Please see [http://www.sankalpacmfs.org/src/wp/bg_crematorium.pdf].
2002	Environmental Economics of Biomass gasification based power plant (BGBPP); Rural electrification;	Principal Investigator for a World Bank funded research project entitled *'Study of the Economic and Environmental Impact of Biomass Gasification Based Power Plants'*. The policy recommendations emerging from this project were used as inputs by the Government of India to frame policy decisions at the national level for the dissemination of biomass-based renewable energy strategies.
2001	Solar Cooker	Provide consultancy to build, operate and evaluate a community solar cooker and pond reclamation project for *Stree Shakti* at Rajarhaat, Kolkata. *- As Managing Trustee, Sankalpa Trust*
1996 – 1997	Wind Power; Solar Photovoltaic & Solar Thermal; Anaerobic Digesters (Biogas Plants)	Technical management and monitoring of Wind Power, Solar Photovoltaic/Thermal, and Biogas renewable energy projects. Work included development of life-cycle costing projections for Solar Photovolatic/Solar Thermal plants, modelling of renewable energy systems in general, and monitoring and evaluation of sysytems. *- As Advisor to Prudential Power Pvt Ltd*
1993 – 1996	Solar Photovoltaic; Rural domestic lighting project	Design, manufacture and dissemination of an efficient *solar lantern* for rural villages, with a novel 'maximum power point' static electronic device for optimising energy conversion. *- As Managing Director, Q Tronix Pvt Ltd*
1990 – 1993	Energy metering	Management, control and evaluation of companywide activities in '*Quality Assurance*', '*R&D*' and '*Production*' of energy meters and metering equipment. *- As General Manager, VXL Landis & Gyr*
1989 – 1990	Motor controlgear and switchgear	*'Applications Engineering*' for motor controlgear and switchgear products at Faridabad, India; '*Marketing & Strategic Planning*' – New Projects (electronic relays); '*Corporate Planning*'. *- As Manager (Applications), Bhartia Cutler Hammer*
1988	Digital power monitoring	Design, formulate and evaluate the algorithms and simulate/test the critical sub-systems of a unique digital power monitoring and control system product for Electronics Systems Div. Of Square D Co., Cedar Rapids, Iowa, USA. For remote data communication, system status, power quality monitoring & evaluation, automatic load shedding & power factor correction. *- As Post Doctoral Fellow, University of Missouri-Columbia.*
1984 - 1988	Inverter Induction Motor Drives	FEM Analysis of the performance of inverter induction motor drives (simulation of rotor current in cage-type machines). *- Doctoral Thesis, University of Missouri-Columbia.*
1982-1984	Residential solar energy systems	MS Thesis at Wayne State University on applications and residential usage of solar energy systems. - <u>*Research area*</u>: Photovoltaic /Thermal (PVT) systems
1974 - 1982	Electric fans	Research & Development of domestic and industrial electric fans; management of cost reduction/value engineering projects. *- Manager R&D, Jay Engineering Works, Calcutta.*