

## Ankush Sharma

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### Experience Summary

- Around 16 years of Research & Development (R&D), consultancy, and the project management experience, primarily in the area of power systems and smart grid.
- Areas of interest include Power System State Estimation (PSSE), Wide Area Monitoring Systems (WAMS), IT application into power system, Smart Grid and Smart City technology development, real-time simulation, Energy Management System (EMS), and Distribution Management System (DMS).
- Worked as Research Scientist and Consultant in the Power System Centre of Excellence (CoE) of TCS as well as Wipro. I was mainly involved in carrying out research on new initiatives and providing domain consultancy on global utility projects.
- Executed various consultancy assignments in power system and smart grid area.
- Strong project management experience (PMP certified in 2009)
- Excellent academic background throughout the educational career.
- Published 6 research papers in various IEEE journals and 3 research papers in various national as well as international conferences.
- Member of IEEE.

### Qualifications

Degree and Date	Institute	Major and Specialization
Ph. D., Sep. 2014	Indian Institute of Technology Kanpur, Kanpur, India	Electrical Engineering, Thesis Title – Multi-Area Power System State Estimation Utilizing Synchrophasor Measurements, Multi-Agents and Common Information Model CPI – 10/10
MBA, May 2009	ICFAI University, Dehradun	Finance
M. Tech., May 2001	Indian Institute of Technology Kanpur, Kanpur, India	Electrical Engineering with major in Power Systems CPI-8.86/10
B. Tech., July 1998	Harcourt Butler Technological Institute, Kanpur, India	Electrical Engineering Marks – 84.4%, 1 <sup>st</sup> Rank in the branch

### Other Degrees/Certifications

- Certification on Big Data and Cloud Computing, 2015
- Project Management Professional (PMP®), April 2009
- Master of Business Administration (MBA), Finance, Institute of Chartered Financial Analysts of India (I.C.F.A.I.) University Hyderabad, India, May 2009
- Advance Diploma in Management, (I.C.F.A.I.) Dehradun, July 2007
- Certificate Program in Mutual Fund Competency, Financial Technology Centre (TCS), 2007
- Diploma in Business Management, (I.C.F.A.I.), 2005

## Career Profile

Dates	Organization	Major Roles
Aug 2016 – Till Date	IIT Bhubaneswar	Assistant Professor
Oct 2015 – July 2016	Wipro Technologies	Research Scientist, Managing Consultant
Jun 2001– Oct 2015	TATA Consultancy Services	Research Scientist, Domain Consultant, Project Manager
Jan 2015 – May 2015	Indian Institute of Information Technology, Design, and Manufacturing, Jabalpur	Guest Faculty
Jan 2011-Apr 2014	Indian Institute of Technology Kanpur	Research Scholar
Jul 1998-Jun 1999	CMC Limited	Customer Service Engineer

## Project Assignments in the Power System and Smart Grid area

The details of various power system and smart grid related R&D and consultancy assignments that I have handled are listed below in a chronological order.

Project	<b>Smart Grid Centre of Excellence (CoE)</b>
Organisation	<b>Wipro Technologies</b>
Customer	<b>Various Power Utilities</b>
Role	<b>Research Scientist and Managing Consultant</b>
Period	<b>Oct 2015 – July 2016</b>
Description	<ul style="list-style-type: none"> <li>Identify issues related to the solar PV integration into the power grid and develop solution to resolve these issues. This research work is being carried out presently by considering the complexities of the UK market.</li> <li>Development of Dynamic Energy Optimization algorithm to utilize storage batteries in demand based tariff hedging at customer level and peak load clipping at utility level.</li> </ul>

Project	<b>Power System Centre of Excellence (CoE)</b>
Organisation	<b>Tata Consultancy Services</b>
Customer	<b>Various Power Utilities</b>
Role	<b>Research Scientist and Domain Consultant</b>
Period	<b>May 2014 to Oct 2015</b>
Description	<ul style="list-style-type: none"> <li>Development of demand response management algorithms and associated analytics, utilizing the information from a smart facility test bed containing Internet of Things (IoT) enabled devices and smart meters. This R&amp;D initiative is being undertaken in collaboration with the Industry Internet Consortium (IIC).</li> </ul>

	<ul style="list-style-type: none"> <li>• Developing AMI implementation architecture and landscape for a large US utility customer and providing innovative solutions on future AMI information analysis scenarios pertaining to the load forecasting, distributed intelligence, monitoring and control of Distributed Energy Resources (DERs), intelligent asset management, power quality improvement, voltage VAR optimization</li> <li>• Provide end-to-end smart home solution for a large UK utility customer, an R&amp;D initiative to resolve the issues related to demand response management, customer participation, and renewable integration</li> <li>• Providing future roadmap on IEC61850 based Distributed Control System (DCS) implementation for the substations of a large utility customer in Macau. This is a Research-cum-Consultancy assignment in which the customer was provided the future landscape of the proposed IEC61850 based substations automation technology and its impact on the future smart grid technologies.</li> <li>• TCS in-house R&amp;D initiative to develop innovative algorithms and solutions on the following in-house power system applications, keeping in mind the future smart grid roadmap – <ul style="list-style-type: none"> <li>▪ Advanced Storm Outage Management System</li> <li>▪ Solar PV Plants Remote Operation Monitoring and Fault Diagnosis System</li> <li>▪ TCS Wind Farm Management Solution</li> <li>▪ Power System Transmission Network Visualization and Analytics System</li> </ul> </li> <li>• Providing consultancy to the team, leading the project of government utility in Kuwait, for the smart meter implementation.</li> <li>• Providing power system domain consultancy to the utility company in Saudi Arabia for the Meter Data Management System (MDMS) implementation.</li> </ul>
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<b>Project</b>	<b>Setting up Real-Time Digital Simulation Facility for Advance Research in Power and Control (DST Sponsored)</b>
<b>Organisation</b>	<b>Indian Institute of Technology Kanpur</b>
<b>Customer</b>	<b>NA</b>
<b>Role</b>	<b>Senior Project Engineer</b>
<b>Period</b>	<b>March 2012 to April 2014</b>
<b>Description</b>	<ul style="list-style-type: none"> <li>• Analysis, design, development and execution of the test power systems on the RTDS</li> <li>• Integration of the hardware PMUs with the RTDS and setting up synchrophasor based Wide Area Monitoring System (WAMS) lab</li> <li>• Integration of the MATLAB with RTDS using Software-in-the-Loop (SiL) configuration</li> <li>• Smart City pilot project – Participated in developing a proposal for submission to Ministry of power (MoP) and actively participated in various presentations to the MoP and meetings with vendors</li> </ul>

	<ul style="list-style-type: none"> <li>Participated in the consultancy project of the Uttar Pradesh Irrigation Department (UPID) on the SCADA implementation (PI: Dr. Saikat Chakrabarti)</li> <li>Supported in the development of Innovation Model for the Sectorial Innovation Council (SIC) of Ministry of Power</li> </ul>
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Project	<b>Enhancements for the EMS and DMS applications</b>
Organisation	<b>Tata Consultancy Services</b>
Customer	<b>Areva T&amp;D India Limited</b>
Role	<b>Domain Consultant</b>
Period	<b>Feb 2007 to Oct 2009</b>
Description	<ul style="list-style-type: none"> <li>Offline Simulator (OFFLS) for the Energinet, Denmark – The purpose of this assignment was to develop an innovative algorithm to carry out the base-case violations, contingency violations, and short-circuit violations, in an offline mode using the real-time data stream available from SCADA.</li> <li>Development of algorithms and solutions for the Work Sequence, Fault Detection Isolation and Restoration (FDIR), Optimal Switching (OSW), Load-shed schemes for Meghalaya State Electricity Board</li> <li>Dynamic Case Preparation (DCP) and Transient Stability Analysis (TSA) interface development for North China Grid - To analyze various contingency violation scenarios in the TSA application and provide recommendations</li> <li>Kalman Filter (KF) based Pond Monitor Application (PMA) development for Meridian Energy Limited (MEL) New Zealand – A new KF based algorithm was developed for the MEL to carry out the correct estimation of the water level of the pond in hydro power plant.</li> </ul>

#### Other Relevant Assignments

Project	<b>Various Technology Projects</b>
Organisation	<b>Tata Consultancy Services</b>
Customer	<b>Utility and Non-Utility Customers</b>
Role	<b>Various Lead Roles</b>
Period	<ul style="list-style-type: none"> <li><b>Jun 2001 to Jan 2007</b></li> <li><b>Nov 2009 to Dec 2010</b></li> </ul>
Description	<ul style="list-style-type: none"> <li>Quality Assurance Lead - Leading the project team, Designing quality models, Managing quality processes and quality control activities. Testing the applications using tools such as Clear Quest, HP Quality Centre. Client – Ceredian, USA, Duration – (Dec2009 – Dec 2010)</li> </ul>

	<ul style="list-style-type: none"> <li>• Business Analyst and Team Lead – Analysis of business cases, develop software design, support in the development and delivery of the MIS application of the client. Client – Uttarakhand PWD, Duration – Sep 05 – Jan 07</li> <li>• Business Analyst and Team Lead – Analysis of business cases, develop software design, support in development and delivery of various applications, such as Safe Control Operation and G17 applications, of the client to comply the laws related to deregulated market. Client – NGT UK, Duration – Feb 04 – Aug 05</li> <li>• Module Lead and Developer – Member of core development team to design and develop Financial Accounting module of the MIS application of the client. Client – UP State Industrial Development Corporation Duration – Sep, 2001 – Jan, 2004</li> </ul>
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Project	<b>Customer Service</b>
Organisation	<b>CMC Limited</b>
Customer	<b>Various Public Sector Enterprises</b>
Role	<b>Engineer - Customer Services</b>
Period	<b>July 1998 to June 1999</b>
Description	<ul style="list-style-type: none"> <li>• Computer Hardware and software Maintenance support activities for CMC clients, such as Indian Railway, Ordnance Factory, HAL, SAIL etc.</li> </ul>

### Tools and Technologies Experience

MATLAB, RSCAD, OPAL-RT, Enterprise Architect 9.0, UML, e-terraPlatform, e-terraDistribution, PASIS, OpenPDC, CIMTool, CIMclipse, Liquid XML Studio, PMU Connection Tester, C, JAVA, UML, Web sphere Portal, J2EE, Visual Studio .Net, Crystal Reports, Visual Basic, Oracle PL/SQL, DB2, Fortran77

### Accomplishments & Recognition

- Recipient of POSOCO PPSA 2015 award in Top 10 PhD Thesis category.
- First Prize to the project on “Remote Monitoring and Control for Power System Network using Mobile SCADA Applications” in Gridtech 2013 at Pragati Maidan, New Delhi.
- Star of the Month Award in TCS in October 2005.
- President Medal for being topper of the branch in B. Tech. in 1998.
- 18th Rank in state in Intermediate Examination.
- 19th Rank in state in High School Examination.
- Several awards in quiz and creative writing at school and college level.

## Patent Filed

- A. Sharma, P. Banerjee, S. C. Srivastava, and S. Chakrabarti, "Monitoring of Devices Installed at Remote Locations", Indian Patent Application No. – 1322/DEL/2014

## Research Publications – Journals (Accepted)

1. A. Sharma, S. C. Srivastava, and S. Chakrabarti, "An Iterative Multi-area State Estimation Approach Using Area Slack Bus Adjustment," *IEEE Systems Journal*, pp.1-9, Apr. 2014
2. A. Sharma, S. C. Srivastava, and S. Chakrabarti, "A Cubature Kalman Filter Based Power System Dynamic State Estimator," *IEEE Transactions on Instrumentation and Measurement*, pp.1-10, Oct. 2014
3. A. Sharma, S. C. Srivastava, and S. Chakrabarti, "A Multi-Agent Based Power System Hybrid Dynamic State Estimator for Smart Grid," *IEEE Intelligent Systems*, pp.1-7, Oct. 2014
4. A. Sharma, S. C. Srivastava, and S. Chakrabarti, "An Extension of Common Information Model for Power System Multi Area State Estimation," *IEEE Systems Journals*, pp. 1-10, Nov. 2014
5. A. Sharma, S. C. Srivastava, and S. Chakrabarti, " Testing and validation of Power System Dynamic State Estimators Using Real Time Digital Simulator (RTDS)", *IEEE Transactions on Power System*, pp. 1-10, Aug. 2015
6. A. Sharma, S. C. Srivastava, and S. Chakrabarti, " Multi-Agent Based Dynamic State Estimator for Multi-Area Power System," *IEEE Gen. Trans. and Dist.*, pp. 1-11, Sep. 2015

## Journal Papers to be submitted –

1. A. Sharma, S. C. Srivastava, and S. Chakrabarti, " A New Model for the Smart Grid Maturity Assessment," to be submitted to IEEE Transactions on Engineering Management

## Research Publications - Conferences

1. J. Sreenath, S. Chakrabarti, A. Sharma, "Implementation of Rauch-Tung-Striebel smoother for power system dynamic state estimation in the presence of PMU measurements", IEEE Innovative Smart Grid Technologies-Asia (ISGT ASIA), 2015, pp. 1–6, 2015
2. A. Sharma, S. C. Srivastava, and S. Chakrabarti, "Multi Area State Estimation for Smart Grid Application Utilizing All SCADA and PMU Measurements," *IEEE Innovative Smart Grid Technology (ISGT) ASIA, 2014, Kuala Lumpur, Malaysia*, pp.1-6, 20-23 Apr. 2014
3. A. Sharma, S. C. Srivastava, and S. Chakrabarti, "Multi Area State Estimation Using Area Slack Bus Angle Adjustment With Minimal Data Exchange," *IEEE Power and Energy Society General Meeting (PES)*, 2013, pp.1-5, 21-25 Jul. 2013
4. A. Sharma, S. C. Srivastava, and S. Chakrabarti, "Synchrophasor Based Power System Monitoring and Control Using Real Time Digital Simulation Facility," National Power System Conference (NPSC) 2012, *Indian Institute of Technology (IIT) BHU, Varanasi*, pp.1-6, 14-16 Dec. 2012