**Israel Y. Kang, Ph.D.**

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**Career Summary**

Generate innovative ideas, establish strategic directions, provide technical guidance,develop practical working models, and implement application projects as an expert with hands on experience in applying industry-proven knowledge and cutting-edge practices of data mining, data science, machine learning, data-driven prognostics for real world problems.

More than twenty years of working experience and domain knowledge in development and implementation of quantitative modeling, statistical modeling, and risk management for energy and technology industries.

AWS SageMaker/Azur DevOps/Azur DataBricks

Python/R/Rapidminer/Matlab/SAS/SQL/C/C++/

Technical/Team leadership.

**WORK**

**EXPERINCE**

**BKO Services**

*Data Science Expert Consultant*

Nov 2019 – December 2019

*Overseeing and managing data science application projects for the client company.*

*Provide strategic and technical guidance for data scientists in implementation and*

*deployment of data driven machine learning prognostic models in the AWS Cloud*

*based SageMaker Platform. These models include fault detection, prediction of RUL*

*SDAE ,LSTM, as well as Isolation Forest etc.*

**2DA Analytics**

*Director of Data Science*

Feb 2019 – April 2019

*Mentoring and building a dynamic Data Science team, currently 3 members   
 Working in the AWS Cloud based Elastic Search/Kibana Platform to support*

*data engineering team for Data Ingestion, Data Quality Control, Business Alerts*

*with machine learning and Python scripts   
 Serve as Energy Quantitative Modeling, Data Science Expert and Consultant*

*to build strategic and sustainable business process for Software development,*

*deployment and moving to production   
 Developing pricing, optimization, risk management solutions for oil products'*

*scheduling, trading activities*

**HP Inc**

*Senior Data Scientist*

Nov 2017 – October, 2018

*Led as Lead Data Scientist at Finance Controller Department developing and implementing cutting edge Data Science Pilot Projects for Enterprise Direct Cash Forecasting, Global Trade Screening process. Provided Corporate Tech Talk to introduce and educate Senior Management and Program Management on the Big Data Infrastructures and Data Science life cycle process.*

* As Lead Data Scientist for Global Trade Screening projects, designed, developed and implementing Natural Language Processing based Python coded intelligent and automated screening tools to replace 80% of manual screening process.
* As Lead Data Scientist for Enterprise Direct Cash Forecasting projects, designed developed and implementing Machine-Learning (LSTM) forecasting methodology combined with driver based statistical models.

**Just Energy**

*Senior Data Scientist*

July 2016 – October 2017

*Working at Corporate Business Intelligence Division, providing Predictive Analytics modeling, support, and implementation for Executives, Business Departments such as Operations, Sales, Marketing, Call Centers with cutting edge Data Mining, Machine Learning, and Data Analytics. Design, develop, and deploy dashboards based on key insights and outputs from analyses presented to executives.*

* Designed, implemented and executed marketing and sales Campaigns for Customer Retentions and Renewals
* Built Customer Churn Model for customer behaviors with Decision Tree/Deep Learning/Survival Analysis methodologies
* Established Customer Channel Comparison models with data mining processes
* Developed Customer Risk and Value Scores with advanced data analytics
* Implemented Customer Renewal Model with predictive analytics

**GE Power & Water**

*Data Scientist Manager*

February 2015 – June 2016

*Generate innovative ideas, establish research directions, and implement technical projects. Provide technical guidance and reviews as an expert in developing data-driven algorithms for failure prediction, warranty simulation and analysis, financial risk analysis. Applies pioneer and industry-proven knowledge and practices of data science, analytics, data-driven prognostics, data mining, and machine learning to GE’s RM&D (Remote Monitoring & Diagnostics) operations.*

* Led the design, development, and delivery of DATA tool (Datalake Analytics Access Tool). It utilized GE’s newly developed Hadoop BIG DATA infrastructure, retrieving high volume data in terabytes from HDFS based Proficiency Database with automatic data quality checking and preprocessing, generating tables and downloading data into desktop in the backend with HAWQ capability. It is 150 times faster comparing to traditional data analytics access tool.
* Developed and implemented algorithms in Matlab to detect abnormal behavior and operation of power engines in real time.
* Built Bayesian algorithms in R to estimate failure rate for Gas Turbine products: LM 6000, LM 2500, as well as LMS 100 using past ten years failure and testing data.
* Developed Python based Random Forest algorithm to conduct importance factors analysis for Weibull modeling of engine failure.
* Invited TED Talk to GE Analytics Team: Hadoop and its Applications

**Escalera Resources**

*Data Scientist*

October 2014 – November 2014

*Developed forward price curve models of US Natural gas and basis, WTI Oil, as well as NGLs for evaluation of Natural Gas reserves and assets transaction deals.*

**Baker Hughes**

*Risk Modeling Consultant*

November 2013 – March 2014

*Developed new methodologies for statistical and mathematical multivariate survival models to combine financial and physical risk for oil drilling process by using MATLAB, VBA, Minitab, and Java as platform. Conducted daily risk predictions for Middle East, US Permian, as well as European Continent. Used Monte Carlo simulation in the model prediction process to provide customers realistic presentation of the risk distribution based on the model parameter precision.*

* Conducted statistical clustering analysis for data analysis and model accuracy improvement using Minitab and MATLAB
* Developed new model process and methodological framework to improve the multivariate survival modeling process with Weibull, Lognormal and Linear distribution.
* Coded Monte Carlo simulation in Java to automate the current risk prediction process.

**SunGard Energy**

*Risk Analytics (QAD) and Business Analyst*

December 2010 – July 2013

*Conduct quantitative analysis and model evaluation/validation for SunGard Aligne Analytics Product’s energy risk applications for gas, power, oil, as well as metal industries. Provide quantitative and energy risk management expertise and guidance for SunGard’s Sales, Consulting Service Group as well as Customer Service Group in terms of methodology, business requirements and user functions, data flow and processes, mathematical formulations and evaluations. Working as business analyst, provide business requirements documentation to development team; serve as liaison between client business and development implementation.*

* Perform risk and quantitative model validation and design for SunGard’s Aligne product. Generate and provide official documentations to demonstrate, illustrate, and validate step by step mathematical computation results, business process as well as data flow for Aligne Analytics product’s energy risk management applications, such as price simulation, principal component analysis, PDEs computation, Monte Carlo VaR calculation, stress testing, option models, and power generation models, and so on.
* Serve as liaison in product management between client business and development team, to provide business requirements/system function requirements documentations, including screen design, dataflow, and computation process for trading system development implementations. Provide consultant service to SunGard’s sale team, professional service team, as well as customer service team in terms of energy risk management control and processes, as well as quantitative modeling expertise.
* Provide quantitative and bushiness function testing design to replicate customer’s issues/bugs related to Aligne Analytics and Trading product. Provide system testing environment for the entire Aligne Analytics and Trading product. Design and conduct periodic quantitative and functional validation and regression testing for energy risk management core computations, such as profit & loss, cash flow, Mark to Market value, option modeling, and so on. Work side by side with SunGard’s Development Team to debug and solve the issues related to Aligne Analytics and Trading product.

**Deutsche Bank Energy Trading**

*Independent Risk Consultant*

March, 2010 – June, 2010

*Conduct extensive review and study of the Deutsche Bank’s current existing Energy Stress Testing Tools’ methodologies, processes, data structures as well as system integrations. Provide detailed documentations for current mathematical algorithms, system processes, database data structures as well as information integrating flow with OpenLink and RMS system. Propose and specify the next generation of Stress Testing systems’ requirements, methodologies, processes as well as system functions and integrations with OpenLink and RMS systems.*

* Conducted model review and validation for the current Full Revaluation Stress Testing Tools for natural Gas, Gas Skew, Oil, Oil Skew, US Power, Base Metal portfolios
* Provide overview, high level, mid-level, as well as low level technical documentation of the existing system’s methodologies, processes, Access database data structures, and data flow interaction with OpenLink and RMS system.
* Propose and specify the new integrated Stress Testing Systems for all commodities to overcome the scalability problems the current Stress Testing Tools encountered.

**Transocean Inc.**

*Independent Risk Consultant*

February, 2009 – May, 2009

*Serve as an energy financial risk expert consultant for the Client Company (Transocean Inc). Provide quantitative and qualitative expert assessments and evaluation of the Client Company’s financial/physical risk management system process, risk control, cost calculation and control, as well as the revenue generation process. Explore the opportunities for potential development and implementation of risk management systems.*

* Built pilot Excel/VBA based models to capture the overall Client Company’s financial and physical business and risk management process by utilizing all the available corporate data
* Developed Monte Carlo simulation based financial and physical risk models for the Client Company to analyze the risk distribution and statistical characteristics for the future 20 years revenue generation and forecasts.
* Evaluate and calculate the financial benefits and revenue impacts of implementing the future proposed financial/physical risk management systems for the Client Company.

**British Petroleum**

*Lead Risk Specialist*

September 2006 – August 2008

*Developed and implemented various risk management models and systems for BP’s Gas, Power & NGL (NAGP) Market Risk Function. Validate and improve the existing risk system’s data structure, architect design, and mathematical methodologies and capabilities. Provide quantitative expertise on validating/calibrating evaluation models for potential complex structure deals (physical and financial option deals) as well as their risk impact analysis. Perform statistical and quantitative analysis for Power & NGL Book’s major trading strategies, hedge ratios, VaR and P&L drivers. Daily risk monitoring, reporting, interpreting, and control on the NGL Book as well as NGL portfolio analytics. Perform monthly portfolio stress testing and market liquidity risk.*

* Participated in the validation and improvement project for BP’s Enterprise-wide Risk management system - SAF. It utilizes the large sized P&L correlation matrix of BP’s world-wide portfolio Books such as Oil America, Oil Europe, NAGP (North America Gas & Power), NEGP (North Europe Gas and Power), and Quantitative trading Q-Book, and so on, to calculate the Enterprise-wide Var for senior BP management.
* Participated and implemented a Monte Carlo based cross-commodities market risk management system for NAGP. Developed and implemented a Matlab based off-system VaR model for BP’s Canadian Gas portfolio to validate and improve the functions and capabilities of SunGard’s Entegrate Analytics System. Develop a Matlab based off-system VaR model for BP’s NGL and Power portfolio to validate and improve the functions and capabilities of SunGard’s Epsilon System.
* Conducted model validation and review for the mathematical methodology in the NAGP’s Long Term Risk Management Framework. This system uses a spot price simulation processes based on mean-reverting methodology to evaluate the value and risk of the long term Gas and Power transactions.
* Participated in design, development, and validation/calibration of various deal/transaction/option evaluation models and systems for Power and NGL trading desk; including compute/assess market/credit risk for various risk factors in these models such as market fundamental changes, forward market movements, volatility as well as correlations.
* Daily Var and risk metrics report for NGL trading Book for senior management, provide front office daily VaR impact analysis of potential new deals; participate in weekly TSPA meeting to provide trading manager and commercial manager risk analysis and assessment of major trading strategies, provide statistical analysis on NAGP’s portfolio actual P&L and theoretical P&L distribution, stress testing, liquidity computation, as well scenario analyses.
* Participated in and validated the simulation methodology and parameter estimation for BP’s Power Credit Risk PFE model, involved in the development and implementation of BP’s brand-new SAS based cross-commodities Credit Risk Management system including PFE methodology, which uses the historical forward market price movement’s seasonal and monthly correlation matrix to simulate and compute the potential future exposure for the power industry.
* Led and coordinated development efforts between Risk function and IT function for SunGard Risk management systems in architect design, data flow integration, and control process, as well as methodologies.

**Merrill Lynch Commodities**

*Senior Quantitative Strategist/Financial Associate,*

January 2002 – May 2006

*Coordinating with lead traders and function heads to initiate, design, and implement systems and projects of quantitative model developments and trading strategy analyses critical to Power, Gas, Crude trading books as well as risk/credit risk functions; Leading, developing and implementing effective, and practical mathematical methodology and solutions for these projects.*

* Designed, and developed a mathematical approach to calculate the daily volatility and risk exposures of Balance of Month for power and gas market based on the combination of current monthly & daily price data and the current monthly forward price data. It proposed and established an explicit mathematical relationship between the Balance of Month price movement and daily & monthly price movement. It has being tested with satisfactory results and is being implemented in ALLEGRO system.
* Conducted model validation and review of credit risk ranking model for the Credit department, by utilizing the established credit ranking agency’s score information for major industry companies, the model can provide any unknown company’s credit ranking and score based on the specific company’s financial information, economical measurements and indexes available. It can be calibrated periodically to accommodate the most recent financial and economical information.
* Provided critical guidance to the development and implementation of a Kalman Filter based approach to process the historical temperature data and estimate both trend and seasonality for weather derivative trading book. It has been demonstrated as one of the best and robust methodology in EKT for obtaining reliable analytical results for climate analysis.
* Participated in a joint effort to develop and implement a power flow and price simulation model. It integrally models the power generating capacities, major transmission lines, and power demands for every region based on a mathematical programming algorithm. It has been tested for one month online with real market for Cinergy with good results. It is a friendly JAVA based system that can run various sensitivity analysis and scenarios analysis for power trading and asset evaluation & optimization applications. The transmission limits and hydro generating capabilities were also modeled.
* Designed, developed and implemented a cluster analysis methodology based approach to model the US power plants’ planed and forced outages using 8000 generating units data over five years’ period. The cluster analysis resulted in 13 cluster groups that have very distinctive statistical characteristics in terms of how frequent an outage would happen for a single unit, how long the outage would last for a single unit, as well as how much the monthly capacity would be reduced for that particular cluster group. It has very significant contribution to power trading, origination, and asset evaluation & optimization operations.
* Led, designed, developed, and coordinated a joint project between Entergy Corp. & Entergy-Koch Trading. It utilized PROMOD, a commercial Locational Marginal Pricing Model (LMP), as basic tool to support online power trading in New York ISO. After significant in-house improvement for PROMOD on the short term modeling capabilities of multiple daily fuel prices, multiple daily transmission & generation outages, as well as multiple daily interface flow and heat rate, the online process and procedures were designed, implemented, tested and matured during a three months testing phase. It provides wide range of applications in power trading, asset evaluation and optimization. The results demonstrated accurate predictability and profitable opportunities for Zone G and Zone A spread price direction.
* Provide daily market volatility analysis and strategy recommendations for Crude and Gas options trading, such as today’s market volatility curve comparing with historical actualized volatility and historical implied volatility curves in terms of year by year, four year average, ten year average. Calculate daily volatility skews and historical skews analysis for trading strategy generation purpose. Spread trading strategy analysis for Crude and Gas options desk.

**Entergy Corp.**

*Senior Manager of Quantitative Analysis,*

July 2001- Dec 2001

*As the chief Functional and Technical Architect, designed, developed, and implemented the Entergy’s brand-new Asset Risk Book system. Led, developed quantitative/mathematical tools in the format of C/C++ software package, Excel/Macro/VBA, and SAS based software package for corporate portfolio optimization and risk management as well as power assets/derivatives/contracts pricing and evaluation.*

* Supervised the implementation of a Monte-Carlo simulation based power risk management system. It is a SAS Risk Dimension based system. It can perform scenario analysis, sensitivity analysis, as well as stress testing to serve the interests of higher management and decision makers for short term, middle term and long-term purposes. It uses a Principal Component Analysis (PCA) methodology to simulate zero-drift Geometric Brownian Motions of risk factors and has the transformation flexibility to reduce the number of risk factors based on the market observed variance-covariance matrix. It can evaluate financial instruments/derivatives, as well as power generator assets by applying a dispatch model
* Supervised the implementation of the mean-reversion and mean-reversion with jumps models as the primary tools to simulate power/gas market prices in daily and hourly level
* Supervised the implementation of the estimation methodologies for model parameters and scalars in the format of Excel/Macro/VBA for hourly, daily, monthly, seasonally, and yearly periods and for different regions (including PJM, Entergy, NEPOOL, UK, PPP, CINERGY, HERY HUB, ERCOT, NBP)
* Developed and provided statistical analysis methods and tools to support the pricing/fundamental analysis group to conduct middle term and long term price and load shape forecasting (i.e. Clustering analysis, various forecasting tools)

**PROS Revenue Management Inc.**

*Research Scientist /Product Science Manager/Lead Scientist*,

July 1999-May 2001

*Pioneer of PROS’s all the current energy industry product suites in mathematical modeling, product design, and system development. These energy products are Trading Optimization System, Storage Optimization System, Firm Transportation Optimization System, as well as Interruptible Transportation Optimization System.*

**EDUCATION**

**The University of Texas at Austin, Austin, Texas**

Ph.D., May 1999, Civil Engineering. Specialized in Mathematical Modeling, System Optimization, and Forecasting.

**Zhengzhou Technological & Engineering University, Zhengzhou, China**

Bachelor & Master of Engineering, Aerospace Engineering Applications, (July 1983 & July 1989)

**Citizenship** US Citizen