**Vijay Koju, Ph.D.**

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**EDUCATION**

**Middle Tennessee State University**

* Ph.D. in Computational Science August 2012 - May 2017
* M.Sc. in Computer Science August 2012 - December 2015

**Truman State University**

* B.Sc. in Physics (Minor: Mathematics) August 2008 - May 2012

**PROFESSIONAL EXPERIENCE**

**Enterprise Data Scientist,** Parkland Health & Hospital System Feb 2019 - Present

* Develop and maintain COVID-19 data models and dashboards/reports for the Infection Prevention department.
* Explore predictive analytics initiative, develop and test machine learning model prototypes in python.
* Conduct statistical analysis on clinical/patient data to evaluate the effectiveness of clinical interventions in patients, compare operational efficiency of the organization compared to its peers, etc.
* Develop clinical data queries in Clarity, Caboodle, and Safety Center to meet quality reporting requirements.
* Build Safety Center and Vizient data models in SAP HANA for developing executive dashboards.
* Create, manage and automate quality of care, operations, and clinical quality and safety interactive dashboards in SAP Digital Boardroom and Web Intelligence.
* Develop and implement metrics for accessing healthcare equity for the hospital patient population.
* Collaborate with UTSW to investigate the impact of Dexamethasone on length of stay in diabetic patients.

**Adjunct Professor,** G. Brint Ryan College of Business, University of North Texas Aug 2023 – May 2024

* Teach a core graduate course in Enterprise applications of Business Intelligence.
  + Topics covered: Business Intelligence, Analytics in different business functional areas such as accounting, finance, marketing, operations, and human resources.

**Data Science & AI Instructor,** Divergence Academy Feb 2020 - Present

* Teach programming in Python to military veterans who are looking for a career in industry as data analysts/business analysts/data scientists.
* Mentor students in overcoming their challenges while learning python as their first programming language.
* Teach data wrangling in python using libraries like pandas, numpy, matplotlib, beautifulsoup, requests, etc.
* Introduce the concept of machine learning algorithms, model evaluation metrics, and statistical analysis and hypothesis testing.
* Teach data science and machine learning pipelines/workflows in Microsoft AzureML cloud platform.

**Data Science & AI Instructor,** McCombs School of Business, The University of Texas at Austin Nov 2021 – Jul 2022

* Mentor professionals and students in a Post Graduate Program - Data Science & Business Analytics offered by The University of Texas at Austin in collaboration with Great Learning.
* Teach Python, Data Visualization and Data Science topics such as Linear Regression, Logistic Regression, Decision Trees, Ensemble Methods – Random Forest, Boosting – GBM/XGBM/Adaboost, Feature Engineering, K-means and Hierarchical Clustering, Inferential Statistics, and Estimation and Hypothesis Testing using hands-on labs.

**Data Scientist,** Delek US Holdings Aug 2017 - Feb 2019

* Performed root cause analysis of the discrepancies in data residing in different sources; validated the correctness of the data and created a new data source as a single source of truth.
* Created and maintained interactive reporting dashboards in Qlik Sense and Power BI for the executive team.
* Conducted market research on consumer buying behaviors through market basket analysis of customers from 300+ convenience stores.
* Identified margin improvement opportunities in different sales categories and provided recommendations to the category management team for implementing new pricing strategies/promotions.
* Presented the market trends, business performances, and the results of our analysis to the president of the retail and wholesale department weekly
* Identified the primary, secondary and tertiary fuel competitors of our stores using k-mean clustering in python and assisted the fuel team in implementing data-driven fuel pricing strategy which improved the daily fuel volume by more than 5%
* Helped the operations team identify the fuel dispensers with slow fuel flow problem using statistical anomaly detection analysis of average time required to pump a gallon of fuel
* Implemented an Amazon-like product recommendation system for suggestive selling of different items based on the items purchased by the customers in company owned convenience stores.
* Analyzed the historical data of inside sales and fuel sales to determine sale shares and used it to formulate companywide budget for the year and integrated it to the dashboards in Qlik Sense

**Data Science Fellow,** The Data IncubatorMar 2017 – May 2017

* Selected as a fellow in a two-month data science training program with an acceptance rate below 2%
* Scraped event photograph albums from newyorksocialdiary.com to form a weighted network of 102k socialites

appearing together based on the captions

* Used NLP bag-of-words and bigram model to predict star ratings of restaurants using Yelp review data
* Determined the distribution of links across titles on the 12.2 GB English Wikipedia (5M articles) using

MapReduce, as well as the entropy of n-grams across simple English and Thai languages

* Investigated correlation between user reputation and kind of posts they make and wait time to get question

answered in 9.5 GB StackOverflow data using Spark

* Developed a logistic regression-based ML model to predict the winning teams in the upcoming NBA games

**Research/Teaching Assistant,** Middle Tennessee State UniversityAug 2012 – May 2017

* Improved sensitivity of photonic biosensors by an order of magnitude via azimuthal control of light
* Developed novel 1D/2D PhCs based on Fibonacci and Thue-Morse sequence that support Bloch surface waves
* Optimized multilayers using genetic algorithm, simulated annealing, and particle swarm optimization.
* Used COMSOL Multiphysics, Lumerical Solutions, and Meep to model Bloch surface wave (BSW) in photonic crystals.
* Taught astronomy labs, tutored physics, and graded homework for calculus-based physics classes.
* Mentored undergraduate students on their thesis projects resulting two co-authored journal publications.

**Computational Biomedical Optics Summer Intern,**Oak Ridge National Lab Jun-Aug 2014, 2015

* Parallelized serial Monte Carlo (MC) for light transport in scattering media using OpenMP and MPI in C++.
* Analyzed 100+ GB of MC simulation data, using Python, Bash scripts, and C++ analysis code.
* Established a positive correlation between the Berry phase and photon penetration depth in turbid media via Berry phase imaging.

**TruScholar Summer Undergraduate Researcher,**Truman State UniversityJun-Aug 2010, 2011

* Investigated the origins of the O’Connell effect in eclipsing binaries via computational modeling.
* Analyzed the light curve data of eclipsing binaries from the *OGLE* and *Kepler* databases.
* Developed python programs using NumPy, and Matplotlib to extract, analyze, and visualize the data.

**Professional Trainings:**

* **COMSOL Multiphysics –** Professional 2-day training on COMSOL RF module from AltaSim Technology.
* **Silicon Photonics Design, Fabrication and Data Analysis –** Professional 7-week edX online course from The University of British Columbia.

**JOURNAL PUBLICATIONS**

* **V. Koju**, and W. M. Robertson, “Leaky Bloch-like surface waves in the radiation-continuum for sensitivity enhanced biosensors via azimuthal interrogation”, *Scientific Reports*, 7, 3233 (2017)
* **V. Koju**, and W. M. Robertson, “Excitation of Bloch-like surface waves in quasi-crystals and aperiodic dielectric multilayer structures”, *Optics Letters*, 41, 2915-2918 (2016)
* B. C. Crow, J. M. Cullen, W. W. Mckenzie, **V. Koju**, and W. M. Robertson, “Experimental realization of extraordinary acoustic transmission using Helmholtz resonators”, *AIP Advances*, 5, 027714 (2015)
* **V. Koju**, and Matthew M. Beaky, “Null correlation between the O’Connell effect and orbital period change for SW Lac, CN And, and V502 Oph”, *Information Bulletin on Variable Stars*, 6101, 6127 (2015)
* **V. Koju**, E. Rowe, and W. M. Robertson, “Extraordinary Acoustic Transmission mediated by Helmholtz Resonators”, *AIP Advances*, 4, 077132 (2014)
* **V. Koju**, and W. M. Robertson, “Slow light by Bloch surface wave tunneling”, *Optics Express,* 22, 15679-15685 (2014)

**INVITED TALK**

* **V. Koju,** and W. M. Robertson, “Computational modeling of Bloch surface waves in one-dimensional periodic and aperiodic multilayer structures”, Physics Colloquium, Vanderbilt University, September 30, 2016.
* **V. Koju**, E. Rowe, and W. M. Robertson, “Extraordinary Acoustic Transmission Mediated by Helmholtz Resonators”, Department of Physics and Astronomy Colloquium, Middle Tennessee State University, TN, September 27, 2013

**TALKS**

* **V. Koju**, and W. M. Robertson, “Sensitivity enhancement in grating coupled Bloch surface wave resonance by azimuthal control”, AVS 63rd International Symposium & Exhibition, Nashville, TN, November 10, 2016
* **V. Koju**, and W. M. Robertson, “Highly sensitive grating-coupled Bloch surface wave resonance biosensor via azimuthal interrogation”, COMSOL Conference, Boston, MA, October 6, 2016
* **V. Koju**, and W. M. Robertson, “Bloch-like surface waves in Fibonacci quasi-crystals and Thue-Morse aperiodic dielectric multilayers”, SPIE Optics + Photonics, San Diego, CA, August 31, 2016 (Young Scientist Awards - 1st Place)
* J. S. Baba, **V. Koju**, and D. John, “The impact of absorption coefficient on polarimetric determination of Berry phase based depth resolved characterization of biomedical scattering samples: a polarized Monte Carlo investigation”, SPIE Photonics West BIOS, San Francisco, CA, February 15, 2016
* J. S. Baba, **V. Koju**, and D. John, “Monte Carlo based investigation of Berry phase for depth resolved characterization of biomedical scattering samples”, SPIE Photonics West BIOS, San Francisco, CA, February 8, 2015
* **V. Koju**, J. Baba, and D. John, “High-performance computing Monte Carlo modeling of photon propagation in highly scattering media”, Joint Institute for Computational Science Seminar, Oak Ridge National Laboratory, TN, August 21, 2014
* **V. Koju**, and M. M. Beaky, “Study of the Variable O’Connell Effect in Over-Contact Eclipsing Binaries”, Student Research Conference, Truman State University, MO, April 17, 2012
* **V. Koju**, and M. M. Beaky, Differential Rotation: A Possible Cause of the Varying O’Connell Effect in Eclipsing Binaries”, TruSymposium, Truman State University, MO, August 27, 2011
* **V. Koju**, and M. M. Beaky, “Investigations into the Origins of the O’Connell Effect in Eclipsing Binary Star Systems”, Student Research Conference, Truman State University, MO, April 14, 2011
* **V. Koju**, and M. M. Beaky, “Investigations into the Origins of the O’Connell Effect in Eclipsing Binary Star Systems”, National Conference of Undergraduate Research (NCUR), Ithaca College, NY, April 1, 2011
* **V. Koju**, and M. M. Beaky, A Photometric Study of the O’Connell Effect in Eclipsing Binary Star Systems”, TruSymposium, Truman State University, MO, August 28, 2010

**POSTERS**

* **V. Koju**, and W. M. Robertson, “Highly sensitive grating-coupled Bloch surface wave resonance bio-sensor via azimuthal interrogation”, COMSOL Conference, Boston, MA, October 6, 2016
* **V. Koju**, and W. M. Robertson, “Highly sensitive biosensors based on grating coupled Bloch surface waves”, Scholars Week, Middle Tennessee State University, TN, March 20, 2015
* B. C. Crow, J. M. Cullen, W. W. Mckenzie, **V. Koju**, and W. M. Robertson, “Experimental realization of extraordinary acoustic transmission using Helmholtz resonators”,Scholar Week, Middle Tennessee State University, TN, March 17, 2015 (3rd position)
* **V. Koju**, E. Rowe, and W. M. Robertson, “Extraordinary Acoustic Transmission Mediated by Helmholtz Resonators”, Scholars Week, Middle Tennessee State University, TN, April 21, 2014
* **V. Koju**, and W. M. Robertson, “Simulation of Surface Plasmons and Bloch Surface Waves using COMSOL”, MTSU Summer Research Celebration, Middle Tennessee State University, TN, July 26, 2013
* **V. Koju**, and W. M. Robertson, “Finite Element Simulation of Surface Plasmon Resonance”, Scholars Week, Middle Tennessee State University, TN, April 5, 2013 (2nd position)
* **V. Koju**, and W. M. Robertson, “Finite Element Simulation of Surface Plasmon Resonance”, Annual Meeting of the Tennessee Section of the American Association of Physics Teachers (TAAPT), Middle Tennessee State University, TN, March 23, 2013
* M. M. Beaky, **V. Koju**, “Time-Depending Behavior of the O’Connell Effect in Eclipsing Binary Star Systems”, American Astronomical Society, AAS Meeting #200, #333.03, May, 2012
* **V. Koju**, and M. M. Beaky, “Migrating Starspots: A Possible Explanation of the periodic O’Connell Effect in Kepler Eclipsing Binaries”, MidAmerican Regional Astrophysics Conference (MARAC), University of Kansas, KS, April 13, 2012

**GRANTS**

* “Berry phase imaging (BPI) development: a novel modality for back-reflectance imaging of scattering samples”

Principal Investigator: J. S. Baba, Ph.D. Co-Investigators: **V. Koju**, D. John

Award: 500,000 service units (SUs) on Darter supercomputer, Oak Ridge National Laboratory

* “Monte Carlo simulation on the nature of photon propagation in scattering samples”

Principal Investigator: J. S. Baba, Ph.D. Co-Investigators: **V. Koju**, D. John

Award: 500,000 service units (SUs) on Darter supercomputer, Oak Ridge National Laboratory

**PROFESSIONAL MEMBERSHIP AND SERVICE**

* Sigma Pi Sigma (Physics Honor Society), Student Member Spring 2010 – Present
* Reviewed papers for Optics Letters, Journal of Sound and Vibrations and Review of Scientific Instruments.

**AWARDS AND HONORS**

* SPIE Young Scientist Awards (1st Place), awarded for best paper at SPIE conference September 2016
* MTSU Scholars Week Poster presentation (2nd Place) March 2013
* Albert L. and Ethel Carver Smith Scholarship Fall 2015 – Spring 2017
* Dr. Robert Peavler Memorial Scholarship Fall 2010 – Spring 2011
* L. Scott and Carol D. Ellis Scholarship Fall 2010 – Spring 2011
* President’s Honorary Scholarship Fall 2008 – Spring 2012