



EDUCATION

PROGRAM	INSTITUTION	GPA	YEAR	RANK
MS & Ph.D. in Computational Science, Engineering & Mathematics	The University of Texas at Austin	3.76/4	2022	-
B.Tech (Hons) & M.Tech - Chemical Eng. XII	Indian Institute of Technology Madras	8.94/10	2017	2
X	Vidyadham Junior College, Hyderabad	97.5%	2012	1
	Johnson Grammar School (ICSE), Hyderabad	95%	2010	1

RESEARCH INTERESTS

I am passionate about developing **machine learning algorithms** to solve the world's most challenging problems.

Research interests: Machine Learning (DL, RL), Optimization, Graph theory, Computational biology

CODING SKILLS

Python (scikit-learn, tensorflow, networkx, pandas), **C++** (GRVY, MASA, HDF5, PETSc), **R** (tidyverse), **Matlab** (Statistics & ML, Optimization, ODE Solvers), **Scala**, **Latex**, **Linux** & **HPC** (at TACC), [Github](#)
Exposure: Travis-CI, autotools, Valgrind, Docker, C, Java, Arduino-coding, HTML, CSS, Javascript, C#

SELECT GRADUATE COURSE WORK

- Statistical Models for Big Data
- Tools & Techniques in Computational Science
- Geometric Foundations of Data Science
- Reinforcement Learning
- Deep probabilistic modeling
- Pattern Recognition
- Bayesian Deep Learning
- Functional Analysis
- Graph Theory & Optimization

PROJECTS (MACHINE LEARNING & HPC)

- **Machine Learning methods for detection of protein complexes from PPI networks** (*Ph.D. Thesis*) Jun 2018 +
 (Guide: Prof. Edward Marcotte - Oden Institute, UT Austin)

- Developed [Super.Complex](#), a supervised ML pipeline achieving 98% accuracy in classification as complex in human PPINs.
- Formulating a deep reinforcement-learning algorithm with graph embeddings for complex search (NP hard problem).

- **Laplacian finite difference solver application** Aug-Dec 2018

(Guide: Prof. Karl Schulz - Dept. of Women's Health, Oden Institute, UT Austin)

- Developed from scratch a C++ application leveraging solvers for the 2D heat equation, achieving high convergence rates.
- **Features:** performance - 0.4s (100x100 mesh), tests (bats, Travis CI & Docker), 100% code coverage (lcov), 0 memory errors (Valgrind), visualization (Paraview), build (autotools), HPC env (Stampede2), storage (HDF5), parser & logger (GRVY).

- **Hyperspectral image denoising & classification** Mar-May 2018

(Guide: Prof. Chandrajit Bajaj - Computational Visualization Center (CVC), Oden Institute, UT Austin)

- Applied a framework with one-against-one and one-against-all SVMs for multi-class classification with 90% accuracy.

- **Re-ranking molecule docking poses with RankSVM** Oct-Dec 2017

(Guide: Prof. Chandrajit Bajaj - CVC, Oden Institute, UT Austin)

- Formulated & implemented a novel SVM classifier for re-ranking docking poses from F2-dock with 75% accuracy.

- **Implementation of ML algorithms for image & speech data classification** Aug-Dec 2016

(Guide: Prof. Chandra Sekhar C. - Speech & Vision Lab, Dept. of Computer Science, IITM)

- Developed from scratch and compared- neural networks (MLP), GMM, HMM, Bayes, k-means and k-nn classifiers.

PROJECTS (OPTIMIZATION)

- **Human bio-chemical reaction network analysis for treating autism** (Master's Thesis) Jun 2016-May 2017
(Guide: Prof. Raghunathan Rengaswamy & Dr. Swagatika Sahoo - Initiative for Biological Systems Engineering (IBSE), IITM)
■ Developed **2 constrained pareto-optimization algorithms** and **2 metrics** for optimal reaction **network flow distribution**.

- **Kinetic modeling of anti-cancer drug action** (Mathematical Biology) Jul 2016-May 2017
(Guide: Prof. Raghunathan Rengaswamy, Prof. G.K Suraishkumar & Prof. Karunakaran D. - Dept. of Biotechnology, IITM)
■ **Simulated experimental circadian rhythms** with a **robust data-tuned parametric model**, using a **genetic algorithm**.

- **Design of microfluidic networks performing floating point operations** (Systems & Control) Jul 2015-Jun 2016
(Guide: Prof. Raghunathan Rengaswamy - Systems & Control Group, Dept. of Chemical Engineering, IITM)
■ Employed **genetic algorithms & MINLP** to **design optimal micro-fluidic networks** for **combinatorial sequence sorting**.

- **Model Predictive Control** (Modern Control Theory) Oct-Nov 2015
(Guide: Prof. Raghunathan Rengaswamy - Systems & Control Group, Dept. of Chemical Engineering, IITM)
■ **Optimized operating conditions** of a catalytic cracker via an MPC framework and **studied its performance**.

- **Modeling of polymer solar cell nano-morphologies** (Stochastic Simulations) Oct-Dec 2013
(Guide: Prof. Ethayaraja Mani - Polymer Engineering & Colloid Sciences Group, Dept. of Chemical Engineering, IITM)
■ **Generated event sequences** in morphology via **FRM queuing model** developed with **Dynamic Monte Carlo** simulations.

PUBLICATIONS & INTERNATIONAL CONFERENCES

- Palukuri M, Marcotte EM "Super.Complex v3.0: A Supervised Machine Learning Pipeline for Molecular Complex Detection in Protein-interaction Networks", *US HUPO (Human Proteome Organization Conference)* [Poster] (2021)
- Palukuri M, Marcotte EM "Super.Complex: **Intelligent subgraph search** for communities with **deep reinforcement learning**", *SIAM MDS: Conference on Mathematics of Data Science*, Cincinnati [Invited Talk] (2020)
- Palukuri M, Marcotte EM "**Super.Complex**: A Computational Pipeline for Supervised Community Detection in Graphs", *TACCSTER 2019: TACC Symposium for Texas Researchers*, Austin [Invited Talk, Poster] (2019)
- Palukuri M, Marcotte EM "Supervised community detection in protein-interaction networks", *The 2nd Annual Meeting of the SIAM Texas Louisiana Section*, Dallas [Best Poster Award] (2019)
- Palukuri M, Marcotte EM "Supervised community detection", *Workshop on Recent Developments on Mathematical/Statistical approaches in Data Science (MSDAS)*, Dallas [Poster] (2019)
- Kizhuveetil U, Palukuri M, Karunakaran D, Rengaswamy R, Suraishkumar GK. "Entrainment of superoxide rhythm by menadione in HCT116 colon cancer cells", *Scientific Reports, Nature Publishing Group* 9.1: 3347 [Paper] (2019)
- Palukuri M, Shivakumar S, Sahoo S, Rengaswamy R. "Computational framework for exploring the interplay of diet and gut microbiota in autism." *bioRxiv*: 422931 [Paper] (2018)
- Palukuri M, et al. "An integrated COBRA-PBPK model to study interactions between gut & brain in autism", *5th Conference, Constraint-Based Reconstruction & Analysis*, Seattle [Poster] (2018)
- Kizhuveetil U, Palukuri M, Rengaswamy R, Suraishkumar GK. "Menadione induced reset of circadian superoxide rhythms in human colon cancer cells", *Free Radical Biology and Medicine*, 112, 91-92, Baltimore [Poster] (2017)
- Palukuri M, et al. "Predicting the role of gut microbiota & diet in autism", *11th Copenhagen Bioscience Conference: "Data-Driven Biotechnology: Bench, Bioreactor, Bedside"*, Hillerød [Poster] (2017)
- Palukuri M, Shivakumar S, Sahoo S, Rengaswamy R. "Predicting the role of gut microbiota and diet in autism", *Interdisciplinary Laboratory for Data Sciences Workshop*, Chennai [Poster] (2016)

SELECT PROFESSIONAL EXPERIENCE

- **Graduate Research Assistant, University of Texas at Austin** Jun 2018 - present
- **Concentration in Teaching and Mentoring**, Texas Institute for Discovery Education in Science Jun 2018 - present
- **Professional Memberships: Society for Industrial and Applied Mathematics**, SBE, AIChE 2017 - present
- **Applied Scientist II Intern, Amazon** *Project: Substitute Product Recommender* Jun - Aug 2020
 - Built product embedding space based on catalog text info & performed nearest neighbor search for substitutes (**0.99 Recall**).
- **Cloud Software Engineering Intern, Schlumberger** *Project: Time-Series Operations* Jun - Aug 2019
 - Deployed on Google Cloud - a Domain Specific Language in Scala, for custom calculations with real time-series data .
- **Graduate Teaching Assistant, Indian Institute of Technology, Madras** 2016-17
- **Internship at Hindustan Unilever** *Project: Autonomous Maintenance* May-Jul 2015
 - Improved process energy efficiency by 20% by eliminating an identified stream through **modification of system logic**.
- **Internship at Hindustan Coca-Cola Beverages** *Project: Water Balance* May-Jul 2014
 - Analyzed water data trends & network distribution, devising methods to **improve factory's water usage ratio by 40%**.

AWARDS & HONOURS

- Passed **Ph.D candidacy exam & Ph.D preliminary exam** (applicable math, scientific computing, math modeling).
- Awarded **\$24k O'Donnell Fellowship & \$9.5k GIFA** award by UT Austin to encourage research. (2017-19)
- **2-time \$500 Professional Development Award** recipient & **25% discount** to present at conferences. (2018-20)
- Selected for admission to graduate studies at **UT Austin, CMU** and the **University of Delaware**. (2017)
- Received the **C.A. Sastri Endowment Award** for best graduating chemical engineering student. (2017)
- Selected for the **KVPY Fellowship** awarded by the Department of Science & Technology, Govt. of India. (2012)
- **1 out of 6** students from 90 chemical engineering students to be awarded a **B.Tech Honours** degree (2017)
- Qualified for nationals (**top 5%**) of **International Chemistry Olympiad** hosted by HBCSE (TIFR). (2012)
- Secured undergrad admission at IITM, the **best engineering college** in India (**top 0.5%** of 500k applicants) (2012)
- Secured All India Rank of **34** in **National Science Olympiad**, **64** in **International Math Olympiad**. (2006,12)

CO-CURRICULAR ACTIVITIES

Coding	Windows App(C#): Wardrobe Assistant- dress suggestions 2016 <i>Microsoft-24hr Code.Fun.Do Hackathon</i>
Robotics	Coded locomotion for autonomous transwheel robot 2013 Asia-Pacific Robot Contest - Robocon Secured 3rd in Gold Rush Maze Solving Robot contest & Mechanica Autonomous Robotics (2013)
VR	Designed spatial augmented reality at Envisage, India's largest student tech show: 2000+ people (2014)
Table Tennis	UT Austin TT Team Member : Participated in USA nationals by NCTTA, securing 9th place. (2018) IITM TT Team Captain : Won Gold Medal - Sportsfest, Silver Medal - 48th Inter-IIT Meet . (2012-16)
Chess	Placed 1st in Intra-hostel Chess Competition, 4th in Dean's Trophy. (2013,15)
Classical Arts	Learnt Carnatic music for 7 years , classical dance forms Bharatnatyam & Kuchipudi for 3 years Selected for the Guinness World Record event, ' Laksha Gala Sankeertanarchana '. (2009)

VOLUNTEERING

- **2-time Captain Judge**, Dallas Regional **Science & Engineering Fair** for Chemistry & Environmental Engg. 2019-20
- Information desk volunteer at **Explore UT** - campus wide event to promote learning attended by 1000+ people. 2019
- **Organized IITM** campus engineering facilities **tours and workshops** for middle **school kids**. 2015-16
- **Organized Run for a Cause**, event for **Chennai flood relief**, with proceeds going to **school repairs**. 2015-16

LEADERSHIP POSITIONS

- **Vice President, SIAM Chapter of UT Austin** (2020-2021)
 - **Founder, Literary Fest 'Saahitya'** *(a self-driven initiative, commended by the Director, Dean & Alumni)* (Feb - Apr 2016)
 - Formed & lead a **team of 60** across 6 divisions to **organize the fest with 30 events**, with a **footfall of over 1000** in IITM.
 - **Secretary, Chemical Engineering Society** *(Nominated by Dept. Faculty)* (2015 - 2016)
 - **Lead a team of 120 people** across 9 divisions to organize '**ChemClave**' (dept fest), with a footfall of around **1000** students.
 - **Pioneered an AICHE Student Chapter** in IITM, **introduced** the event - **Research Confluence with industry**.
 - **Convener, Word Games Club** *(Head of 1 out of 9 institute cultural clubs)* (2015 - 2016)
 - **Raised club participation by 100%** through 25+ new events & 2 flagship events, with a budget of **INR 2 lakh**.
 - **Placement Support Team Member** *(1 out of 6 selected from 40 applicants to the post)* (2014 - 2015)
 - **Contacted & convinced 30+** companies to attend the campus recruitment program.
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