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Qualifications

• Ph.D. research scientist with 5+ years of experience in interdisciplinary teams from NASA and Saudi Aramco for material characterization and statistical analysis, track record of scientific accomplishment 12 publications.
• 4 years of experience in machine learning and algorithms for physics and chemical engineering.
• 5+ years proficient in Python, Java, C++, SQL database, MATLAB.

EDUCATION

Rice University, Houston, TX
PhD in Chemical and Biomolecular Engineering, GPA 3.63/4.00 Research Advisor: Prof. Matteo Pasquali
Purdue University, West Lafayette, IN
BSE with honor degree in Chemical Engineering, GPA 3.76/4.00 Research Advisor: Prof. Alex Wei

WORK EXPERIENCES

Rice University Complex Flow and Complex Fluids Lab Houston, TX
Research Assistant, Advisor: Prof. Matteo Pasquali
Machine learning assisted singled-walled carbon nanotube(SWCNT) Transport in silica pores

- Led an optical team of 5 to design, build and maintain near infrared(NIR) laser fluorescent optical system(microscopy and spectroscopy) to visualize **SWCNT** as oil-marker for extending crude oil mapping to smaller pores beyond current tracers' pore size limit.
- Estimated Hurst exponent, categorize anomalous diffusion type of SWCNT in complex pores developing a convolutional deep neural-network model **(CNN)** in MoNet Architecture with more than 90% accuracy. Results will be presented at AIChE annual meeting.
- Conducted **failure analysis** on SWCNT adsorption on rock with **environment SEM with EDX**. No SWCNT adsorption found proves the stability of SWCNT in rock pores.

Super-resolution video tracker for fast-moving and flexible nanoparticles

- Developed automated **MATLAB image processing** code to track multiple parameters for various kinds of complex nanoparticles, such as bending flexible nanorods and nano-sheets.
- **K nearest neighbors (KNN)** algorithm is applied and achieved flow visualization in 10 times smaller published rock pore system with 10 times stronger signal intensity. This software direct offers methods for 5 high-impact journal papers.
- Optimized MATLAB **video processing** code and leveraged parallel computing in cluster, achieving a **reduction of video processing time** from 15 hours to 30 minutes.

Optimize process parameters for improving carbon nanotube fiber's electrical and mechanical property

- Monitored fiber batch differences for process improvement through **statistical modeling (JMP, Excel)** on measuring mechanical and electrical properties, such as fiber weight (**microbalance**), diameter(**microscopy**), tensile strength(**UTM**), and electrical conductivity. The method led to 10x fiber conductance increase.
- Conducted **failure analysis** on broken fibers(**SEM)** to check break morphology and microfiber alignment. This process removed 100% partially broken samples before test.
- Created a MATLAB based software to measure fiber tensile strength with **statistical analysis** and published the result on top journal. This broken-free and UTM-free method save 100% sample and machine cost.

TECHNICAL SKILLS

- Lab skills: Microscopy and single-molecular spectroscopy, photolithography, soft lithography, microfluidics, SEM, EDX, TEM. Clean room certified.
- Programming language: Java, JavaScript, MATLAB, SQL, Python, C, Go, FORTRAN
- Web Development: Java Servlet, AngularJS, Node.js, HTML &CSS, React, Ant Design, Material-UI, Android

PROJECTS

LabSup: Spring and Hibernate based Lab supplies management system (github.com/zt5rice/hermes)

- Built a web application based on **Spring MVC** to support item search and listing (dependency injection, inversion of control, REST API, etc.).
- Implemented security workflow via in-memory and **JDBC** authentication provided by **Spring Security**.
- Utilized **Hibernate** to provide better support for database operations.
- Developed a Spring Web Flow to support item ordering.

Job+: A Personalized Job Recommendation Engine (https://github.com/zt5rice/jobplus)

- Designed and implemented an interactive web app for users to search and apply for available positions.
- Performed front-end web UI design and implementation using **HTML/CSS/JavaScript**.
- Implemented RESTful APIs using Java servlets, retrieved job descriptions using GitHub API, and stored data in **MySQL**.
- Explored multiple recommendation algorithms and extracted keywords from job descriptions to implement a Content-based algorithm.
- Deployed the service to **AWS EC2**.

Starlink: React JS-based Starlink Trajectory Visualization (https://github.com/zt5rice/space-x4)

- Set up the Repo by leveraging the React official CLI tool and use **NPM** to manage project dependencies.
- Design the **layout, component interface,** and **data flow** before the implementation.
- Built forms to collect user observation geo-information using the **Ant Design** component library.
- Fetch nearby satellite information and position prediction data through the **N2YO API(s)**.
- Animated selected satellite paths on a world map using **React-Simple-Map** to improve user-friendliness.
- Deployed the dashboard to **AWS** for demonstration.

Tinnews: a Tinder-like News App (https://github.com/zt5rice/tinnews)

- Designed the Instagram Flavor News app based on Google Component Architectural **MVVM Pattern**.
- Implemented the bottom bar & page navigation using the **JetPack** navigation component.
- Utilized 3rd party CardStackView(RecyclerView) to support swipe gestures for liking/disliking the news.
- Built the Room Database with LiveData & ViewModel to support local cache and offline model.
- Integrated Retrofit and LiveData to pull the latest news data from a RESTful endpoint (newsapi.org).

SELECTED PUBLICATIONS

- **Tang, Z.**; Wei, Q.; Wei, A. "*Metal-Mesh Lithography*". ACS applied materials & interfaces 3 (12), 4812-4818.
- **Tang, Z.**; Wei, A. *"Fabrication of Anisotropic Metal Nanostructures Using Innovations in Template-Assisted Lithography*". ACS nano 6 (2), 998-1003.
- Adnan, M.; Pinnick, R. A.; **Tang, Z.**; Taylor, L. W.; Pamulapati, S. S.; Carfagni, G. R.; Pasquali, M. "*Bending Behavior of CNT Fibers and Their Scaling Laws*". Soft Matter 14 (41), 8284-8292.
- Smith, A. D.; **Tang, Z.**; Pasquali, M.; Martí, A. *"Real-Time Visualization and Dynamics of Boron Nitride Nanotubes Undergoing Brownian Motion*". The Journal of Physical Chemistry B 124 (20), 4185-4192.
- **Tang, Z.**; Eichmann, S.L.; Lounis, B.; Cognet, L.; MacKintosh, F. C.; Pasquali, M. *"Single-walled carbon nanotube reptation dynamics in submicron sized pores from randomly packed mono-sized colloids*". Soft Matter 18 (29), 5509-5517.
- Umezaki,U.; Smith, A. D.; **Tang, Z**.; He,Z.M.S.; Corr,S.; Kolomeisky,A.; Pasquali, M. Martí, A. *"Two-Dimensional Diffusion of Hexagonal Boron Nitride Nanosheets in Aqueous Solution."* submitted to ACS nano.
- **Tang, Z.**; Eichmann, S.L.; Jamali, V.; MacKintosh, F. C.; Pasquali, M. *"Investigating Ergodicity-Broken Rotational Dynamics of SWCNT in Hexagonally Packed Colloidal Pores Via Machine Learning.*" AIChE Annual meeting 2023 Orlando FL.

AWARDS

- Hin Wei Wong Graduate Fellowship Award for outstanding incoming freshmen students, Rice University.
- Saudi Aramco Research Fellowship Scholar, Rice University.
- Robert Welch Research Fellowship Scholar, Rice University.
- Undergraduate research fellowship from the Purdue Center for Cancer Research.
- Harrison M. Stine Memorial Scholarship, Purdue University.