Jacob Varghese

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OBJECTIVE

Biomedical Engineer with robust laboratory and research experience, adept at conducting routine tests, documenting procedures, and managing data analysis under strict SOPs. Demonstrates proficiency in DNA/RNA extraction, PCR, protein purification, and various analytical techniques. Brings meticulous attention to detail and a strong practical background to support dynamic research environments.

EDUCATION

Johns Hopkins University **2024 - 2025**

Masters in Biomedical and Bioengineering

- **GPA:** 3.7/4.0
- **Coursework:** Computational Medicine, Neuroscience and Neuro engineering, Cellular Engineering, Precision Care Medicine

APJ Abdul Kalam Technological University - TKM Institute of Technology **2020 - 2024**

Bachelor of Technology (Honors), Biomedical Engineering

- **GPA:** 3.9/4.0
- **Achievements:** Rank Holder
- **Coursework:** Principles of Medical Imaging, Therapeutic Equipment, Bio Signal Processing, Biophysics, Biomechanics, Medical Device Instrumentation

PROFESSIONAL EXPERIENCE

Mao Lab, Institute for Cell Engineering Johns Hopkins University **Oct 2024 - May 2025**

Research Assistant *225N Calvert St, Baltimore*

- Conducted routine tests and experiments on neurodegenerative disorders by processing samples in strict accordance with established SOPs and regulatory guidelines.
- Performed assays and molecular techniques, including PCR analysis, DNA/RNA extraction, and tissue processing, while upholding laboratory safety and infection control protocols.
- Collected and analyzed experimental data for ongoing studies on advanced therapeutic strategies for Parkinson's Disease, maintaining detailed records and daily logs of methodologies and results.
- Purified and characterized recombinant proteins using both automated bioreactor systems and manual shake flask techniques, ensuring adherence to calibration and quality assurance standards.
- Documented in-process sample analyses—such as OD determination, metabolite profiling, and SDS-PAGE—and input data into LIMS system, integrating basic statistics for result interpretation.

Department of Nanoscience and Nanotechnology University of Kerala **Feb 2024 - Jun 2024**

Nanotechnology Research Intern

- Conducted synthesis and characterization of Chromium oxide nanoparticles for biomedical applications, following rigorous laboratory protocols and standard operating procedures.
- Executed hydrothermal synthesis using techniques such as coagulation and thermal decomposition, while strictly observing safety protocols and maintaining routine documentation.
- Performed nanoparticle analyses including X-ray diffraction (XRD), UV, and IR spectroscopy, and applied routine calculations to support quality control measures.
- Collaborated with cross-functional teams to optimize synthesis processes and compile experimental data into detailed reports, ensuring clear communication using Microsoft Office tools.
- Maintained comprehensive inventory logs and recorded experimental methodologies to support ongoing laboratory research and compliance with established procedures.

St Gregorios Multi-Specialty Hospital **Aug 2022**

Intern *Parumala Kerala*

- Gained proficiency in various medical devices used in modern hospitals.
- Engaged in routine checkups of medical devices like BP Apparatus, Patient Monitoring System, Anesthesia Machine, etc., under the supervision of the Head of the Biomedical department.
- Familiarized with the Linear Accelerator Machine used for cancer treatment.
- Prepared detailed reports regarding the equipment by understanding the working principle, machine model, manufacturer, etc.

PROJECTS

Longitudinal Analysis of T cell repertoire in Ulcerative Colitis **Aug 2024 - Present**

- Analyzed TCR sequencing data to identify patient-specific and cohort-level biomarkers distinguishing flare and remission states in ulcerative colitis (UC).
- Conducting longitudinal studies on TCR repertoire dynamics to uncover temporal transitions and disease arc patterns in UC patients.

- Integrated TCR data with clinical phenotypes and EHR to evaluate biomarkers' clinical relevance and guide personalized immunotherapy strategies.
- Engineered features related to V, D, and J gene segments, providing insights into shared immune mechanisms between UC and other disorders.

Synthesis and Characterization of Cr2O3 Nanoparticle for Biomedical Applications **Feb 2024 - Jun 2024**

- Synthesized Cr2O3 nanoparticle using hydrothermal process involving Chromium Chloride and Sodium Hydroxide.
- Characterized properties like mechanical strength, corrosive property and optical property using X ray diffraction and UV- Visible Spectroscopy.
- Integrated these identified characteristics into the medical device development process to enhance the applicability of these devices including surface coating of nanoparticles to improve biocompatibility as well as corrosive nature.

Detection Of Babesia Bigemina In Cattle Blood: AI And Impedance Methods **Sep 2023 - Mar 2024**

- Designed: An embedded AI software utilizing the YOLO V8 model to detect Babesia bigemina protozoans in cattle blood.
- Developed: A software solution achieving a mean average precision of 66.2% for an IoU threshold of 0.5 and 34.7% for an IoU threshold of 0.5 to 0.9.
- Integrated: The AI detection software into a 3D printed open flexure microscope for practical application.
- Implemented: Research on the conductivity and impedance changes in infected cattle blood, revealing a decrease in conductivity by 2.2 to 3 milli siemens and an increase in impedance by 330 to 450 milli ohms, aiding in the early detection of haemoprotezoans.

Recording System for Measuring the Effectiveness of Rehabilitation **Dec 2022 - May 2023**

- Designed an intelligent recording system with a team to help physiotherapists or doctors to effectively analyse the progress in the rehabilitation provided to the patient, the effect of stroke.
- Brought oxygen flow back to normal condition through the rehabilitation techniques to the particular region in the brain affected by stroke; measured the oxygen content in the brain and analysed if the provided rehab was effective.
- Used a simple PPG sensor, which is cost-effective and suitable for home usage and utilised techniques for understanding the effectiveness of rehab, including MRI, CT, etc.

QUALIFICATIONS

- **Laboratory Techniques**: Laboratory Proficiency, Equipment Qualification, Operation, Maintenance, Inventory Management, Experiment Documentation, Compliance With SOPs, cGMP Guidelines, Troubleshooting, Root Cause Analysis, Implementing Effective Solutions, Task Management, Prioritization, Record-Keeping Capabilities, Laboratory Techniques, SOP Compliance, Equipment Calibration, LIMS Systems, Quality Assurance, Infection Control Procedures, Safety Protocols, Routine Calculations, Molecular Biology Techniques, Cell Biology Techniques, DNA Sequencing, Biochemistry Techniques, PCR Analysis, Protein Purification, Electrophoresis, Chromatography
- **Data Analysis & Research**: Data Analysis, Research Methodologies, Project Management, Basic Statistics
- **Software Tools**: Microsoft Office Tools, Microsoft Outlook, Microsoft Word, Microsoft Excel, Access, PowerPoint, Python, R Programming, MATLAB, Bioinformatics, C Programming, 8051 Microcontroller Basics, PIP Microcontroller, COMSOL Simulation, Proteus

PUBLICATIONS

- Jacob Varghese, Allen George Thomas, Khadeeja Nilofer, Sivan Murali, Lakshmy GB. Detection of Babesia Bigemina in Cattle Blood: AI and Impedance Methods. Detection of Babesia Bigemina in Cattle Blood: AI and Impedance Methods. SCITEPRESS, 3rd International Conference on Futuristic Technologies (INCOFT 2025), Pune, India
- Jacob Varghese, Khadeeja Nilofer Saleem, Sivan Murali, Neethu K Sathyan. Recording System for Measuring the Effectiveness of Rehabilitation. Recording System for Measuring the Effectiveness of Rehabilitation. Proceedings of National Conference on Biomedical Instrumentation and Signal Processing 2023. ISBN No: 974-93-8SG66-76-6