Khushi Doshi

Biological sciences (Masters) + Chemical Engineering (Bachelors)

(+91) 749 853 9030 | doshikhushi1801@gmail.com | khushi-doshi-528712250 | Khushi Doshi

Education

M.Sc. Biological Sciences

GPA: 9.01 (Dept.) / 8.34 (Overall)

Birla Institute of Technology and Science, Pilani, Rajasthan — *Aug 2018 - Jul 2023*

B.E. Chemical Engineering

GPA: 8.68 (Dept.) / 8.34 (Overall)

Birla Institute of Technology and Science, Pilani, Rajasthan — *Aug 2018 - Jul 2023*

Internships

Enzyme Cascade-Enabled Biosensing for Ultrasensitive Antigen-Based Diagnostics

Thesis

Prof. Hadi Shafiee | Harvard Medical School — *July 2022 - June 2023*

- Performed and optimized a rapid, bioluminescence-based diagnosis of HIV, SARS-CoV-2, HBV and HCV using magnetic bead sandwich immunoassay, achieving high sensitivity and specificity. Actively engaged in troubleshooting the challenges faced during assay development. Helped integrated the method into a portable, cost-effective, and user-friendly cartridge
- Implemented and optimized the protocol for testing HBV. Selected antibody pairs and target antigen, carried out bioconjugation reactions of nanoparticles and immunogens and achieved a limit of detection of 0.4 fM for HBV surface antigen. Evaluated 50 HBV patient samples in microfluidic cartridge, resulting in a clinical sensitivity of 95.6% and specificity of 96.15%

Microfluidic Platforms for Droplet Synthesis

Remote Internship

Prof. Uday Kompella | University of Colorado Denver — *June - Aug 2021*

- Designed a solvent extraction channel, with 4 inlets, a fusion chamber and a collection reservoir. Simulated the mixing of silicone oil, water and DCM in the chip to generate droplets in Ansys Fluent
- Performed the mixing of silicone oil and water in a T-chip. Modified the design and added a laminated water stream in order to extract droplets from the oil phase and collect them in aqueous phase
- Created a parametric model of a 3-inlet microfluidic channel in AutoCAD. Simulated the mixing of aqueous PVA and PLGA dissolved in acetone by varying flow parameters in Autodesk CFD

Fruit Fly - Biology and Behaviour

Remote Internship

Dr. Adelaine Leung | University of Saskatchewan — *June - Aug 2021*

- Conducted manual analysis of fly behavioral videos, documenting copulation periods, alignment during copulation, and unique postures. Also performed the above analysis utilizing Caltech FlyTracker software
- Developed a MATLAB code that processed the output files from the FlyTracker software, analyzing the start and end times of copulation based on a threshold value of distance between two flies
- Worked with JAABA, a machine learning-based behavioral annotator, to understand how to train classifiers for automated analysis of fly behaviors

Prototyping of Portable Centrifuge and Reagent Strip Quantification

Internship

Prof. Rohit Srivastava | Indian Institute of Technology Bombay — *May - July 2019*

- Designed a 3-D model of a lateral flow assay reader and portable centrifuge of 10,000 RPM using AutoCAD and 3-D printed the designs using the Ultimaker-3 printer as a part of a bigger project for remote healthcare
- Prepared reagent strips and solutions of albumin, creatinine and glucose and quantified them using light sensors (TSL 2591 and AS 7262)

Publications & Pre-prints

Enzyme Cascade-Enabled Biosensing for Ultrasensitive Antigen-Based Diagnostics

S. Kim, G. Cho, J. Lee, **Khushi U. Doshi**, S. Gharpure, H. Chen, J.M. Hardie, H. Shafiee — *2023*

Manuscript in Preparation

COVID-19 Pandemic: Mechanism, Diagnosis and Treatment

[link]

V. Kumar, **Khushi Upesh Doshi**, W. H. Khan, Anurag Singh Rathore — *2020*

Journal of Chemical Technology & Biotechnology

Academic Projects

Genetic Engineering Techniques
Lab course

Dr. Prabhat N. Jha | BITS Pilani — *Jan - May 2020*

- Isolation of plasmid from pQE60 clone of E. coli by boiling lysis, alkaline lysis and kit based methods, restriction-digestion of isolated plasmid and analysis using agarose gel electrophoresis followed by DNA extraction, purification and quantification using Nanodrop
- Performed competent cells preparation of E. coli, transformation using PuC19 vector followed by DNA ligation, creation of recombinant clones and their selection by blue-white screening

Biomarkers of Ovarian Cancer
Design project

Dr. Rajdeep Chowdhury | BITS Pilani — *Aug - Dec 2020*

- Undertook an in-depth study on ovarian cancer, analyzing treatment approaches, drug repurposing strategies, mechanisms of drug tolerance and resistance, collateral sensitivity and FDA-approved biomarkers used for detection
- Worked on identifying molecular signatures and created database for the machine learning team, enabling them to develop a cognitive model that can predict ovarian cancer and the patient's response to therapy

Fruit Fly Genetics
Lab Project

Dr. Meghana Tare | BITS Pilani — *Jan - Mar 2020*

- Performed literature review on the study of Alzheimer's disease using fruit fly as a model organism
- Learned to identify male, female and virgin flies, their handling, transferring and maintenance, food preparation, anaesthetizing flies and fruit fly genetics
- Studied the anatomy and developmental stages of different model organisms (zebrafish, fruit fly, chick, worm and mouse)

Biosensors and Biorecognition Elements
Study Project

Prof. Ashis Kumar Das | BITS Pilani — *Aug - Dec 2019*

- Conducted literature review to explore the classification, functionality, and applications of different types of biosensors, including strip-based biosensors, implantable biosensors, and wearable sensors that have the capability to measure and monitor heart rate, blood pressure, and respiration rate. Additionally, covered various biorecognition elements employed in biosensors, such as enzymes, antibodies, microbes, DNA, and aptamers

Comparative Genomics of the ATR gene
Lab course

Dr. Shibasish Chowdhury | BITS Pilani — *Jan - May 2021*

- Analyzed the ATR gene from various organisms. Wrote python scripts to examine gene content, restriction enzymes sites and start/stop codons. Used GOR4, Predator and Predict Protein to predict and visualize the secondary and 3D protein structures
- Predicted structural and functional regions using GENSCAN and used ORF Finder to obtain the ORFs and protein sequences
- Performed pairwise amd multisequence alignments (EMBOSS, BLAST, Clustal Omega) and phylogenetic tree constructions (MEGA-X) to gain insights into evolutionary and functional relationships and sequence conservation among organisms

Skills

Laboratory Skills	ELISA, Agarose gel Electrophoresis, SDS-PAGE, Luminometer, UV-Vis spectroscopy, Fluorescence spectroscopy, TLC, FT-IR, Gas Chromatography, molecular cloning techniques, Safe handling of patient samples within BSL2+ setting, Bacterial and Fungal microbiology techniques
Software Skills	MS Office, ImageJ, AutoCAD, Ansys Fluent, basic programming (MATLAB, python, C), Serial Cloner software, IMG-JGI, Caltech FlyTracker

Scholastic Achievements

Aug. 2022	One of the 10 students in the '23 batch to receive IPCD Travel Grant Award for Off-Campus Thesis at BITS Pilani
Jan. 2020	Awarded the Merit-cum-Need Scholarship at BITS Pilani to cover 25% of tuition for the semester
2018	Selected for Dual Degree Program (B.E. Chemical with MSc. Biological Sciences) at BITS Pilani, Pilani Campus (Acceptance Rate 1.47%)

Certified Courses

Aug 01, 2020	Biology Meets Programming : Bioinformatics for Beginners - UC San Diego	*Coursera*
May 12, 2020	Introduction to the Biology of Cancer - Johns Hopkins University	*Coursera*
Jun 25, 2020	MATLAB Onramp	*MathWorks*