

# Abel Gurung

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## Education

University of Southern Mississippi

Major: *Mathematics*

Minor: *Computer Science and Biological Sciences*

Hattiesburg, MS

Expected Graduation: May 2024

## Internship

Chan Zuckerberg Biohub, San Francisco

San Francisco, CA

### Theory and Data Science Intern

May 2023 – November 2023

- Studied the developmental trajectories of single cells using Single-cell RNA sequencing (scRNA-seq) and RNA velocity
- Developed a novel method to find the transition path of developmental trajectories with defined initial and final states
- Pioneered a method to compute macrostate transition probabilities based on microstate transitions

Baylor College of Medicine

Houston, TX

### Biomedical Research Assistant

June 2022 - August 2022

- Studied how the Integrator complex regulates gene expression
- Compared the efficacy of CRISPR-based cytosine base editors (CBEs) to introduce stop codons within genes encoding Integrator subunits and analyzed effects on expression of Integrator regulated genes.
- Performed DNA extraction from E. coli, transfection of HEK293FT cells, total RNA extraction, cDNA preparation, qPCR, western blot, and KLD cloning

## Research Experience

University of Southern Mississippi

Hattiesburg, MS

### Machine Learning Research Assistant

Project: Modelling the Open Probability of Ion Channels on Cell/Organelle's Membrane

August 2022 – Present

- Built a deep neural network that models the probability of ion channels opening as accurately as traditional ODE models with less information
- Improve the model's performance by fine-tuning the neural network architecture and hyperparameters

### Bioinformatics Research Assistant

Project: Post-translational gene regulation through small regulatory RNAs

February 2022 – June 2022

- Collected genome data of organisms to study the role of RNAi in crop pests
- Developed an algorithm to identify adapter sequences in unfiltered RNA datasets
- Preprocessed genome data for further analysis and interpretation

Project: Global Gene Regulation of Virulence Staphylococcus Aureus

September 2021 - February 2022

- Studied the effects of antimicrobial agents in different media for Staphylococcus Aureus
- Performed RT-PCR, gel-electrophoresis, and preparation of growth media

## Work Experience

Telenutrition Center

Hattiesburg, MS

### Full-Stack Engineer

November 2021- May 2023

- Maintain and upgrade health application used by researchers to collect data from participants
- Built features to make interaction between researchers and participants more accessible
- Utilized Vue.js for front-end development and Ruby on Rails for back-end services, integrating USDA API to enhance the application with comprehensive nutritional information.

## Presentation

**Gurung, Abel;** "Investigating Cell Fate Trajectories Using Kinetic Monte Carlo" (2023) Oral presentation presented at Chan Zuckerberg Biohub Internship Symposium

**Gurung, Abel;** “Modelling the Open Probability of Ion Channels on Cell/Organelle’s Membrane” (2023) Oral presentation presented at University of Southern Mississippi and University of Southern Alabama

**Gurung, Abel;** “Testing the efficacy of cytosine base editors for making targeted mutations in the Integrator complex” (2022) Oral presentation presented at Baylor College of Medicine Smart Program

### Honors & Awards

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|---|-------------|
| • Cross-Scholar – Competitive Scholarship awarded to students doing research in Mathematics   | August 2023 |
| • University of Southern Mississippi Undergraduate Research Symposium – 1 <sup>st</sup> Place | April 2023  |
| - Title: “Modelling the Open Probability of Ion Channels on Cell/Organelle’s Membrane”        |             |
| • 3rd Annual VJ Canizaro, MD Health Summit Research Abstract – 1 <sup>st</sup> Place          | March 2023  |
| • Cross-Scholar – Competitive Scholarship awarded to students doing research in Mathematics   | August 2022 |
| • Academic Excellence Scholarship – Merit based scholarship that covers full-tuition          | August 2021 |

### Personal Project

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| Fine-tuned GPT-2                                     | June 2020 - December 2020 |
| • Fine-tuned GPT-2 model to mimic literature authors |                           |

### Skills & Interest

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|--------------|-----------------------|--------------------|
| • Python     | • Stochastic Modeling | • Machine Learning |
| • C++        | • TensorFlow          | • Pytorch          |
| • JavaScript | • Vue                 | • Keras            |
| • SQL        | • React               | • Ruby on Rails    |