

# Chinmayi R. Gudi

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*PhD candidate engineering next-generation probiotic platforms (EcN) for gut-brain and immune-modulating biotherapeutics using CRISPRi and metabolic engineering, with experience across microbiology, genetic engineering, and immunology; aiming to translate microbial engineering into real-world healthcare solutions.*

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## EDUCATION

- **Ph.D., Chemical and Biological Engineering (Minor in Immunobiology)** **Aug 2021- present**  
Iowa State University (ISU), Ames, IA  
Major Professor: Dr. Thomas J. Mansell
- **B.E., Chemical Engineering** **Aug 2017 – Aug 2021**  
B.M.S College of Engineering (BMSCE)  
(Autonomous Tier-1 Institute, Affiliated to Visvesvaraya Technological University), Bangalore, India

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## RESEARCH EXPERIENCES

### Graduate Research Assistant Jan 2022- May 2026 (expected)

Department of Chemical and Biological Engineering, ISU, Ames, IA

- Developed a novel, high-transformation strain of E. coli Nissle 1917 (EcN), and characterized strain of EcN for motility, competition, growth, survival, and overall robustness.
- Engineered a strain of EcN that chromosomally expresses mScarlet and dCas9 to investigate performance of genome wide knockdowns (CRISPRi) across various constitutive, immunological, and in-vivo stressors.

### Research Intern Jul 2020- Aug 2020

Washington University at St. Louis, St. Louis, MO

- Modelled a simulation for carbon dioxide capture by algae in a photobioreactor and implemented process control loops to maximise biomass production across various modes of operation.

### Research Intern May 2019- Aug 2019

Indian Institute of Technology-Bombay, Mumbai, India

- Modelled the human bone with various tessellations and probability tools, optimizing the algorithm to reduce printing time and material and 3D printed prototypes of bone scaffold for grafting in various regular and irregular shapes.

### Undergraduate Research Assistant Jun 2018- Sep 2018

Indian Institute of Science (IISc), Bangalore, India

- Constructed an electrochemical band-marking procedure to visualise fluid flow in paper microfluidics.
- Proposed and set up mechanisms for electromagnetic switches in paper microfluidic devices.

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## TEACHING EXPERIENCES

### Teaching Assistant Dept of Chemical and Biological Engineering, ISU, Ames, IA (Spring 2022)

"CHE 365: Transport Phenomena I" ~40 students

- Delivered lectures on packed-bed and fluidized-bed reactors; designed and graded assignments/projects; held weekly office hours.

"CHE 325: Chemical Engineering Lab I" ~40 students (Fall 2022)

- Supervised students in fluid-mechanics laboratory experiments; graded reports and exams; ran weekly office hours to prepare students for experiments.

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## SKILLS

- **Technical Laboratory Skills**
  - Bacterial microbiology (culture, plating, media prep), molecular cloning (Gibson, PCR), nucleic acid purification, transformation, CRISPR, CRISPRi, flow cytometry, genome-scale library construction and screening, high-throughput sequencing workflows, ELISA, Lyophilization.
- **Software and Computational Skills**
  - MATLAB, C, AutoCAD, COMSOL, Prism GraphPad, SIMULINK, SnapGene, BLAST, ImageJ, BioRender, Protocols.io, Canvas, Zoom.

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## PATENTS

Title: **E. coli Nissle strain with high Transformation Efficiency** (Application No: 19/036,754)

Inventors: Thomas J. Mansell, **Chinmayi R. Gudi**

Engineered a strain of EcN with high transformation efficiency, along with higher motility, growth, survival, iron consumption, and overall robustness as a candidate for probiotic engineering.

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## PUBLICATIONS

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### Journal Articles

1. **Gudi, Chinmayi R.**, Anderson, Bennett., Sara, Holscher., Michael, Wannemuehler., and Mansell, Thomas. "Systematic CRISPRi mapping of fitness in E. coli Nissle identifies targets for probiotic chassis optimization" (in preparation to submit to *Nature Chemical Biology*)
2. **Gudi, Chinmayi R.**, Neilson, Wiliam., and Mansell, Thomas. "Engineered variant of E. coli Nissle with enhanced transformation efficiency and versatility" (Submitted to *ACS Synthetic Biology*).
3. **Gudi, Chinmayi R.**, Michael J. Wannemuehler, and Thomas J. Mansell. "Gut-brain-immune interactions: exploring probiotics as a drug delivery platform for neurological disease." *Advanced Drug Delivery Reviews* (2025): 115650.
4. Xiao, Zhengyang, Yurui, Zheng., **Gudi, Chinmayi R.**, Yan Liu., Wei Liao., and Yinjie J. Tang. "Development of a kinetic model to describe six types of symbiotic interactions in a formate utilizing microalgae-bacteria cultivation system." *Algal Research* 58 (2021): 102372.

### Conference Proceedings

1. **C Gudi**, W Neilson, SK Murali, H Zainuddin, TJ Mansell (2023). " Engineering E. coli Nissle 1917 for Increased Transformation Efficiency, Heterologous Protein Production, and Robustness in the Gut Environment," AIChE Annual Conference- Orlando, Nov 5-10, 2023.

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## CONFERENCE PRESENTATIONS

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### Oral Presentations

**Total: 4**

1. **Gudi, Chinmayi R.**, Neilson, Wiliam., and Mansell, Thomas. (2024) "Engineered variant of E. coli Nissle unveils enhanced transformation efficiency and versatility in probiotic Engineering"
  - o Central US SynBio Workshop, Evanston, Sept 15-16, 2024.
  - o American Chemical Society (ACS), Spring Conference, New Orleans, March 17-21, 2024.
  - o Interdisciplinary Biological Sciences Symposium, Ames, April 3-4, 2024
2. **Gudi, Chinmayi R.**, Soni, Shruti., and Toley, Bhushan. "Fluid Visualization in Paper Microfluidics" at American Institute of Chemical Engineers (AIChE) South Asian Regional Conference, Pune, Aug 29-31, 2019.

### Poster Presentations

**Total: 3**

1. **Gudi, Chinmayi R.**, Neilson, Wiliam., and Mansell, Thomas. (2022) "Engineered strain of E. coli Nissle shows improved transformation efficiency"
  - o Central US SynBio Workshop, Madison, Oct 6-7, 2022.
  - o International Conference for Biomolecular Engineering, Santa Barbara, Jan 8-11, 2023.
  - o International Conference for Microbiome Engineering (ICME), Boston, Nov 12-14, 2024.

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## INVITED TALK

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1. **American Institute of Chemical Engineers Annual Conference**, Orlando, FL, Nov 7-12, 2019.  
Title: Fluid Flow Visualization and Bioengineering in Paper Microfluidics

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## HONORS & AWARDS

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1. Chemical and Biological Engineering **Graduate Fellowship**, ISU, 2021
2. **Honorable Mention for Prodigious Technical Intent** at an Undergraduate level at AIChE Annual Conference, 2019.
3. **Gold Medalist** at the 20<sup>th</sup> National Childrens' Science Congress awarded by the Dept. of Science and Technology, Govt. of India in 2012.

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## SERVICES & LEADERSHIPS

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### President of AIChE Student Chapter, BMSCE

**2018 - 2020**

BMSCE, Bangalore, India

- Led AIChE student chapter; organized professional development events, K-12 outreach, and industry visits.

### Senator, Graduate and Professional Student Senate, ISU

**Fall 2024**

- Represented the CBE department, and worked with university leadership to address student concerns, align course policies and schedules, and ensure consistent TA/RA compensation within the College of Engineering.

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References available on request.