PREM SINGH BIST, PhD



Postdoctoral Research Fellow | AI for Computational Biology & Drug Discovery

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RESEARCH PROFILE

AI and computational biology researcher developing predictive, explainable and generative models for biological sequences and therapeutic discovery. Current postdoctoral work emphasizes antimicrobial peptide (AMP) activity prediction, protein language models, physicochemical representations and uncertainty-aware modeling. PhD research addressed viral evolution and immune-escape prediction. Brings 10+ years of software engineering experience to reproducible, scalable, end-to-end scientific workflows.

RESEARCH FOCUS & METHODS

Research domains Antimicrobial peptide prediction and design; protein/peptide sequence modeling; viral immune escape; computational drug discovery.

AI methodologies Transformers and protein language models; semi-supervised learning; multimodal feature fusion; generative modeling; uncertainty quantification and calibration; explainable AI.

Computational tools Python, PyTorch, TensorFlow, Java; biological data curation, model evaluation, reproducible ML pipelines; Git, Docker, cloud and distributed computing.

RESEARCH EXPERIENCE

Postdoctoral Research Fellow | Nanyang Technological University, Singapore *Current*

- Develop AI-based approaches for quantitative AMP activity prediction, integrating protein language model representations with sequence-derived and physicochemical features.
- Investigate semi-supervised and trust-weighted learning, multi-task peptide property prediction, and interpretable evaluation across biological datasets.
- Develop and evaluate uncertainty-aware prediction and generative peptide design methodologies, with emphasis on rigorous held-out testing and reproducibility.

Doctoral Researcher | Jeonbuk National University, South Korea *2021–2025*

- Developed machine learning and generative modeling approaches to identify SARS-CoV-2 immune-escape sequences and characterize mutation patterns.
- Produced peer-reviewed work on viral escape prediction and therapeutic-oriented sequence modeling.

SELECTED RESEARCH PROJECTS

TW-GMProt — Trust-weighted semi-supervised AMP activity prediction combining gated sequence representations and engineered physicochemical features (manuscript research).

PepMetaStack — Multi-representation learning and predictive modeling for peptide bioactivity (manuscript research).

TW-SelectFlow — Ongoing uncertainty-aware generative AMP design targeting MIC, hemolysis (HC50), novelty and diversity; benchmark evaluation in progress.

SELECTED PUBLICATIONS

2026 Gated Modulation Protein Language Model for the prediction of Antimicrobial Peptide Activity (GMProt), European Conference on Computational Biology (ECCB, Poster Presentation)

2026 Unveiling Viral Escape Mechanisms With Machine Learning: A Transformative Approach to Mutation Analysis for SARS-CoV-2 and Beyond. *IEEE Transactions on Computational Biology and Bioinformatics*.

2024 Generative AI in the Advancement of Viral Therapeutics for Predicting and Targeting Immune-Evasive SARS-CoV-2 Mutations. *IEEE Journal of Biomedical and Health Informatics*.

2023 SARS-Escape Network for Escape Prediction of SARS-CoV-2. *Briefings in Bioinformatics*.

2024 Synthetic Generation of Escape Sequences for Escape Prediction of SARS-CoV-2. *WCCS / Springer conference proceedings*.

2022 Identification of SARS-CoV-2 Viral Escape Sequences Using EscapeTrans Network. *IEEE conference proceedings*.

Full publication record and citation metrics: Google Scholar (link in header).

AWARDS & RECOGNITION

Presidential Excellence Award, Jeonbuk National University (2025) • Best Poster Award, SONSIK International Conference (2024)

Research Excellence Award, Jeonbuk National University (2022) • BK Scholarship Award (2021)

EARLIER INDUSTRY EXPERIENCE

Technical Architect | Guru Technology, Nepal *2018–2021*

Led software teams and architecture for enterprise analytics and public-sector digital information systems; subsequently involved in consulting and technology strategy.

Senior Software Engineer | Impetus Infotech, India *2013–2016*

Built scalable distributed data-processing and backend systems using Java, Hadoop, Spark and cloud technologies.

Team Lead | Guru Institute of Engineering & Technology, Nepal *2017–2018*

Led software development for a learning management platform.

Software Engineer | Itriangle Infotech & Faststream Technology *2011–2013*

Built web, android-based tracking, education and healthcare software applications.

EDUCATION

PhD, Electronics & Information Engineering | Jeonbuk National University, South Korea | 2021–2025

MTech, Computer Science & Engineering | Dr. A.P.J. Abdul Kalam Technical University, India | 2013–2015

Bachelor of Computer Engineering | Pokhara University, Nepal | 2006–2010