Kailash Babu Panneerselvam | CV

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I am a 23-year-old biotechnology enthusiast, excited about uncovering the secrets of the genome. Computational Biology and Synthetic Bioengineering are my fields of interest. I am particularly interested in using analysing the human genome to understand the manifestation of complex diseases such as Alzheimer's disease.

Education

- **Indian Institute of Technology (IIT) Madras, Chennai** — **Aug 2015 - July 2020**
  Integrated Bachelor and Master of Technology in **Biological Engineering** — *Cum. GPA: 7.82/10*
  Specialization in **Computational Biology** — *Major Cum. GPA: 8.55/10*

Research Experience

- **Indian Institute of Technology Madras (IIT-M)** — **May 2019 - Present**
  Master's Thesis Project — *Guide : Prof. Manikandan Narayanan*
  Title: Multi-tissue differential correlation analysis of Alzheimer's disease
  - Developed a framework to statistically infer the underlying correlation (co-expression) network structure among genes in different brain tissues affected by Alzheimer's disease using R and Python.
  - Studied the rewiring of this gene co-expression network between healthy vs diseased groups of individuals.
  - Analyzed the contribution of cell-type proportions to the observed gene co-expression network.

- **National University of Singapore (NUS)** — **May 2018 - August 2018**
  Summer Research Intern — *Guides : Prof. Chester Drum, SRF Dr. Leroy Pakkiri*
  Yong Loo Lin School of Medicine, MD6 - Centre for Translational Medicine — *Opportunity funded by NUS*
  - Worked on metabolic profiling of Atorvastatin and its metabolites in dry blood spot (DBS) samples using LC-MS.
  - Optimized and validated DBS assay for cholesterol lowering drug Atorvastatin in >100 clinical samples.
  - Resulted in a DBS assay for detection and quantification of Atorvastatin and its metabolites.

Industry Experience

- **MedGenome: Clinical genomics and drug discovery research company** — **May 2017 - July 2017**
  Clinical Diagnostics Intern (Certificate) — *Guide : Dr. Vivek Gopalan*
  Narayana Nethralaya building, Narayana Health City, Bangalore, India — *Opportunity funded by MedGenome*
  - Developed a horizontally scalable, indexed data storage prototype using ElasticSearch for >200 clinical samples.
  - Developed a JSON query framework to filter for reliable variant data, analyze features such as allele frequency.
  - Concluded that ElasticSearch fits the data storage and analysis requirements for variants from clinical samples.

Notable Projects

- **International Genetically Engineered Machine (iGEM) 2018** — **March 2018 - November 2018**
  Guides : Prof. Nitish R Mahapatra and Prof. Guhan Jayaraman — *IIT Madras, Chennai, India*
  - Student leader for a group of 14 undergraduate students. Represented the team at the Giant Jamboree iGEM 2018 held at Boston, MA (Fully funded by IIT Madras). Contributed to three different projects (Poster).
  - Led the Language Project science communication initiative, making 105 educational videos introducing Synthetic Biology in 15 Indian and 20 foreign languages which have been published on YouTube.
  - Initiated and managed to completion, collaborations with 13 teams from around the world to create Language Project content in 26 different languages and to collect data for the ChassiDex database.

- **International Genetically Engineered Machine (iGEM) 2017** — **March 2017 - November 2017**
  Guides : Prof. Nitish R Mahapatra and Prof. Guhan Jayaraman — *IIT Madras, Chennai, India*
  - Worked with a team of 13 undergraduate students to develop a database of host organisms called **ChassiDex**.
  - Project aimed at encouraging usage of different chassis in synthetic biology, because *E.Coli* cannot do everything!
  - Developed web-based tools, for generating codon tables from genome data of any organism, and to carry out codon optimization for organisms on ChassiDex. Database and tools available at (chassidex.org).

Publications

- Kailash B P*, Karthik D*, Mousami Shinde*, Nikhita Damaraju* et. al. ChassiDex: A microbial database useful for synthetic biology applications bioRxiv 803239; doi: https://doi.org/10.1101/803239.
- Beal, J.*, Farny, N.G.*, Haddock-Angelli, T.*, **the iGEM Interlab Study Contributors** et al. Robust estimation of bacterial cell count from optical density. Commun Biol 3, 512 (2020). https://doi.org/10.1038/s42003-020-01127-5

Conferences

- Srivatsan C R*, Kailash B P^{P}, Philge Philip, Manikandan Narayanan Inferring spatial progression of Alzheimer's disease from multi-tissue gene expression data, BESCON 2019 (Certificate).
- Kailash B P*, Srivatsan C R, Philge Philip, Manikandan Narayanan^{P} Dysregulation of inter-tissue gene co-expression networks in Alzheimer's Disease, Development and 3D Modeling of the human brain 2019, Cold Spring Harbor Laboratory Meeting.
- Kailash B P*, ^{P}, Nikhita Damaraju*, ^{P} et al. ChassiDex: A microbial database useful for synthetic biology applications, Engineering meets evolution: Designing biological systems 2020, India EMBO Symposium (Certificate).

Skills

- **Dry-lab:** R (ggplot2, tidyverse, psych, BRETIGEA, CellCODE, GSEABase), Python (numpy, pandas, scikit-learn, scipy, flask), MATLAB, Weka, GROMACS, BioMart, DAVID, PyMOL, Cytoscape.
- **Wet-lab:** Molecular cloning using bacterial expression vectors, PCR, FACS, SDS-PAGE, Western blotting.

Relevant Coursework

- Probability and Statistics
- Data Structures and Algorithms for Biology
- Bioinformatics
- Genomics and Proteomics
- Computational Biology Laboratory
- Algorithmic Approaches to Computational Biology
- Pattern Recognition and Machine Learning
- Quantitative and Population Genetics
- Data-driven Modeling and Optimization of Bioprocesses
- Machine Intelligence and Brain Research

Scholastic Achievements

- **1st/7** teams at a bio-hackathon conducted by **SVCE iGEM 2017 team**, for developing a user-friendly web page to codon optimize protein sequences for different chassis, using Python library Flask, HTML, CSS.
- **Silver medal** (Certificate) at the international Genetically Engineered Machine competition, **iGEM 2017**.
- **Gold medal** (Certificate) at the international Genetically Engineered Machine competition, **iGEM 2018**.
- **1 of 6 winners/26** selected teams at the **Tata Consultancy Services (TCS) poster presentation competition**, (Certificate) at national technical festival **Shaastra 2019**, presenting work on ChassiDex database.
- Represented team IIT Madras at Students Academic Conference **Inter IIT Tech Meet 8.0 2020**, presented work on Inferring spatial correlation of Alzheimer's disease from multi-tissue gene expression data.

Teaching experience - funded by HTTA scholarship^{+}

- **Teaching Assistant** for *CS6024: Algorithmic approaches to computational biology; (Jul - Nov 2019)*
  - Conducted a class introducing the central dogma of molecular biology and next generation sequencing.
  - Corrected and graded five assignments, with two other TAs for the graduate level class of 12 students.
- **Teaching Assistant** for *BT3040: Bioinformatics; (Jan - May 2020)*
  - Assisted and supervised students during ten practical sessions on databases, algorithms, tools and applications.
  - Corrected and graded four assignments for the entire class of 57 undergraduate students.

Community service

- **National Service Scheme** *Project representative, Blood Connect, IIT Madras (July 2019 – June 2020)*
  - Led a team of 11 NSS volunteers to conduct two blood donation camps, recording 142 donations on 6^{th} October 2019 and 156 donations on 1^{st} March 2020. Handled emergency blood requirement requests.
  - Managed and led an awareness campaign on 23^{rd} February 2020 to address the need for blood donations.

*First authorship, ^{P}Presenting author, $^{+}$Awarded for clearing the Graduate Aptitude Test in Engineering