Seongyong **Park**

Research Scientist · Synergistic Bioinformatics Lab

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"Things which we see are not by themselves what we see... It remains completely unknown to us what the objects may be by themselves and apart from the receptivity of our senses. We know nothing but our manner of perceiving them." ***Immanuel Kant***

Summary

I have over 7 years of experience in bioinformatics and machine learning. In the meantime, I managed 'Multi-Component and Multi-Target (MCMT) drug discovery from Traditional Korean Medicine' project and initiated 'Developing AI model for cancer drug discovery' projects for Synergistic Bioinformatics Lab at KAIST. I managed databases related to the bioinformatic/chemoinformatic discovery and closely interact with experimental lab's members who verify prediction of biomarkers and candidate drugs. I designed computational methods to harmonize prior knowledge of disease gene, biological network, disease mechanism associated gene sets and gene expression datasets of patient/model organisms. I managed CPU/GPU clusters to perform high-performance computing (HPC) too.

My major research topic for MCMT project is developing computational methods to optimize gene expression marker set to explain clinical and model organism responses at the same time, by utilizing the prior knowledge related to the disease mechanisms. I have co-authored several patents and peer-reviewed articles related to bioinformatics and machine learning. For bioinformatic applications, I studied gene expression based prognostic model development, assay oriented marker set optimization, drug-target interaction prediction and drug repurposing.

Work Experience

Synergistic Bioinformatics Lab, KAIST. *Daejeon, S.Korea*

Ph.D. Research Scholar *(Aug. 2015 - –)*

- research, design and implement algorithms in graph theory, machine learning and deep learning for development of gene expression based diagnostic & prognostic models and drug candidate prediction models.
- apply theoretical expertise and innovation to generate patents and publications in top-ranked journals.
- using wide range of tools to acquire information and interpret data, writing up reports and presenting finding.

Synergistic Bioinformatics Lab, KAIST. *Daejeon, S.Korea*

Researcher *Aug. 2014 - Aug, 2015*

- research, design and implement algorithms in graph theory, machine learning and deep learning for development of gene expression based diagnostic & prognostic models and drug candidate prediction models.
- apply theoretical expertise and innovation to generate patents and publications in top-ranked journals.
- using wide range of tools to acquire information and interpret data, writing up reports and presenting finding.

Biobrain Inc. *Daejeon, S.Korea*

Researcher *Aug. 2012 - Aug, 2014*

- research, design and implement biosignal processing algorithms for EEG applications.
- using wide range of tools to acquire information and interpret data, writing up reports and presenting finding.

Planning and Evaluation Office, Korea Institute of Energy Technology Evaluation and Planning (KETEP). *Seoul, S.Korea*

Researcher *Feb. 2012 - Aug, 2012*

- Evaluation of research project associated with renewable energy.
- writing research trend reports.
- attending staff meetings and general administration.

Skills

Expertise	Bioinformatics, Machine Learning, Deep Learning, Network Science, Signal Processing
Programming	R, Python, MATLAB, TensorFlow, Keras, Pytorch, LaTeX
Languages	Korean, English

Publications

Patents & Patent Applications

1. Bumki Min, Gwansu Yi and **Seongyong Park**. "System and method for disease prediction based on group marker consisting of genes having similar function." ***KR. Patent 1022361940000, App. 1020200145453, issued Mar 30, 2021.*** [online]
2. Taesung Kim and **Seongyong Park**. "Microfluidic concentrator array for observing predation behavior of microbes." ***KR. Patent 1012385560000, App. 1020100110945, issued Febrary 22, 2013.*** [online]
3. Taesung Kim and **Seongyong Park**. "Microfluidic concentrator for communication assays of microbes." ***KR. Patent 1013304730000, App. 1020110073766, issued Febrary 04, 2013.*** [online]

Peer-Reviewed Journal Papers

1. **Seongyong Park**, Gwansu Yi*. "Development of Gene Expression-Based Random Forest Model for Predicting Neoadjuvant Chemotherapy Response in Triple-Negative Breast Cancer" ***Cancers***, Febrary, 2022, [online]
2. Yoon Hyeok Lee, Hojae Choi, **Seongyong Park**, Boah Lee, Gwansu Yi*. "Drug repositioning for enzyme modulator based on human metabolite-likeness" ***BMC Bioinformatics***, May, 2017, [online]
3. Sung Min Kim, **Seongyong Park**, Jong Won Hong, Eu Jean Jang, Chun Ho Pak*. "Psychophysiological Effects of Orchid and Rose Fragrances on Humans" ***Hortic Sci Technol***, June, 2016, [online]
4. Woon Sun Choi, Dogyeong Ha, **Seongyong Park**, Taesung Kim*. "Synthetic multicellular cell-to-cell communication in inkjet printed bacterial cell systems" ***Biomaterials***, April, 2011, [online]
5. **Seongyong Park**, Dasol Kim, Robert J Mitchell, Taesung Kim*. "A microfluidic concentrator array for quantitative predation assays of predatory microbes" ***Lab on a Chip***, September, 2011, [online]
6. Vinuselvi Parisutham, **Seongyong Park**, Minseok Kim, Jung Min Park, Taesung Kim, Sung Kuk Lee*. "Microfluidic Technologies for Synthetic Biology" ***Int J Mol Sci.***, December, 2011, [online]
7. Woon Sun Choi, Minseok Kim, **Seongyong Park**, Sung Kuk Lee, Taesung Kim*. "Microfabricated ratchet structure integrated concentrator arrays for synthetic bacterial cell-to-cell communication assays" ***Lab on a Chip***, January, 2012 [online]
8. **Seongyong Park**, Xiaoqiang Hong, Woon Sun Choi, Taesung Kim*. "Microfabricated ratchet structure integrated concentrator arrays for synthetic bacterial cell-to-cell communication assays" ***Lab on a Chip***, June, 2012, [online]

Abstracts, Posters and Conference Proceedings

1. **Seongyong Park**, Dasol Kim, Robert J. Mitchell, Taesung Kim*. "A Microfluidic Concentrator Array for Studying Predatory Bacterial Microbes." in ***MicroTAS. 2010, Groningen, Netherland.***
2. **Seongyong Park**, Xiaoqiang Hong, Minseok Kim, Woon Sun Choi, Taesung Kim*. "Bacterial Cell-to-cell Communication Assays in A Micro-fabricated Concentrator Array Device." in ***MicroTAS. 2011, Seattle, USA.***
3. **Seongyong Park**, Xiaoqiang Hong, Minseok Kim, Woon Sun Choi, Taesung Kim*. "Bacterial Cell-to-cell Communication Assays in A Micro-fabricated Concentrator Array Device." in ***ISMM. 2011, Seoul, Korea.***
4. **Seongyong Park**, Dasol Kim, Robert J. Mitchell, Taesung Kim*. "A Bacteria-on-a-chip: Understanding on the Predation Rate of Predatory Prokaryotes." in ***Biochip. 2010, Seoul, S.Korea.***
5. **Seongyong Park**, Sunjang Lee, Dasol Kim, Robert J. Mitchell, Taesung Kim*. "High Throughput Screening of Predatory Bacterial Microbes using Chemotaxis." in ***KSME Spring Conference on Bioengineering Division. 2010, Jeju, S.Korea.***
6. **Seongyong Park**, Dasol Kim, Robert J. Mitchell, Taesung Kim*. "A Microfluidic Concentrator Array for Quantifying Predation by Predatory Microbes Toward Its Prey." in ***Biochip. 2011, Ulsan, S.Korea.***
7. **Seongyong Park**, Sunjang Lee, Dasol Kim, Robert J. Mitchell, Taesung Kim*. "Bacterial Cell-to-Cell Communication Assays in Microfabricated Concentrator Array Device." in ***KSME Spring Conference on Bioengineering Division. 2011, Pohang, S.Korea.***

Education

KAIST(Korea Advanced Institute of Science and Technology)

Daejeon, S.Korea

PH.D. IN BIO & BRAIN ENGINEERING

Aug. 2015 - –

- Got the KAIST student scholarship which is given to promising students.

UNIST(Ulsan National Institute of Science and Technology)

Ulsan, S.Korea

M.S. IN MECHANICAL ENGINEERING

Mar. 2010 - Feb. 2012

- *Thesis*: Microfluidic Concentrator Array for Quantitative Predation Study of Predatory Microbes [online]
- Got the UNIST student scholarship which is given to promising students.

PKNU (Pukyung National University)

Busan, S.Korea

B.E. IN MECHANICAL ENGINEERING

Mar. 2002 - Feb. 2010

- Got BK21 scholarships which are given to top-ranked students in each Dept.