

# Sang Yoon Byun

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## Education

### Grinnell College

*Bachelor of Arts in Computer Science | Minor in Policy Studies*

Grinnell, IA

Expected May 2022

- GPA: 3.7 / 4.0 | Dean's List (2 Semesters)
- Relevant Coursework: Functional Programming, Imperative Programming, Object-Oriented Programming and Data Structures, Discrete Mathematics: Number Theory, Calculus I & II, Applied Statistics, Linear Algebra, Operating Systems & Parallel Algorithms, Artificial Intelligence, Analysis of Algorithms, Software Design & Development

### Online Education Certificates (University of California, San Diego)

*Coursera: Bioinformatics I – Finding Hidden Messages in DNA*

Jan 2021

- <https://coursera.org/share/257350c14d38424beeb650d2918f79bc>

*Coursera: Bioinformatics II – Genome Sequencing*

Jan 2021

- <https://coursera.org/share/a484938b6ad2eab074f56ee60fec655>

## Research Experiences

### Bioinformatics Research Internship

*Artificial Intelligence Institute at Seoul National University*

Seoul, South Korea

Apr – Aug 2021

- Developed a novel, computational approach that applies deep-learning-based protein embedding techniques to represent an entire B-cell receptor repertoire as a 100-dimensional vector and as a single point in vector space.
- Managed over 100 million amino acid sequences through Elasticsearch database.
- Reduced the running time of original algorithm two fold.
- Submitted an article to *Communications Biology* (currently revising after peer-review feedback).  
Publication: <https://doi.org/10.1101/2021.08.02.454701>

### Parallel Computing Summer Research Internship

*Los Alamos National Laboratory (LANL)*

Los Alamos, NM

Jun – Aug 2020

- Assisted in optimizing HIGRAD, LANL's high-performance computing (HPC) fluid dynamics code (written in Fortran), including porting it to a C/C++ code that effectively utilizes Kokkos and MPI to achieve higher performance parallelism and portability.
- Performed robust and reliable test cases to validate basic functionalities of the code.
- Designed and conducted scalability studies and performance measurements of the code on various HPC architectures (GPU-based and ARM-based) at LANL.

### Blockchain Research / Marketing Internship

*RankingBall Inc. (Innovative Sports / eSports Gaming Platform on Blockchain)*

Seoul, South Korea

Jan – Jul 2018

- Analyzed a collection of whitepapers and business models from different blockchain services.
- Collected and wrangled sports statistical data from MLB, NFL, and NBA Data APIs.
- Assisted in product design for building RankingBall NFL and NBA (minimum viable product).

## Additional Work Experiences

### Volunteer Full Stack Developer

*ideas42 (in collaboration with Develop For Good)*

Brooklyn, NY (Virtual)

Apr – Jun 2021

- Established frontend/backend service (MERN stack) for web app designed to help probationers and parolees navigate their case plan responsibilities within their communities.

**International Pre-Orientation Program Mentor***Grinnell College Office of International Student Affairs*

Grinnell, IA

Aug – Dec 2019

- Mentored a group of eight incoming international students throughout the Fall 2019 semester.
- Identified and reached out to first-year students who were struggling academically and/or culturally.

**Associate Editor***Rootstalk: A Prairie Journal of Culture, Science, and the Arts*

Grinnell, IA

Jan – May 2019

- Interviewed the executive director of Cow Tipping Press, an organization that teaches and publishes writing by people with developmental disabilities.
- Published the interview and curated poems written by Cow Tipping authors for Spring 2019 issue to change people's fundamental perspective on disability: <https://bit.ly/3cS80is>.

**Sergeant Squad Leader***The Republic of Korea Army*

Daejeon, South Korea

Sept 2015 – Jun 2017

- Led and supervised First Squad in the Ammunition Support Command Headquarters Company.
- Developed and managed headquarters security plans and biannual training sessions.
- Mentored and counseled soldiers who were mentally vulnerable and needed extra attention.
- Collaborated with other non-commissioned officers in the English Translation Unit in preparation for a conference with the U.S. Army.

**Course-embedded Research Experiences****Student Researcher***PST-420: Advanced Policy Research*

Grinnell, IA

Jan – May 2020

- Proposed an extensive policy memo that examined the algorithmic bias in the U.S. criminal justice system and explored policy alternatives that would mitigate further cases of disparate impact.
- Invited to speak at the annual Grinnell Student Research Symposium (cancelled due to COVID-19).

*PST-320: Applied Policy Analysis*

Aug – Dec 2019

- Analyzed the lack of affordable housing for people with substance use disorder and co-occurring mental disorders in the U.S. and proposed policy alternatives to alleviate the social issue.

*BIO-150: Introduction to Biological Inquiry with Lab*

Jan – May 2015

- Examined the effects of *orai-1* mutation and calcium concentration on the viability of *Caenorhabditis elegans* progeny.

*STA-209: Applied Statistics*

Jan – May 2015

- Investigated the effects of music and color on cognitive inference and automated human behaviors.

**Volunteer Experiences***Fairybytes: Computer Science Project-Driven Student Club*

Nov 2021 – Present

- Appointed as a mentor to teach students fundamental machine learning and deep learning techniques using Python and TensorFlow during Spring 2022 semester.
- Currently designing a comprehensive curriculum with projects and activities.

*Association for Computing Machinery (ACM) Grinnell Chapter*

Jan – May 2019

- Volunteered for a program that provides fundamental computer science education to elementary students, especially focusing on the underrepresented minority groups residing in rural areas of Iowa.
- Planned and coordinated events that connected upper and lower classmen in the CS Department.

*Grinnell College Office of Accessibility and Disability Resources*

Aug – Dec 2018

- Volunteered to take and share detailed notes during ECN-111: Introduction to Economics for students with disabilities such as severe visual impairment.

## Publications

### Bioinformatics Research Article

Seoul, South Korea

Inyoung Kim, Sang Yoon Byun, Sangyeup Kim, Sangyoon Choi, Jinsung Noh, Junho Chung, Byung Gee Kim. 2021. Computational analysis of B cell receptor repertoires in COVID-19 patients using deep embedded representations of protein sequences. bioRxiv doi: 10.1101/2021.08.02.454701  
- Publication: <https://doi.org/10.1101/2021.08.02.454701>

### Interview Article

Grinnell, IA

Byun, Sang Yoon. "Sunflower, Sunflower—A Neurodiverse Landscape." *Rootstalk: A Prairie Journal of Culture, Science, and the Arts*, Volume V, no. 2, 2019.  
- Publication: <https://bit.ly/3cS80is>

## Honors and Awards

*Fellowship in the National Security Education Center at LANL*

Jun 2020

- Awarded USD 8,900 for participating in Parallel Computing Summer Research Internship program.
- Competitively selected and awarded 1 out of 5 applications.

## Technical Skills

C, C++, Java, Python, Scheme  
TensorFlow, Pandas, Numpy  
R, Shiny  
OpenCV, Pygame  
Node.js, React, Express, Django  
HTML, CSS, JavaScript  
UNIX and Linux environments  
MPI, Kokkos, OpenMP, CUDA

Working Knowledge: Learned and used in internships, classes, and projects.  
Working Knowledge: Used in various independent projects.  
Working Knowledge: Learned and used in classes and academic projects.  
Working Knowledge: Used in various independent projects.  
Working Knowledge: Used in personal and professional projects  
Basic Knowledge: Learned from online classes for personal development.  
Basic Knowledge: Familiar with working in UNIX and LINUX environments.  
Basic Knowledge: Learned and used in different HPC architectures.

## Independent Projects

More at <https://byunsy.github.io/>

### Machine Learning & Deep Learning

- Lane Detection for Autonomous Vehicles [<https://github.com/byunsy/enhanced-lane-detection>]
- Deep Learning Retinal Optical Coherence Tomography [<https://github.com/byunsy/retinal-oct-classification>]
- Deep Learning Pneumonia Classification [<https://github.com/byunsy/pneumonia-classification>]
- Personalized Facial Recognition [<https://github.com/byunsy/face-recognition>]
- Hand-motion Screen Control using Optical Flow [<https://github.com/byunsy/handmotion-control>]
- Business Card / Document Textual Content Scanner [<https://github.com/byunsy/card-scanner>]
- Heart Disease Random-Forest Classifier Model Analysis [<https://github.com/byunsy/heart-disease-diagnosis>]
- HOG & SVM Digit Recognition [<https://github.com/byunsy/digit-recognition>]

**Languages:** English (Fluent), Korean (Native)