# Sang Yoon Byun

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## Education

**Grinnell College** — Grinnell, IA
*Bachelor of Arts in Computer Science | Concentration in Policy Studies* — Expected May 2022
- GPA: 3.7 / 4.0 | Dean's List (2 Semesters)
- Relevant Coursework: Functional Problem Solving, Imperative Problem Solving, Object-Oriented Problem Solving and Data Structures, Discrete Mathematics - Elementary Number Theory, Operating Systems & Parallel Algorithms, Introduction to Artificial Intelligence, Linear Algebra, Calculus I & II

**International School of Kuala Lumpur** — Kuala Lumpur, Malaysia
*International Baccalaureate Diploma* — May 2014

## Research Experience

**Parallel Computing Summer Research Internship** — Los Alamos, NM
*Los Alamos National Laboratory (LANL)* — 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.
- Received professional training on parallel computing and attended HPC lectures and workshops.

**Research Internship** — Seoul, South Korea
*RankingBall Inc. (Innovative Sports / eSports Gaming Platform on Blockchain)* — Jan – Jul 2018
- Managed 'Know Your Customer' applications and Initial Coin Offering Whitelisting processes.
- Analyzed and wrangled sports statistical data from MLB, NFL, and NBA Data APIs.
- Assisted in service design for building RankingBall NFL and NBA (minimum viable product).

**Academic Programming Projects** — Grinnell, IA

*CSC 261 – Introduction to Artificial Intelligence* — Jan – May 2020
- Completed an A-star search for eight-puzzle problem and a heuristic for lights-out-puzzle problem.
- Implemented uninformed search algorithms like breadth-first search or depth-first search algorithms for simple puzzle problems.
- Implemented value iteration and policy iteration algorithms in a small, sequential environment.
- Applied probabilistic inference model for analyzing text datasets and their general error patterns.

*CSC 213 – Operating Systems & Parallel Algorithms* — Jan – May 2020
- Parallelized a simple n-body physics simulation using CUDA C and GPGPUs.
- Constructed a basic program that can crack MD5-hashed passwords using POSIX threads.
- Created a simple interactive shell program that allows users to run programs in the foreground/background.
- Designed a basic cooperative scheduling system that can manage tasks in a round-robin fashion to specifically support a simple snake game.

*CSC 207 – Object-oriented Problem Solving and Algorithms with Lab* — Aug – Dec 2019
- Implemented Dijkstra's algorithm to find the shortest paths in Word Ladder puzzles.
- Developed a version of the sieve of Eratosthenes to compute the first five hundred primes.

## Personal Projects Portfolio

https://byunsy.github.io/

**Retinal OCT (Optical Coherence Tomography) Classification**

- Constructed a CNN (Convolutional Neural Network) model and trained it on over 83,000 retinal OCT images to classify for macular degeneration and diabetic retinopathy divided into four distinct classes.

**Lane Detection for Autonomous Vehicles**

- Accurately detects and highlights lanes under different light conditions (shadows, unclear markings, etc).
- Calculates and displays curvature and offset information for the vehicle at every frame.

**Business Card Scanner**

- Uses edge detection and perspective warping methods to take a photo, straighten the image, and automatically or manually interpret the text of the business card with Tesseract OCR.

**Adaptive Face Filter**

- Detects human faces real-time in a webcam feed and applies up to ten (or more) different Snapchat-like filters using SSD (Single Shot MultiBox Detector) based neural network.

## Honors and Awards

*Fellowship in the National Security Education Center at LANL* Jun 2020

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

## Technical Skills

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|---|---|
| C, C++, Java, Python, Scheme | Working Knowledge: Learned and used in classes for various projects. |
| TensorFlow, OpenCV, Pandas | Basic Knowledge: Learned from online classes for personal development. |
| UNIX and Linux environments | Basic Knowledge: Familiar with working in UNIX and LINUX environments. |
| MPI, Kokkos, OpenMP, CUDA | Basic Knowledge: Learned and used in different HPC architectures. |

## Volunteer Experiences

*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.

## Additional Work Experiences

**Sergeant Squad Leader** Daejeon, South Korea

*The Republic of Korea Army* 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.

## Reference(s)

Eunmo Koo, Ph.D.
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**Languages:** English (Fluent), Korean (Native)