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| Associate Applications Architect | MAHLAU-HEINERT, Saejin , BS (computer science/studio art) (cum laude), Allegheny College, 2019. Joined firm 2019. Associate Applications Architect since 2022. |
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SAEJIN A. MAHLAU-HEINERT

Associate Applications Architect – Daniel H. Wagner Associates, Inc.

Allegheny College, Meadville, PA, B.S. (Cum Laude) Computer Science/Studio Art (with Honors), 2019

RELEVANT EXPERIENCE: Saejin Mahlau-Heinert joined Daniel H. Wagner Associates, Inc. in 2019, after an internship with the company in Summer 2018. He has primarily been involved with mission planning, optimization, and user interface development. Additionally, he has developed supporting infrastructure, tools, and continuous deployment and integration software for internal development, testing, and documentation efforts. While in University, he led or solely developed multiple educational tools for use in Allegheny College's Computer Science Department, as well as multiple computational art exhibits with a special focus on Virtual Reality.

In the area of **automated data registration**, he developed and optimized RANSAC, with efforts focused on data accuracy testing as well as interactive user interfacing, algorithm automation, and extensive linear algebra mathematical performance optimization. In addition, he modernized the development process, implementing continuous integration and developing internal tools to support automated documentation.

In the area of **mission planning and optimization**, he worked on the modernization of development and testing infrastructure for Mission Optimization Configuration Item (MOCI), Undersea Warfare Decision Support System (USW-DSS), Wide Area Integrated Situational Awareness Data Fusion and Optimization Module (WISDOM), and other internal components in the Wagner Search Planning System (WSPS). He has implemented core data translation and orchestration features for internal components of WSPS, and has designed, prototyped, and built SPECIWebService, a data orchestration and management subsystem of WSPS that supports environmental data generation and CDP map creation. He also developed internal tools to aid in test case generation and ASW theater specification, and implemented a custom Jenkins- and Vagrant-based continuous integration (CI) pipeline for WSPS and various subcomponents.

In the area of **mission planning and optimization user interfaces**, he has led a team of two to design, prototype, and implement the Search Planning, Execution, and Configuration Interface (SPECI), which currently consists of a Cumulative Detection Probability (CDP) mapping interface and a Transmission-Loss Data Generation interface, with more interfaces in development. He demonstrated this interface at the 2023 TUSW C2 IPT. He has also designed and built multiple user interface prototypes for evaluation by project leadership.

In the area of **Virtual Reality geospatial web applications**, he has developed two tech demos: a visualization of icing, rain, and temperature for drone flights, and a visualization of GRIB2-derived isosurfaces for wind speed. Both of these were developed using CesiumJS and demonstrated to potential customers. Visual and interactive documentation is available upon request.

In the area of **educational software and automated grading tools**, he was the sole developer for GatorGradle, a tool to integrate automated grading checks such as text analysis, structure specifications, and documentation requirements into the Gradle build system. He was also the secondary developer on GatorGrader, the tool which GatorGradle integrates with to provide grading analysis. In addition to main development work, he also was the primary developer on continuous integration and deployment infrastructure for the Gator suite of automated grading software, ensuring that hundreds of users were served error-free production-quality software. Additionally, he was the industry liaison and project lead for GatorGrade, a replacement for GatorGradle developed by students at Allegheny College.

In the area of **software containerization**, he has created Docker container images for MOCI, SPECIWebService, and various related subcomponents, as well as for educational use of GatorGradle and GatorGrader, and for hobbyist use of CKAN, a popular video game mod distribution platform. He has also utilized Docker containers for customer demonstrations of geospatial web applications, internal development tools and services, and external websites.

In the area of **photo-realistic graphical rendering**, he was the sole developer of RayTerm, a real-time photo-realistic graphical rendering system. This involved both complex ray-tracing calculation optimization as well as low-level hardware programming, all of which he described in his bachelor's thesis: "RayTerm: A Ray-Tracing Graphics Engine for Xterm-like Terminals." The thesis and surrounding documentation are available at saejinheinert.com.

In the area of **Virtual Reality computational art**, he has showcased two exhibits: "Doorway," a haunting, mysterious scene evoking the opening of "2001: A Space Odyssey" and "The Gallery," a site-specific experience shown during "Free Wine: Art + Food" at the Allegheny Art Gallery that explored the concept of Worlding: the emergence of whole universes only somewhat visible. Both of these were developed in the HTC Vive ecosystem using the SteamVR SDK, along with Unity3D, and were shown during gallery times to students, faculty, and the general public. Visual documentation is available at saejinheinert.com, and interactive documentation is available upon request.

He has developed numerous smaller **independent research and open-source projects**, sometimes with the indirect support of faculty at Allegheny College. Some of his work includes the following: *mesi*, a Python tool to measure the similarity in a many-to-many fashion of long-form documents like Python source code or technical writing; *py-battle-net*, a Python-based artificial intelligence for playing the game Battleship using a neural network trained by a genetic algorithm; *brainfuse*, an esoteric programming language; *bebop_teleop* and *bebop_track_tag*, systems allowing Bebop quadcopter drones to follow AR tracking tags using visual tag recognition and be automatically remote controlled; and *pr-tag-release*, a tool to automate git-tagged software releases using text analysis on pull requests in the Github ecosystem.

RELEVANT AWARDS: Allegheny College's *Alden Scholar* (x2), *Distinguished Alden Scholar* (x2), and *Cupper Scholar*

RELEVANT PUBLICATIONS:

1. Mahlau-Heinert, S., "RayTerm: A Ray-Tracing Graphics Engine for Xterm-like Terminals," Allegheny College Bachelor's Thesis, May 2, 2019