Seungwon Seok

Jeonbuk National University, Jeonju, South Korea 54896
E-mail: champ9162@jbnu.ac.kr | Cell: +82-10-3930-9162
https://ethanseok.kr
https://github.com/EthanSeok

Education

Master's Program
Jeonbuk National University, South Korea
Department of Agricultural Engineering, College of Agricultural & Life Sciences
Smart Digital Agriculture Lab (SDA) – Supervisor prof. Taegon Kim
Feb. 2025 - Present

Bachelor of Engineering
Jeonbuk National University, South Korea
Department of Smart Farm, College of Agricultural & Life Sciences
2025

Awards & Honors

KSAE, Best Poster Presentation Award — Oct. 2025
Title: Development of an APEX-Metamodel integrated framework for simulating agricultural nutrient discharge under future climate change

MAFRA, Grand Prize of AI Student Competition, Minister's Award — Oct. 2025
Title: Development of an Artificial Intelligence Model for Agricultural Reservoir Operation Using Water Level and Multi-Source Data

KSAE, 4th Student Creative Idea Competition, Best Idea Award — Oct. 2025
Title: Development of a Web-Based Platform for Integrating and Visualizing Agricultural and Spatial Data Using Public APIs

KSSSF, Best Poster Presentation Award — Aug. 2025
Title: Development of Machine Learning-Based APEX Meta-Model for Assessing Agricultural Nutrient Loss in South Korea

KSBEC, Best Poster Presentation Award — Mar. 2025
Title: Quantitative Assessment of Low Radiation Conditions in Korea through Analysis of Solar Radiation and Sunshine Duration

University of Florida, Certificate of Achievement, DSSAT 2025 Training Course — Feb. 2025
Assesing Crop Production, Water and Nutrient Management, Climatic Risk and Environmental Sustainability with Simulation Models

JBNU, SW Convergence Competition, Grand Prize — Dec. 2024
Title: Analysis of Soil Chemical Properties and Vegetation Indices Derived from Drone Imagery for Agricultural Field Assessment

KSHS, Best Poster Presentation Award — Sep. 2024
Title: Development of a Kale Leaf Growth Model Using Growing Degree Days (GDD) and the Beta Distribution Function

KSBEC, Best Poster Presentation Award — Sep. 2024
Title: Development of a Greenhouse Heating Load Estimation Model Using Solar Radiation and Temperature Forecast Data

KSAE, Best Poster Presentation Award — Sep. 2024
Title: Development of a YOLO v10-Based Model for Detection and Quantification of Solar Power Plants Using Satellite Imagery

KSAE, 3rd Student Creative Idea Competition, Best Idea Award — Sep. 2024
Title: Development of an Environmental Monitoring and Temperature Alert Service for Winter Potato Greenhouses in Paddy field Using a Portable Solar Power

JBNU, 2024 Spatial Information AI Competition Merit Award — Jun. 2024
Title: Development of an Algorithm for Solar Power Plant Detection and Address Extraction from Aerial Imagery Using AI-Based Object Segmentation

CIGR, Best Poster Presentation Award — Apr. 2024
Title: Implications of Sowing Dates and Cultivars Selection based on APSIM with Decision Support for Successful Wheat Production in South Korea

KSBEC, Best Poster Presentation Award — Apr. 2024
Title: Analysis of Crop Production through Process-Based Models Based on Meteorological Factors at a National Scale

EPIS, 2023 Smart Agriculture AI Competition, EPIS President's Award — Feb. 2024
Developed and demonstrated an AI-based Energy-Saving RTR (ESR) algorithm for tomato greenhouses, achieving stable winter production and energy reduction under Pyeongchang's extreme climate.

FKII, Finalist Award — Dec. 2023
Title: Development of an Agricultural Data–Driven Mobile Chatbot Using ChatGPT API and LangChain

KSAE, Best Poster Presentation Award — Oct. 2023
Title: Estimation of Wheat Yield driven by Cultivation Environments: A Scenario Analysis using the APSIM Model

FKII, Finalist Award — Dec. 2022
Title: Development of a Bell-Pepper Ripeness Classification and Sorting Machine Prototype Using YOLOv5

Publications

Refereed Journal Publications in Korean

1. Kim, S., Jeon, J., **Seok, S.**, Jung, J., & Kim, T. (2025). Development of agricultural parcel detection model based on YOLO-Seg using CAS500-1 satellites images. Journal of the Korean Society of Agricultural Engineers, 67(2), 55-67. https://doi.org/10.5389/KSAE.2025.67.2.055

2. Kim, S., **Seok, S.**, Cheng, L., Jang, T., & Kim, T. (2024). Design and development of web-based decision support systems for wheat management practices using process-based crop model. Journal of the Korean Society of Agricultural Engineers, 66(4), 17-26. https://doi.org/10.5389/KSAE.2024.66.4.017

In press/Under Review

1. **Seok, S.,** Kim, S., & Kim, T. (2025) Optimizing APSIM Phenological Parameters and Simulating Growth Stages for Korean Wheat Cultivars, Journal of the Korean Society of Agricultural Engineers

2. **Seok, S.,** Kim, S., Lee, J., & Kim, T. (2025) Process-Based Modeling for Temperature-Dependent Leaf Appearance and Expansion in Kale (*Brassica oleracea* L. var. *acephala*), Horticulture, Environment, and Biotechnology

Presentations in Conferences

1. **Seungwon Seok,** Jaeyoung Jung, Miso Kim, Hajong Kim, Eunsu Jang, Solhee Kim, Donghyun Kim, Taegon Kim. (2025, Fall). Development of an APEX-Metamodel Integrated Framework for Simulating Agricultural Nutrient Discharge under Future Climate Change. Korean Society of Agricultural Engineers (KSAE) Conference, Jeju, Oct 31, Poster.

2. **Seungwon Seok**, Hajong Kim, Jaeyoung Jung, Miso Kim, Eunsu Jang, Solhee Kim, Taegon Kim. (2025, Summer). Development of Machine Learning-Based APEX Meta-Model for Assessing Agricultural Nutrient Loss in South Korea. Korean Society of Soil Science and Fertilizer (KSSSF) Conference, Geoje (Sono Calm), Aug 27–29, Poster.

3. **Seungwon Seok**, Boseong Seo, Solhee Kim, Siwon Yoon, Taegon Kim. (2025, Summer). Decision Support System for Optimizing Greenhouse Heating Strategies in South Korea. International Conference on Resource Sustainability (icRS), Adelaide, Australia, Jul 16–18, Oral.

4. **Seungwon Seok**, Jaeyoung Jung, Solhee Kim, Taegon Kim. (2025, Summer). Analysis of Winter Sunshine Hour Deficiency Status in Korea and Its Effects on Greenhouse Horticultural Crops. GreenSys International Symposium, Almería, Spain, Jun 23–26, Poster.

5. **Seungwon Seok**, Taegon Kim, Solhee Kim, Jaeyoung Jung, Heewon Yang, Miso Kim. (2025, Spring). Analysis of Short-Term Solar Irradiance Forecasting Models Using All-Sky Images and Domestic Weather Forecast Data. Korean Society for Horticultural Science (KSHS) Conference, Gyeongju HICO, May 21–23, Poster.

6. **Seungwon Seok**, Solhee Kim, Taegon Kim. (2025, Spring). Quantitative Assessment of Low Radiation Conditions in Korea through Analysis of Solar Radiation and Sunshine Duration. Korean Society for Bio-Environment Control (KSBEC) Conference, Korea Univ., Apr 17–18, Poster.

7. **Seungwon Seok**, Solhee Kim, Taegon Kim. (2024, Fall). Optimization of Phenological Parameters and Simulation of Growth Stages for Major Wheat Varieties in Korea Using the APSIM Model. Korean Meteorological Society for Agricultural Environment (KMSAE) Conference, Jeju, Dec 5–6, Poster.

8. **Seungwon Seok**, Hyejin Jeon, Heewon Yang, Jaeyoung Jung, Da-Eun Ha, Solhee Kim, Taegon Kim. (2024, Fall). Development of a Kale Leaf Growth Model Using Growing Degree Days

(GDD) and the Beta Distribution Function. Korean Society for Horticultural Science (KSHS) Conference, Changwon, May 29–Jun 1, Poster.

9. **Seungwon Seok**, Hyejin Jeon, Jaeyoung Jung, Heewon Yang, Da-Eun Ha, Miso Kim, Siwon Yoon, Solhee Kim, Taegon Kim. (2024, Fall). Development of a Greenhouse Heating Load Estimation Model Using Solar Radiation and Temperature Forecast Data. Korean Society for Bio-Environment Control (KSBEC) Conference, Iksan (Wonkwang Univ.), Oct 17–18, Poster.

10. **Seungwon Seok**, Hyejin Jeon, Jaeyoung Jung, Da-Eun Ha, Heewon Yang, Miso Kim. (2024, Fall). Development of a Greenhouse Environmental Monitoring and Management System for Winter Paddy Field Potato Double Cropping. Korean Society of Agricultural Engineers (KSAE) Conference, Danyang, Oct 30–Nov 1, Idea Competition.

11. **Seungwon Seok**, Hyejin Jeon, Jaeyoung Jung, Da-Eun Ha, Heewon Yang, Miso Kim, Solhee Kim, Taegon Kim. (2024, Fall). Simulation of Nitrogen Leaching in Farmland Based on Management Practices and Environmental Factors Using APSIM. Korean Society of Agricultural Engineers (KSAE) Conference, Danyang, Oct 30–Nov 1, Poster.

12. **Seungwon Seok**, Hyejin Jeon, Jaeyoung Jung, Da-Eun Ha, Heewon Yang, Miso Kim, Yunkyung Oh, Solhee Kim, Taegon Kim. (2024, Fall). Development of a YOLO v10-Based Model for Detection and Quantification of Solar Power Plants Using Satellite Imagery. Korean Society of Agricultural Engineers (KSAE) Conference, Danyang, Oct 30–Nov 1, Poster.

13. **Seungwon Seok**, Hyejin Jeon, Heewon Yang, Da-Eun Ha, Jaeyoung Jung, Solhee Kim, Taegon Kim. (2024, Spring). Development of a Kale Leaf Growth Model Using Growing Degree Days (GDD) and the Beta Distribution Function. Korean Society for Horticultural Science (KSHS) Conference, Pyeongchang, May 29–Jun 1, Poster.

14. **Seungwon Seok**, Solhee Kim, Taegon Kim. (2024, Spring). Implications of Sowing Dates and Cultivars Selection based on APSIM with Decision Support for Successful Wheat Production in South Korea. International Commission of Agricultural and Biosystems Engineering (CIGR) Conference, Jeju, May 19–23, Poster.

15. **Seungwon Seok**, Hyejin Jeon, Da-Eun Ha, Heewon Yang, Jaeyoung Jung, Solhee Kim, Taegon Kim. (2024, Spring). Analysis of Crop Production through Process-Based Models Based on Meteorological Factors at a National Scale. Korean Society for Bio-Environment Control (KSBEC) Conference, Andong, Apr 25–26, Poster.

16. **Seungwon Seok**, Solhee Kim, Taegon Kim. (2023, Fall). Development of Decision Support System for Water Management of Wheat Production in Paddy Field using APSIM-Wheat. International Society of Paddy and Water Environment Engineering (PAWEES) International Conference, Busan (Haeundae), Oct 23–25, Poster.

17. **Seungwon Seok**, Solhee Kim, Taegon Kim. (2023, Fall). Estimation of Wheat Yield driven by Cultivation Environments: A Scenario Analysis using the APSIM Model. Korean Society of Agricultural Engineers (KSAE) Conference, Tongyeong, Oct 5–6, Poster.

18. **Seungwon Seok**, Jaeyoung Jung, Hyejin Jeon, Solhee Kim, Taegon Kim. (2023, Fall). Development of Web-Based Decision Support System for Wheat Cultivation using Process-Based Crop Model and NDVI. Korean Society for Bio-Environment Control (KSBEC) Conference, Seoul Nat'l Univ. Siheung Campus, Sep 21–22, Poster.

19. **Seungwon Seok**, Da-Eun Ha, Heewon Yang, Hyejin Jeon, Solhee Kim, Taeyoung Shin, Taegon Kim. (2023, Fall). Pest Identification and Instance Detection Using Deep Learning Technology. Korean Society for Horticultural Science (KSHS) Conference, Gunsan (Saemangeum), Oct 19–20, Poster.

20. **Seungwon Seok**, Taegon Kim. (2023, Spring). Development of Leaf Length Distribution and Leaf Area Index (LAI) Prediction Model for Kale (Brassica oleracea L.). Korean Society for Horticultural Science (KSHS) Conference, Daejeon, May 25–26, Poster.

21. **Seungwon Seok**, Da-Eun Ha, Taegon Kim. (2023, Spring). Estimation of Kale (Brassica oleracea L.) Leaf Appearance Based on Temperature. Korean Society for Bio-Environment Control (KSBEC) Conference, Buyeo, Apr 20–21, Poster.

22. **Seungwon Seok**, Jaeyoung Jung, Hyejin Jeon, Taegon Kim. (2023, Spring). Prediction and Analysis of Wheat Yield by Crop Models in Korea. Korean Society for Bio-Environment Control (KSBEC) Conference, Buyeo, Apr 20–21, Poster.

23. **Seungwon Seok**, Hyejin Jeon, Taegon Kim. (2022, Fall). Development of Sorting Model and Prototypes using Deep Learning Technology: Bell Pepper Cases. Korean Society for Horticultural Science (KSHS) Conference, Jeju, Nov 2–5, Poster.

24. **Seungwon Seok**, Taegon Kim. (2022, Fall). Implementation and Application of a PBM-based Lettuce Growth Model using Python. Korean Society for Bio-Environment Control (KSBEC) Conference, Daejeon, Oct 27–28, Poster.

25. **Seungwon Seok**, Taegon Kim. (2022, Fall). Deep Learning Model Comparison and Development of Sorting Prototypes: Bell Pepper Sorting Cases. Korean Society of Agricultural Engineers (KSAE) Conference, Daegu, Oct 13–14, Poster.

Research Interests

- **Process-Based Crop Modeling (PBM) for simulating crop growth, physiology**
- Deep Learning (Computer Vision) and Machine Learning
- Agricultural Data Processing and Visualization
- Greenhouse Operation and Energy Balance Simulation
- Geospatial Data Utilization for spatial analysis in agricultural systems

Research Experience

Development of Standard Cultivation Technology for Enhancing Photosynthetic Efficiency in Response to Insufficient Solar Radiation
Rural Development Administration (RDA), Republic of Korea, Project No. RS-2025-02303401, **Research Associate** — 2025 - present
- Development of a Short-Term Solar Radiation Prediction Model Using All-Sky Images and Deep Learning

Development of impact, vulnerability assessment and adaptation technology for agricultural nutrient runoff, water quality under changes in climate and cropping system
Rural Development Administration (RDA), Republic of Korea, Project No. RS-2024-00396736, **Research Associate** — 2024 - present
- Assessment of Nutrient Discharge Vulnerability in South Korea under Future Climate Scenarios Using the APEX Meta-model

Application of Remote Sensing and Crop Modeling to Advance Monitoring of Crop Conditions and Related Information Systems in Major Global Grain Areas
Rural Development Administration (RDA), Republic of Korea, roject No. RS-2024-00397146, **Research Assistant** — 2024 - present
- Development of a Crop Yield Reporting System Integrating Satellite Imagery and Process-Based Crop Models

Advancement of fertilizer and water recommendation program for upland crops
Rural Development Administration (RDA), Republic of Korea Project, No. RS-2023-00220014, **Research Assistant** — 2025 - present
- Implementation of a Water Prescription Module for the Heuktoram System Using a Process-Based Crop Model

Development of advanced analysis of drought for upland crops and assessing the variability of moisture conditions based on effective soil moisture
Rural Development Administration (RDA), Republic of Korea, Project No. 017048, **Research Assistant** — 2022 - 2024
- Simulation of Wheat Productivity by Integrating the APSIM Model with Drone Imagery

Development of Crop Model using Machine Learning for Utilizing the Korean Agriculture and Forestry Satellite
National Research Foundation of Korea (NRF), Project No. PJ017048, **Research Assistant** — 2022 - 2024
- Development of a Process-Based Model for Leaf Area of Kale
- Comparative Analysis Using Process-Based Models (APSIM, DSSAT, DNDC, and AquaCrop)

Software Copyrights / Registrations

AgField-YOLO-SAM (C-2025-011577) — Mar. 2025
Developed an AI-based boundary extraction software utilizing the YOLO and SAM algorithms for automatic delineation of agricultural fields from drone imagery.

Academic Activities

- The Korean Society for Agricultural and Forest Meteorology (KSAFM) - Member 2024 - present
- The Korean Society of Soil Science and Fertilizer (KSSSF) - Member 2024 - present
- The Korean Society of Agricultural Engineers (KSAE) - Member 2022 - present
- The Korean Society for Horticultural Science (KSHS) - Member 2022 - present
- The Korean Society for Bio-Environment Control (KSBEC) - Member 2022 - present