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Sustainable Technology and the Built Environment
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ACADEMIC APPOINTMENTS

- 2021-Present **Appalachian State University**, Boone, North Carolina, USA
Professor and Department Chairperson
- 2016-2021 **Appalachian State University**, Boone, North Carolina, USA
Associate Professor and Assistant Department Chairperson
- 2010-2016 **Appalachian State University**, Boone, North Carolina, USA
Assistant Professor, Building Science Program
- 2009-2010 **Texas A&M University**, College Station, Texas, USA
Postdoctoral Research Associate, Zachry Department of Civil Engineering

EDUCATION

- 2006-2009 **Texas A&M University**, College Station, Texas, USA
Ph.D., Zachry Department of Civil Engineering, May 2009
Dissertation: "Systems Approach and Quantitative Decision Tools for Technology Selection in Environmentally Friendly Drilling"
Advisors: Jean-Louis Briaud (Chair), Seth Guikema, David Burnett, and Roy Hann
- 2003-2005 **Texas A&M University**, College Station, Texas, USA
M.S., Department of Construction Science, December 2005
Area: Construction Management / Building Information Modelling (BIM)
Advisor: Dr. Julian H. Kang
- 1992-1999 **KonKuk University**, Seoul, Korea
B.S., Department of Civil Engineering, February 1999

RESEARCH / TEACHING INTERESTS

- Emerging Technologies in Construction:
 - UAV technology (e.g., thermal infrared remote sensing in building energy performance analysis, bridge scour and [soil erosion monitoring](#), construction surveying)
 - Construction visualization (BIM, digital twin), Building energy modeling
- Infrastructure Sustainability:
 - Remote structural health monitoring
 - Natural hazard mitigation (i.e., Early warning systems)
- Risk and Decision Analysis for Project Management

- Sustainable Energy System Development:
 - Integrated greenhouse heating system (e.g., root zone heating)
 - Biochar applications (e.g., soil amendment, building material)
 - Geothermal system

FUNDED RESEARCH EXPERIENCES

[Appalachian State University] (Total Amount = \$1,981,767; PI = \$586,023)

- 2023-2026 **Optimization of Hybrid Mass Timber Structure for Carbon Positive Affordable Housing**
Role: *Co-Principal Investigator*
Sponsor: Wood Innovations Grants, USDA Natural Resources and Environment (NRE) Forest Service (\$299,986 awarded)
Investigators: Sadoughi, A. (PI)
- 2022-2024 **Demonstrating the Capabilities of UAS Topobathymetric LiDAR Mapping in Support of DOT Project Planning, Monitoring and Modeling**
Role: *Principal Investigator - AppState Portion*
Sponsor: North Carolina Department of Transportation (AppState received \$121,897 of the total \$326,838 awarded)
Investigators: Pricope, N. (PI at UNCW), Shu, S., and Schoonover, C.
- 2022-2024 **Promoting Integrated On-Farm Bioenergy Technologies**
Role: *Co-Principal Investigator*
Sponsor: Bioenergy Research Initiative Program, NC Department of Agriculture and Consumer Services (\$76,396 awarded)
Investigators: Ferrell, J. (PI), Kim, H., and Gamble, K.
- 2021-2022 **Use of UAV-Based Thermal Infrared Remote Sensing in Building Energy Performance Analysis (Phase I and II)**
Role: *Principal Investigator*
Sponsor: Appalachian Energy Center (\$9,998 awarded)
Investigators: Liu, F., Shu, S., and Schoonover, C.
- 2021-2022 **UAV-Based Soil Erosion Monitoring for the Removal of Ward’s Mill Dam**
Role: *Co-Principal Investigator*
Sponsor: Chancellor’s Innovation Scholars Program, Appalachian State University (\$9,984 awarded)
Investigators: Shu, S. (PI), and Liu, F.
- 2021-2022 **High Tunnel Greenhouse Energy Efficiency Study by Improving Surface and Ground Insulation and Ventilation at Nexus Greenhouse (Phase I and II)**
Role: *Co-Principal Investigator*
Sponsor: Appalachian Energy Center (\$8,750 awarded)
Investigators: Kim, H. (PI) and Ferrell, J.

- 2020-2022 **Biochar with Anaerobic Digestion: Enhancing Crops, Phase II**
Role: *Co-Principal Investigator*
Sponsor: Bioenergy Research Initiative Program, NC Department of Agriculture and Consumer Services (\$80,738 awarded)
Investigators: Houser, J. (PI), Ferrell, J., and Kim, H.
- 2020-2021 **Earth-Air Heat Exchanger Systems for High Tunnel Greenhouses in Southern Appalachia**
Role: *Principal Investigator*
Sponsor: CONCERT Grant, Research Institute for Environment, Energy and Economics (RIEEE), Appalachian State University (\$ 6,366 awarded)
Investigators: Kim, H. and Ferrell, J.
- 2020 **UAV-Based Soil Erosion Monitoring and Assessment**
Role: *Co-Principal Investigator*
Sponsor: CONCERT Grant, Research Institute for Environment, Energy and Economics (RIEEE), Appalachian State University (\$ 4,896 awarded)
Investigators: Liu, F. (PI) and Shu, S.
- 2019 **Root Zone Heating System and Lighting System Installation for Future Research and Demonstration at NEXUS Facility**
Role: *Principal Investigator*
Sponsor: CONCERT Grant, Research Institute for Environment, Energy and Economics (RIEEE), Appalachian State University (\$ 5,000 awarded)
Investigators: Ferrell, J. and Kim, H.
- 2018-2020 **Biochar with Anaerobic Digestion: Enhancing Crops, Phase I**
Role: *Principal Investigator*
Sponsor: Bioenergy Research Initiative Program, NC Department of Agriculture and Consumer Services (\$98,599 awarded)
Investigators: Ferrell, J., Houser, J., Doll, S., and Kim, H.
- 2018-2020 **Development of Multi-Physics Analysis Methodology and Field Verification to Assess Interactions between Shallow-Depth Geothermal Energy System and Ground**
Role: *Advisory Committee*
Sponsor: National Research Foundation of Korea (\$336,000 awarded)
Investigators: Yune, C. (PI) and Woo, S
- 2018-2019 **Soil Erosion Monitoring Using Unmanned Aerial Vehicle (UAV) Technology**
Role: *Co-Principal Investigator*
Sponsor: University Research Council (\$4,996 awarded)
Investigators: Liu, F. (PI)
- 2018-2019 **Demonstration of Root Zone Heating Supported by the Developed Biomass Greenhouse Heating System**
Role: *Principal Investigator*

Sponsor: On-Farm Research Grant, Southern Sustainable Agriculture Research & Education, USDA (\$14,883 awarded)
Investigators: Ferrell, J. and Kim, H.

2017-2018 **Thermal Testing of Roxul Insulation**

Role: *Investigator*

Sponsor: Hall Architects (\$22,500 awarded)

Investigators: Tiller, J. (PI), Ramsdell, J., Raichle, B., and Perry, C.

2017-2018 **Demonstration of Root Zone Heating Supported by the Developed Biomass Greenhouse Heating System at Local Cooperative Farms**

Role: *Principal Investigator*

Sponsor: Chancellor's Innovation Scholars Program, Appalachian State University (\$10,000 awarded)

Investigators: Ferrell, J. and Kim, H.

2017-2018 **Demonstrating Syngas Production from BioEnergy Crops**

Role: *Co-Principal Investigator*

Sponsor: Bioenergy Research Initiative Program, NC Department of Agriculture and Consumer Services (\$97,231 awarded)

Investigators: Ferrell, J. (PI), Houser, J., and Hamburger, M.

2016-2017 **Promoting Biomass Greenhouse Heating Systems**

Role: *Principal Investigator*

[[webpage](#)]

- Implemented biomass heating technologies to cooperative farms.

Sponsor: Bioenergy Research Initiative Program, NC Department of Agriculture and Consumer Services (\$85,343 awarded)

Investigators: Ferrell, J.

2016 **NEXUS: University-based Multidisciplinary Research Site in Service to Local Community**

Role: *Principal Investigator*

- Conducted combustion and emission analysis for a biochar-maker at Nexus.

Sponsor: CONCERT Grant, Research Institute for Environment, Energy and Economics (RIEEE), Appalachian State University (\$ 4,328 awarded)

Investigators: Ferrell, J. and Kim, H.

2015-2017 **P3 Awards: Integration of Biomass Greenhouse Heating Systems**

Role: *Principal Investigator*

- Integrated heating technologies into greenhouse heating system.

Sponsor: Environmental Protection Agency (Phase II, \$74,553 awarded)

Investigators: Ferrell, J., Domermuth, D., Houser, J., and Oh, S.

2015-2016 **Biomass Greenhouse Heating Systems for Resource-Limited Farmers**

Role: *Principal Investigator*

- Developed and refined biomass greenhouse heating systems.

Sponsor: Bioenergy Research Initiative Program, NC Department of Agriculture and Consumer Services (\$83,150 awarded)
Investigators: Domermuth, D. and Houser, J.

2015

Greening North Carolina's Jail System

Role: *Principal Investigator*

- Installed an energy monitoring system to the Caldwell County Jail, NC to predict facility energy consumption.

Sponsor: Appalachian Energy Center (\$4,000 awarded)

Investigators: Holcomb, J. and Tiller, J.

2015

Real-time Landfill Gas Monitoring System

Role: *Co-Principal Investigator*

- Developed and installed a remote landfill gas monitoring system using Modbus TCP/IP protocol at Wilkes County Landfill, NC.

Sponsor: Appalachian Energy Center (\$3,000 awarded)

Investigators: Raichle B. (PI) and Peralion, J.

2014-2016

Greening North Carolina's Jail and Detention Facilities

Role: *Principal Investigator*

Sponsor: Graduate Research Associate Mentoring Program, Cratis D. Williams School of Graduate Studies, Appalachian State University (\$24,000 awarded)

Investigators: Holcomb, J. and Tiller, J.

2014-2015

P3 Awards: Biomass Greenhouse-Heating Systems to Extend Growing Seasons for Resource-Limited Farmers

Role: *Principal Investigator*

- Developed biomass greenhouse heating systems to extend growing seasons.

Sponsor: Environmental Protection Agency (Phase I, \$14,806 awarded)

Investigators: Domermuth, D. and Houser, J.

2014

Biomass Manufacturing Facility Development

Role: *Principal Investigator*

- Conducted research regarding the business potential of new development of a bio-burner.

Sponsor: Mitchell County Economic Development Commission (\$5,000 awarded)

Investigators: Domermuth, D. and McCurry, C.

2013-2015

IDEXlab: Integrative Design Experience Laboratory (TUES Grant)

Role: *Co-Principal Investigator*

- Developed project-based integrative Design Experience Laboratory (IDEXlab).

Sponsor: National Science Foundation (\$199,741 awarded)

Investigators: Everhart, C. (PI), Russell, J., Debelius, C., and Ramsdell, J.

2013-2014

Implementation of the ASU BV System to Convert Biomass to Useful Products and Biofuel

Role: *Co-Principal Investigator*

- Developed and implemented the ASU BV system.
- Sponsor: TVA Ag & Forestry Fund, NC Department of Agriculture and Consumer Services (\$45,000 awarded)
Investigators: Domermuth, D. (PI)

2013 **Greening North Carolina's Jail System**

Role: *Principal Investigator*

- Installed an energy monitoring system to the Watauga County Jail, NC.
- Sponsor: Appalachian Energy Center (\$2,100 awarded)
Investigators: Holcomb, J. and Russell, J.

2012-2013 **Greening NC's Prison System: An Interdisciplinary Investigation**

Role: *Co-Principal Investigator*

- Developed a decision-making tool to support optimized capital investment in sustainable project planning.
- Sponsor: University Research Council, Appalachian State University (\$1,585 awarded)
Investigators: Holcomb, J. (PI) and Russell, J.

2012-2013 **Real-time Monitoring of Landfill Gas Using Remote Monitoring Technology**

Role: *Principal Investigator*

[[webpage](#)]

- Developed a landfill gas monitoring and controlling unit.
- Sponsor: University Research Council / Department of Technology and Environmental Design, Appalachian State University (\$11,500 awarded)

2010-2012 **Real-time Structural Health Monitoring System for Buildings**

Role: *Principal Investigator*

[[webpage](#)]

- Developed a web-based real-time building health monitoring system.
- Sponsor: Department of Technology and Environmental Design, Appalachian State University (\$10,500 awarded)

[Texas A&M University]

2009-2010 **Environmentally Friendly Drilling (EFD) Systems (Phase II)**

Role: *Post-Doctoral Research Associate*, Texas A&M University

- Developed a Web-Based Decision Optimization Tool (Causal approach) for system selection in EFD.
- Sponsor: Research Partnership to Secure Energy for America (\$2.7M awarded)
Investigators: Haut, R. (PI), Burnett, D., and Medina-Cetina, Z.

2009-2010 **Real-time Monitoring of Scour Events Using Remote Monitoring Technology**

Role: *Post-Doctoral Research Associate*, Texas A&M University

- Developed a Web-Based Bridge Scour Monitoring System.
- Sponsor: Texas Department of Transportation (\$375,733 awarded)
Investigators: Briaud, J.-L. (PI), Hurlebaus, S., and Chang, K.

- 2006-2009 **Environmentally Friendly Drilling (EFD) Systems (Phase I)**
Role: *Research Assistant*, Texas A&M University
- Designed deep foundations with elevated platform for onshore EFD and performed a parametric study for the feasibility of using composite mats.
- Sponsor: U.S. Department of Energy (\$2.4M awarded)
Investigators: Haut, R. (PI), Burnett, D., and Briaud, J.-L.
- 2004-2005 **Web-Based Bridge Design Support System (WBDSS)**
Role: *Research Assistant*, Texas A&M University
- Developed a Web-Based Bridge Design Support System and evaluated its commercial potential.
- Sponsor: Ministry of Construction and Transportation of the Korean Government (\$450,000 awarded)
Investigators: Lho, B. (PI) and Kang, J.

PROFESSIONAL INDUSTRY EXPERIENCES

- 2000-2003 **Daehan Consultants Co., Ltd.**, Seoul, Korea
Bridge and Tunnel Design Engineer, Structural Division
- Performed numerical analysis (2D, 3D) for "Jookryung Tunnel Master Plan & Layout" project: Jookryung Tunnel is one of the longest road tunnels in Korea (4.5 km).
 - Performed static and dynamic structural analysis of tunnels for "Jeonju~Hamyang Highway (Sect.10)" project.
 - Performed numerical analysis (2D, 3D) for "Gumga Bridge Alternative Design Competition" project: steel arch bridge (800 m).
- 1998-2000 **Dongshin Engineering & Development Co., Ltd.**, Seoul, Korea
Structural Engineer, Structural Division
- Performed static structural analysis of bridges, generated drawings using AutoCAD, and prepared engineering reports including estimated bill of quantities for "Hampyung~Hampyung I.C. Extension & Paving Layout" project.

MILITARY SERVICE

- 1993-1996 *Sergeant*, **Ministry of National Defense**, Seoul, Korea

LICENSES AND CERTIFICATES

- FAA Part 107 Remote Pilot (No. 4235691), 2019.
- Professional Engineer (No. 041698), North Carolina, 2014.
- Professional Engineer (No. 105221), Texas, 2009 (surrendered).
- Certificate In Business, Mays Business School, Texas A&M University, 2008.
- Engineer-In-Training (EIT), Texas, 2007.
- EIT, Korea, 1998.
- Construction Safety Certificate, Korea, 1998.

HONORS AND AWARDS

- Outstanding Scholarship/Creative Activity Award, Appalachian State University, 2016.
- The U.S. Environmental Protection Agency P3 Award, 2015.
- Korean American Scholarship Foundation Award, 2008.
- Korean Honor Scholarship, 2008.
- Oscar T. Trevino Endowed Scholarship, 2005.
- Construction Industry Advisory Council Scholarship, 2004.
- Excellent Research Proposal Award, 2004.
- O.N. Mitchell, Junior, Endowed Graduate Fellowship, 2003.
- Academic Excellence Scholarship, 1997 and 1998.
- Merit Scholarship, 1992.

PROFESSIONAL AFFILIATIONS

- Member, North Carolina Board of Professional Engineers
- Member, Korean-American Construction Engineering and Project Management Association
- Member, International Biochar Initiative
- Expert Member, The Global Network of Korean Scientists & Engineers (KOSEN)
- Member, Korean-American Scientists and Engineer Association (KSEA)

PUBLICATIONS (* denotes a student)

[Refereed Journal Articles]

1. Kim, H., **Yu, O.-Y.**, and Ferrell, J. (2024). "Case Study: Reducing Heating Energy Consumption in a High Tunnel Greenhouse with Renewable Energy and Microclimate Control by Bench-top Root-zone Heating, Bench Covers, and Under-bench Insulation," *Discover Sustainability*, 5 (1), [1-14](#).
2. Oan, A., **Yu, O.-Y.**, and Elrefaei, A. (2024). "The Influence of Using Cattle Bone Ash and Waste Glass Powder of Mortar and Concrete Compressive Strength," *ERJ. Engineering Research Journal*, 47 (1), [123-129](#).
3. Shu, S., **Yu, O.-Y.**, Schoonover, C., Liu, H., and Yang, B. (2023). "UAV-based Structure from Motion Technique for Precise Snow Depth Retrieval – Implication for Optimal GCP Deployment Strategy," *Remote Sensing*, 15 (9), [2297](#).
4. Ferrell, J., **Yu, O.-Y.**, and Kim, H. (2020). "Case study: Promoting Sustainable Energy Greenhouse Heating Systems to Local Farms," *Journal of Agricultural Science and Technology A*, 10, [165-180](#).
5. **Yu, O.-Y.**, Harper, M.*, Hoepfl, M., and Domermuth, D. (2017). "Characterization of Biochar and its Effects on the Water Holding Capacity of Loamy Sand Soil: Comparison of Hemlock Biochar and Switchblade grass Biochar Characteristics," *Environmental Progress and Sustainable Energy*, 36 (5), [1474-1479](#).
6. **Yu, O.-Y.** and Moore, S.* (2015). "A Case Study for the Effectiveness of Solar Powered Attic Ventilation Fans," *Energy Efficiency*, 8 (4), [691-698](#).
7. **Yu, O.-Y.**, Raichle, B., and Sink, S.* (2013). "Impact of Biochar on the Water Holding Capacity of Loamy Sand Soil," *International Journal of Energy and Environmental Engineering*, [4:44](#).

8. **Yu, O.-Y.**, Guikema, S., Briaud, J.-L., and Burnett, D. (2012). "Sensitivity Analysis for Multi-Attribute System Selection in Onshore Environmentally Friendly Drilling (EFD)," *Systems Engineering*, 15 (2), [153-171](#).
9. **Yu, O.-Y.**, Medina-Cetina, Z., Guikema, S., Briaud, J.-L., and Burnett, D. (2012). "Integrated Approach for the Optimal Selection of Environmentally Friendly Drilling Systems," *International Journal of Energy and Environmental Engineering*, [3:25](#).
10. **Yu, O.-Y.**, Guikema, S., Briaud, J.-L., and Burnett, D. (2011). "Quantitative Decision Tools for System Selection in Environmentally Friendly Drilling," *Civil Engineering and Environmental Systems*, 28 (3), [185-208](#).
11. Kang, J., Lho, B., Kim, J., and **Yu, O.-Y.** "Design Automation and Sustainable Drawing Management on the Web using ASP, XML and SVG," *Journal of Computing in Civil Engineering*, ASCE (accepted as technical note).

[Peer-Reviewed Conference Proceedings]

1. **Yu, O.-Y.**, Ferrell, J., Kim, H., and Houser, J. (2018). "NEXUS: Integrated Sustainable Energy for Enhancing Farm Productivity," *International Conference on New Energy and Future Energy System (FES1747)*, Shanghai, China.
2. **Yu, O.-Y.**, Roxby, E.*, Tiller, J., and Holcomb, J. (2015). "Energy Modeling for Jails and Detention Facilities," *2015 ASHRAE Annual Conference (#AT-15-C011)*, Atlanta, GA, USA.
3. Kim, H.*, **Yu, O.-Y.**, Hoyle, J., Houser, J., Ramsdell, J., and Hoepfl, M. (2014). "Decision-Making in the Selection of Food Waste Diversion Systems by Life Cycle Assessment and Cost Benefit Analysis," *The Fourth Annual Asian Conference on Sustainability, Energy and the Environment (#0089)*, Osaka, Japan.
4. Domermuth, D., **Yu, O.-Y.**, Houser, J., Smith, A.*, and Harper, M.* (2014). "Nexus," *American Society for Engineering Education Southeast Section Conference*, Macon, GA, USA.
5. **Yu, O.-Y.** and Moore, S.* (2013). "Real-time Structural Health Monitoring of Live Loads on a Flat Commercial Roof," *SPIE Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring (#8695-8)*, San Diego, CA, USA.
6. **Yu, O.-Y.** and Medina-Cetina, Z. (2012). "Best Selection of Oil and Gas Environmentally Friendly Drilling Systems Using Bayesian Decision Networks," *Rina Conference, ICSOT: Developments in Fixed & Floating Offshore Structures*, Pusan, Korea.
7. **Yu, O.-Y.**, Medina-Cetina, Z., and Briaud, J.-L. (2011). "Towards an Uncertainty-Based Design of Foundations for Onshore Oil and Gas Environmentally Friendly Drilling (EFD) Systems," *Geo-Frontiers 2011 (#1751)*, Dallas, TX, USA.
8. Al-Yami, A.*, Schubert, J., Medina-Cetina, Z., and **Yu, O.-Y.** (2010). "Development of Drilling Expert System for Designing and Applying Successful Cement Jobs," *IADC/SPE Asia Pacific Drilling Technology Conference and Exhibition (IADC/SPE 135183)*, Ho Chi Minh City, Vietnam.
9. Yao, C., Darby, C., **Yu, O.-Y.**, Briaud, J.-L. et al. (2010). "Scour Monitoring Development for Two Bridges in Texas," *International Conference on Scour and Erosion (ICSE)*, San Francisco, CA, USA.
10. Briaud, J.-L., Yao, C., Darby, C., **Yu, O.-Y.** et al. (2010). "Motion Sensors for Scour Monitoring: Laboratory Experiments and Numerical Simulations," *Transportation Research Board (TRB) 89th Annual Meeting*, Washington, D.C., USA.

11. **Yu, O.-Y.**, Medina-Cetina, Z., Briaud, J.-L., and Burnett, D. (2009). "Towards a Causal Probabilistic System Selection in Environmentally Friendly Drilling," *16th International Petroleum and Biofuels Environmental Conference*, Houston, TX, USA.
12. **Yu, O.-Y.**, Guikema, S., Bickel, E., Briaud, J.-L., and Burnett, D. (2009). "Systems Approach and Quantitative Decision Tools for Technology Selection in Environmentally Friendly Drilling," *SPE Americas E&P Environmental & Safety Conference (SPE 120848)*, San Antonio, TX, USA.
13. Burnett, D., **Yu, O.-Y.**, and Schubert, J. (2009). "Well Design for Environmentally Friendly Drilling System: Using a Graduate Student Drilling Class Team Challenge to Identify Options for Reducing Impacts," *SPE/IADC Conference and Exhibition (SPE/IADC 119297)*, Amsterdam, The Netherlands.
14. Yao, C., Darby, C., **Yu, O.-Y.**, Briaud, J.-L. et al. (2009). "Motion Sensors for Scour Monitoring: Laboratory Experiment with a Shallow Foundation," *GeoFlorida 2010*, West Palm Beach, FL, USA.
15. Darby, C., Yao, C., **Yu, O.-Y.**, Briaud, J.-L. et al. (2009). "Motion Sensors for Bridge Scour Monitoring: Preliminary laboratory and Field Experience," *Texas Section-American Society of Civil Engineers*, The Woodlands, TX, USA.
16. Lho, B., Kim, J., **Yu, O.-Y.**, and Kang, J. (2005). "Sustainable Design Automation and Management Using XML," *The 1st International Conference on Construction Engineering and Management (ICCEM)*, Seoul, Korea.

[Technical Reports]

1. **Yu, O.-Y.**, Ferrell, J., Houser, J., and Kim, H. (2021). "Biochar with Anaerobic Digestion: Enhancing Crops," *Bioenergy Research Initiative Grant Final Report*, North Carolina Department of Agriculture and Consumer Services.
2. **Yu, O.-Y.**, Ferrell, J., and Kim, H. (2020). "Demonstration of root zone heating supported by the developed biomass greenhouse heating system," *On-Farm Research Grant Final Report*, Southern Sustainable Agriculture Research & Education, USDA.
3. **Yu, O.-Y.**, Ferrell, J., Houser, J., and Kim, H. (2019). "Biomass Greenhouse-Heating Systems to Extend Growing Seasons for Resource-Limited Farmers," *EPA People, Prosperity & the Planet Grant Final Report*, US Environmental Protection Agency.
4. **Yu, O.-Y.**, Ferrell, J., and Kim, H. (2018). "Promoting biomass greenhouse heating systems," *Bioenergy Research Initiative Grant Final Report*, North Carolina Department of Agriculture and Consumer Services.
5. **Yu, O.-Y.**, Ferrell, J., Houser, J., and Kim, H. (2016). "Biomass greenhouse-heating systems for resource-limited farmers," *Bioenergy Research Initiative Grant Final Report*, North Carolina Department of Agriculture and Consumer Services.
6. Briaud, J.-L. and **Yu, O.-Y.** et al. (2011). "Real-time Monitoring of Bridge Scour Using Remote Monitoring Technology (Report 0-6060-1)," *Real-time Monitoring of Scour Event Using Remote Monitoring Technology Project*, Texas Department of Transportation.
7. **Yu, O.-Y.** and Briaud, J.-L. et al. (2007). "Environmentally Friendly Foundation System for Onshore Oil and Gas Drilling Platform," *Environmentally Friendly Drilling Systems Project*, GPRI.

8. **Yu, O.-Y.** (2005). "The Four Dimensional Visualization Tool for Developing Construction Schedule of a Typical Residential House in the United States," *Mitchell Fellowship Report*, Department of Construction Science, Texas A&M University.

PRESENTATIONS

[Invited Keynote Speaker]

1. "Welcome and Opening Remarks," *Thermodynamics 2.0| 2024 Conference*, Boone, NC, 5 August 2024.
2. "Update on Energy Efficiency in the US – Recent Trends on PV Development and Module Encapsulation," *2017 Green Energy Conference – Advanced Encapsulation Technology and Application of Photovoltaic Modules*, Taoyuan, Taiwan, 15 December 2017.

[Conference Presentation]

1. "Topo-Bathymetric Modeling of High-Gradient Mountain Streams Utilizing UAS Based Structure From Motion (SFM)," *2024 Association of American Geographers (AAG) Annual Meeting*, Honolulu, Hawaii, USA, 17 April 2024 (Poster).
2. "UAB-based Monitoring of Soil Erosion Induced by Dam Removal," *American Geophysical Union (AGU) 2023 Annual Meeting*, San Francisco, CA, USA, 13 December 2023 (Poster).
3. "UAV-Based Soil Erosion Monitoring for the Removal of Ward's Mill Dam, NC," *American Association of Geographers Annual Meeting*, 1 March 2022 (online).
4. "Ground Control Point Survey Strategy for Snow Depth Retrieval Using Drone-based Structure-from-Motion Photogrammetry," *American Geophysical Union Fall Meeting*, 16 December 2021 (Poster-online).
5. "Winterization & Automation of Greenhouse Grow Beds: Extending the Growing Season by Stabilizing Microclimates," *International Environmental Engineering Conference*, Busan, Korea, 12 December 2019.
6. "NEXUS: Integrated Sustainable Energy for Enhancing Farm Productivity," *International Conference on New Energy and Future Energy System*, Shanghai, China, 23 August 2018.
7. "The Effects of Biochar as a Soil Amendment on Soil Quality and Plant Growth: A Study for the North Carolina High County," *Biochar: Production, Characterization and Applications, Engineering Conferences International*, Alba, Italy, 24 August 2017.
8. "NEXUS," *EPA P3 National Sustainable Design Expo*, Washington DC, 14-17 May 2017 (Poster).
9. "Characteristics Comparison of Two Different Types of biochar obtained from a Small-scale Biochar Production System," *Asia Pacific Biochar Conference 2016*, Chuncheon, Korea, 22 October 2016.
10. "A Low-Cost Remote Monitoring System Using Arduino and ModBus TCP," *2016 AASHE Conference & Expo*, Baltimore, MD, USA, 10 October 2016 (Poster).
11. "Local Farmers, Season Extension, and Technology transfer: Experiences from the "Nexus" Greenhouse project at Appalachian State," *2016 AASHE Conference & Expo*, Baltimore, MD, USA, 10 October 2016 (Poster).

12. "Energy Efficiency in Jails and Secure Detention Facilities," *2016 NC State Energy Conference*, Raleigh, NC, USA, 21 April 2016.
13. "NEXUS: Demonstration site for biomass greenhouse-heating systems to extend growing seasons for resource-limited farmers," *2015 AASHE Conference & Expo*, Minneapolis, MN, USA, 26 October 2015 (Co-Author).
14. "Identification of Potential Benefits of Using Energy Modeling by Comparing Two Campus Buildings," *ASHRAE Energy Modeling Conference*, Atlanta, GA, USA, 2 October 2015.
15. "Energy Modeling for Jails and Detention Facilities," *2015 ASHRAE Annual Conference*, Atlanta, GA, USA, 28 June 2015.
16. "Decision-Making in the Selection of Food Waste Diversion Systems by Life Cycle Assessment and Cost Benefit Analysis," *The Fourth Annual Asian Conference on Sustainability, Energy and the Environment*, Osaka, Japan, 13 June 2014.
17. "The Effect of Atmospheric Conditions on the Performance of a Landfill Gas Collection," *Solid Waste Association of North America - NC Chapter Spring Conference*, Raleigh, NC, USA, 9 April 2014.
18. "Real-time Structural Health Monitoring of Live Loads on a Flat Commercial Roof," *SPIE Smart Structures and Materials + Nondestructive Evaluation and Health Monitoring Conference*, San Diego, CA, USA, 11 March 2013.
19. "Reliability-based Design of Foundations for Oil and Gas Elevated Platforms," *Palisade Risk Conference*, Las Vegas, NV, USA, 7 November 2012.
20. "Best Selection of Oil and Gas Environmentally Friendly Drilling Systems Using Bayesian Decision Networks," *Rina Conference, ICSOT: Developments in Fixed & Floating Offshore Structures*, Pusan, Korea, 23 May 2012.
21. "Towards an Uncertainty-Based Design of Foundations for Onshore Oil and Gas Environmentally Friendly Drilling (EFD) Systems," *Geo-Frontiers*, Dallas, TX, USA, 15 March 2011.
22. "Towards a Risk-Based Environmentally Friendly Drilling System Selection," *16th International Petroleum and Biofuels Environmental Conference*, Houston, TX, USA, 4 November 2009.
23. "Systems Approach and Quantitative Decision Tools for Technology Selection in Environmentally Friendly Drilling," *SPE Americas E&P Environmental & Safety Conference*, San Antonio, TX, USA, 24 March 2009.
24. "Systems Approach for Technology Selection in Environmentally Friendly Drilling," *INFORMS Southwest Regional Conference*, College Station, TX, USA, 18 April 2008.

[Invited Speaker]

1. "NEXUS: Greenhouse Heating Systems for Season Extension," *Green Energy Research Center & Department of Electrical Engineering, Chien Hsin University of Science and Technology*, Taoyuan, Taiwan, 14 December 2017.
2. "NEXUS: Biomass Greenhouse Heating Systems for Season Extension," *Sustaining Collaborative Opportunities for Research & Education (SCORE) Cluster Series*, Boone, NC, USA, 20 September 2017.
3. "Greenhouse Heating Systems for Season Extension," *Bioenergy Research Initiative - Bioenergy Field Day*, Mills River, NC, USA, 13 September 2017.

4. "Biomass Greenhouse Heating System," *Department of Electrical Engineering, Chien Hsin University of Science and Technology*, Taoyuan, Taiwan, 20 May 2015.
5. "Introduction of Real-time Monitoring Research," *Department of Civil Engineering, Gangneung-Wonju National University*, Gangneung, Korea, 5 June 2012.
6. "What are Decision Tools for Technology Selection in Environmentally Friendly Drilling?," *School of Civil & Environmental Engineering, Pusan National University*, Pusan, Korea, 22 May 2012.
7. "Evolution of Decision Tools for Technology Selection in Environmentally Friendly Drilling (EFD)," *Research Partnership to Secure Energy for America (RPSEA) Project Workshop – Accessible Software Developed for Application to Unconventional Resources*, Houston, TX, USA, 30 June 2011.
8. "Systems Approach and Decision Optimization for Technology Selection in Environmentally Friendly Drilling," *Research Partnership to Secure Energy for America (RPSEA) Forum*, College Station, TX, USA, 30 May 2008.

TEACHING EXPERIENCES

[Appalachian State University]

Student evaluations are consistently above the departmental average.

- **Regularly Taught:**

BSC 3330: Materials and Structures III (3 credit hours): This course introduces basic behavior of substructures. Topics include but not limited to the engineering properties of soil, load tracing, and foundation design and construction. In addition to the substructures, this course introduces basic surveying principles.

BSC 2115: Surveying Methods (1 credit hour): The course includes classroom instruction as well as hands on instruction in the field from industry professionals utilizing state of the art industry tools and technology. Learn and understand how the use of the most advanced surveying equipment available today, in today's fast paced construction environment, allows the workflow to seamlessly move from the office to the field and back to the office. Industry professionals provide insight and hands-on training with Robotic Total Stations (e.g., Trimble software and hardware technology). This short course emphasizes how to increase production while minimizing re-work through the use of Building Information Modeling and Intelligent Layout.

BSC 1310: Materials and Structures I (3 credit hours): An in-depth introduction to the structure, characteristics, analysis, and real-world application of fundamental materials used in construction today, with an emphasis on the properties and performance interrelationship. Topics include but not limited to mechanical properties, strengthening mechanisms, and mix design of the most commonly used construction materials such as aggregates, concrete, asphalt, steel, masonry, etc.

BSC 3625: Construction Safety (2 credit hours): This course focuses on occupational safety and health in construction, adhering to OSHA standards. Students are required to complete the OSHA 30-Hour Construction Training through an OSHA-certified program and submit a certificate of completion.

- **Occasionally Taught:**

TEC 5530: Making Hard Decisions (3 credit hours – graduate course): This course is designed to provide tools, knowledge, and experience in modelling uncertainty in engineering management and policy problems. Examples are taken from different areas, including infrastructure, water resources, and energy (e.g., solar and wind power, biofuel, and electricity demand) modeling.

BSC 4900/4901: Internship (6 credit hours): This course is designed to provide a capstone experience in which students are able to apply knowledge and skills gained through course work, and to demonstrate their capacity to function successfully in a professional setting.

BSC 3630: Planning and Scheduling (3 credit hours)

TEC 4638: Contemporary Problems in Sustainable Technology (3 credit hours): This course is designed to provide students with an overview of contemporary problems facing the Sustainable Technology movement such as affordable and efficient alternative energy systems, small scale production systems, waste management and recycling, bioregional development, community and shelter design and technology transfer methodology.

TEC 4103: Leadership Technical Settings - Project Risk Management (3 credit hours): This course aims at developing an integrated probabilistic approach (risk assessment) to project organizational design and management. Note: For Building Science majors in Integrative Design Experience Laboratory (IDEXlab) cohort only.

TEC 3548: Architecture and Energy Efficiency in Korea (3 credit hours): This study abroad course is for students who are interested in learning historical architectural design and energy efficiency in Korea and Taiwan. The course explores to learn about historical architectural design in Asia and floor heating system technology and other energy efficient approaches to construction. Students will conduct initial research while at Appalachian State and complete their research project in Taiwan and Korea.

TEC 3531: Construction Management (3 credit hours): The National Association of Home Builders (NAHB) Student Chapters Residential Construction Management Competition is one of the highlights of the annual NAHB International Builders' Show. The competition gives students the opportunity to apply skills learned in the classroom to a real construction project by completing a management proposal. This course is for the preparation of the competition.

[Texas A&M University]

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|-------------|--|
| Fall 2009 | Registered for the Graduate Teaching Academy (GTA) <ul style="list-style-type: none"> • GTA is a graduate student-led organization supported by Texas A&M University. The mission is to provide professional development opportunities to equip participants in the area of college teaching. |
| Spring 2009 | Co-Instructor, CVEN 687: Foundation Engineering <ul style="list-style-type: none"> • Taught various design methods of shallow and deep foundations for different soil conditions. |
| 2008-2010 | Guest Lectures, PETE 661: Drilling Engineering (each spring semester) |

- Introduced and taught how to use the Web-Based Decision Optimization Tools for student's well site design term project.

Fall 2009 **Guest Lectures, CVEN 365: Introduction to Geotechnical Engineering**

- Taught soil consolidation theory (soil compressibility).

Spring 2008 **Guest Lectures, CVEN 687: Foundation Engineering**

- Taught various design methods of pile foundations (i.e., driven piles and drilled shafts) for different soil conditions (sand and clay).

STUDENT ADVISING

[M.S. Thesis]

1. Clayton Pope (December 2023), **Committee Member**, Thesis Title: "*Comparative Assessment of the Effects Biochar Particle Size Has on Microbial Activity*," Appalachian State University.
2. Summer Gee (December 2022), **Committee Member**, Thesis Title: "*Characterizing the Effects of Ventilation Fans, Double Glazing, And Automated Sidewall Roll Up System on A High Tunnel Greenhouse Microclimate in The High Country*," Appalachian State University.
3. Hyla Zouzias (December 2022), **Committee Member**, Thesis Title: "*Using FTIR Analysis to Examine Aging Susceptibility on Bio-Asphalts Modified by Black Soldier Fly Larvae Oil*," Appalachian State University.
4. Alex Gray (May 2022), **Committee Member**, Thesis Title: "*Characterizing Effects of Charged Biochar on Soil Quality and Plant Growth in Degraded North Carolina High Country Soils*," Appalachian State University.
5. Alexandra Lowrie (December 2017), **Committee Chair**, Thesis Title: "*Energy Modeling of Jails: A Case Study of Watauga County Detention Facility*," Appalachian State University.
6. Jared Sanborn (May 2017), **Committee Chair**, Thesis Title: "*The Effects of Biochar as a Soil Amendment on Soil Quality and Plant Growth*," Appalachian State University.
7. David Harrill (May 2014), **Committee Chair**, Thesis Title: "*Analysis of Changes in Landfill Gas Output and the Economic Potential for Development of a Landfill Gas Control Prototype*," Appalachian State University.

[M.S. Research Advisor]

1. Porter Dalton (May 2023)
2. Jacob Ekstrand (May 2022)
3. Jackson Sloan (May 2022)
4. Nicolai Solomon (May 2022)
5. Alex Christofalos (May 2021)
6. Austin Exford (December 2020)
7. Zack Howard (December 2020)
8. Aaron Bradshaw (May 2020)

9. Behnam Shokri (December 2019)
10. Jordan Holder (August 2019)
11. Gordon Miller (May 2019)
12. Aaron Wells (May 2019)
13. Jon Linck (May 2019)
14. Henry Mull (December 2018)
15. Devan Shumate (May 2018)
16. Barry Febos (May 2018)
17. Bahareh Shirkhanloo (December 2017)
18. Reid Anderson (May 2017)
19. Johnny O'Neal (December 2016)
20. Nathan Anderson (December 2016)
21. Pedro Franco (May 2016)
22. Chelsea Davis (May 2016)
23. Chris Schoonover (December 2015)
24. Alan Smith (May 2015)
25. Miranda Harper (December 2014).
26. Stacy Moore (May 2013).
27. Janet Miller (May 2012)

[Undergraduate/Graduate Mentor]

- Zack Howard, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$400, September 2020).
- Zack Howard, Alex Christofalos, Jasmine Garland, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$300/student, December 2019).
- Nick Woody and Aaron Bradshaw, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$300/student, December 2018).
- Bahareh Shirkhanloo, mentored for *Graduate Student Association Senate (GSAS) Travel Grant*, Cratis D. Williams School of Graduate Studies, Appalachian State University (Funded: \$278.50, October 2017).
- Jon Linck, Henry Mull, and Christian Houpe, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$300/student, September 2017).
- Mentored 7 undergraduate/graduate students (EPA P3 Expo participants) for *Travel Grant*, Office of Student Research, Appalachian State University (Funded: \$150/student, May 2017).
- Jared Sanborn, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$300, December 2016).

- Alex Hannum, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$300, December 2016).
- Johnny O'Neal, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$300, October 2016).
- Bahareh Shir Khanloo, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$300, October 2016).
- Christopher Schoonover, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$300, December 2015).
- Chelsea Davis, mentored for *Travel Grant*, Office of Student Research, Appalachian State University (Funded: \$500, October 2015).
- Alexandra Lowrie, mentored for *Travel Grant*, Office of Student Research, Appalachian State University (Funded: \$250, July 2015).
- Mentored 5 undergraduate/graduate students (EPA P3 Competition participants) for *Travel Grant*, Office of Student Research, Appalachian State University (Funded: \$150/student, February 2015).
- David Harrill, mentored for *Travel Grant*, Office of Student Research, Appalachian State University (Funded: \$225, March 2014).
- David Harrill, mentored for *Cratis D. Williams Graduate Student Research Grant*, Office of Student Research, Appalachian State University (Funded: \$500, September 2013).
- Laura McCree, mentored for *National Association of Home Builders (NAHB) Student Chapters Outstanding Student Award* (January 2013).
- Laura McCree and Austin Westmoreland, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$250/student, December 2012).
- Mentored 7 undergraduate students (Residential Construction Management Competition participants) for *Travel Grant*, Office of Student Research, Appalachian State University (Funded: \$200/student, December 2012).
- Stacy Moore, mentored for *Cratis D. Williams Graduate Student Research Grant*, Office of Student Research, Appalachian State University (Funded: \$500, September 2012).
- Laura Clark, mentored for *NAHB Student Chapters Outstanding Student Award* (February 2012).
- Levi Pritchett and Laura Clark, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$200/student, January 2012).
- Mentored 14 undergraduate students (Residential Construction Management Competition participants) for *Travel Grant*, Office of Student Research, Appalachian State University (Funded: \$100/student, January 2012).
- John Arnaud, mentored for *NAHB Student Chapters Outstanding Student Award* (January 2011).
- John Arnaud and Andrew Ferguson, mentored for *Research Grant*, Office of Student Research, Appalachian State University (Funded: \$350/student, December 2010).

- Mentored 13 undergraduate students (Residential Construction Management Competition participants) for *Travel Grant*, Office of Student Research, Appalachian State University (Funded: \$225/student, December 2010).
- Al Y. Abdullah, Ph.D. dissertation on *Development of a Drilling Expert System*, Texas A&M University, Co-advised with Professors Jerome Schubert and Zenon Medina-Cetina (May 2012).
- C. Steinmetz, Undergraduate research project on *Environmentally Friendly Drilling Systems*, Texas A&M University, Co-advised with Professor Zenon Medina-Cetina (May 2010).
- Mentored J. Kim, D. Yang, H. Zhang, M. Surendra, Y. Tian, and F. Solomon for Environmentally Friendly Drilling well site design project on *Drilling Engineering (PETE 661)*, Texas A&M University (Spring 2010).

ACADEMIC SERVICES

[Editorial Positions]

- **Editorial Board Member**, *Modern Management Science & Engineering*
- **Reviewer**, *KSCE Journal of Civil Engineering*
- **Reviewer**, *Association for the Advancement of Sustainability in Higher Education (AASHE)*
- **Reviewer**, *Archives of Agronomy and Soil Science*
- **Reviewer**, *ASCE Journal of Infrastructure Systems*
- **Reviewer**, *Environmental Progress and Sustainable Energy*
- **Reviewer**, *International Conference on New Energy and future Energy System*
- **Reviewer**, *Modern Environmental Science and Engineering*
- **Reviewer**, Southern SARE Grant Proposals
- **Reviewer**, Techno-Press

[Conference Session Chair]

- *Thermodynamics 2.0/ 2022 Conference*, Boone, NC, USA, July 18 – 20, 2022.
- *The Fourth Annual Asian Conference on Sustainability, Energy and the Environment*, Osaka, Japan, June 12 – 15, 2014.

UNIVERSITY SERVICES

- **Member**, *Chair Search Committee*, Department of Sustainable Development, 2023-2014.
- **Co-Chair**, *Building Science Tenure-Track Assistant Professor Search Committee*, 2021-2022.
- **Co-Chair**, *Building Science Tenure-Track Assistant Professor Search Committee*, 2019-2020.
- **Chair**, *Building Science Tenure-Track Assistant Professor Search Committee*, 2018-2019.
- **Member**, *College Assessment Team*, 2018-2019.
- **Member**, *Wachovia Environmental Research Award Committee*, 2018.
- **Member**, *Department Personnel Committee*, 2017-Present.
- **Member**, *Promotion and Tenure Committee*, 2016-Present.
- **Member**, *Building Science Curriculum Development Ad-Hoc Committee*, 2016-Present.
- **Member**, *Building Coordinator Committee*, 2011-Present.
- **Member**, *Building Science Tenure-Track Assistant Professor Search Committee*, 2017-2018.
- **Member**, *Student Development Committee*, 2017.

- **Member**, *Chair Search Committee*, Department of Sustainable Technology and the Built Environment, 2016-2017.
- **Member**, *Program Development Committee*, 2016-2017.
- **Faculty Advisor**, *REI Data Management Sub-Committee*, 2013-2017.
- **Member**, *Dean Search Committee*, College of Fine and Applied Arts, 2015-2016.
- Hosted Nexus Open House Event as part of National Bioenergy Day, a campaign to unite bioenergy supporters across the country, 2015.
- Hosted an IESVE, Building Energy Modeling Software Demonstration Seminar, 2015.
- **Member**, *QEP/ International Experiences Committee*, 2015-2016.
- **Member**, *Promotion and Tenure Policy Development Committee*, 2014-2015.
- **Faculty Advisor**, *Renewable Energy Initiative (REI)*, 2013-2016.
- **Member**, *Faculty Development Committee*, 2014-2015.
- **Member**, *Web/Social Networking Committee*, 2010-2015.
- **Faculty Advisor**, *Solar Decathlon Europe 2014 Competition, Appalachian State University, USA + University of Angers, France – Maison Reciprocity*:
 - Helped the team to analyze the structural stability of the proposed solar complex.
- **Member**, *QEP/ International Liaison Committee*, 2013-2014.
- **Coordinator**, *Department Equipment and Instrumentation*, 2012-2013.
- **Coordinator**, *Program Digital Media*, 2012-2013.
- **Faculty Advisor**, *Residential Construction Management Competition*, NAHB, 2010-2013.
- **Faculty Advisor**, *Student Builders Association (SBA)*, 2011-2012.
- **Consultant**, *Appalachian Solar Decathlon Project – Solar Homestead*, 2011:
 - Helped the team to estimate wind load applied to the solar house.
 - Won the People’s Choice Award.

OUTSIDE SERVICES

- Executive Board Member, Watauga County Habitat for Humanity, 2024-Present.
- Interviewed with Watauga Democrat to introduce the Nexus research project, 2018 and 2019.
- Workshop Organizer to promote biomass greenhouse heating systems to local farmers in conjunction with Blue Ridge Women in Agriculture, 2015-Present.
- Mentor, IDEXlab students to design and build the Farmers Market at Alleghany County, NC, 2013-2015.
- Mentor, IDEXlab students to design and build the Welcome Center at Valle Crucis Community Park, NC, 2013-2015.
- Choir Member, St. John Lee Korean Catholic Church, Charlotte, NC, 2011-2013.
- Mentor, an Eagle Scout student, College Station, TX, 2008:
 - Helped him to re-build a bridge at Carter Lake Subdivision.
- President, Korean Student Association (KSA), Texas A&M University, 2006-2007:
 - Handled various organizational events for about 700 Korean students and their families. KSA is the 3rd largest international student organization at Texas A&M University.
 - Contributed to the organization of the Korean movie screening to introduce Korea to the university students and staffs.
- Korean Choir Member, Saint Mary Catholic Church, College Station, TX, 2005-2010.
- Student Officer, Department of Civil Engineering, KonKuk University, Seoul, Korea, 1997.
- Freshman Representative, Department of Civil Engineering, KonKuk University, Seoul, Korea, 1992.