RESUME

CHUN-CHIEH YANG, Ph.D.

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Interdisciplinary engineer with more than 20 years of experience in interdisciplinary engineering, mathematics and statistics, data mining, computer modeling, data analysis and management, machine vision, environmental and agricultural science.

CITIZENSHIP: U.S. citizen

EXPERTISE

- Environmental and Agricultural Engineering
  - Precision Agriculture
  - Geographic Information System
  - Remote Sensing
  - Food Safety and Protection
  - Sustainable Agriculture
  - Environmental Protection
  - Hydrology
  - Sub-drainage/Sub-irrigation
  - Underground Water and Chemical Movement
  - Non-point Pollution Modeling

- Machine Vision
  - Hyperspectral / Multispectral Imaging Processing and Analysis
  - Online / Offline Image Processing and Analysis
  - UV / Visual / NIR / IR Data Modeling and Simulation
  - UV / Visual / NIR / IR Imaging System
  - Line Scan

- Mathematics and Statistics
  - Statistics / Biostatistics
  - Large-scale Data Analysis, Programming and Modeling
  - Mathematic Methodology Development
  - Computer Modeling and Simulation
  - Evaluation and Comparison of Models
  - Various Statistical and modeling Software Implementation
  - Risk Management, Assessment and Data Analysis
  - System Management, Integration and Control

- Data Mining
  - Artificial Neural Network
  - Fuzzy Logic
  - Decision Tree
  - Multivariate Adaptive Regression Splines
  - Principal Component Analysis

- Computer Software and Programming
  - MATLAB
  - LabVIEW
  - C / C++
  - ENVI
  - Fortran
  - SAS / SQL
  - R
  - SPSS
  - Microsoft Office

PROFESSIONAL EXPERIENCE:

- **2003 – present: Research Associate, GS-0890, Grade 12, Step 4**
  Environmental Microbial and Food Safety Laboratory
  Agricultural Research Service, United States Department of Agriculture
  - 2012 – present: Federal contractor
    Supervisor: Dr. Moon S. Kim, Research Leader, 301-5048450 ext. 245
  - 2008 – 2012: Federal employee
    Supervisor: Dr. Kuanglin Chao, Researcher, 301-5048450 ext. 260
  - 2003 – 2008: Federal contractor
    Supervisor: Dr. Kuanglin Chao, Researcher, 301-5048450 ext. 260

  - **General mathematics/statistics job duties:**

    1. Collecting and processing data for food safety, food contaminants, online food inspection, and bioprocessing related programs from field and laboratory works
    2. Using statistical software tools to collect, prepare, maintain, organize, document, compile, convert, upload and download statistical data to form multiple electronic databases
    3. Managing and analyzing multiple complex large databases
    4. Generating, evaluating, and concluding the results from statistical data analyses within and among multiple databases
    5. Interpreting, evaluating, and validating the results of analysis for the quality control of programs and databases
    6. Analyzing, evaluating, summarizing, and reviewing the data and results to identify, resolve, and document errors, discrepancies, and unusual findings among the databases
    7. Selecting, developing, and recommending methodology from the results to maximize program effectiveness
    8. Searching, developing, evaluating, comparing, and identifying the existing and potentially new methods from scientific literature reviews
    9. Preparing, editing, revising, presenting, and publishing scientific reports from data analyses and research results for scientific meetings, inquiry, advisory opinions, explanation of laboratory practices, and program management
    10. Collaborating with and advising peer engineers and scientists for data collection, problem solving, and methodology development

  - **General engineering job duties:**

    1. Selecting, evaluating, and testing the instruments and devices for the machine vision system components
    2. Installing, calibrating, and practicing the instruments and devices for the machine vision system
    3. Calibrating and integrating the software and hardware of the instruments and devices into a machine vision system
    4. Running, analyzing, evaluating, calibrating, and improving the integrated machine vision system under various environments in the laboratory and fields
    5. Collecting, analyzing, evaluating, interpreting, and summarizing the performance of each component of the machine vision system and that of the whole system
    6. Writing, editing, migrating, and improving the control software of the machine vision system
    7. Preparing, editing, revising, presenting, and publishing scientific reports for scientific meetings, inquiry, advisory opinions, explanation of laboratory practices, and program management
    8. Searching, developing, evaluating, comparing, and identifying the existing and potentially new methods from scientific literature reviews

9. Collaborating with and advising peer engineers and scientists for data collection, problem solving, and methodology development

- **Major scientific / engineering accomplishments**:

1. Built, developed, evaluated, and improved an online high speed line-scan hyperspectral/multispectral machine vision system for detection of human pathogens on fresh produce
    - Selected, evaluated, and integrated several instruments and devices into the machine vision system
    - Statistically evaluated and determined operation parameters for the development of a hyperspectral line-scan fluorescence imaging system for online detection of E.coli O157:H7 on fresh produce
    - Collected and analyzed visible/near-infrared reflectance spectroscopy data for statistical analysis
    - Managed complex large database from field and laboratory data collection
    - Developed statistical models for online food safety inspection of fresh produce
    - Published the research results in the academic peer-reviewed journals
    - Represented USDA to deliver oral or poster presentations of research in the national/international scientific meetings, technical conferences, workshops, and seminars
    - Supervise and provide expert guidance and scientific direction to junior personnel including graduate research fellows and other support science personnel on research projects

2. Built, developed, evaluated, improved and commercialized an automated poultry carcass inspection machine vision system for detection of unwholesome poultry for Stork Food and Dairy Systems, Inc.
    - Selected, evaluated, and integrated several instruments and devices into the machine vision system
    - Statistically evaluated and determined operation parameters for the development of a hyperspectral machine vision system for online detection of unwholesome poultry carcasses
    - Collected and analyzed visible/near-infrared reflectance spectroscopy data for statistical analysis
    - Managed complex large database from field and laboratory data collection
    - Developed statistical models for online food safety inspection of poultry carcasses
    - Integrated artificial intelligence algorithms into a machine vision system to implement image processing techniques for an automated food safety inspection system on chicken processing lines
    - Published the research results in the academic peer-reviewed journals
    - Represented USDA to deliver oral or poster presentations of research in the national/international scientific meetings, technical conferences, workshops, and seminars

- **2000 – 2002:** **Postdoctoral research fellow**
  Department of Bioresource Engineering, Macdonald Campus, McGill University
  Ste-Anne-de-Bellevue, Quebec, Canada
  Supervisor: Dr. Shiv O. Prasher, Professor, 514-3987774

- **Major scientific / engineering accomplishments**:

1. Successfully developed hyperspectral imaging methodology and data analysis techniques for weed detection in precision agriculture
    - Adapted remote sensing methods of hyperspectral imaging to weed detection
    - Developed data-mining computer models based on artificial intelligence methods (neural networks, decision trees, fuzzy logic) for weed differentiation from crops in precision agriculture
    - Integrated hyperspectral imaging methodology and data analysis techniques with computer models to successfully develop a complete weed management system suitable for site-specific adaptation

2. Developed computer models using artificial intelligence based on neural networks for subsurface drainage/subirrigation water management systems

3. Developed computer models using neural networks, decision trees, fuzzy logic, and multivariate adaptive regression spline for higher efficiency in agrochemical management

4. Developed a mathematical model for the prediction of nitrate concentrations in the Phreatic Aquifer of Esposende and Vila do Conde, project ref. POCTI/MGS/47182/2002, the Science and Technology Foundation of the Portuguese Science and Superior Education Ministry, Portugal
    - Provided technical expertise as part of an international team of university researchers conducting government-sponsored development
    - Supervise and provide expert guidance and scientific direction to junior personnel including graduate

research fellows and other support science personnel on GIS-based non-point pollution modeling research projects
- Guided data collection and computer model development in the project

5. Collaborated a mathematic modeling project of water consumption between Northern China, Canadian International Development Agency (CIDA), involving four Canadian universities (McGill University, University of Toronto, University of British Columbia and University of Montreal) and three Chinese universities (Beijing University, Chinghua University and Nankai University), funded by Canadian International Development Agency (CIDA), Canada
   - Provided technical expertise as part of an international team of university researchers conducting government-sponsored development
   - Supervise and provide expert guidance and scientific direction to junior personnel including graduate research fellows and other support science personnel on GIS-based non-point pollution modeling research projects
   - Guided data collection and computer model development in the project

6. Completed efficient planning of Montreal urban forests by means of a decision making computerized system project, Canada
   - Provided technical expertise as part of an international team of university researchers conducting government-sponsored development
   - Supervise and provide expert guidance and scientific direction to junior personnel including graduate research fellows and other support science personnel on research projects
   - Guided data collection and computer model development in the project

7. Collaborated in project proposals successfully submitted for various grant applications.

EDUCATION

- Ph.D. 2000. Department of Bioresource Engineering, McGill University, Canada
- M.Sc. 1995. Department of Bioresource Engineering, McGill University, Canada
- B.Sc. 1990. Department of Bio-lndustrial Mechatronics Engineering, National Taiwan University, Taiwan ROC

ADDITIONAL TRAINING

- **Certified training**
  - Statistic analysis using R. USDA, 2012
  - Environmental management. USDA, 2012
  - Risk management. USDA, 2012
  - Risk analysis. USDA, 2012
  - Information systems security awareness. USDA, 2008 - 2012
  - Lab biosafety. USDA, 2008 - 2012

- **Hands-on / Online training**
  - Mathematical Biostatistics Online Course. Johns Hopkins University, 2013
  - SAS Enterprise Guide. Online, 2013
  - SAS Analytics Training. Online, 2013
  - Experimental Design and Statistics for Microbiology Workshop. GMA, Washington DC, 2013
  - An Introduction to the US Food System: Perspectives from Public Health online course. Johns Hopkins University, MD, 2013
  - Food Defense Fundamentals: Food Safety Modernization and Economically Motivated Adulteration. GMA, Washington DC, 2012
  - Online HACCP Training. GMA, Washington DC, 2012
  - Learning by Example: Hazard Analysis and Food Safety Control. GMA, Washington DC, 2012
  - Food Chemistry Online Training Course. Technology Ed, Midlothian, Virginia, 2009

PATENTS

1. Chao, K., Y.-R. Chen, M. S. Kim, D. E. Chan and **C.-C. Yang**. 2014. Method and system for wholesomeness inspection of freshly slaughtered chickens on a processing line. US Patent # 8,625,856, USPTO.
2. Chao, K., Y.-R. Chen, M. S. Kim, D. E. Chan and **C.-C. Yang**. 2012. Method and system for wholesomeness inspection of freshly slaughtered chickens on a processing line. US Patent # 8,126,213, USPTO.

REFEREED PUBLICATIONS

1. **Yang, C.-C.**, M. S. Kim, P. Millner, K. Chao, B.-K. Cho, C. Mo, H. Lee, D. E. Chan. 2014. Development of multispectral imaging Algorithm for detection of frass o mature red tomatoes. *Postharvest Biology and Technology*, 93(1): 1-8.
2. Lee, H., **C.-C. Yang**, M. S. Kim, J. Lim, B.-K. Cho, A. M. Lefcourt, K. Chao, C. D. Everard. 2014. A simple multispectral imaging algorithm for detection of defects on red delicious apples. *Journal of Biosystems Engineering*, 39(2): 142-149.
3. **Yang, C.-C.**, M. S. Kim, B.-K. Cho, H. Lee, K. Chao, H. Lee, D. Jeong, A. M. Lefcourt, D. E. Chan. 2013. Development of multispectral algorithm for detection of cracked tomatoes. *Transactions of the ASABE*, 56(4): 1581-1588.
4. **Yang, C.-C.**, M. S. Kim, S. Kang, B.-K. Cho, K. Chao, A. M. Lefcourt and D. E. Chan. 2012. Red to far-red multispectral fluorescence image fusion for detection of fecal contamination on apples. *Journal of Food Engineering*, 108(2): 312-319.
5. **Yang, C.-C.**, M. S. Kim, S. Kang, T. Tao, K. Chao, A. M. Lefcourt and D. E. Chan. 2011. The development of a simple multispectral algorithm for detection of fecal contamination on apples using a hyperspectral line-scan imaging system. *Sensing and Instrumentation for Food Quality and Safety*, 5(1): 10-18.
6. **Yang, C.-C.**, K. Chao, M. S. Kim, D. E. Chan, H. L. Early and M. Bell. 2010. Machine vision system for on-line wholesomeness inspection of poultry carcasses. *Poultry Science*, 89(6): 1252-1264.
7. Chao, K., **C.-C. Yang**, and M. S. Kim. 2010. Spectral line-scan imaging system for high-speed non-destructive wholesomeness inspection of broilers. *Trends in Food Science & Technology*, 21(3): 129-137.
8. **Yang, C.-C.**, K. Chao and M. S. Kim. 2009. Machine vision system for online inspection of freshly slaughtered chickens. *Sensing and Instrumentation for Food Quality and Safety*, 3(1): 70-80.
9. Chao, K., **C.-C. Yang**, M. S. Kim and D. E. Chan. 2008. High throughput spectral imaging system for wholesomeness inspection of chicken. *Applied Engineering in Agriculture* 24(4): 475-485.
10. Chao, K., X. Nou, Y. Liu, M. S. Kim, D. E. Chan, **C.-C. Yang**, J. R. Patel and M. Sharma. 2008. Detection of fecal/ingesta contaminants on poultry processing equipment surfaces by visible and near-infrared reflectance spectroscopy. *Applied Engineering in Agriculture*, 24(11): 49-55.
11. Kim, M. S., Y.-R. Chen, B. Cho, A. M. Lefcourt, K. Chao and **C.-C. Yang**. 2008. Online hyperspectral line-scan fluorescence imaging for safety inspection of apples. *Acta Horticulturae*, 768(1): 385-390.
12. Chao, K., **C.-C. Yang**, Y.-R. Chen, M. S. Kim and D. E. Chan. 2007. Hyperspectral-multispectral line-scan imaging system for automated poultry carcass inspection applications for food safety. *Poultry Science*, 86(11): 2450-2460.
13. Kim, M. S., Y.-R. Chen, B. K. Cho, K. Chao, **C.-C. Yang**, A. M. Lefcourt and D. E. Chan. 2007. Hyperspectral reflectance and fluorescence line-scan imaging for online defect and fecal contamination inspection of apples. *Sensing and Instrumentation for Food Quality and Safety*, 1(3): 151-159.
14. **Yang, C.-C.**, S. O. Prasher, S. Wang, S. H. Kim, C. S. Tan, C. Drury and R. M. Patel. 2007. Simulation of nitrate-n pollution in southern Ontario with DRAINMOD-N. *Agricultural Water Management*, 87(3): 299-306.
15. Chao, K., **C.-C. Yang**, Y.-R. Chen, M. S. Kim and D. E. Chan. 2007. Fast line-scan imaging system for broiler carcass inspection. *Sensing and Instrumentation for Food Quality and Safety*, 1(2): 62-71.
16. Chao, K., Y.-R. Chen, F. Ding, **C.-C. Yang** and D.E. Chan. 2007. Development of two-band color-mixing technique for identification of broiler carcass conditions. *Journal of Food Engineering*, 80(1): 276-283.
17. Wang, S., S. O. Prasher, R. M. Patel, **C.-C. Yang**, S. H. Kim, A. Madani, P. M. Macdonald and S. D. Robertson. 2006. Fate and transport of nitrogen compounds in a cold region soil using DRAINMOD. *Computers and Electronics in Agriculture*, 53(2): 113-121.
18. **Yang, C.-C.**, K. Chao, Y.-R. Chen, M. S. Kim and D. E. Chan. 2006. Development of Fuzzy Logic-based Differentiation Algorithm and Fast Line-Scan Imaging System for Chicken Inspection. *Biosystems Engineering*, 95(4): 483-496.
19. Liu, Y., K. Chao, Y.-R. Chen, M. S. Kim, X. Nou, D. E. Chan and **C.-C. Yang**. 2006. Determination of key wavelengths in the detection of feces / ingesta contaminants for sanitation verification at slaughter plants from visible and near infrared spectroscopy. *Journal of Near Infrared Spectroscopy*, 14(5): 325-331.
20. **Yang, C.-C.**, K. Chao, Y. R. Chen, M. S. Kim and H. L. Early. 2006. Simple region of interest analysis for systemically diseased chicken identification using multispectral imaging. *Transactions of the ASAE*, 49(1): 245-257.
21. **Yang, C.-C.**, K. Chao, Y. R. Chen and H. L. Early. 2005. Systemically diseased chicken identification using multispectral images and region of interest analysis. *Computers and Electronics in Agriculture*, 49(2): 255-271.
22. **Yang, C.-C.**, K. Chao and Y. R. Chen. 2005. Development of multispectral imaging processing algorithms for identification of wholesome, septicemia, and inflammatory process chickens. *Journal of Food Engineering*, 69(2): 225-234.
23. **Yang, C.-C.**, S. O. Prasher, R. Lacroix and S. H. Kim. 2004. Application of multivariate adaptive regression splines (MARS) to simulate soil temperature. *Transactions of the ASAE*, 47(3): 881-887.
24. **Yang, C.-C.**, S. O. Prasher and P. K. Goel. 2004. Differentiation of crop and weeds by decision-tree analysis of multi-spectral data. *Transactions of the ASAE*, 47(3): 873-879.
25. **Yang, C.-C.**, S. O. Prasher, R. Lacroix and S. H. Kim. 2003. A multivariate adaptive regression spines model for simulation of pesticide transport in soils. *Biosystems Engineering*, 86(1): 9-15.
26. **Yang, C.-C.**, S. O. Prasher, P. Enright, C. Madramootoo, M. Burgess, P. K. Goel and I. Callum. 2003. Application of decision tree technology for image classification using remote sensing data. *Agricultural Systems*, 76(3): 1101-1117.
27. **Yang, C.-C.**, S. O. Prasher, J.-A. Landry and H. S. Ramaswamy. 2003. Development of a herbicide application map using artificial neural networks and fuzzy logic. *Agricultural Systems*, 76(2): 561-574.
28. **Yang, C.-C.**, S. O. Prasher and J.-A. Landry. 2003. Development of an image processing system and a fuzzy controller for

site-specific herbicide applications. *Precision Agriculture*, 4(1): 5-18.

29. **Yang, C.-C.**, S. O. Prasher and J.-A. Landry. 2002. Weed recognition in corn fields using back-propagation neural network models. *Canadian Biosystems Engineering*, 44:715-722.
30. **Yang, C.-C.**, S. O. Prasher, J. Whalen and P. K. Goel. 2002. Use of hyperspectral imagery for identification of different fertilization methods with decision tree technology. *Biosystems Engineering*, 83(3): 291-298.
31. **Yang, C.-C.**, S. O. Prasher, J.-A. Landry and H. S. Ramaswamy. 2002. Development of neural networks for weed recognition in corn fields. *Transactions of the ASAE*, 45(3): 859-864.
32. **Yang, C.-C.**, S. O. Prasher, J.-A. Landry and R. Kok. 2002. The development of image processing and weed localization algorithms for precision farming. *Biosystems Engineering*, 81(2): 137-146.
33. **Yang, C.-C.**, S. O. Prasher, J.-A. Landry, J. Perret and H. S. Ramaswamy. 2000. Recognition of weeds with image processing and their use with fuzzy logic for precision farming. *Canadian Agricultural Engineering*, 42(4): 195-200.
34. **Yang, C.-C.**, S. O. Prasher, J.-A. Landry, H. S. Ramaswamy and A. DiTommaso. 2000. Application of artificial neural networks in image recognition and classification of crop and weeds. *Canadian Agricultural Engineering*, 42(3): 147-152.
35. **Yang, C.-C.**, C. S. Tan and S. O. Prasher. 2000. Artificial neural networks for subsurface drainage and subirrigation systems in Ontario, Canada. *Journal of the American Water Resources Association*, 36(3): 609-618.
36. **Yang, C.-C.**, S. O. Prasher and C. S. Tan. 1999. An artificial neural network model for water table management systems. *Canadian Water Resources Journal*, 24(1): 25-33.
37. **Yang, C.-C.**, R. Lacroix, and S. O. Prasher. 1998. The use of back-propagation neural networks for the simulation and analyses of time-series data in subsurface drainage systems. *Transactions of the ASAE*, 41(4): 1181-1187.
38. **Yang, C.-C.**, S. O. Prasher, R. Lacroix and A. Madani. 1997. Application of Artificial neural networks in subsurface drainage system design. *Canadian Water Resources Journal*, 22(1): 1-12.
39. **Yang, C.-C.**, S. O. Prasher, R. Lacroix, S. Sreekanth, A. Madani and L. Masse. 1997. Artificial neural network model for subsurface-drained farmlands. *Journal of Irrigation and Drainage Engineering*, 123(4): 285-292.
40. **Yang, C.-C.**, S. O. Prasher and G. R. Mehuys. 1997. An artificial neural network to estimate soil temperature. *Canadian Journal of Soil Science*, 77(3): 421-429.
41. **Yang, C.-C.**, S. O. Prasher, G. R. Mehuys and N. K. Patni. 1997. Application of artificial neural networks for simulation of soil temperature. *Transactions of the ASAE*, 40(3): 649-656.
42. **Yang, C.-C.**, S. O. Prasher, S. Sreekanth, N. K. Patni and L. Masse. 1997. An artificial neural network model for simulating pesticide concentrations in soil. *Transactions of the ASAE*, 40(5): 1285-1294.
43. Sreekanth, S., S. O. Prasher and **C.-C. Yang**. 1997. Importance of choice of input parameters in artificial neural network simulation of water-table depths. *Canadian Water Resource Journal*, 22(2): 111-124.
44. **Yang, C.-C.**, S. O. Prasher and R. Lacroix. 1996. Applications of artificial neural networks to simulate water-table depths under subirrigation. *Canadian Water Resources Journal*, 21(1): 27-44.
45. **Yang, C.-C.**, S. O. Prasher and R. Lacroix. 1996. Applications of artificial neural networks to land drainage engineering. *Transactions of the ASAE*, 39(2): 525-533.

CONFERENCE PROCEEDINGS AND TECHNICAL REPORTS

1. **Yang, C.-C.**, M. S. Kim, Y.-K. Chuang, and H. Lee. 2013. The development of a line-scan imaging algorithm for the detection of fecal contamination on leafy greens. *Sensing for Agriculture and Food Quality and Safety V, Proceedings of SPIE, Volume 8721*, p. 87210G-1-87210G-7. SPIE Defense, Security + Sensing, Baltimore, MD, USA, April 30-May 1, 2013. The International Society for Optical Engineering.
2. **Yang, C.-C.**, M. S. Kim, and K. Chao. 2012. Development and Application of Multispectral Algorithms for Fresh Produce Safety Inspection. *The American Society of Agricultural and Biological Engineers (ASABE) 2012 international meeting*, paper no. 1337013.
3. Chuang, Y.-K., **C.-C. Yang,** M. S. Kim, S. Delwiche, M. Lo, S. Chen, and D. E. Chan. 2012. Inspection of fecal contamination on strawberries using line-scan LED-induced fluorescence imaging techniques. *The American Society of Agricultural and Biological Engineers (ASABE) 2012 international meeting*, paper no. 1337179.
4. **Yang, C.-C.**, M. S. Kim, P. Millner, K. Chao, and D. E. Chan. 2012. The development of the line-scan image recognition algorithm for the detection of frass on mature tomatoes. *Sensing for Agriculture and Food Quality and Safety VI, Proceedings of SPIE, Volume 8369*, p. 836908-1-836908-7. SPIE Defense, Security + Sensing, Baltimore, MD, USA, April 24-25, 2012. The International Society for Optical Engineering.
5. Rao, X., **C.-C. Yang,** Y. Ying, M. S. Kim, and K. Chao. 2012. Classification of Korla fragrant pears using NIR hyperspectral imaging analysis. *Sensing for Agriculture and Food Quality and Safety VI, Proceedings of SPIE, Volume 8369*, p. 83690Y-1-83690Y-8. SPIE Defense, Security + Sensing, Baltimore, MD, USA, April 24-25, 2012. The International Society for Optical Engineering.
6. **Yang, C.-C.**, M. S. Kim and K. Chao. 2011. The application of Hyperspectral Imaging analysis to detection of tomato crack defects. *The American Society of Agricultural and Biological Engineers (ASABE) 2011 international meeting*, paper no. 111-0948.
7. Kim, M. S., K. Chao, **C.-C. Yang**, J. Qin, A. Lefcourt and D. Chan. 2011. Agro-food safety and quality inspection using line-scan hyperspectral imaging. *The American Society of Agricultural and Biological Engineers (ASABE) 2011 international meeting*, paper no. 111-1723.

8. **Yang, C.-C.**, M. S. Kim, K. Chao, S. Kang, and A. Lefcourt. 2011. Fast and accurate image recognition algorithms for fresh produce food safety sensing. *Sensing for Agriculture and Food Quality and Safety III, Proceedings of SPIE, Volume 8027*, p. 80270G-1-60270G-12. SPIE Defense, Security + Sensing, Orlando, FL, USA, April 26-27, 2011. The International Society for Optical Engineering.
9. Kim, M. S., K. Chao, A. Lefcourt, **C.-C. Yang**, D. E. Chan, and S. Kang. 2010. Optical sensing technologies for rapid food safety and quality inspection. *The Third Joint Researchers Meeting, FDA-Center for Food Safety and Applied Nutrition, USDA-ARS Beltsville Agricultural Research Center on Produce Safety*, paper no. 21.
10. Kim, M. S., A. Lefcourt, K. Chao, **C.-C. Yang**, S. Kang, and D. E. Chan. 2010. Online line-scan hyperspectral imaging for safety and quality inspection of apples. *The Third Joint Researchers Meeting, FDA-Center for Food Safety and Applied Nutrition, USDA-ARS Beltsville Agricultural Research Center on Produce Safety*, paper no. 22.
11. **Yang, C.-C.**, W. Jun, M. S. Kim, K. Chao, S. Kang, D. E. Chan, and A. Lefcourt. 2010. Classification of fecal contamination on leafy greens by hyperspectral imaging. *Sensing for Agriculture and Food Quality and Safety II, Proceedings of SPIE, Volume 7676*, p. 76760F-1-76760F-8. SPIE Defense, Security + Sensing, Orlando, FL, USA, April 6-7, 2010. The International Society for Optical Engineering.
12. Kim, M. S., K. Chao, D. E. Chan, W. Jun, K. Lee, S. Kang, **C.-C. Yang** and A. M. Lefcourt. 2009. Nondestructive sensing technologies for food safety. *The International Symposium for Improvement of Agri-Food Safety Proceeding*, p. 119-126. Seoul, Korea.
13. **Yang, C.-C.**, K. Chao and M. S. Kim. 2009. Automatic inspection using machine vision for food safety. *The 4th World Congress on Computers in Agriculture / The American Society of Agricultural and Biological Engineers (ASABE) 2009 international meeting*, paper no. 09-7549.
14. **Yang, C.-C.**, K. Chao, M. S. Kim, D. E. Chan and Y. R. Chen. 2008. Multispectral imaging system and differentiation algorithm for online inspection of poultry carcasses. *The American Society of Agricultural and Biological Engineers (ASABE), 2008 international meeting*, paper no. 08-3925.
15. **Yang, C.-C.**, K. Chao, M. S. Kim, D. E. Chan and Y. R. Chen. 2008. Online machine vision system for inspection of poultry carcasses. *The American Society of Agricultural and Biological Engineers (ASABE), 2008 international meeting*, paper no. 08-3926.
16. Chao, K., **C.-C. Yang** and M. S. Kim. 2008. High throughput spectral imaging system for broiler carcass inspection. *The American Society of Agricultural and Biological Engineers (ASABE), 2008 international meeting*, paper no. 08-3818.
17. **Yang, C.-C.**, K. Chao, M. S. Kim and D. E. Chan. 2008. Machine vision system for automatic online inspection of freshly slaughtered chickens. *Food Processing Automation Conference*, Providence, RI, USA, June 28-29, 2008. The American Society of Agricultural and Biological Engineers (ASABE).
18. **Yang, C.-C.**, K. Chao and Y. R. Chen. 2007. Online application of machine vision system for differentiation of wholesome and diseased poultry carcasses. *The American Society of Agricultural and Biological Engineers (ASABE), 2007 international meeting*, paper no. 07-3084.
19. Chen, Y.-R., B. K. Cho, C.-C. Yang, K. Chao and A.M. Lefcourt. 2007. Online line-scan hyperspectral imaging for postharvest safety and quality inspection of apples. *The American Society of Agricultural and Biological Engineers (ASABE), 2007 international meeting*, paper no. 07-3026.
20. Chao, K., **C.-C. Yang**, Y.-R. Chen, M. S. Kim and D. E. Chan. 2007. Fast-line scan imaging system for chicken carcass inspection. *The American Society of Agricultural and Biological Engineers (ASABE), 2007 international meeting*, paper no. 07-3032.
21. **Yang, C.-C.**, D. E. Chan, K. Chao, Y. R. Chen and M. S. Kim. 2006. Development of online line-scan imaging system for chicken inspection and differentiation. *Optical Sensors and Sensing Systems for natural Resources and Food Safety and Quality, Proceedings of SPIE, Volume 6381*, p. 63810Y-1-63810Y-10. OpticsEast 2006, Boston, MA, USA, October 2-4, 2006. The International Society for Optical Engineering.
22. Chao, K., **C.-C. Yang**, Y. R. Chen, D. E. Chan and M. S. Kim. 2006. Poultry carcass inspection by a fast line-scan imaging system: results from in-plant testing. *Optical Sensors and Sensing Systems for natural Resources and Food Safety and Quality, Proceedings of SPIE, Volume 6381*, p. 63810V-1-63810V-11. OpticsEast 2006, Boston, MA, USA, October 2-4, 2006. The International Society for Optical Engineering.
23. Liu, Y., K. Chao, Y. R. Chen, M. S. Kim, X. Nou, D. E. Chan and **C.-C. Yang**. 2006. Detection of fecal / ingesta contaminants at slaughter plants from a number of characteristic visible and near infrared bands. *Optical Sensors and Sensing Systems for natural Resources and Food Safety and Quality, Proceedings of SPIE, Volume 6381*, p. 63810U-1-63810U-9. OpticsEast 2006, Boston, MA, USA, October 2-4, 2006. The International Society for Optical Engineering.
24. Kim, M. S., B.-K. Cho, **C.-C. Yang**, K. Chao, A. M. Lefcourt and Y. R. Chen. 2006. Hyperspectral reflectance and fluorescence line-scan imaging system for online detection of fecal contamination on apples. *Optical Sensors and Sensing Systems for natural Resources and Food Safety and Quality, Proceedings of SPIE, Volume 6381*, p. 63810P-1-63810P-8. OpticsEast 2006, Boston, MA, USA, October 2-4, 2006. The International Society for Optical Engineering.
25. **Yang, C.-C.**, K. Chao, Y.-R. Chen, M. S. Kim and D. E. Chan. 2006. Fuzzy logic-based differentiation imaging system for systemically diseased chicken detection. *The American Society of Agricultural and Biological Engineers (ASABE), 2006 international meeting*, paper no. 06-3076.
26. **Yang, C.-C.**, K. Chao, Y.-R. Chen, M. S. Kim, and D. E. Chan. 2006. Fast line-scan imaging system using fuzzy logic-based differentiation algorithm for chicken inspection. *Institute of Food Technologists (IFT), 2006 annual meeting and food expo*,

presentation no. 078E-09.

27. **Yang, C.-C.**, K. Chao, Y. R. Chen, and M. S. Kim. 2006. Line-Scan Machine Vision System for Online Poultry Carcass Inspection. April 26, 2004, *BARC Poster Day*. Beltsville Agriculture Research Center, USDA-ARS.
28. **Yang, C.-C.**, K. Chao, Y. R. Chen and M. S. Kim. 2005. Development of fast line scanning imaging algorithm for diseased chicken detection. *Optical Sensors and Sensing Systems for natural Resources and Food Safety and Quality, Proceedings of SPIE, Volume 5996*, p. 59960C-1-59960C-12. OpticsEast 2005, Boston, MA, USA, October 22-23, 2005. The International Society for Optical Engineering.
29. **Yang, C.-C.**, S. O. Prasher and J. Whalen. 2005. Application of hyperspectral imagery and prediction algorithms to precision agriculture. *The American Society of Agricultural Engineers (ASAE), 2005 international meeting*, paper no. 05-1062.
30. **Yang, C.-C.**, K. Chao, Y. R. Chen and H. L. Early. 2005. Application of multispectral imaging for wholesome and systemically diseased chickens. *The American Society of Agricultural Engineers (ASAE), 2005 international meeting*, paper no. 05-3125.
31. Chao, K., Y. R. Chen, **C.-C. Yang,** and D. E. Chan. 2005. Characterizing spectra variations for cleaning and sanitation issues in poultry processing plant *The American Society of Agricultural Engineers (ASAE), 2005 international meeting*, paper no. 05-3035.
32. Abreu, A. S., S. O. Prasher and **C.-C. Yang**. 2005. Development of REDENITRA, an artificial neural network clone of RZWQM model, for the simulation of nitrate-N leaching. *The American Society of Agricultural Engineers (ASAE), 2005 international meeting*, paper no. 05-2112.
33. Abreu, A. S., S. O. Prasher and **C.-C. Yang**. 2005. REDENITRA, a backpropagation artificial neural network (BANN) model, clone of RZWQM, that predicts the amount of nitrate-N leaching in agricultural systems. *EGU General Assembly 2005*. Vienna, Austria.
34. **Yang, C.-C.**, K. Chao, Y. R. Chen and H. L. Early. 2004. Systemically diseased chicken identification using multispectral images and region of interest analysis. *Nondestructive Sensing for Food Safety, Quality, and Natural Resources, Proceedings of SPIE, Volume 5587*, p. 121-132. OpticsEast 2004, Philadelphia, PA, USA, October 26-27, 2004. The International Society for Optical Engineering.
35. **Yang, C.-C.**, K. Chao and Y. R. Chen. 2004. Development of multispectral imaging processing algorithms for Identification of Wholesome, Septicemic, and Inflammatory Process Chickens. April 29, 2004, *BARC Poster Day*. Beltsville Agriculture Research Center, USDA-ARS.
36. **Yang, C.-C.**, K. Chao, Y. R. Chen and M. S. Kim. 2004. Application of multispectral imaging for identification of wholesome and systemically diseased chicken. *The American Society of Agricultural Engineers (ASAE), 2004 international meeting*, paper no. 04-3034.
37. **Yang, C.-C.**, K. Chao and Y. R. Chen. 2003. Development of multispectral imaging processing algorithms for food safety inspection on poultry carcasses. *The American Society of Agricultural Engineers (ASAE), 2003 international meeting*, paper no. 03-3054.
38. **Yang, C.-C.**, S. O. Prasher and J. Whalen. 2003. Neural network models for crop yield classification using hyperspectral imagery. *The American Society of Agricultural Engineers (ASAE), 2003 international meeting*, paper no. 03-1112.
39. Karimi, Y., S. O. Prasher, H. McNarin, R. B. Bonnell, P. Dutilleul, P. K. Goel, **C.-C. Yang** and Y. Uno. 2003. Hyperspectral remote sensing for discriminating water and nitrogen stresses in a corn field. *The American Society of Agricultural Engineers (ASAE), 2003 international meeting*, paper no. 03-1111.
40. **Yang, C.-C**. S. O. Prasher, S. Wang, S. H. Kim. C. S. Tan and C. Drury. 2002. Simulation of nitrate-N pollution in southern Ontario with DRAINMOD-N. *Northeast Agricultural and Biological Engineering Conference (NABEC), 2002 annual meeting*, paper no. 02-028.
41. **Yang, C.-C.**, S. O. Prasher and P. K. Goel. 2002. Differentiation of crop and weeds by decision tree analysis of multi-spectral data. *The American Society of Agricultural Engineers (ASAE), 2002 international meeting*, paper no. 02-1080.
42. **Yang, C.-C.**, S. O. Prasher and J. Whalen. 2002. Prediction of yields for corn and soybean with hyperspectral imagery. *The American Society of Agricultural Engineers (ASAE), 2002 international meeting*, paper no. 02-3139.
43. Wang, S., S. O. Prasher, **C.-C. Yang**, S. H. Kim, A. Madani, P. M. MacDonald and S. D. Robertson. 2002. Field validation of a mathematical model to estimate nitrate-nitrogen pollution from subsurface drained farmlands. *The American Society of Agricultural Engineers (ASAE), 2002 international meeting*, paper no. 02-2039.
44. Jutras, P., S. O. Prasher, **C.-C. Yang** and C. Hamel. 2002. Urban tree growth modeling with artificial neural network. *Proceedings of the 2002 International Joint Conference on Neural Networks, IJCNN'02*, Honolulu, Hawaii, USA, May 12-17, 2002: 1385-1389.
45. **Yang, C.-C.**, S. O. Prasher, J. Whalen and P. K. Goel. 2001. Application of data mining technology for hyperspectral imagery classification in agricultural fields. *The American Society of Agricultural Engineers (ASAE), 2001 international meeting*, paper no. 01-3116.
46. Goel, P. K., S. O. Prasher, R. M. Patel, J. A. Landry, A. A. Viau and **C.-C. Yang**. 2001. Weed and nitrogen stress detection in corn using airborne hyperspectral remote sensing. *The American Society of Agricultural Engineers (ASAE), 2001 international meeting*, paper no. 01-1199.
47. Salehi, F., S. O. Prasher, S. Amin, A. Madani, S. J. Jebelli, H. S. Ramaswamy, C. Tan, C. F. Drury and **C.-C. Yang**. 2001. Prediction of annual nitrate-N losses in drain outflows with artificial neural networks. *The American Society of Agricultural Engineers (ASAE), 2001 international meeting*, paper no. 01-3064.

48. **Yang, C.-C.**, S. O. Prasher, P. Enright, C. Madramootoo, M. Burgess, P. K. Goel and I. Callum. 2001. Application of data mining technology for image classification using remote sensing data. *The Canadian Society of Agricultural Engineering (CSAE), 2001 annual meeting with the Northeast Agricultural and Biological Engineering Conference (NABEC) and the Agricultural Institute of Canada (AIC)*, paper no. 01-611.
49. **Yang, C.-C.**, S. O. Prasher, P. K. Goel and R. Patel. 2001. Application of data mining for image classification in remote sensing. *Journée d'information scientifique et technique en génie agroalimentaire*, Saint-Hyacinthe, QC, Canada, March 21, 2001, 33-40.
50. **Yang, C.-C.**, S. O. Prasher and J. A. Landry. 2000. Development of a weed management system for precision farming. *Northeast Agricultural and Biological Engineering Conference (NABEC), 2000 annual meeting*, paper no. 2031.
51. **Yang, C.-C.**, S. O. Prasher and J. A. Landry. 2000. Applications of artificial neural networks to plant recognition in the field. *The American Society of Agricultural Engineers (ASAE), 2000 international meeting*, paper no. 00-3054.
52. **Yang, C.-C.**, S. O. Prasher and J. A. Landry. 1999. Development of weed maps in corn fields for precision farming. *The American Society of Agricultural Engineers (ASAE), 1999 international meeting*, paper no. 99-3044.
53. **Yang, C.-C.**, S. O. Prasher and J. A. Landry. 1999. Weed recognition in precision farming. *The American Society of Agricultural Engineers (ASAE), 1999 international meeting*, paper no. 99-3115.
54. **Yang, C.-C.**, S. O. Prasher and J. A. Landry. 1999. Use of artificial neural networks to recognize weeds in a corn field. *Journée d'information scientifique et technique en génie agroalimentaire*, Saint-Hyacinthe, QC, Canada, March 3, 1999, 60-65.
55. **Yang, C.-C.**, S. O. Prasher and J. A. Landry. 1998. Application of artificial neural networks to image recognition in precision farming. *The American Society of Agricultural Engineers (ASAE), 1998 international meeting*, paper no. 98-3039.
56. **Yang, C.-C.**, S. O. Prasher and J. A. Landry. 1998. Application of image processing and weed recognition in precision farming. *Northeast Agricultural and Biological Engineering Conference (NABEC), 1998 annual meeting*, paper no. 9825.
57. **Yang, C.-C.**, S. O. Prasher and C. S. Tan. 1998. An artificial neural network model for water table management system. *Drainage in the 21st Century: Food Production and the Environment. Proceedings of the 7th Annual Drainage Symposium*, Orlando, FL, USA, March 8-10, 1998, p. 250-257.
58. **Yang, C.-C.**, S. O. Prasher and J. A. Landry. 1997. Application of machine vision and artificial neural networks in precision farming. *The American Society of Agricultural Engineers (ASAE), 1997 international meeting*, paper no. 97-3107.
59. **Yang, C.-C.** and S. O. Prasher. 1997. Application of precision farming. *CSAE Conference Proceedings*, volume A, Sherbrooke, QC, Canada, 1997. p. 71-80. Canadian Society of Agricultural Engineering.
60. **Yang, C.-C.**, S. O. Prasher and J. A. Landry. 1997. The use of information technologies in precision farming. *CSAE Conference Proceedings*, volume A, Sherbrooke, QC, Canada, 1997. p. 562-571. Canadian Society of Agricultural Engineering.
61. **Yang, C.-C.**, S. O. Prasher and S. Sreekanth. 1996. An artificial neural network model for pesticide fate and transport. *The American Society of Agricultural Engineers (ASAE), 1996 international meeting*, paper no. 96-2025.
62. **Yang, C.-C.**, S. O. Prasher, R. Lacroix, S. Sreekanth, N. K. Patni and L. Masse. 1996. An artificial neural network model for the simulation of water-table depths and drain outflows. *Proceedings of the 49th Annual Conference of the Canadian Water Resources Association*, Quebec City, June 26-28, 1996: 225-239.
63. **Yang, C.-C.**, R. Lacroix, and S. O. Prasher. 1996. The use of back-propagation in neural networks for the simulation and analyses of time-series data in subsurface drainage systems. *Proceedings of Computers in Agriculture*, Cancun, Mexico, June 10-14, 1996: 941-949.
64. **Yang, C.-C.**, S. O. Prasher and R. Lacroix. 1996. Application of artificial neural networks in subsurface drainage system design. *Proceedings of Computers in Agriculture*, Cancun, Mexico, June 10-14, 1996: 932-940.
65. **Yang, C.-C.**, S. O. Prasher and R. Lacroix. 1995. Applications of artificial neural networks to land drainage engineering. *The Canadian Society of Agricultural Engineering (CSAE), 1995 annual meeting*, paper no. 95-610.

PROFESSIONAL ORGANIZATION MEMBERSHIP AND ACTIVITIES

- Member of International Association of Food Protection (IAFP). 2009 – present

- Member of Institute of Food Technologist (IFT). 2006 – present

- Member of the American Society of Agricultural and Biological Engineers (ASABE). 1995 – present
  - Representative of the Information and Electrical Technologies Division to the ASABE Meeting Council. 2010 - 2012
  - Committee Member of ASABE Information and Electrical Technologies Division, IET-01 Executive. 2008 – present
  - Committee Member of ASABE Information and Electrical Technologies Division, IET-02 Steering. 2009 – present
  - Committee Member of ASABE Information and Electrical Technologies Division, IET-04 Publications Review and Paper Awards. 2007 – present
  - Committee Member of ASABE Information and Electrical Technologies Division, IET-07 Forward Planning and Structure. 2009 – 2012
  - Committee Member of ASABE Information and Electrical Technologies Division, IET-217 Computational Methods, Simulations, and Applications. 2011 – present

- Committee Member of ASABE Information and Electrical Technologies Division, IET-312 Machine Vision. 2004 – present
- Committee Member of ASABE Information and Electrical Technologies Division, IET-348 Electromagnetics and Spectroscopy. 2012 – present
- Representative of IET to the ASABE Meetings Council. 2010-2012
- Chair, ASABE Information and Electrical Technologies Division, IET-312 Machine Vision. 2008 – 2009
- Vice Chair, ASABE Information and Electrical Technologies Division, IET-312 Machine Vision. 2007 – 2008
- Secretary, ASABE Information and Electrical Technologies Division, IET-312 Machine Vision. 2006 – 2007

AWARDS AND HONORS

- Information and Electrical Technologies Division Meeting Paper Award, ASABE. 2012
  - International-wide competition

- Performance of Superior, USDA-ARS. 2011
  - For an official performance appraisal of Superior for the period of October 1, 2010 through September 30, 2011

- Performance of Superior, USDA-ARS. 2010
  - For an official performance appraisal of Superior for the period of October 1, 2009 through September 30, 2010

- Performance of Superior, USDA-ARS. 2009
  - For an official performance appraisal of Superior for the period of October 1, 2008 through September 30, 2009

- Recognition for the "Electronics in Agriculture" Top-15 Achievement as part of "100 Years of Innovation" for ASABE Centennial Anniversary at the ASABE 2007 International Meeting in Minneapolis, MN, June 17-20, which highlighted the high-speed poultry inspection system developed by the Instrumentation and Sensing Laboratory (was renamed Food Safety Laboratory).
  - International-wide competition

- Honorable Mention, BARC Poster Day, Beltsville Agriculture Research Center, Beltsville Area, USDA-ARS. 2006
  - Area-wide competition

- Extra Effort Award, USDA-ARS. 2004
  - For the support provided to in-plant testing of the ISL commercial prototype visible/near-infrared automated poultry inspection system at Tyson Foods chicken processing facility in New Holland, PA

- Second Prize, BARC Poster Day, Beltsville Agriculture Research Center, Beltsville Area, USDA-ARS. 2004
  - Area-wide competition

PROFESSIONAL SERVICE

- Associate Editor for the ASABE Publications, IET Division. 2007 – present

- Manuscript reviewer for the following technical journals (listed alphabetically). 1999 – present:
  1. Agriculture
  2. Applied Engineering in Agriculture
  3. Biosystems Engineering
  4. Canadian Biosystems Engineering
  5. Canadian Water Resources Journal
  6. Chemometrics and Intelligent Laboratory Systems
  7. Computer Standards & Interfaces
  8. Computers and Electronics in Agriculture
  9. Field Crops Research
  10. Food and Bioprocess Technology
  11. Hydrological Sciences Journal
  12. Journal of the American Society for Horticultural Science
  13. Journal of the American Water Resources Association
  14. Journal of Engineering Science and Technology Review
  15. Journal of Food Engineering
  16. Journal of Food Measurement & Characterization
  17. Natural Resource Modeling
  18. Sensing and Instrumentation for Food Quality and Safety

19. Soil Science Society of America Journal
20. Transactions of the ASABE
21. Weed Research

LANGUAGE PROFICIENCIES

- Chinese (Mandarin)
- English