

MANOJ KARKEE

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RESEARCH AREA AND EXPERTISE

- *General Area:* Agricultural Automation and Mechanization
 - *Particular Focus:* Sensing and Control Technologies for Automation and Robotics
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EDUCATION

2005 -2009: **PhD** in Agricultural Engineering and Human Computer Interaction, **Iowa State University**, Ames, IA.

2003 - 2005: **ME** in Remote Sensing and GIS, **Asian Institute of Technology**, Thailand.

1998 - 2002: **BE** in Computer Engineering, **Tribhuvan University**, Nepal.

1994 - 1997: **Associate Degree** in Civil Engineering, **Tribhuvan University**, Nepal

PROFESSIONAL EXPERIENCE

2016 – present: **Associate Professor**, Biological Systems Engineering Department, Center for Precision and Automated Agricultural Systems, *Washington State University*

2010 – 2016: **Assistant Professor**, Biological Systems Engineering Department, Center for Precision and Automated Agricultural Systems, *Washington State University*

2009 – 2010: **Assistant Scientist**, Agricultural and Biosystems Engineering Department, *Iowa State University*

2005 – 2009: **Research Assistant**, Agricultural and Biosystems Engineering Department, *Iowa State University*

2003 – 2005: **Research Assistant**, RS and GIS Field of Studies and Asian Center for Research on Remote Sensing, *Asian Institute of Technology*, Thailand

2002 - 2003: **Lecturer**, *Tribhuvan University*, Nepal

1997 – 1998: **Junior Civil Engineer**, *Building Design Authority*, Nepal

HONORS AND AWARDS

Honorary Membership

- Phi Kappa Phi Honor Society - 2009
- Tau Beta Pi, The Engineering Honor Society (TBP)
- Alpha Epsilon, Honor Society of Agricultural, Food, and Biological Engineers (AE)

Awards, Certificates and Recognitions

- *Nominated for 2017 New Holland Young Researcher Award, American Society of Agricultural and Biological Engineers.*
- *Invited Participant, Next Generation Leaders Event, International Commission of Agricultural and Biosystems Engineering (CIGR), 2015.*

- *Certificate of Excellence in Reviewing, Computers and Electronics in Agriculture*, 2014.
- *Outstanding Reviewers Award, American Society of Agricultural and Biological Engineers*, 2013.
- *Honorable Mention Paper Award* (In the recognition of authorship of a literature of exceptional merit), **American Society of Agricultural and Biological Engineers**, 2011.
- *Research Excellence Award* (In the recognition of outstanding research performance among the 2009-2010 graduates), **Iowa State University**, 2009.
- *The Rev. P.T. Taiganides Award* (In the recognition of the most outstanding academic performance among agricultural engineering PhD students), **Iowa State University**, 2009.
- *The AIT Alumni Association Prize* (In the recognition of the most outstanding academic performance among students in the School of Technologies), **Asian Institute of Technology**, THAILAND, 2005.

MAJOR SEMINARS

- Birds Deterrence in Fruit Crops Using UAS, *Washington Small Fruit Conference*, Nov 30 – Dec 2, 2016, Lynden, WA.
- Mechanism for Bundling and Tying of Red Raspberry Promicanes, *Washington Small Fruit Conference*, Nov 30 – Dec 2, 2016, Lynden, WA.
- Automation Technologies for Specialty Crops, *Washington Small Fruit Conference*, Nov 30 – Dec 2, 2016, Lynden, WA.
- UAVs for Pest Management, *2016 Mid-Atlantic Crop School*, Ocean City, MD, Nov 15-17, 2016.
- Automated and Robotic Weeding in Vegetable Crops, *Annual Meeting of Oregon Society of Weed Science*, Hood River, OR, Oct 25, 2016.
- Recent Advancement in Tree Fruit Harvesting Technologies, *IEEE Distinguished Lecture Series*, Amrita University, Kerala, India, August 7, 2016.
- Automated Fresh Market Tree Fruit Harvesting - Where Do We Stand? *Workshop on Smart Life and City*, Beijing, China, July 7, 2016.
- Automated Fresh Market Tree Fruit Harvesting - Where Do We Stand? *Invited Seminar Series*, Penn State University, State College, PA, June 2, 2016.
- Panel Moderator, Recent Development and Future Trend in Precision Chemical Application Technologies, *2016 Precision Ag Expo*, Kennewick WA, Jan 7, 2016.
- Robotic Technologies for Specialty Crop Production - Emerging Technology Panel, *2016 Precision Ag Expo*, Kennewick WA, Jan 7, 2016.
- Robotics and Automation in Agriculture, *Undergraduate Seminar*, Heritage University, Toppenish, WA, Nov 23, 2015
- Engineering Developments – UAVs, *Advanced Technology for Precision IPM: Development and Legal Considerations with Examples from the Field*, 8th International IPM Symposium, Salt Lake City, UT, March 23-25, 2015.
- Human Robot Collaboration for Apple Harvesting, *2nd International Conference on Agricultural and Food Engineering (CAFEi2014)*, Kuala Lumpur, Malaysia, Dec 1-3, 2014.
- The State of Drones for Agriculture (Keynote Speech), *Annual Meeting of Washington State Grape Society*, Grandview, WA, Nov 13, 2014.
- Robotics and Automation in Agriculture, *Undergraduate Seminar*, Heritage University, Toppenish, WA, March 19, 2014
- Robotics and Automation in Agriculture (Keynote Speech), *Zillah Robotics Competition*, March 8, 2014.
- Pruning Branch Identification for Automated Pruning of Apple Trees, *IEEE Agricultural Robotics Group Webinar*, May 6, 2013.

- Automation and Mechanization Research for Specialty Crops, *Annual Hermiston Farm Fair and Trade Show*, Hermiston, OR; 11/29/2012.
- Pruning Branch Identification for Automated Pruning of Apple Trees, *Specialty Crop Engineering Solutions Workshop*, Pittsburg, PA; 11/28/2012.
- Precision Agriculture in Specialty Crops: Accomplishments, Challenges and Future Direction. *First International Precision Agriculture Forum*, Richland, WA; 3/15-16/2012.
- Mechanization in Berry Crops. *WA Small Fruit Conference*; Lynden, WA; 12/9/2011.

GRANTS AND FUNDING

Funded Projects

1. Silwal, A. and **Karkee, M.** (Co-PIs); 2016-2017. *In-tree crop load estimation of apples with Smartphone*; WSU Office of Commercialization.
2. **Karkee, M.** (PI); Taylor, M.; Zhang, Q.; 2016 – 2018; *Unmanned Aerial Systems (UASs) for Mitigating Bird Damage in Fruit Crops*; Washington State University Emerging Research Issues Program.
3. **Karkee, M.** (PI), L. He, C. Mo, and Q. Zhang; 2016-2017; *The Blue Challenge for the Future Harvest; Naturipe Farms*.
4. DeKleine, M. (PI); **Karkee, M.**; 2015; *Commercializing an apple harvesting system by integrating three critical technologies: fruit removing end-effector; fruit catching structure; and transportation mechanism*; WSU Office of Commercialization.
5. **Karkee, M. (PD)**; Whiting, M.; Zhang, Q.; 2014-2017; *Shake and Catch Harvesting for Fresh Market Apples*. USDA-NIFA Agriculture and Food Research Initiative.
6. Slaughter, D. (PD); Fennimore, S.; Giles, K.; **Karkee, M.**; Siemens, M.; Smith, R.; Tourte, L.; Upadhyaya, S.; Voigtoukas, S.; Zhang, Q.; 2015-2019; *Crop Signaling for Automated Weed/Crop Differentiation and Mechanized Weed Control in Vegetable Crops*; USDA Specialty Crop Research Initiative.
7. **Karkee, M. (PI)**; Leachman, J.; Taylor, M.; Zhang, Q.; 2014 – 2016; *Unmanned Aerial Systems (UASs) for Mitigating Bird Damage in Blueberry Crops: Proof of Concept*; WA Blueberry Commission.
8. **Bierlink, H. and Karkee, M. (PIs)**; Tarara, J.; 2014-2017; *Mechanizing red raspberry pruning and cane tying*; WSDA – Specialty Crop Block Grant.
9. **Karkee, M. (PI)**; Lewis, K; Mo, C.; Zhang, Q; 2013 - 2016; *Human-machine collaboration for automated harvesting of tree fruit*; National Robotics Initiative - National Science Foundation/USDA.
10. **Karkee, M. (PI)**, Tarara, J.; Walters, T.; 2013–2016; *Red Raspberry trellising demonstration plot for development of automation technologies*; Washington Red Raspberry Commission.
11. **Karkee, M. (PD)**, Zhang, Q.; Lewis, K.; De Kleine, M.; 2012-2013; *Design and development of apple harvesting techniques*; Washington Tree Fruit Research Commission.
12. Hashimoto (PD), Cooper, Eggeman, Jakeway, **Karkee**, Khanal, Murray, Murthy, Ogoshi, Regentin, Vaughn, Yanagida, Zhang; 2012-2016; *Conversion of High-Yield Tropical Biomass into Sustainable Biofuels*; USDA Biomass Research and Development Initiative.
13. **Karkee, M. (PD)**; Lewis, K.; 2012; *Study Tour Proposal to 2012 World Ag Expo, Tulare, CA (Feb 13-16, 2012)*; Washington Tree Fruit Research Commission.
14. Whiting, M (PD); Almenar, E.; Dhingra, A.; Grant, J.; Harte, J.; **Karkee, M.**; Long, L.; Oraguzie, N.; Ross, C.; Seavert, C. F.; Zhang, Q.; 2009-2014; *A total systems approach to developing a sustainable, stem-free sweet cherry production, processing, and marketing system*; USDA Specialty Crops Research Initiative.
15. Grieshop, M (PD); Agnello, A.; Brunner, J.; Cox, K.; DeMarree, A.; Flore, J.; Gut, L.; Hanrahan, I.; Hoheisel, G.; **Karkee, M.**; Landers, A.; Lang, G.; Lizotte, E.; Miller, J.; Miller, S.; Nye, J.; Perry, R.;

- Rothwell, N.; Schmidt, T.; Shumway, J.; Styles, S.; Sundin, G.; Wise, J.; Whalon, M.; Whiting, M.; Xiao, C.; Zhang, Q.; 2011-2014; *Development and Optimization of Solid-Set Canopy Delivery Systems for Resource-Efficient, Ecologically Sustainable Apple and Cherry Production*; USDA Specialty Crops Research Initiative.
16. **Karkee, M. (PI)**; Zhang, Q.; Lewis, K.; 2011-2013; *3D machine vision for improved apple crop load estimation*; Washington Tree Fruit Research Commission.
 17. Zhang (PD), Clary, C.; **Karkee, M.**; Walters; T.; Whiting, M.; 2011-2013; *Placing Fruit Canopy Management Automation Technology in the Field*; USDA Specialty Crops Research Initiative.
 18. Alva, A., **M. Karkee**, and Zhang; 2011- 2015; *Nutrient and Water Stress Sensing for Potatoes*; USDA
 19. **Karkee, M (PI)**; 2011-2012; *Machine Vision System for Mechanical Pruning of Apple Trees*; New Faculty Seed Grant, Washington State University.
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PATENTS

Patent

- De Kleine, M., Y. Ye, and **M. Karkee**. 2016. *Harvesting machine for formally trained orchards*. US Patent # US 2016/0120124 A1.
- Davidson, J., C. Mo, A. Silwal, **M. Karkee**, Q. Zhang; 2016. Robotic systems, methods, and end-effectors for harvesting produce; US Patent Application No.: 14/849,729. **Accepted**.

Invention Disclosure

- Silwal, A., **M. Karkee**, Q. Zhang; 2016. Acquiring well-exposed images in outdoor orchard environment for robotic tree fruit harvesting. Invention Disclosure with Washington State University.
 - **Karkee, M.**, L. He, Q. Zhang; 2016; Multi-Layer Shake and Catch Harvesting System. Invention Disclosure with Washington State University.
 - **Karkee, M.**, A. Silwal, S. Bhusal. 2016. Smart-phone App for automated in-tree crop load estimation of apples. Invention Disclosure with Washington State University.
 - Taylor, M., J. Leachman, **M. Karkee**, and Q. Zhang. 2015. *Unmanned Aerial Vehicles for Bird Deterrence, Monitoring and Surveillance*. Invention Disclosure with Washington State University.
 - Mo, Changki, Q. Zhang, and **M. Karkee**. 2015. *An exoskeleton type wearable, lifting-walking robot for orchard operations*. Invention Disclosure with Washington State University.
 - Zhang, Q., L. He, **M. Karkee**, L. Chen, and S. Kaewkorn, 2015. *A Robotic Weeding Platform for Organic Vegetable Crops*. Invention Disclosure with Washington State University.
 - **Karkee, M.**, L. He, C. Mo., and Q. Zhang. 2015. *Robotic Harvesting Solutions for Fresh Market Blueberries*. Robotic Harvesting Solutions for Fresh Market Blueberries
 - Silwal, A., **M. Karkee**, Q. Zhang, 2015. *Acquiring well-exposed images in outdoor orchard environment for robotic tree fruit harvesting*. Invention Disclosure with Washington State University.
 - Ma, S, **M. Karkee**, D. Sun, Q. Zhang, 2015. *Air suspension catcher for apple mechanical harvesting*. Invention Disclosure with Washington State University.
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PUBLICATIONS

Peer Reviewed Journal Articles

1. Zhou, J., L. He, M. Whiting, S. Amatya, P. Larbi, **M. Karkee**, and Q. Zhang. 2016. Field evaluation of a mechanical-assist cherry harvesting system. *Engineering in Agriculture, Environment and Food*, 9(4): 324-331.
2. Silwal*, A., **M. Karkee**, and Q. Zhang. 2016. A Hierarchical approach of apple identification for robotic harvesting. *Transaction of the ASABE*. 59(5): 1079-1086.

3. Santiago*, W. E., N. J. Leite, B. J. Teruel, **M. Karkee**, C. A. M. Azania, and R. Vitorino. 2016. Development and testing of image processing algorithm to estimate weed infestation level in corn fields. *Australian Journal of Crop Science*. 10(9): 12232-1237.
4. Davidson, J., A. Silwal*, **M. Karkee**, C. Mo, and Q. Zhang. 2016. Hand Picking Dynamic Analysis for Undersensed Robotic Apple Harvesting. *Transactions and the ASABE*, Vol. 59(4): 745-758.
5. Li*, J., **M. Karkee**, Q. Zhang, K. Xiao, and T. Feng. 2016. Characterizing apple fruit robotic picking patterns and detaching parameters. *Computers and Electronics in Agriculture*, 127:633-640.
6. Ma*, S., P. A. Scharf, Q. Zhang, **M. Karkee**, J. Tong, and L. Yu. 2016. Effect of Cane Stool Density and Stubble Height on Sugarcane Stubble Damage in Hawaii Fields. *Transactions and the ASABE*, 59(3): 813-820.
7. Amatya*, S., and **M. Karkee**, 2016. Integration of visible branch sections and cherry clusters for detecting cherry tree branches in dense foliage canopies. 2016. *Biosystems Engineering*, 119:72-81.
8. Zhou, J., L. He, **M. Karkee**, and Q. Zhang. 2016. Analysis of shaking-induced cherry fruit motion and damage. *Biosystems Engineering*, 144: 105-114.
9. Zhou, J., L. He*, **M. Karkee**, and Q. Zhang. 2016. Effect of Catching Surface and Tilt Angle on Reducing of Bruise Damage of Sweet Cherry due to Mechanical Impact. *Computers and Electronics in Agriculture*, 121:282-289.
10. Amatya*, S., **M. Karkee**, A. Gongal, Q. Zhang, M.D. Whiting. 2016. Detection of Cherry Tree Branches in Planner Architecture for Automated Sweet-Cherry Harvesting. *Biosystems Engineering*. 146:3-15.
11. De Kleine*, M. E., and **M. Karkee**. 2016. A Semi-Automated Harvesting Prototype for Shaking Fruit Tree Limbs. *Transactions of the ASABE*, 58(6): 1461-1470.
12. Gongal*, A., A. Silwal, S. Amatya, **M. Karkee**, Q. Zhang, and K. Lewis. 2016. Apple Crop-load Estimation with Over-the-Row Machine Vision System. *Computers and Electronics in Agriculture*, 20: 26–35.
13. He*, L., J. Zhou, Q. Zhang, **M. Karkee**. 2015. Evaluation of multipass mechanical harvesting on 'Skeena' sweet cherries trained to Y-trellis. *HortScience*, 50(8): 1178-1182.
14. Ma*, S., P. A. Scharf, **M. Karkee**, and Q. Zhang. 2015. Performance Evaluation of a Chopper Harvester in Hawaii Sugarcane Fields. *The Transactions of ASABE*, 58(2): 271-279.
15. Gongal*, A., S. Amatya, **M. Karkee**, Q. Zhang, and K. Lewis. 2015. Sensors and Systems for Fruit Detection and Localization: A Review. *Computers and Electronics in Agriculture*, 116:8-19. **Most Downloaded in Jan 2016.**
16. Larbi* P., S. Amatya, **M. Karkee**, Q. Zhang, and M. Whiting. 2015. Modification and Field Evaluation of an Experimental Mechanical Sweet Cherry Harvester. *Applied Engineering in Agriculture*, 31(3):387-397.
17. Larbi*, P., C. N Vong, **M. Karkee**. 2015. A Study of Operator Performance for a Mechanical Sweet Cherry Harvester: Comparison between Manual and Remote-Controlled Operation. *Journal of Agricultural Safety and Health*, 21(3): 145-157.
18. De Kleine*, M.E., and **M. Karkee**. 2015. Evaluating a non-Newtonian Shear Thickening Surface during Fruit Impacts. *The Transactions of ASABE*, 58(3): 907-915.
19. **Karkee, M.**, and B. Adhikari*. 2015. A Method for Three Dimensional Reconstruction of Apple Trees for Automated Pruning. *Transactions of the ASABE*, 58(3): 565-574.
20. Sharda*, A., **M. Karkee**, Q. Zhang, J. Brunner, I. Ewlanow, and U. Adameit. 2015. Effect of emitter type and mounting configuration on spray coverage for Solid Set Canopy Delivery Systems. *Computers and Electronics in Agriculture*, 112: 184-192.
21. Silwal*, A., A. Gongal, and **M. Karkee**. 2014. Apple identification in field environment with over the row machine vision system. *Agricultural Engineering International: CIGR Journal*, 16(4): 66-75.

22. Ma*, S., **M. Karkee**, P. A. Scharf, and Q. Zhang. 2014. Sugarcane Harvester Technology: a Critical Overview. *Applied Engineering in Agriculture*, 30(5): 727-739.
23. Zhou, J., L. He, Q. Zhang, and **M. Karkee**. 2014. Effect of Excitation Position of a Handheld Shaker on Fruit Removal Efficiency and Damage in Mechanical Harvesting of Sweet Cherry. *Biosystems Engineering*, 125:36-44.
24. **Karkee, M.**, B. Adhikari*, S. Amatya, and Q. Zhang. 2014. Identification of Pruning Branches in Tall Spindle Apple Trees for Automated Pruning. *Computers and Electronics in Agriculture*, 103(2014):127-135.
25. Larbi*, P. A., and **M. Karkee**. 2014. Effects of Orchard Characteristics and Operator Performance on Harvesting Rate of a Mechanical Sweet Cherry Harvester. *GSTF Journal on Agricultural Engineering*, 1(1): 1-11.
26. Amatya*, S., **M. Karkee**, A. K. Alva, P. A. Larbi, and B. Adhikari. 2014. Hyperspectral Imaging for Detecting Water Stress in Potatoes. *GSTF Journal on Agricultural Engineering*, 1(1): 52-61.
27. Zhou, J., L. He, Q. Zhang, X. Du, D. Chen, and **M. Karkee**. 2013. Evaluation of the Influence of Shaking Frequency and Duration in Mechanical Harvesting of Sweet Cherry. *Applied Engineering in Agriculture*, 29(5): 607-612.
28. He, L., J. Zhou, X. Du, D. Chen, Q. Zhang, and **M. Karkee**. 2013. Energy Efficacy Analysis of a Mechanical Shaker in Sweet Cherry Harvest. *Biosystems Engineering*, 116(4): 309-315.
29. He, L., X. Du, R. Luo, **M. Karkee**, Q. Zhang. 2012. A Twining Robot for High Trellis String Tying in Hops Production. *The Transactions of ASABE*, 55(5): 1167-1173.
30. **Karkee, M.**, R. McNaull, S. J. Birrell, and B. L. Steward. 2012. Estimation of Optimal Biomass Removal Rate Based on Tolerable Soil Erosion for Single-Pass Crop Grain and Biomass Harvesting System. *The Transactions of the ASABE*, 55(1): 107-115.
31. Abd Aziz, S., B. L. Steward, A. Kaleita, and **M. Karkee**. Assessing the Effects of DEM Error Uncertainty on Soil Loss Estimation in Agricultural Field. *The Transactions of the ASABE*, 55(3): 785-798.
32. **Karkee, M.**, and B. L. Steward. 2011. Parameter Estimation and Validation of a Tractor and Single Axle Towed Implement Dynamic System Model. *Computers and Electronics in Agriculture*, 77(2): 135-146.
33. **Karkee, M.**, B. L. Steward, A. G. Kelkar, and Z. T. Kemp II. 2011. Modeling and Real-time Simulation Architectures for Virtual Prototyping of Off-Road Vehicles. *Virtual Reality*, 15(1):83-96.
34. **Karkee, M.**, and B. L. Steward. 2010. Study of the Open and Closed Loop Characteristics of a Tractor and a Single Axle Towed Implement System. *Journal of Terramechanics*, 47(6): 379-393.
35. **Karkee, M.**, and B. L. Steward. 2010. Local and Global Sensitivity Analysis of a Tractor and Single Axle Grain Cart Dynamic System Model. *Biosystems Engineering*, 106(4): 352-366.
36. Abd Aziz, S., B. L. Steward, L. Tang, and **M. Karkee**. 2010. Using Spatial Uncertainty of Prior Measurements to Design Targeted Sampling of Elevation Data. *The Transactions of the ASABE*, 53(2): 349-357.
37. **Karkee, M.**, B. L. Steward, L. Tang, and S. Abd Aziz. 2009. Quantifying Sub-pixel Signature of Paddy Rice Field Using Neural Network. *Computers and Electronics in Agriculture*, 65 (2009): 65-76.
38. Abd Aziz, S., B. L. Steward, L. Tang, and **M. Karkee**. 2009. Utilizing Repeated GPS Measurement from Field Operations for Development of Agricultural Field DEM. *The Transactions of the ASABE*, 52(4): 1057-1067.
39. **Karkee, M.**, B. L. Steward, and S. Abd Aziz. 2008. Improving Quality of Digital Elevation Models through Data Fusion. *Biosystems Engineering*, 101(3): 293-305.

Peer Reviewed Extension Article

1. Khot, L., Q. Zhang, **M. Karkee**, S. Sankaran, and K. Lewis. 2015. Small Unmanned Aerial Systems in Agriculture: Part I (Systems) - UAS in Ag Series. *WSU Extension*.

Book Chapters

1. **Karkee, M.**, A. Silwal, J.R. Davidson. 2017. Mechanical Harvest and In-field Handling of Tree Fruit Crops. Book Chapter; Chapter on '*Automation in Tree Fruit Production, Principles and Practice*. Editor: Qin Zhang'. In Press.
2. **Karkee, M.**, Q. Zhang, and A. Silwal. 2017. Agricultural Robots for Precision Agricultural Tasks in Tree Fruit Orchards. Book Chapter on '*Innovation in Agricultural Robotics for Precision Agriculture*. Editor: Avital Bechar'. In Press.
3. Zhang, Q., **M. Karkee** and L. Khot. 2017. Mechanization and automation for apple production. *Chapter on 'Achieving Sustainable Cultivation of Apples'* Editor: Kate Evans. In Press.
4. **Karkee, M.**, B. Steward, and J. Kruckeberg. 2013. Automation of Pesticide Application Systems. In *Agricultural Automation: Fundamentals and Practices* (Q. Zhang and F. Pierce editors; ISBN: 9781439880579). CRC Press: Boca Raton, Florida, USA.

Invited Articles

1. Zhang, Q. and **M. Karkee**. 2016. Fully Automated Tree Fruit Harvesting. Invited Article, *ASABE Resource Magazine*, Nov/Dec 2016.
2. **Karkee, M.** and Q. Zhang. 2012. Mechanization and Automation Technologies in Specialty Crop Production. Invited Article, *ASABE Resource Magazine*, Sep/Oct 2012: 16-17.

Referred Conference Proceedings

1. Shrestha, A. M. Karkee, and Q. Zhang. 2016. Mechanism for Bundling and Tying of Red Raspberry Primocanes. Proceedings of the 5th IFAC Conference on Sensing, Control and Automation Technologies for Agriculture; Seattle, WA; August 14-17, 2016.
2. Ma*, S., M. Karkee, H. Fu, D. Sun, and Q. Zhang. 2016. Air Suspension-based Catching Mechanism for Mechanical Harvesting of Apples. Proceedings of the 5th IFAC Conference on Sensing, Control and Automation Technologies for Agriculture; Seattle, WA; August 14-17, 2016.
3. He*, L., H. Fu, M. Karkee, and Q. Zhang. 2016. Effect of Fruit Location on Apple Detachment with Mechanical Shaking. Proceedings of the 5th IFAC Conference on Sensing, Control and Automation Technologies for Agriculture; Seattle, WA; August 14-17, 2016.
4. Fu*, H., L. He, S. Ma, M. Karkee, D. Chen, Q. Zhang, and S. Wang. 2016. Bruise Responses of Apple-to-Apple Impact. Proceedings of the 5th IFAC Conference on Sensing, Control and Automation Technologies for Agriculture; Seattle, WA; August 14-17, 2016.
5. Chen*, L., S. Kaewkorn, L. He, Q. Zhang, and M. Karkee. 2016. Design and Evaluation of a Levelling System for a Weeding Robot. Proceedings of the 5th IFAC Conference on Sensing, Control and Automation Technologies for Agriculture; Seattle, WA; August 14-17, 2016.
6. Davidson*, J.R., A. Silwal, C.J. Hohimer, M. Karkee, C. Mo, and Q. Zhang. 2016. Proof-of-Concept of a Robotic Apple Harvester. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Daejon, Korea, October 9 - 14, 2016.
7. Davidson*, J., C. Mo, A. Silwal, **M. Karkee**, J. Li, K. Xiao, and Q. Zhang. 2015. Human-Machine Collaboration for Robotic Harvesting of Fresh Market Apples. *ICRA 2015 Workshop on Robotics in Agriculture*; 30 May, 2015; Seattle, WA.
8. Gongal, A., S. Amatya, **M. Karkee***, Q. Zhang, and K. Lewis. 2014. Identification of Repetitive Apples for Improved Crop-Load Estimation with Dual-Side Imaging. *Proceedings of The 19th World Congress of the International Federation of Automatic Control*; 24-29 August 2014; Cape Town, South Africa.
9. Monga, M.*, **M. Karkee**, S. Sun, L. K. Tondehal, B. L. Steward, A. Kelkar, J. Zambreno. 2012. Real-time Simulation of Dynamic Vehicle Models using a High-performance Reconfigurable Platform.

International Conference on Computational Science, ICCS 2012, June 4-6, 2012, Ames, IA 50011 USA.

10. **Karkee, M.***, M. Monga, B. L. Steward, J. Zambreno, A. G. Kelkar. 2010. Real-time Simulation and Visualization Architecture with Field Programmable Gate Array (FPGA) Simulator. *The Proc. of the ASME 2010 World Conference on Innovative Virtual Reality (WINVR2010)*, May 12-14, 2010, Ames, Iowa, USA.
11. Aziz*, S. A., B. L. Steward, L. Tang, and **M. Karkee**. 2006. Multiple GPS Measurements for Digital Elevation Model. *Proceedings of the 8th Int'l. Conf. on Precision Agriculture*, Eds. R. H. Rust and W. E. Larson, Madison WI: ASA- CSSA-SSSA.

Non-Referred Conference Papers

1. **Karkee***, M., Q. Zhang, M. Whiting, L. He, H. Fu, and H. Xia. 2016. Localized shake-and-catch harvesting for fresh market apples. *CIGR-AgEng Conference*. June 26-29, Aarhus, Denmark.
2. He*, L., H. Fu, D. Sun, **M. Karkee**, and Q. Zhang – 2016. A Shake and Catch Harvesting System for ‘Jazz’ Apples Trained in Vertical Fruiting Wall Architecture. *ASABE Paper No. 162461420*. St. Joseph, Mich.: ASABE.
3. Fu*, H., L. He, S. Ma, **M. Karkee**, D. Chen, Q. Zhang, and S. Wang. 2016. Impact Bruise Responses for “Jazz” Apple on Different Materials of Catch Surface. *ASABE Paper No. 162461461*. St. Joseph, Mich.: ASABE.
4. Silwal*, A., J. Davidson, **M. Karkee**, C. Mo, and Q. Zhang. 2016. Effort towards robotic apple harvesting in Washington State. *ASABE Paper No. 162460869*. St. Joseph, Mich.: ASABE.
5. Ma*, S., P. A. Scharf, **M. Karkee**, and Q. Zhang. 2015. Adaptability of Chopper Harvester in Harvesting Sugarcane, Energy Cane, and Banagrass. *ASABE Paper No. 152157706*. St. Joseph, Mich.: ASABE.
6. Amatya*, S. and **M. Karkee**. 2015. Detection of cherry tree branches for automated shake-and-catch harvesting. *ASABE Paper No. 152158372*. St. Joseph, Mich.: ASABE.
7. Silwal*, A., **M. Karkee**, and Q. Zhang. 2015. A Hierarchical approach of apple identification for robotic harvesting. *ASABE Paper No. 152167504*. St. Joseph, Mich.: ASABE.
8. Ma*, S., P. Scharf, **M. Karkee**, Q. Zhang, J. Tong, and L. Yu. 2014. Effects of Off-Track Errors of a Sugarcane Harvester On Stubble Height and Weight. *Proceedings of the 6th Automation Technology for Off-road Equipment Conference (ATOE)*, 15-19 September 2014, Beijing, China.
9. Silwal*, A., A. Gongal, and **M. Karkee**. 2014. Apple Identification In Field Environment With Over The Row Machine Vision System. *Proceedings of the 6th Automation Technology for Off-road Equipment Conference (ATOE)*, 15-19 September 2014, Beijing, China.
10. Sharda, A., D. Mangus, **M. Karkee***, and Q. Zhang. 2014. Effect Of Time Of Application On Spray Coverage Using Solid Set Canopy Delivery System. *Proceedings of 12th International Conference on Precision Agriculture*; July 20-23, Sacramento, CA.
11. De Kleine, M.E., **M. Karkee***, K. Lewis, and Q. Zhang. 2014. A Dual Motor Actuator used to Detach Fruit by Shaking Limbs of Fruit Trees. *Proceedings of 12th International Conference on Precision Agriculture*; July 20-23, Sacramento, CA.
12. Gongal*, A., S. Amatya, and **M. Karkee**. 2014. Identification of Repetitive Apples for Improved Crop-Load Estimation with Dual-Side Imaging. *ASABE Paper No. 141888882*. St. Joseph, Mich.: ASABE.
13. Tong*, J., Q. Zhang, M. Karkee, H. Jiang, and J. Zhou. 2014. Understanding the Dynamics of Hand Picking Patterns of Fresh Market Apples. *ASABE Paper No. 141898024*. St. Joseph, Mich.: ASABE.
14. De Kleine*, M. E., **M. Karkee**, K. Lewis, and Q. Zhang. 2014. An End Effector Concept for Removing Fresh-Market Apples from a Tree Limb. *ASABE Paper No. 141906284*. St. Joseph, Mich.: ASABE.

15. Larbi*, P. A., **M. Karkee**, S. Amatya, Q. Zhang, and M. D. Whiting. 2014. Field Evaluation of a Modified Mechanical Sweet Cherry Harvester. *ASABE Paper No. 141896871*. St. Joseph, Mich.: ASABE.
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17. Larbi*, P.A., S. Amatya, and **M. Karkee**. 2013. Characterizing the Response of a Hyperspectral Camera Used in Close Range Imaging under Laboratory Conditions. *ASABE Paper No. 1594789*. St. Joseph, Mich.: ASABE.
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19. Sharda*, A., **M. Karkee**, Q. Zhang, and I. Ewlanow. 2013. Effect of nozzle type and mounting configuration around tree canopy on product coverage for Solid Set Canopy Delivery System. *ASABE Paper No. 131620700*. St. Joseph, Mich.: ASABE.
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24. Amatya*, S., **M. Karkee**, A. K. Alva, P. A. Larbi, and B. Adhikari. 2012. Hyperspectral Imaging for Detecting Water Stress in Potatoes. *ASABE Paper No. 121345197*. St. Joseph, Mich.: ASABE.
25. He*, L., J. Zhou, X. Du, D. Chen, Q. Zhang, and **M. Karkee**. 2012. Shaking Energy Delivery on Sweet Cherry Trees in Different Excitation Models. *ASABE Paper No. 12-1337766*. St. Joseph, Mich.: ASABE.
26. Zhou*, J. L. He, X. Du, D. Chen, Q. Zhang, and **M. Karkee**. 2012. Dynamic Response of Sweet Cherry Tree to the Vibration of a Limb Shaker. *ASABE Paper No. 12-1337429*. St. Joseph, Mich.: ASABE.
27. Hashimoto*, A., J. Arnold, J. Ayars, S. Crow, T. Eggeman, L. Jakeway, **M. Karkee**, S. Khanal, J. Kiniry, J. Matsunaga, G. Murthy, M. Nakahata, R. Ogoshi, B. Turano, S. Turn, J. Yanagida, and Q. Zhang. 2012. High-Yield Tropical Biomass for Advanced Biofuels. *Sun Grant Initiative National Conference*, New Orleans, LA; Oct 2-5, 2012.

Dissertation/Thesis

1. Modeling, identification and analysis of a tractor and single-axle-towed implement system. *PhD Dissertation*, Iowa State University, 2009.
2. Fusion of stereo-optical and interferometric SAR DEMs. *Master Thesis*, Asian Institute of Technology, 2005.

SUPERVISION

PhD Students

- Santosh Bhusal – PhD Student; Spring 2017–present
- Xin Zhang – PhD Student; Fall 2016 – present (co-supervision)
- Yaqoob Majeed – PhD Student; Fall 2016 – present (co-supervision)
- Lin Chen – PhD Student; Spring 2015 – present (co-supervision)

- Aadit Shrestha – PhD Student; Spring 2015 – Spring 2016
- Abhisesh Silwal – PhD Student; Spring 2014 – Fall 2016; now at Carnegie Mellon University
- Suraj Amatya – PhD Student; Fall 2011 – Fall 2015; now at Purdue University
- Mark De Kleine – PhD Student; Fall 2011 – Fall 2014; now at DeKleine Machines

MS Students

- Kapil Kandel – MS Student; Fall 2016 – present
- Patrick Scharf – Master Student; Spring 2012 – Spring 2016; Now at WSU
- Aleana Gongal – Master Student; Fall 2012 – Fall 2014; now at John Deere
- Bikram Adhikari – Master Student; Spring 2011 – Fall 2012

Research Scientist

- Long He, July 2015–present

Research Associates

- Santosh Bhusal, March, 2016 – Jan, 2017; now at WSU

Post-doctoral Researchers

- Shaochun Ma; Sep 2012 – Nov 2015 (Now Associate Professor at China Agricultural University)
- Peter Larbi; Mar 2012 – Aug 2014 (Now Assistant Professor at Arkansas State University)
- Ajay Sharda; Feb 2012 – Sep 2013 (Now Assistant Professor at Kansas State University)

Visiting Scholars

- Jing Zhang, China Agricultural University (Oct, 2016 – Oct, 2018)
- Hongxing Peng, Lecturer, South China Agricultural University (March 2016–March, 2017)
- Han Fu, China Agricultural University (Oct, 2014 – Oct, 2016)
- Jun Li, South China Agricultural University (July, 2014 – July, 2015)
- Hongmei Xia, Associate Professor, South China Agricultural University (Jan 2015 – Jan, 2016)
- Supod Kaewkorn, PhD Student, Asian Institute of Technology, Thailand; Jan 2015 – Jan 2016
- Gaili Gao, Associate Professor, China Agricultural University; Sep 2014 – Aug, 2015
- Satoshi Yamamoto, Senior Researcher, Protected Cultivation Engineering Lab, National Agriculture and Food Research Organization, Japan; June 2014 – Dec 2014
- Wesley Santiago, PhD Student, State University of Campinas, Brazil; Jan 2014 – June 2014
- Youchun Ding, Associate Professor, Tianjin University of Technology and Education (China); July 2013 – July 2014
- Yanhua Jia, Associate Professor, China Agricultural University; Nov 2012 – Sep 2013

TEACHING

Washington State University

- BSysE 530: Machine Vision for Biological Systems
- BSysE 551 (Advanced Topics): Precision Agriculture Technologies
- BsystE 598: Seminar Series (Co-Coordinator)
- BSysE 552 (Advanced Topics): Data Structures and Algorithms for Geographic Information Systems

Iowa State University

- TSM 337: Fluid Power System Technology
AE/ME 413: Fluid Power Engineering

Tribhuvan University, Nepal

Several undergraduate level classes
