Methane/biochar related papers at MESA Lab, University of California, Merced.

Last updated: 2/25/2023 more information at http://mechatronics.ucmerced.edu/methane

**News/Accepted or submitted to appear in 2023:**

- Derek Hollenbeck, Kevin Zheng, Demitrius Zulevic, YangQuan Chen 2023. "*Swarm Robotic Source Seeking With Fractional Fluxotaxis*" Accepted to appear at the 2023 Int. Conf. on Fractional Derivatives and Applications (ICFDA23), Dubai, UAE, March 2023.
- Di An and YangQuan Chen. 2023 "*Soil carbon smart sensing using optimized stochastic configuration networks (SCN)*" IFAC Int. Conf. on Industrial Artificial Intelligene (IAI 23), Shenyang, China.

**Survey paper widely cited/read:**

- Hollenbeck, Derek, Demitrius Zulevic, and Yangquan Chen. 2021. "Advanced Leak Detection and Quantification of Methane Emissions Using sUAS" Drones 5, no. 4: 117. https://doi.org/10.3390/drones5040117

**Research Monograph under preparation:**

- Derek Hollenbeck, YangQuan Chen, "Environmental sensing using digital twins: Small unmanned aerial systems for methane detection and mapping", Springer, (book project proposal under review, Feb. 2023).

**First grant 2013-2014:** PG&E Fugitive Methane Detection Using Unmanned Aerial Systems.

**First senior capstone project 2014:** PG&E Fugitive Methane Detection Using Unmanned Aerial Systems.

**First startup by lab former member: http://seekops.com/ (2018)**

**First Biochar workshop: https://mechatronics.ucmerced.edu/biochar (2017)**

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| **Early works: (2013-2017)** | | |
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| Fugitive methane leak detection using sUAS and miniature laser spectrometer payload: System, application and groundtruthing tests<br>BJ Smith, G John, LE Christensen, YQ Chen<br>2017 International Conference on Unmanned Aircraft Systems (ICUAS), 369-374 | 20 | 2017 |
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| Applicability of unmanned aerial systems for leak detection<br>B Smith, G John, B Stark, LE Christensen, YQ Chen<br>2016 International Conference on Unmanned Aircraft Systems (ICUAS), 1220-1227 | 15 | 2016 |
| Methane monitoring from small unmanned aerial systems<br>LE Christensen, V Manzatianu, G Matheou, YQ Chen, B Smith, G John<br>Pasadena, CA: Jet Propulsion Laboratory, National Aeronautics and Space … | | 2016 |
| Development and validation of a microbe detecting UAV payload<br>B Smith, M Beman, D Gravano, YQ Chen<br>2015 Workshop on Research, Education and Development of Unmanned Aerial … | 6 | 2015 |
| An outdoor scientific data drone ground truthing test site<br>B Smith, B Stark, T Zhao, YQ Chen<br>2015 International Conference on Unmanned Aircraft Systems (ICUAS), 436-443 | 9 | 2015 |
| The airworthiness and protocol development for night flying missions for small unmanned aerial systems (sUASs)<br>B Stark, B Smith, N Navarrete, YQ Chen<br>2015 International Conference on Unmanned Aircraft Systems (ICUAS), 252-259 | 3 | 2015 |
| An essay on unmanned aerial systems insurance and risk assessment<br>J Knight, B Smith, YQ Chen<br>2014 IEEE/ASME 10th International Conference on Mechatronic and Embedded … | 4 | 2014 |
| Survey of thermal infrared remote sensing for Unmanned Aerial Systems<br>B Stark, B Smith, YQ Chen<br>2014 International Conference on Unmanned Aircraft Systems (ICUAS), 1294-1299 | 44 | 2014 |
| Take-home mechatronics control labs: A low-cost personal solution and educational assessment<br>B Stark, Z Li, B Smith, YQ Chen<br>International Design Engineering Technical Conferences and Computers and … | 40 | 2013 |
| Dynamic flight modeling of a multi-mode flying wing quadrotor aircraft | 16 | 2013 |

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| P Ferrell, B Smith, B Stark, YQ Chen<br><br>2013 International Conference on Unmanned Aircraft Systems (ICUAS), 398-404 | | |
| A guide for selecting small unmanned aerial systems for research-centric applications<br><br>B Stark, B Smith, YQ Chen<br><br>IFAC Proceedings Volumes 46 (30), 38-45 | | |

## Recent works: (see table below)

| Title | Cited by | Year |
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| Digital twin enabled methane emission abatement using networked mobile sensing and mobile actuation<br>D An, YQ Chen<br>2021 IEEE 1st International Conference on Digital Twins and Parallel … | 8 | 2021 |
| A Non-intrusive quantification method for biochar water retention capacity using a portable microwave sensor and machine learning<br>D An, H Niu, YQ Chen<br>2021 9th International Conference on Control, Mechatronics and Automation … | 6 | 2021 |
| Application of smart, swarm and small UAV's for methane emission reduction<br>D An, YQ Chen<br>International Design Engineering Technical Conferences and Computers and … | 3 | 2021 |
| Optimal antenna pairing of a miniaturized radar array for smart sensing of soil carbon content<br>D An, M Difrieri, YQ Chen<br>2022 4th International Conference on Industrial Artificial Intelligence (IAI … | 2 | 2022 |
| A Field Study of Soil Biochar Treatment Response Using Small Unmanned Aerial Systems (sUAS)<br>D An, D Hollenbeck, S Gao, YQ Chen | 1 | 2022 |
| Soil Methane Emission Suppression Control Using Unmanned Aircraft Vehicle Swarm Application of Biochar Mulch-A Simulation Study<br>D An, D Hollenbeck, K Cao, YQ Chen<br>Journal of Information and Intelligence | | 2022 |
| A Miniature Millimeter-Wave Radar Based Contactless Lithium Polymer Battery Capacity Sensing with Edge Artificial Intelligence<br>D An, YQ Chen<br>2022 18th IEEE/ASME International Conference on Mechatronic and Embedded … | | 2022 |
| A Digital Twin Enabled Internet of Living Things (IoLT) Framework for Soil Carbon Management<br>D An, YQ Chen | | 2022 |

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| 2022 18th IEEE/ASME International Conference on Mechatronic and Embedded … | | |
| A Soil Carbon Content Quantification Method Using A Miniature Millimeter Wave Radar Sensor and Machine Learning<br>D An, YQ Chen<br>2022 18th IEEE/ASME International Conference on Mechatronic and Embedded … | | 2022 |
| A Control System Benchmark for Biomass Burning Based Thermoelectric Generation: Modeling and Efficiency Maximization Algorithms<br>RWM Ajcac, J Viola, D An, YQ Chen<br>2022 10th International Conference on Control, Mechatronics and Automation … | | 2022 |
| A Greenhouse Gas Proximity Sensing System Using Chemiresistive Strip and Miniaturized Radar Array<br>D An, Z Liu, D Hollenbeck, YQ Chen<br>2022 10th International Conference on Control, Mechatronics and Automation … | | 2022 |
| Biochar co-compost improves nitrogen retention and reduces carbon emissions in a winter wheat cropping system<br>S Gao, BP Harrison, T Thao, ML Gonzales, D An, TA Ghezzehei, G Diaz, ...<br>GCB Bioenergy https://doi.org/10.1111/gcbb.13028 | | |
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| Single and Multi-sUAS Based Emission Quantification Performance Assessment Using MOABS/DT: A Simulation Case Study<br>D Hollenbeck, D Zulevicl, YQ Chen<br>2022 18th IEEE/ASME International Conference on Mechatronic and Embedded … | | 2022 |
| A Greenhouse Gas Proximity Sensing System Using Chemiresistive Strip and Miniaturized Radar Array<br>D An, Z Liu, D Hollenbeck, YQ Chen<br>2022 10th International Conference on Control, Mechatronics and Automation … | | 2022 |
| A Digital Twin Framework For Environmental Sensing with sUAS<br>D Hollenbeck, YQ Chen<br>Journal of Intelligent & Robotic Systems 105 (1), 1-15 | 3 | 2022 |
| A Field Study of Soil Biochar Treatment Response Using Small Unmanned Aerial Systems (sUAS)<br>D An, D Hollenbeck, S Gao, YQ Chen<br>Proceedings of the International Conference on Unmanned Aircraft Systems | 1 | 2022 |
| A Modified Near-Field Gaussian Plume Inversion Method Using Multi-sUAS for Emission Quantification | 1 | 2022 |

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| Digital twin behavior matching of gas plumes using a fixed sensor mesh and dynamic mode decomposition<br>D Hollenbeck, YQ Chen<br>International Design Engineering Technical Conferences and Computers and … | 1 | 2021 |
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| Multi-UAV method for continuous source rate estimation of fugitive gas emissions from a point source<br>D Hollenbeck, YQ Chen<br>2021 International Conference on Unmanned Aircraft Systems (ICUAS), 1308-1313 | 6 | 2021 |
| Individual and collective foraging in autonomous search agents with human intervention<br>DS Schloesser, D Hollenbeck, CT Kello<br>Scientific Reports 11 (1), 8492 | 2 | 2021 |
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| Evaluating a UAV-based Mobile Sensing System Designed to Quantify Ecosystem-based Methane<br>D Hollenbeck, K Manies, YQ Chen, D Baldocchi, ES Euskirchen, ... | 6 | 2021 |
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| Characterization of ground-to-air emissions with sUAS using a digital twin framework<br>D Hollenbeck, YQ Chen<br>2020 International Conference on Unmanned Aircraft Systems (ICUAS), 1162-1166 | 10 | 2020 |
| Social Foraging in Groups of Search Agents with Human Intervention.<br>D Schloesser, D Hollenbeck, CT Kello<br>CogSci | | 2020 |
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| Application of the bc GHGMapper™ platform for the Alberta Methane Field Challenge (AMFC)<br>M Whiticar, D Hollenbeck, B Billwiller, C Salas, L Christensen<br>Geoscience BC Summary of Activities, 2020-02 | 8 | 2019 |
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| Wind measurement and estimation with small unmanned aerial systems (suas) using on-board mini ultrasonic anemometers<br>D Hollenbeck, G Nunez, LE Christensen, YQ Chen<br>2018 International Conference on Unmanned Aircraft Systems (ICUAS), 285-292 | 25 | 2018 |