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UAV-based Air Pollutant Source Localization Using Gradient and Probabilistic Methods (Conference Paper)

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Abstract

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This work proposes an algorithm for air pollutant source localization using an Unmanned Aerial Vehicle (UAV). The algorithm combines a gradient-based search with a probabilistic method to localize the pollutant source. The design of the gradient-based search component is based on the simulated annealing metaheuristic and allows to trace the plume of pollutant. The probabilistic component contributes to generate a heuristic position of the source location, which is used by the gradient-based metaheuristic to navigate towards the source position, reducing the searching region at each sampling time. The proposed algorithm was tested in a simulated polluted environment. The results showed high effectiveness and robustness of the proposed strategy. © 2018 IEEE.

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- 1 Šmídl, V., Hofman, R.
Tracking of atmospheric release of pollution using unmanned aerial vehicles

(2013) *Atmospheric Environment*, 67, pp. 425-436. Cited 25 times.
doi: 10.1016/j.atmosenv.2012.10.054

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- 2 Egorova, T., Demetriou, M.A., Gatsonis, N.A.
Estimation of a gaseous release into the atmosphere using an unmanned aerial vehicle

(2015) *2015 European Control Conference, ECC 2015*, art. no. 7330652, pp. 873-878. Cited 3 times.
ISBN: 978-395242693-7
doi: 10.1109/ECC.2015.7330652

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- 3 Gatsonis, N.A., Demetriou, M.A., Egorova, T.
Real-time prediction of gas contaminant concentration from a ground intruder using a UAV

(2015) *2015 IEEE International Symposium on Technologies for Homeland Security, HST 2015*, art. no. 7225276. Cited 5 times.
ISBN: 978-147991737-2
doi: 10.1109/THS.2015.7225276

[View at Publisher](#)

- 4 Cabrita, G., De Sousa, P.A.M., Marques, L.
Odor guided exploration and plume tracking-particle plume explorer
(2011) *ECMR*, pp. 183-188. Cited 2 times.
örebro, Sweden, September

- 5 Alvear, O., Zema, N.R., Natalizio, E., Calafate, C.T.
Using UAV-based systems to monitor air pollution in areas with poor accessibility
([Open Access](#))

(2017) *Journal of Advanced Transportation*, 2017, art. no. 8204353. Cited 13 times.
<https://www.hindawi.com/journals/jat/>
doi: 10.1155/2017/8204353

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- 6 Kristiansen, R., Oland, E., Narayanachar, D.
Operational concepts in UAV formation monitoring of industrial emissions

(2012) *3rd IEEE International Conference on Cognitive Infocommunications, CogInfoCom 2012 - Proceedings*, art. no. 6422003, pp. 339-344. Cited 4 times.
ISBN: 978-146735187-4
doi: 10.1109/CogInfoCom.2012.6422003

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- 7 Han, J., Xu, Y., Di, L., Chen, Y.
Low-cost multi-UAV technologies for contour mapping of nuclear radiation field

(2013) *Journal of Intelligent and Robotic Systems: Theory and Applications*, 70 (1-4), pp. 401-410. Cited 67 times.
doi: 10.1007/s10846-012-9722-5

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- 8 Shen, Z., He, Z., Li, S., Wang, Q., Shao, Z.
A multi-quadcopter cooperative cyber-physical system for timely air pollution localization

(2017) *ACM Transactions on Embedded Computing Systems*, 16 (3), art. no. 70. Cited 3 times.
<http://www.acm.org/tecs/>
doi: 10.1145/3005716

[View at Publisher](#)

- 9 Nurzaman, S.G., Matsumoto, Y., Nakamura, Y., Koizumi, S., Ishiguro, H.
Biologically inspired adaptive mobile robot search with and without gradient sensing

(2009) *2009 IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2009*, art. no. 5353998, pp. 142-147. Cited 17 times.
ISBN: 978-142443804-4
doi: 10.1109/IROS.2009.5353998

[View at Publisher](#)

- 10 Lochmatter, T., Martinoli, A.
Tracking Odor Plumes in a Laminar Wind Field with Bio-inspired Algorithms

(2009) *Springer Tracts in Advanced Robotics*, 54, pp. 473-482. Cited 34 times.
ISBN: 978-364200195-6
doi: 10.1007/978-3-642-00196-3_54

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- 11 Neumann, P.P., Hernandez Bennetts, V., Lilienthal, A.J., Bartholmai, M., Schiller, J.H.
Gas source localization with a micro-drone using bio-inspired and particle filter-based algorithms

(2013) *Advanced Robotics*, 27 (9), pp. 725-738. Cited 81 times.
doi: 10.1080/01691864.2013.779052

[View at Publisher](#)

- 12 Pang, S., Farrell, J.A.
Chemical plume source localization

(2006) *IEEE Transactions on Systems, Man, and Cybernetics, Part B: Cybernetics*, 36 (5), pp. 1068-1080. Cited 133 times.
doi: 10.1109/TSMCB.2006.874689

[View at Publisher](#)

- 13 Van Milligen, B.Ph., Bons, P.D., Carreras, B.A., Sánchez, R.
On the applicability of Fick's law to diffusion in inhomogeneous systems

(2005) *European Journal of Physics*, 26 (5), pp. 913-925. Cited 47 times.
doi: 10.1088/0143-0807/26/5/023

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- 14 Hosseinin, B.
(2013) *Dispersion of Pollutants in the Atmosphere: A Numerical Study*. Cited 3 times.
Master's thesis, Simon Fraser University, Canada

- 15 Daly, A., Zannetti, P.
Air pollution modeling-an overview
(2007) *Ambient Air Pollution*, pp. 15-28. Cited 38 times.
(accessed 12. 04. 2018)
<http://envirocomp.org/books/chapters/2aap.pdf>
-

□ 16 Gendreau, M., Potvin, J.-Y.
(2010) *Handbook of Metaheuristics*, 2. Cited 1101 times.
Springer

□ 17 Aarts, E., Korst, J., Michiels, W.
Simulated annealing

(2014) *Search Methodologies: Introductory Tutorials in Optimization and Decision Support Techniques, Second Edition*, pp. 265-286. Cited 30 times.
<http://dx.doi.org/10.1007/978-1-4614-6940-7>
ISBN: 978-146146940-7; 978-146146939-1
doi: 10.1007/978-1-4614-6940-7_10

[View at Publisher](#)

□ 18 Koenig, S., Likhachev, M.
Fast replanning for navigation in unknown terrain

(2005) *IEEE Transactions on Robotics*, 21 (3), pp. 354-363. Cited 274 times.
doi: 10.1109/TRO.2004.838026

[View at Publisher](#)

□ 19 Yuan, C., Liu, Z., Zhang, Y.
Aerial Images-Based Forest Fire Detection for Firefighting Using Optical Remote Sensing Techniques and Unmanned Aerial Vehicles

(2017) *Journal of Intelligent and Robotic Systems: Theory and Applications*, 88 (2-4), pp. 635-654. Cited 23 times.

www.kluweronline.com/issn/0921-0296/
doi: 10.1007/s10846-016-0464-7

[View at Publisher](#)

□ 20 Wang, B., Zhang, Y.
An adaptive fault-tolerant sliding mode control allocation scheme for multirotor helicopter subject to simultaneous actuator faults
(2017) *IEEE Transactions on Industrial Electronics*. Cited 2 times.

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