

MAS ISW Assignment 3

Simon Deussen

23.11.2020

Task 1: Extract keywords from literature search

- Swarm robotics (Innocente & Grasso, 2019) (Osaba, Del Ser, Iglesias, & Yang, 2020) (Wang & Mao, 2020) (Konur, Dixon, & Fisher, 2012) (Winfield, Liu, Nembrini, & Martinoli, 2008)
- Self-organization (Innocente & Grasso, 2019)
- Particle swarm (Innocente & Grasso, 2019)
- Fire spread modelling (Innocente & Grasso, 2019)
- Autonomous unmanned aerial vehicles (Innocente & Grasso, 2019) (Chung, Paranjape, Dames, Shen, & Kumar, 2018)
- Collective behaviour (Khan, Kasmarik, & Barlow, 2020)
- Artificial swarming (Khan et al., 2020)
- Evolutionary framework (Khan et al., 2020)
- Boids model (Khan et al., 2020)
- Computational value systems (Khan et al., 2020)
- Robotics (Osaba et al., 2020)
- Swarm Intelligence (Osaba et al., 2020)
- Bio-inspired computation (Osaba et al., 2020)
- Distributed Computing (Osaba et al., 2020)
- Metaheuristics (Osaba et al., 2020)
- Optimal mass transport (OMT) theory (Wang & Mao, 2020)
- Dynamic task allocation (Wang & Mao, 2020) (Chung et al., 2018)
- Task allocation (Wang & Mao, 2020) (Chung et al., 2018)

- Balanced allocation (Wang & Mao, 2020)
- Modelling (Winfield et al., 2008)
- Wireless ad hoc network (Winfield et al., 2008)
- Controllability (Chung et al., 2018)
- Cooperative systems (Chung et al., 2018)
- Distributed sensors (Chung et al., 2018)
- Mobile robots (Chung et al., 2018)
- Multi-robot systems (Chung et al., 2018)
- Stability (Chung et al., 2018)
- Trajectory control (Chung et al., 2018)
- Human operator (Chung et al., 2018)
- Ground-based vehicles (Chung et al., 2018)
- Three-dimensional space (Chung et al., 2018)
- Individual vehicles dynamics (Chung et al., 2018)
- Cooperative flight (Chung et al., 2018)
- Trajectory generation (Chung et al., 2018)
- Adversarial control (Chung et al., 2018)
- Distributed monitoring (Chung et al., 2018)
- Distributed mapping (Chung et al., 2018)
- Theoretical tools (Chung et al., 2018)
- Aerial swarm robotics (Chung et al., 2018)
- Robot kinematics (Chung et al., 2018)
- Robot sensing systems (Chung et al., 2018)
- Vehicle dynamics (Chung et al., 2018)
- Mathematical model (Chung et al., 2018)
- Planning (Chung et al., 2018)
- Distributed robot systems (Chung et al., 2018)
- Comprehensive learning (CL)

- Exploration (Lynn & Suganthan, 2015)
- Exploitation (Lynn & Suganthan, 2015)
- Particle swarm optimization (PSO) (Lynn & Suganthan, 2015)
- Heterogeneous (Lynn & Suganthan, 2015)
- Swarm algorithms (Konur et al., 2012)
- Formal verification (Konur et al., 2012)
- Probabilistic model-checking (Konur et al., 2012)

Task 4: Create a mindmap of your taxonomy.

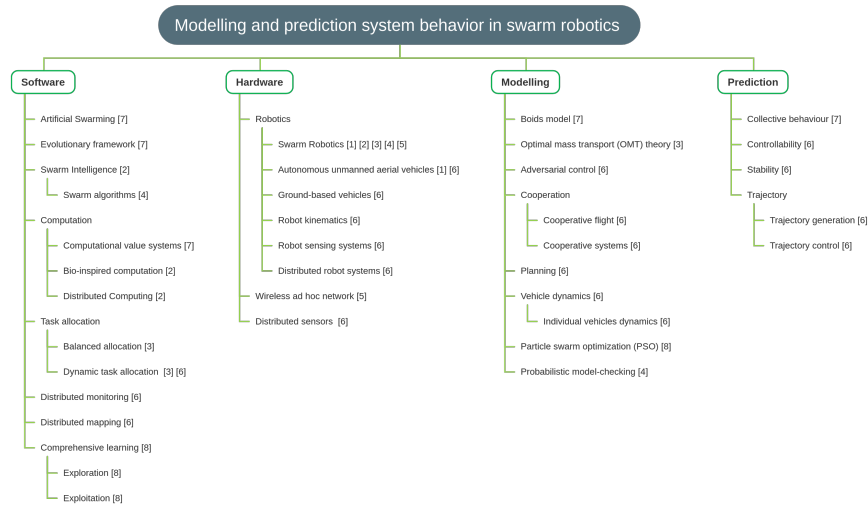


Figure 1: Mindmap of the keywords.

References

- Chung, S., Paranjape, A. A., Dames, P., Shen, S., & Kumar, V. (2018, Aug). A survey on aerial swarm robotics. *IEEE Transactions on Robotics*, 34(4), 837-855. doi: 10.1109/TRO.2018.2857475
- Innocente, M. S., & Grasso, P. (2019). Self-organising swarms of firefighting drones: Harnessing the power of collective intelligence in decentralised

- multi-robot systems. *Journal of Computational Science*, 34, 80 - 101. Retrieved from <http://www.sciencedirect.com/science/article/pii/S1877750318310238> doi: <https://doi.org/10.1016/j.jocs.2019.04.009>
- Khan, M. M., Kasmarik, K., & Barlow, M. (2020). Autonomous detection of collective behaviours in swarms. *Swarm and Evolutionary Computation*, 57, 100715. Retrieved from <http://www.sciencedirect.com/science/article/pii/S2210650220303680> doi: <https://doi.org/10.1016/j.swevo.2020.100715>
- Konur, S., Dixon, C., & Fisher, M. (2012). Analysing robot swarm behaviour via probabilistic model checking. *Robotics and Autonomous Systems*, 60(2), 199 - 213. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0921889011001916> doi: <https://doi.org/10.1016/j.robot.2011.10.005>
- Lynn, N., & Suganthan, P. N. (2015). Heterogeneous comprehensive learning particle swarm optimization with enhanced exploration and exploitation. *Swarm and Evolutionary Computation*, 24, 11 - 24. Retrieved from <http://www.sciencedirect.com/science/article/pii/S2210650215000401> doi: <https://doi.org/10.1016/j.swevo.2015.05.002>
- Osaba, E., Del Ser, J., Iglesias, A., & Yang, X.-S. (2020). Soft computing for swarm robotics: New trends and applications. *Journal of Computational Science*, 39, 101049. Retrieved from <http://www.sciencedirect.com/science/article/pii/S187775031931172X> doi: <https://doi.org/10.1016/j.jocs.2019.101049>
- Wang, Q., & Mao, X. (2020). Dynamic task allocation method of swarm robots based on optimal mass transport theory. *Symmetry*.
- Winfield, A. F. T., Liu, W., Nembrini, J., & Martinoli, A. (2008, sep). Modelling a wireless connected swarm of mobile robots. *Swarm Intelligence*, 2(2-4), 241-266. doi: <https://doi.org/10.1007/s11721-008-0018-0>