**Title**: Machine Learning and Swarm Robotics for Search and Rescue: An Introductory Literature Review

**Abstract:**

* What is ML? What is Swarm Robotics?
* Potential use for search and rescue?
* What has been done, what is currently being done, and what will be done in the future?

**Introduction:**

* Define Machine Learning and Swarm Robotics
* Explain how they relate to each other
* Explain the algorithms we are going to talk about?
  + 3-D mapping of buildings
  + Covering/surveillance of large areas
  + <https://www.youtube.com/watch?v=mUeyfLIGtLQ&t=636s>

**Introduction**

List examples of current projects: star trek, RoboCup, Kilobot, TERMES [1]

Definition of swarm robotics [2]

Wrong citation [3]

Single robots hard, multiple robots even harder [4]

Ted talks [5] [6]

Distributed learning algorithms [7]

Swarm robots helping a firefighter

* Examples of firefighters loosing their lives
* Problems with fires
* For search operations
  + Situations without communication, become a communication network
  + Communicative vs non-communicative behaviors
    - Non-Communicative: groups stay together, but individuals can:
      * Return to origin -> requires reliable mapping and 0 changes in environment
      * Return to last point where it had communication
      * Return to origin
      * Venture forward
    - Communicative:

[1] V. Sebastian, “Swarm Robotics , or ’ The Smartness of a bunch of cheap dumb things ’,” *Next Gener. Build. 3*, vol. 1, no. 2017, pp. 487–490, 2016.

[2] L. Bayindir, “A review of swarm robotics tasks,” *Neurocomputing*, vol. 172, pp. 292–321, 2015.

[3] M. Brambilla, E. Ferrante, M. Birattari, and M. Dorigo, “Swarm robotics: A review from the swarm engineering perspective,” *Swarm Intell.*, vol. 7, no. 1, pp. 1–41, 2013.

[4] TEDx Talks, “Swarm robotics -- from local rules to global behaviors | Magnus Egerstedt | TEDxEmory,” 2014. [Online]. Available: https://www.youtube.com/watch?v=ULKyXnQ9xWA. [Accessed: 17-Feb-2019].

[5] TED, “The Future of Flying Robots | Vijay Kumar | TED Talks - YouTube,” 2015. [Online]. Available: https://www.youtube.com/watch?v=ge3--1hOm1s. [Accessed: 25-Feb-2019].

[6] American Museum of Natural History, “Swarms of Aerial Robots - AMNH SciCafe - YouTube,” 2016. [Online]. Available: https://www.youtube.com/watch?v=mUeyfLIGtLQ&t=636s. [Accessed: 25-Feb-2019].

[7] N. Nedjah and L. de Macedo Mourelle, “Distributed learning algorithms for swarm robotics,” *Neurocomputing*, vol. 172. pp. 290–291, 2016.