International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.03, April 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

SELF-ORGANIZED COOPERATION IN SWARM ROBOTICS

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ABSTRACT

Swarm robotics is a new approach to the coordination of multi-robot systems which consist of large numbers of relatively simple robots which takes its inspiration from social insects. The most remarkable characteristic of swarm robots are the ability to work cooperatively to achieve a common goal. In this paper, classification of existing researches, problems and algorithms aroused in the study of swarm robotics are presented. The existing studies are classified into major areas and relevant sub-categories in the major areas.

Keywords-swarm robotics, review, insects, multi-robot, relevant

I.INTRODUCTION

Swarm robotics is a new approach to the coordination of large numbers of relatively simple robots. The approach takes its inspiration from the system-level functioning of social insects which demonstrate three desired characteristics for multi-robot systems: robustness, flexibility and scalability.

Robustness can be defined as the degree to which a system can still function in the presence of partial failures or other abnormal conditions. Social insects are highly robust. Their self-organized systems can still work even after losing lots of system components or changing the environment parameters considerably.

Flexibility can be defined as the capability to adapt to new, different, or changing requirements of the environment. Flexibility and robustness have partly conflicting definitions. The difference between two occurs in problem level. When the problem changes, the system has to be flexible (not robust) enough to switch to a suitable behavior to solve the new problem. The biological systems have this level of flexibility and can easily switch their behaviors when problems change. For instance, ants are so flexible that they can solve foraging, prey retrieval and chain formation problems with the same base self-organized mechanism.

Scalability can be defined as the ability to expand a self-organized mechanism to support larger or smaller numbers of individuals without impacting performance considerably. Although there is a range in which the swarm performs in acceptable performance levels, this range is preferred to be as large as possible.

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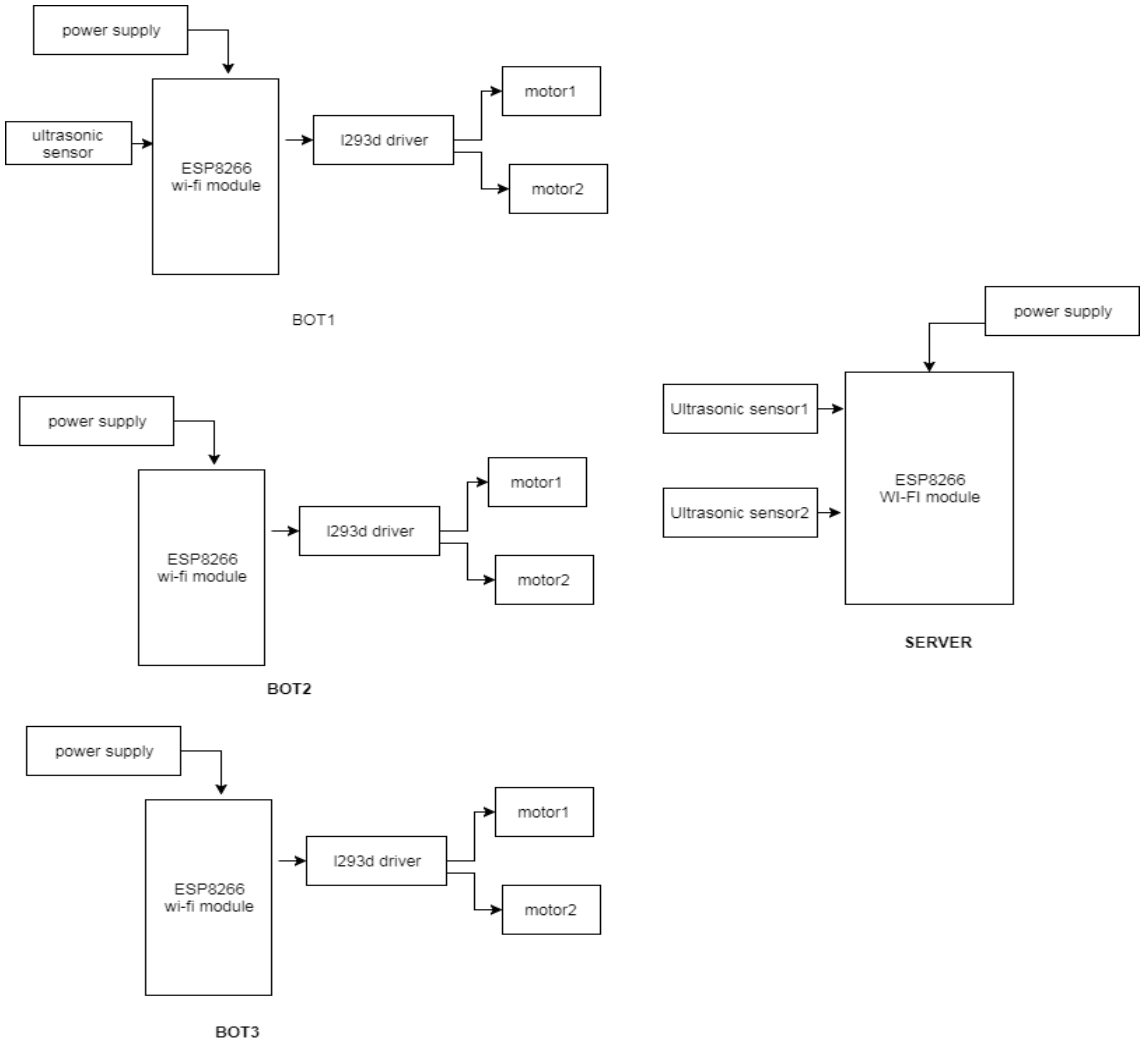
II.METHODOLOGY

The system specifies the operating of SWARM AI for cooperative work management low price sensors and implementation of ESP8266 WLAN. Our initial aim is to style four autonomous robots which might communicate one another if they're ineffectual to push the thing forward single handedly. It implies that if one bot isn't ready to push the thing, it'll communicate with the second bot so on until the thing reaches its destination. the most aim of this project is to review swarm AI. Analyse its completely different parameters and concentrate on reducing the price of style.

FIG.1.OBJECT PLACING DIAGRAM



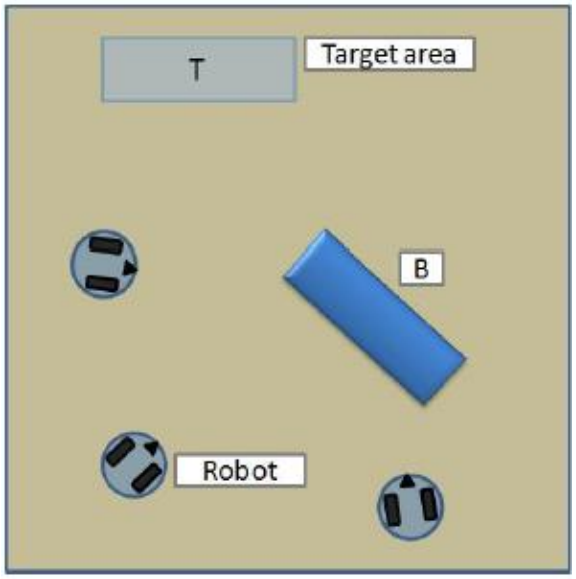
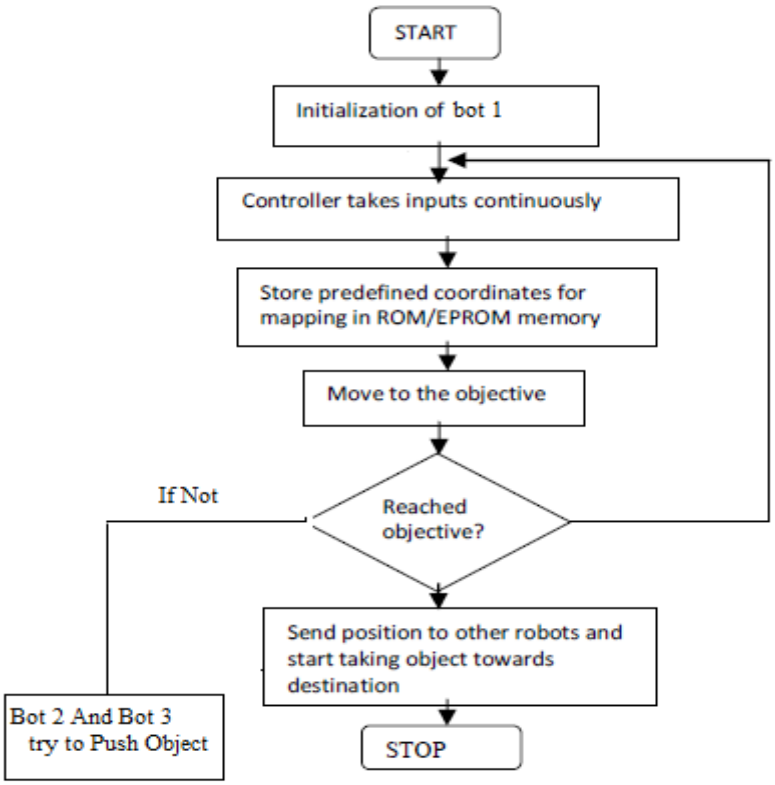


FIG.2.BLOCK DIAGRAM

III.ALGORITHM



IV.ADVANTAGES

1. System provides communicating between robots.
2. System is suburbanized and autonomous.
3. Man power not needed, lesser time consumption

V.DISADVANTAGE

1. Object required to keep in range of ultrasonic sensor
2. Limit of object weight

VI.APPLICATIONS

It has applications in military, telecommunication networks, medical, conveyance.

VII.CONCLUSION

Most of the research conducted was based on the biological inspirations adopted from the behaviours of ants, bees and birds. Implicit communication seems to give more robustness in the communication architecture of swarm robotics. Distributed control architecture was preferred compared to centralized architecture to prevent single point failures. As far as mapping and localization is concerned, work is still being carried out to fine tune the problems faced in this domain. In object transportation and manipulation, caging is preferred over the available methods as the constraints in the domain can be reduced and kept simple. In last two decades, research in reconfigurable robotics has taken a good progress. Even so, this domain is still at its infant stage. Path-planning and formation generation is one of the main domains that received a lot of attention from the authors. A lot of new heuristics and algorithms were introduced to solve the problems in this domain. In the learning domain, reinforcement learning (RL) was given much interest by the researchers. In task allocation domain, heterogeneous and homogenous systems are widely discussed. This domain has contributed in development of various techniques as listed in the paper

REFERENCES

[1]. Charukeerthi A,Abhishek M, " Swarm Robotics: A Nature Inspired Multirobotics System", International Journal of Advance Engineering and Research Development, e-ISSN: 2348-4470,p-ISSN: 2348-6406, PP 65-69,Volume3,Issue1 (January -2016).

[2]. S. Keerthi, Ashwini K, Vijaykumar M.V, "Survey Paper On Swarm Intelligence", International Journal of Computer Applications , *Volume 115 – No.5, April 2015*.

[3]. Yara Khaluf, Emi Mathews, Franz J. Rammig, "Self-Organized Cooperation In Swarm Robotics", IEEE International Symposium on object,DOI- 10.1109/ISORCW.2011, Page 217-226, (2011).

[4]. Yogeswaran Mohan, S. G. Ponnambalam, "An Extensive Review of Research in Swarm Robotics", IEEE Xplore ,DOI: 10.1109/NABIC.2009.5393617, Page 140 – -145 (January 2010).

[5].Ezra Federico Parra-Gonz´alez, Gabriel Ram´ırez-Torres,and Gregorio Toscano- Pulido, "Motion Planning

For Cooperative Multi-Robotbox-Pushing Problem_", IBERAMIA 2008, LNAI 5290, pp. 382–391, 2008.

[6].Lynne E. Parker, "Distributed Intelligence: Overview of the Field and its Application in Multi-Robot Systems", Journal of Physical Agents, vol.2, no. 1, March 2008, pp. 5-14.

[7]. Altshuler Y., Yanovsky V., Wagner I. A. and Bruckstein A. M., "Swarm Intelligence – Searchers, Cleaners and Hunters" in Swarm Intelligent Systems, Nadia Nedjah and Luiza de Macedo Mourelle, Springer, 2006, pp. 93-132.

[8]. Bernardine Dias M. and Anthony (Tony) Stenz, "A Market Approach to Multirobot Coordination", The Robotics Institute, Carnegie Mellon University, Pittsburgh, Pennsylvania 15213, August 2001.

[9]. Dudek G., Jenkin M., Millios E. and Wilkes D., "A Taxonomy for Swarm Robots" in Proceedings of the 1993 IEEE/RSJ International Conference on Intelligent Robots and Systems, Yokohama Japan, July 26-30,1993, pp. 441-447.

[10]. Luca Iocchi, Daniel Nardi and Massimiliano Salerno, "Reactivity and Deliberation: A Survey on Multi-Robot Systems", Balancing Reactivity and Social Deliberation in Multi-Agent Systems, From RoboCup to Real-World Applications (selected papers from the ECAI 2000 Workshop and additional contributions), Springer-Verlag, London, UK, 2001,pp284