AI–IOT Based Self Organizing Approach of Swarm Robots

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***Abstract*- : In many applications like vehicle control, medical applications, robotic movement control, etc.; distance measurement of an object is used. This can be done using a variety of sensors- Ultrasonic, IR, radar, laser, etc. Measurement using ultrasonic sensors is the cheapest and its reliability among several others is very high. In this paper we discuss the uses of these sensors in small robot applications and compare them for a small automobile prototype using controller, to provide an output for automatically finish work without any human interaction. Here we use AI (Artificial Intelligence) and IOT (Internet of Things) concept in this proposed system.**

Index Terms- Sensors; Ultrasonic Sensors; IOT; Obstacle Detection

I. INTRODUCTION

Self-organized multi robot systems have a lot more benefits compared to single robot systems where the coordination and cooperation with the server is more. This results in less human involvement and more precision in responses to full-fill a determined task or operation using inter-bot communication. Here server acts as an intermediary between the bots by using self-organizing map approach. Tasks to robots are assigned without any human involvement considering a dynamic environment. Various methods are proposed to control a swarm of robots and most methods and algorithm are defined to control robots in a dynamic environment. The algorithm focuses on binding swarm of robots to perform distributed formation control.

Server-bot communication is carried out in a two way process which involves invoking the swarm by the server and then consecutive calls to the swarm for further robot manipulation. The detection of load is done by loading bay which recognizes the load and sends the particular information to the server, which then acts according to the given task. The system learns from every task, if the same task repeats server will send the required number of bots to carry out the task automatically. The information regarding the operations will be managed by server into the databases the server and user can fetch the information whenever needed. The database will have fields like load id, load weight, number of bots per load, etc. and this whole information will be accessed by the administrator using his login information.

II. LITERATURE SURVEY

[1] Farshad Arvin, John C. Murray, etal reviewed in their paper swarm robotics as an interesting concept to provide a robust robotics system by exploiting large numbers of identical robots. Swarm algorithms are mostly inspired from social behaviour of insects and other animals. The best example is given by social animals such as ants, though not very intelligent on an individual level perform tasks such as building, brood care, foraging etc. using cooperation. In their project, they have developed a micro robot named “Colias”. It uses a circular platform with a diameter of 4 cm. Long-range infrared modules with adjustable output power allow the robot to communicate with its direct neighbours.[1]

This concept allows coordination of simple physical robots to cooperatively perform tasks. Autonomous and decentralized control of the swarm systems are achieved by providing well defined interaction rules for individual robots.

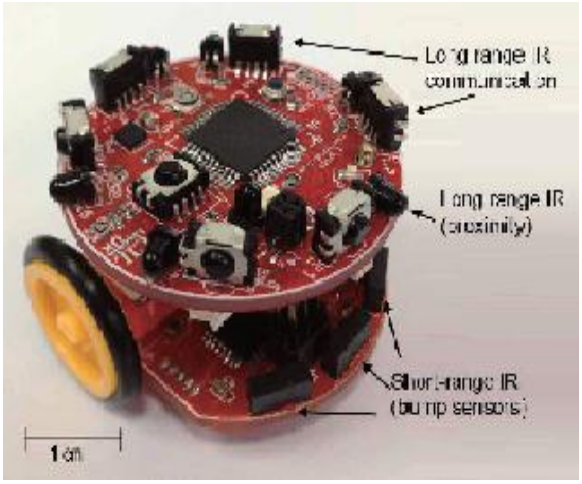

Fig 2.1 Microbot Robot

[2] Yara Khaluf, Emi Mathews, Franz. J Rammig devised in their paper that communication between robots is an important requirement of the swarm platform. In addition, modularity of the robot provides flexibility to be used in different swarm applications. Since, swarm behaviors usually operate in long term scenarios, low power consumption in the design is a must. Cooperative task always include the concept of sharing :space sharing, time sharing, resource sharing etc. This sharing necessitates coordination in various aspects such as motion coordination, manipulation coordination, message exchange coordination and others to prevent deadlocks or task failures.[2] In their paper ,they want to deploy a robotic swarm to track mobile objects in a dynamically changing environment .The swarm collectively tracks the movement of the objects and collects other information of interest about the moving object. The mobile object tracking uses wireless networks.

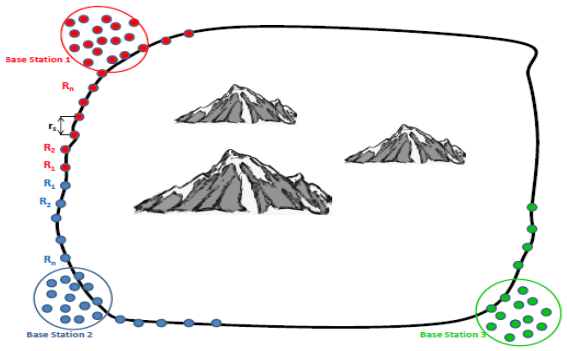

Fig: 2.2 Object tracking with swarm robots

[3] M. Brambilla, E. Ferrante. etal reviewed in their paper that swarm robotics systems have the potential advantage over more traditional approaches, to require less manual intervention because of their robustness, scalability and flexibility. Although these three characteristics might reduce the need for maintenance, this might be true only up to a given extent. Further studies are necessary to understand when and how to perform maintenance on a swarm robotics system. Moreover it is necessary to study if it is possible to derive general maintenance principles or if different collective behaviours need different maintenance approaches. Our project is about coordination amongst the bots to displace a particular object to its destination. Coordination is a tricky subject for multi agents.[3]

Whether the agents are distributed or centralized is one of the decisions to be made. Now, distributed means the agents are mainly governing themselves whereas centralized means there is a leader that is giving orders or making plans for the other agents.

In this project the centralized mode is used since the ESP module is the main governing body to which the micro bots are going to respond. This is a design of a new low cost and open platform micro robot to be used in swarm robotic researches. Experiments were performed on hardware components such as communication and sensory systems.

III. PROPOSED SYSTEM

Block Diagram:-

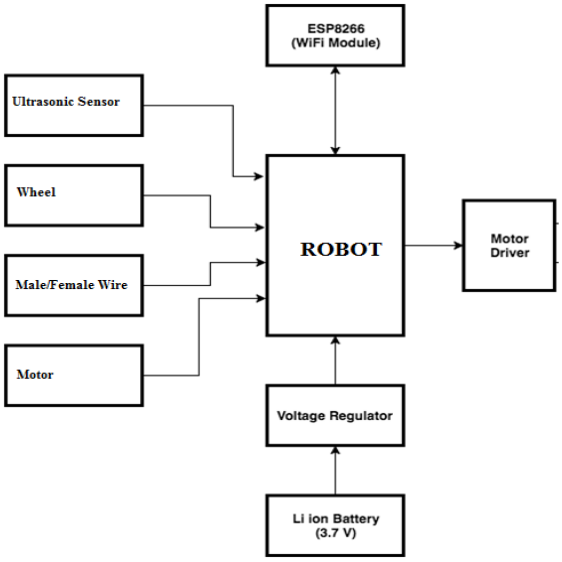

Fig: 3.1 Block diagram

Extensive work has been done based on swarm studies producing a number of models and

corresponding applications intended to solve optimization problems such as routing in goods and production company for shifting the goods from one location to another and the problem in which an optimal route must be calculated to push up the any goods box one location to another. AI is needed in work optimization in industrial automation. Nowadays industrial automation is so fast but human interaction is must for the goods company for shifting box from one location to another, so we design the new solution of the self-communication robot without human interaction using the AI.

IV. CONCLUSION

The system will remove the inclusion of human intervention. The system will function autonomously when it detects a load and the robots will perform their related tasks.

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