

Behaviour of Swarm Robots

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Abstract- This paper presents an introduction to the basic working of swarm robots and its application. Swarm robot is the Master-Slave mechanism adopted by robots in fully autonomous way so that they can locate, approach and connect with an object. It is an approach to the co-ordination of multi robot system which are inspired from environment and is a combination of swarm intelligence and robotics, where swarm intelligence is the collective behavior of a group of animals, especially social insects such as ants, bees, etc. which are following basic rules, thereby representing the strong progressive force which is represented by robots also.

They can effectuate tasks that would be impossible for single robots to achieve and can be applied to many fields such as military, mining areas, rescue operations where it's difficult for humans to reach and its main goal is to cover a wide region where the robots can disperse and perform monitoring tasks in forests etc.

There are many industries which use dangerous things like burning furnace, making nuclear weapons, etc. here the usage of swarms can reduce menace in such type of industries.

Robots are going to be important part of future and this clump of robots will have monstrous potential to benefit mankind so let's work on it to unlock this potential..

Keywords: Swarm robotics; Swarm intelligence; Master-Slaves;

1. INTRODUCTION

The aim of our paper is to study the ways of designing self sustaining and self converging robots and implementing them.

Here we are designing small mobile autonomous robots which will perform specific functions , so to manifest our idea we have designed robots by using various sensors through which clump of robots will interact with each other which is similar to the behavior of insects in nature which is also called as swarm intelligence.

Not only insects , but also Bacteria colonies , fish schools , bird crowds, primates, locusts and even human beings are the examples of swarm intelligence.

Similarly if applied swarm intelligence to robots is called swarm robotics and with this comes the title of our paper.

It has been observed a long time ago that same species survive in the nature taking the advantage of power of swarm rather than wisdom of individuals. The individuals in such swarm are not highly intelligent, yet they complete the complex tasks through cooperation and division of labor which show high intelligence as a whole swarm is self organized.

We have many advantages of swarm robots as they are economical,energyefficient,stable,autonomous,decentralized,fragmented,flexible,expert at multiple applications etc.

These robots acts as force multiplier depending on the needs of particular, by interfacing required sensors to our robots we can get our work done in less time in more sophisticated way.

The ongoing research is continuously improving both in robotics hardware and software, and updates makes for continuous improvements. The better performing platforms are being designed with regular updates in mind.so people don't need to worry about ending up with

a machine that is disconnected or no longer upgraded or supported.

2. MASTER-SLAVE ROBOTS

2.1. Interaction of master-slave robots

This project has only single controller which is available in master bot. the controller is the main part of all the swarm bot as it receive the commands from the user and also transmits the commands to all the slaves. We use only a single controller which makes this project more economic in nature.

The controller used in this project is an Arduino Uno microcontroller .The microcontroller is connected to other few modules ,they are the Bluetooth module(HC05), L293d which is a motor driver module and an RF receiver transmitter pair.

The Bluetooth is paired to the mobile device with which we are going to control our bots through voice commands. These commands received by Bluetooth will send to the Arduino which will process the control to the L293d and to RF transmitter. This L293d will make master bot move accordingly with the instructions.Whereas the slave bots contains only RF receiver and L293d. the RF controller will send commands to RF transmitter, which has been transmitted to slave ,where the receiver at the slave will receive the commands and sends to L293d connected to receiver which results in the motion according to the user instructions.

3. BLOCK DIAGRAMS

3.1 Transmitter

applications in it. Like in defense i.e., military purpose where the soldiers can reach the robot can be sent and the surveillance of the required area can be done and even the robots can be send in the places where there are the risk of lives of soldiers.

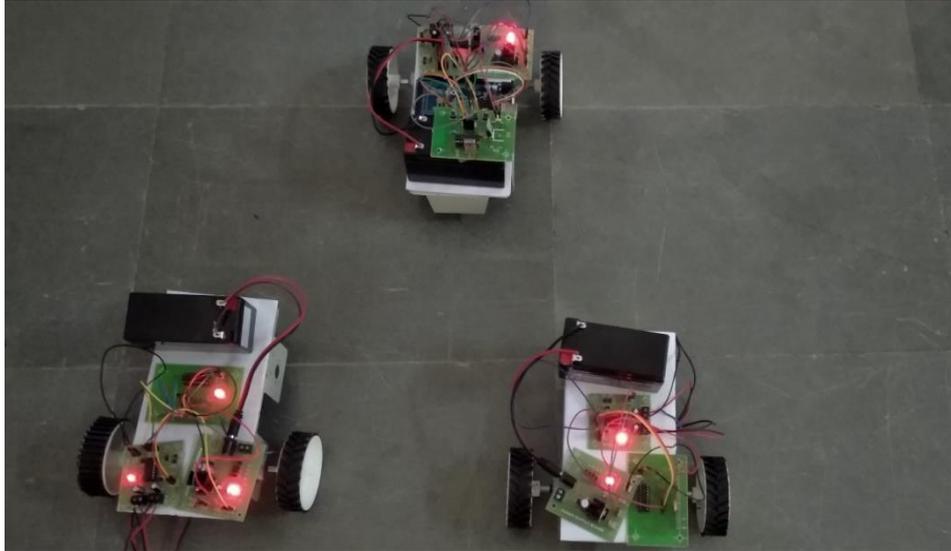
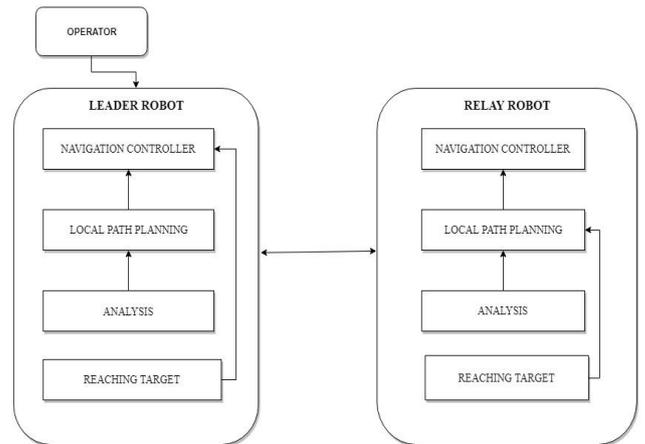
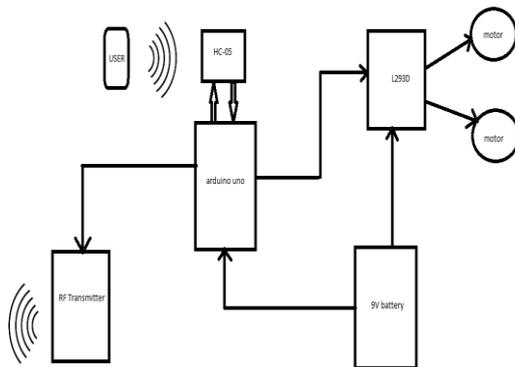
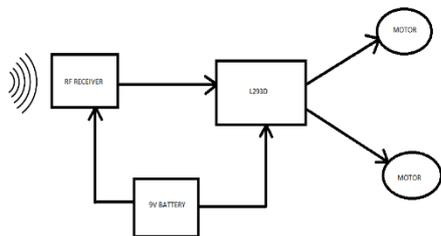


Fig. 1. Interaction Between single Master and two Slaves.



3.2 Receiver



4. APPLICATIONS

Self-assembly is usually used to increase the power of the robots, provide stability to the swarm robots while moving on rough terrains and lifting heavy weights, form a connected structure to guide other swarm robots, this structure is used to overcome the holes that a single robot would fall to do and to combine capabilities of heterogeneous robots. The swarm bot has many

Even in mining these days we come over many accidents happening like blasts and lands lidding and some other health issues to avoid those we can use these swarm robot by adding required number of slave robot and load the weights on those robot and move the material from one place to another so that there is no harm to human life and even this can also give as an advantage of reducing the child labor and working of women in the hot sun. Swarm robot also help is surveillance in forests and remote places were there is a requirement of man power, we can use these robots as monitoring tasks. Swarm robot also can move to locate sources of hazard such as chemical or gas spills, toxic pollution, pipe leaks, radioactivity. In large-scale agriculture applications, we can use it in sowing seeds in multiple lanes at a time so that the time

is saved, and the efforts are given less. Cleaning up of toxic wastes, search and rescue of things, and collection of terrain samples are some of the important applications of Swarms robots. Swarms robots can be used for exploration and mapping it would save money and time. Presently, most of the efforts are being made in surveillance. These robots can be useful in sports grounds like cricket grounds, football grounds, etc... for leveling the grass and cleaning purposes, instead of man power these robots reduce the human effects and make the work done easily. They even help the human in larges places, where cleaning and neatness is much needed instead of more number of humans, we can use swarm bots for cleaning purposes, so the work is done easy and the efforts given to it is less. They even can be used as surveillance or patrolling underground in drainage pipes where the toxic gases and bad odor is present which effects the human health.

There are many industries in which use of dangerous substances like burning furnace, chemicals, making nuclear weapons etc.... here usage of swarms can reduce danger in such types of industries.

5. CONCLUSION

In coal mines the problems faced by people in lifting heavy weights and in loading and unloading weights is prosaic, where by placing robots in place of humans will act as a big plot in future ,as by using such bots we can clinch few very important points like decreasing labor cost as it is one time investment on group of robots , by this we can also achieve an end to child labor as small children are in abundant number working in coal mines and on other hand these bots will also provide high reliability, low unit complexity and decreased cost over traditional robots .

In conclusion ,the swarm robotics can be applied to sophisticated problems involving large amount of time, space or target where a certain danger exist in environment and hence this mechanism of robots are proved to be the most utilitarian and proficient weapon to mankind.

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