ISSN No:-2456-2165

SWARM ROBOTICS

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Abstract- The main objective of this project work is based on implementing swarm intelligence in robots. Swarm intelligence is the adapdation of animal behaviour and to use it in a physical environment to complete a specific task. In this project we are going to study the animal behaviour and its interaction in the environment and implementing in a physical way to accomplish a certain task. Collective work or approach for a complex task makes it easier, much efficient and less time complexity. So this project is aiming at the collective approach of the many system in resolving the tedious work.

Keyword:- *Swarm Intelligence, Swarm Robotics.*

I. INTRODUCTION

From the ancient times, we humans always relied on nature. Nature shows the path whenver the mankind needed it. From the discovery of Gravitational force by Newton or any other invention nature guided the scientist and the researchers. By observing the small thing in nature we can notice the pattern followed by it. This project deals with studying the flocking behavior of insects and birds and implementing them to build a robot. We often must have noticed that ant moves in a queue to the place of food where the leader follow the shortest path to reach its destination and the other ants follow the leader ant to reach their destintion. Another of swarm behaviour is of birds, birds often moves in a V shaped. They move in a V shape because moving in a V shape allows them to give less resistance to the air flowing in opposite direction and hence they can travel large distance and get less tired. One more example of grouping of animals is, in ocean many small fish swims together in order to avoid being prey to the bigger fish in the ocean. This is done so as to protect themselve from external disturbances. Swarm of bees is the other example in this context, bees follow the path as they are instructed by the queen bee. These all are example of swarm intelligence. Swarm robotics extract inspiration from the swarm intelligence. Swarm robotics is an unorthodox approach in building robots because of it's problem solving ability, flexiblity, robustness and many other aspects. Swarm intelligence is defined as the collective behavior of self organised system.

II. PROPOSED SYSTEM

In this project we are going to build two robots, one will be the master robot and other will be the slave robot. Master robot is programmed in such a way that it will follow a certain path and it transmits information to the slave robot. The Master robot is designed by using sensors , IR sensor detects the path And sends the information to microcontroller . Microcontroller acts like a brain ,it recieves information from IR sensors and processes it and then sends the signal to motor driver which are connected to the DC motor which is then connected directly to wheels of the robot . The master robot can be easily compared with human likely the sensors in the robot act as senses of human body , it senses the object or path while moving of the robot and just like our sense organs it sends information to our brain . Here brain can be considered as the microcontroller which is present in the arduino board , it recieves the information from the sensor and after that it send the signal to the motor driver which then function accordingly and rotates the motor clockwise or anticlockwise . DC motor changes it's direction if we change the polarity of the motors. By changing the the polarity of left and right wheels robot can be moved towards right and left. By changing polarity of both wheels at same time robot can be moved forward and backward. After the movement of robot in any direction and successfully following the path then transmitter is interfaced with arduino which gather information from microcontroller and sends it to the reciever-decoder circuit. The slave robot recieves the data from the master robot and performs the same task as done by the master robot. This is the working and implementation of proposed system.

III. METHODOLGY

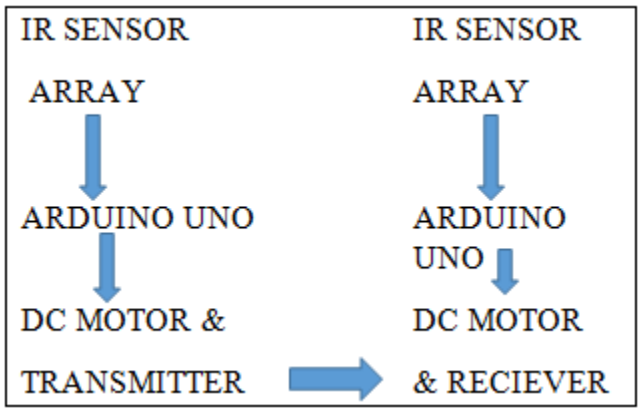

Fig 1

The above flowchart represents the schematic of swarm robotics .The model robots functions according to the flowchart. IR sensors collects data while the robot moves, function of sensor is to detect the black line along the path and it sends the data to the arduino uno. Arduino acts as brain of the system, recieves the information form sensors, arduino is programmed for followin a line and to tranmit the outputs of the master robot to the slave robot. In slave robot reciever is installed, it detects the data transmitted from the master robot decodes it and transmit it to the arduino and again all the process is followed same as master robot.

IV. FUTURE WORK

Lack of global knowledge can lead to a dead lock, and the group of robots cannot progress. New solutions are needed for prevention and evasion of the stage of stagnation. Programing the robots represents an issue when the pathways to solutions are not predefine but emergent. Interesting direction in future research may include ways of enhancing indirect communication among robots.

V. CONCLUSION

Hence the connection of the robots were given according to the the tables given above and the programs were complied and executed successfully. Both the robots are functioning properly. Slave robot functions as the master robot. Master Robot is programmed to follow the path. This work has given a detailed overview of swarm inteligence and its application in swarm robotics. Swarm Robots are different approach in robotics, it is different from the classical approaches of designing and taking out task from a robot. Swarm robotics can be used for numerous puposes. It can be used for accomplishing complex task in an easier approach. In this project we learnt the idea of swarm intelligence and it's highly scalable in present scenario.

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