

Distributed Robotics - Multi Swarm Robots

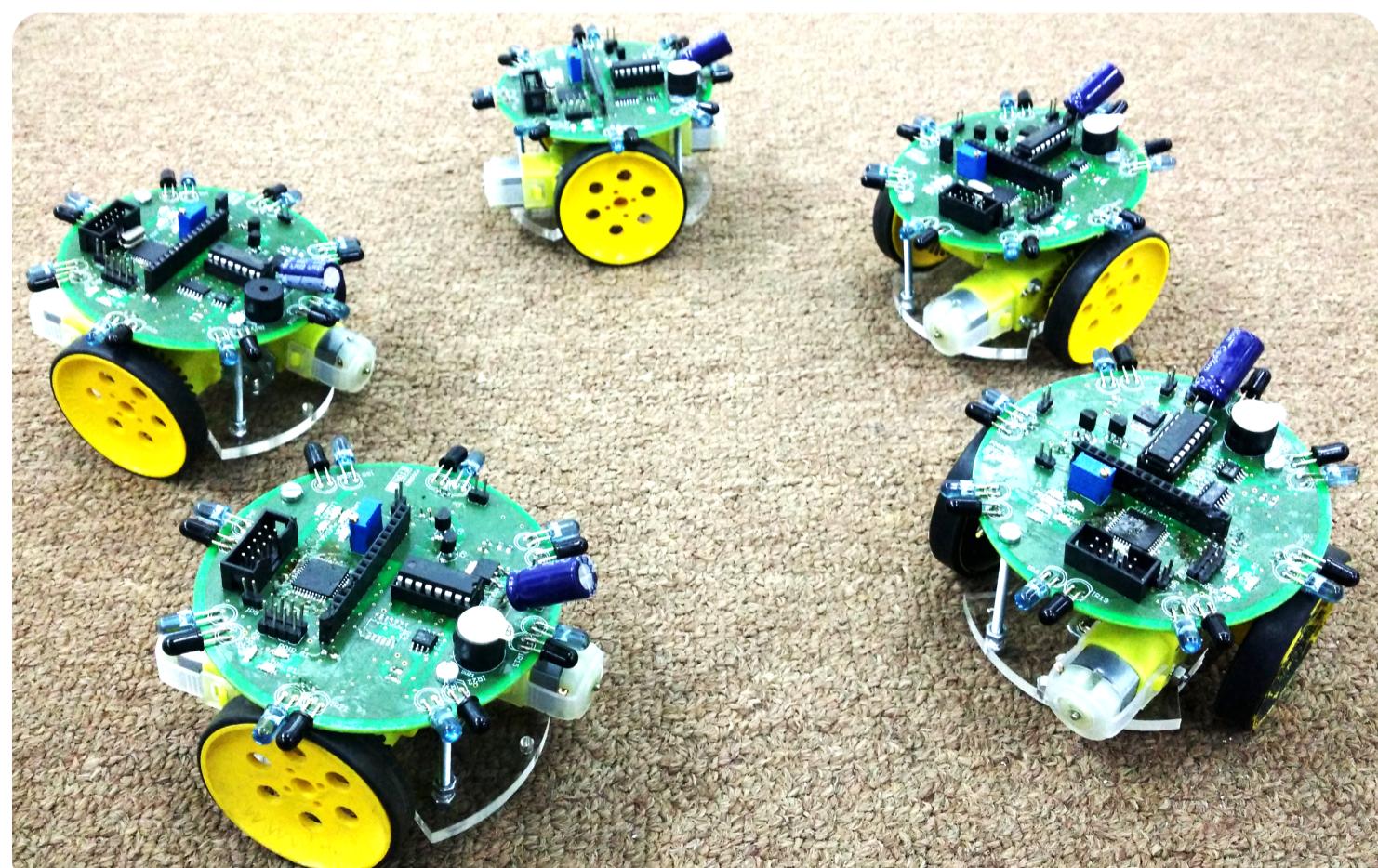
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Abstract

Distributed robotics is a field of study in homogeneous / heterogeneous synchronous/asynchronous autonomous robots. One such example of the distributed system is **Swarm Robotics**. The idea behind our project is to build micro-swarm robots and showcase the swarm behaviour of forming shapes and patterns.

Objective

1. Build microbots which have capabilities to sense its surrounding and communicate with its neighbouring robots
2. Shape formation using the microbots



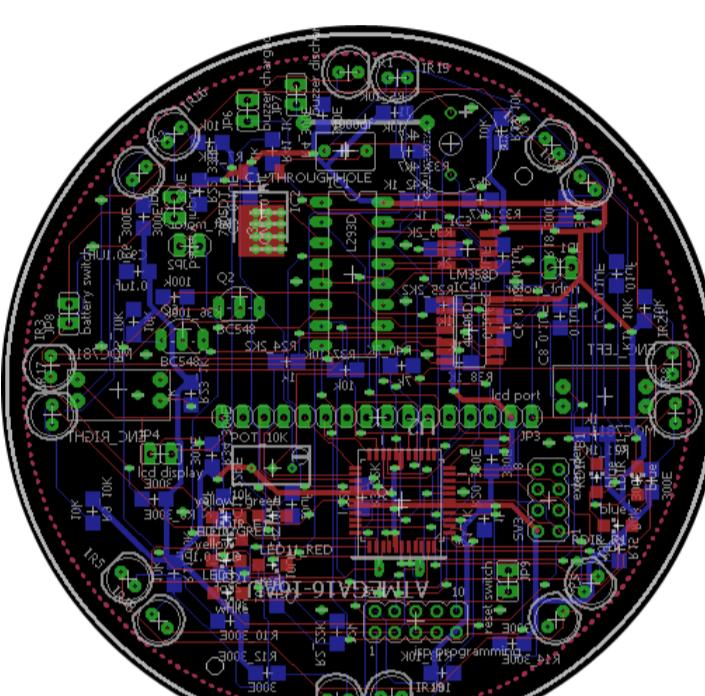
Our Swarm Robots

Design of Microbot

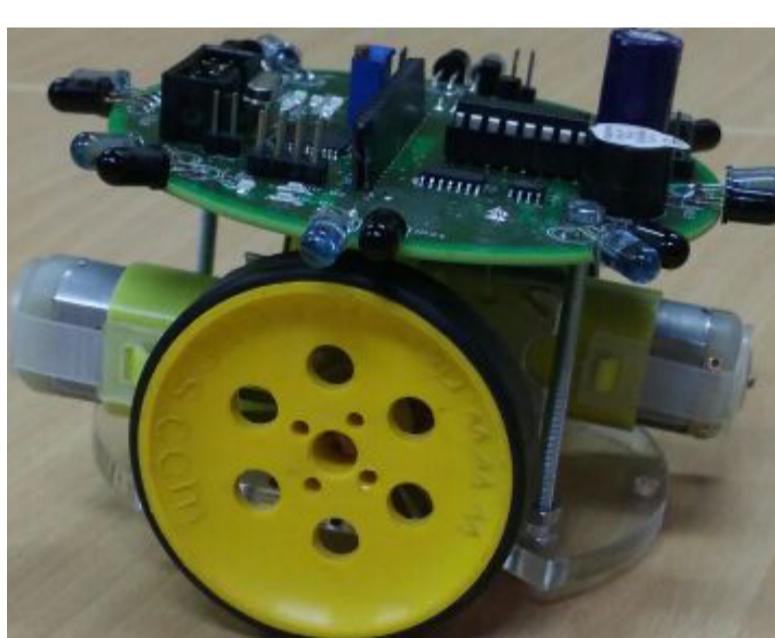
PCB design



The Microbot
8 x 8 x 6 cm



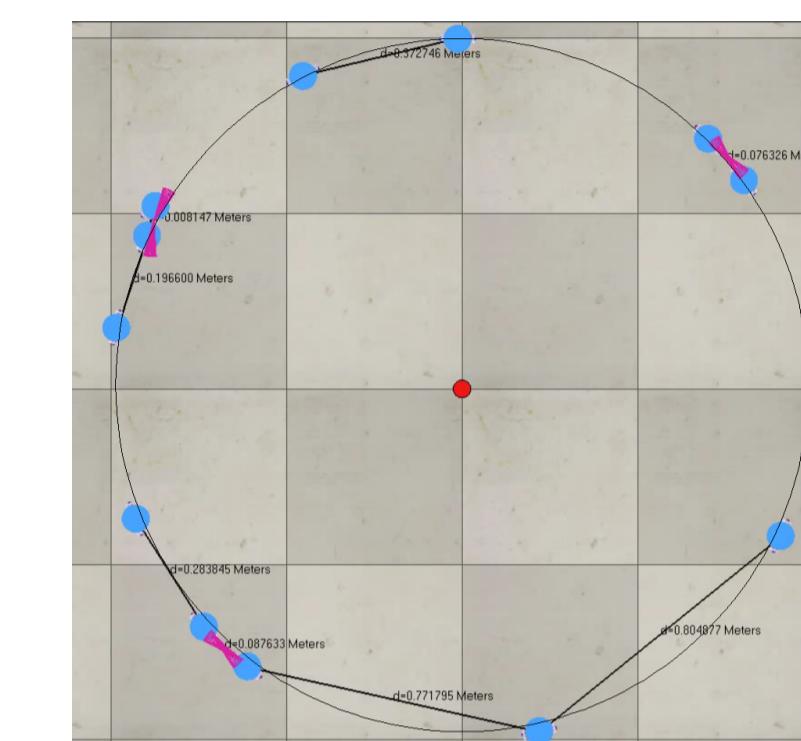
Working PCB



The microbot has :

1. Atmega16 micro-controller
2. Differential drive system
3. 8 IR Transmitter and Receiver pairs
4. A LCD display
5. Position encoders

Circle Formation

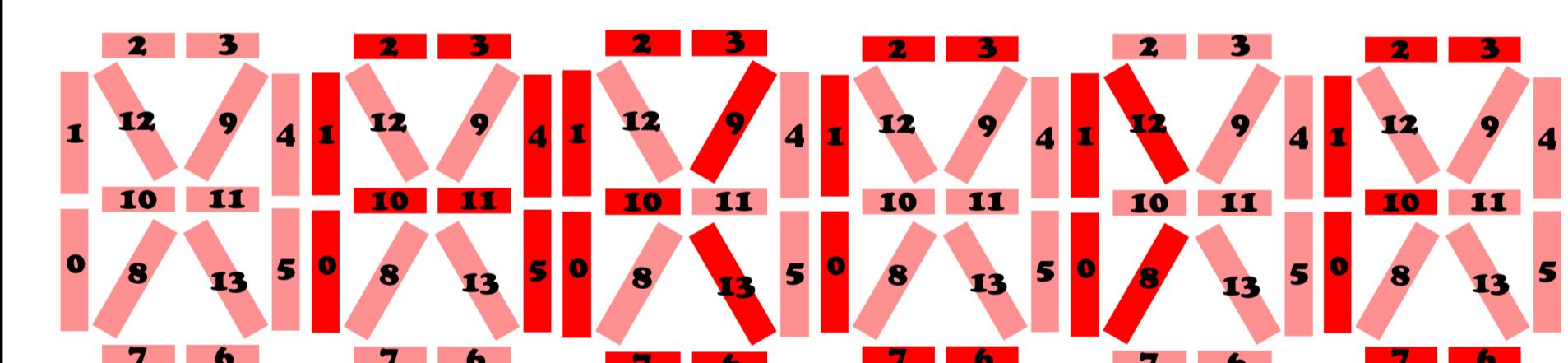


Multiple robots forming a circle

We formed a circle using small and autonomous robots which just have the capability to sense their nearby surrounding just using proximity sensors and make judgments based on it. (V-REP simulation tool)

Reference : Ayan Dutta, Sruti Gan Chaudhari, Suparno Datta and Krishnendu Mukhopadhyay, "Circle formation by asynchronous fast robots with limited visibility"

Shape Formation



The alphabets are represented as shown above. Each shape has a set of vertices the bots must fill. The robots knowing their global location and the shape to be formed move to their nearest vertices. First one to arrive at a vertex occupies it.