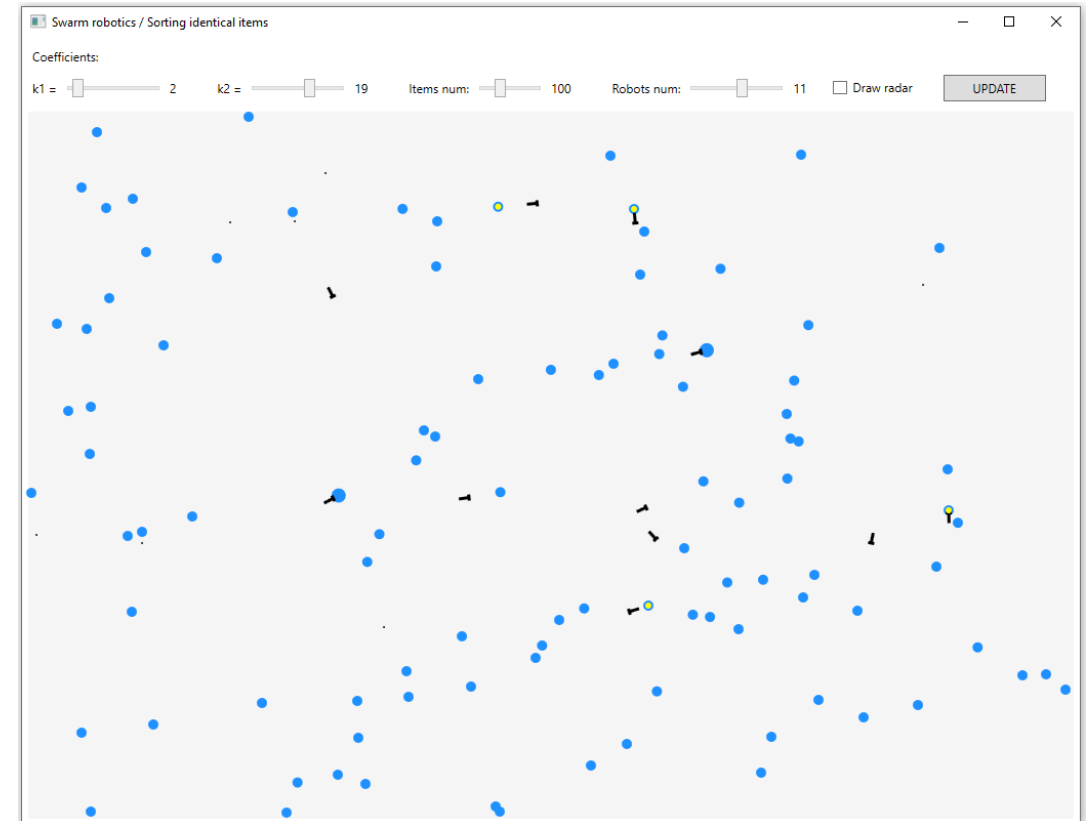# SWARM ROBOTICS

Sorting similar objects

Based on N.M.Ershov article "Swarm Robotics Algorithms"

SWARM ROBOTICS

Sorting similar objects

Robots perform random movements in a given area. Each individual robot can perform the following two actions:

1. **Pick up** the found object;
2. **Drop** the item in the current location if it is free.

These actions are performed by robots in a probabilistic manner based on an analysis of their local neighborhood:

- the robot **picks up** an object it finds with a higher probability, the fewer objects of the same type it sees around it;

- the robot **drops** the object it is carrying with a probability that is greater, the more similar objects it sees around it.

SWARM ROBOTICS

Sorting similar objects

For the simplest case for objects of the same type, the probabilities of lifting **p** and dropping **q** are calculated based on the number **n** of objects located in the field of view of ant:

$$p = \left(\frac{k_1}{k_1 + n}\right)^2 \qquad q = \left(\frac{n}{k_2 + n}\right)^2,$$

where **k1** > 0 and **k2** > 0 are the control parameters of the algorithm.

```
private bool CheckPickingUp(int n)
{
    double p = Math.Pow(k1 / (k1 + n), 2);

    double rand = MainWindow.rnd.NextDouble();
    if (rand < p)
    {
        return true;
    }

    return false;
}
```

```
1 reference
private bool CheckDroping(int n)
{
    double q = Math.Pow(n / (k2 + n), 2);

    double rand = MainWindow.rnd.NextDouble();
    if (rand < q)
    {
        return true;
    }

    return false;
}
```