The Effect of Errors on Gathering in Robot Swarms

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In a growing number if fields, robots are being used to carry out tasks ranging from delivering mail to carrying out drone strikes. Recently developers of these robots are focusing on a type of communication called Swarm Communication. Swarm Communication allows a large number of small robots to carry out tasks without a central control unit. This project is used to observe how a swarm of robots gather to a common point that is unknown to the robots beforehand. The robots are autonomous, synchronous and oblivious. This means that the robots in the swarm make decisions based on what they see locally (autonomous), that they wait for all robots to complete a step before moving on to the next step (synchronous), and that they only use the data known from the current step to make calculations (oblivious). Because of the large cost of building a robot swarm, this experiment is simulated by a program written in the Python programming language. Our simulations show that error although errors are usually bad for the performance, they speed up the gathering process in certain cases. We also broadly discovered that errors relating to actuators are more detrimental to the swarm's performance than sensor errors.