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# Giuseppe Prencipe – Gathering and Circle Formation: hard protocols for easy tasks

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## Résumé

We consider a distributed environment populated by a set of autonomous mobile entities (robots) that are asked to complete a given task; the robots are asynchronous, and totally autonomous. In this context, it is crucial to design efficient strategies to control and coordinate the team. In particular, one fundamental task that has been extensively studied is that of Pattern Formation, where the unites are required to form a pattern given as input. The Pattern Formation problem is practically relevant because, if the robots can form a given pattern, they can agree on their respective roles in a subsequent, coordinated action.

In this scenario, two 'extreme' patterns have been deeply studied: Gathering, where the robots are required to meet at a point in the plane (not agreed in advance), and Uniform Circle Formation, where the  $n$  robots are asked to place themselves on the vertices of a regular  $n$ -gon (thus forming a circle).

Despite the apparent simplicity, the resolute protocols for these two tasks are quite complex.

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**Giuseppe Prencipe** is currently Associate Professor at the Department of Computer Science at the University of Pisa. His research interests are mainly on distributed systems, mobile and wearable computing; he has published more than 50 scientific publications on international journals and conference proceedings, and participated in several national and international research projects. He also contributed to the design and development of software solutions dedicated to environments populated by mobile robots, and developed several mobile applications on Android, Android Wear and iOS platforms.

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