Consiglio Nazionale delle Ricerche
Istituto dei Materiali per l'Elettronica ed il Magnetismo

Colloid intelligence

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Intelligence, understood as cognitive process, can be described both through a symbolic approach, which couples itself well with the adoption of technological elements such as the digital world, and through a continuum approach, more familiar with biology. Current experiments performed with functional liquids will be discussed, with a reference to holonomic machines and to the achievement of liquid state analogue memories, artificial neural networks and reservoir computers, where the continuum approach is more appropriate. Recent results about the first liquid state, electrically programmable, in memory computing system will be discussed, highlighting novelties, opportunities and drawbacks of using liquid reservoirs for calculus. In particular their massively parallel structure, resilience towards fluid loss, electrostatic discharges and mechanical vibrations, and most importantly their endurance suggest several advantages. Pavlovian learning in colloids and related effects will also be discussed.