

## Realizations of complex logic machines at the molecular scale

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The principles underlying the implementation of complex logic operations at the molecular scale will be outlined. Different types of logic machines can be implemented. The simplest ones are combinational circuits, in which logic gates are connected in order to compute a logic function. We will show several physical realizations of combinational circuits operating on Boolean or multivalued variables, as well as cascade thereof, implemented in either a solid state environment or on bio modular systems. The next level of complexity in logic machines is that of finite state machines, which in addition to a combinational unit, possess a memory unit so that the outputs depend not only on the inputs but also on the state of the memory. Physical realizations of finite state machines operating in parallel in a solid-state environment will be discussed.