Title:	Chaotic attractor hopping yields logic operations
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Keywords:	Nonlinear Dynamics fuzzy logic noise stochastic model Chaotic attractor
Issue Date:	2018
Publisher:	Public Library of Science
Citation:	PLOS ONE, 13(12)
Abstract:	Certain nonlinear systems can switch between dynamical attractors occupying different regions of phase space, under variation of parameters or initial states. In this work we exploit this feature to obtain reliable logic operations. With logic output 0/1 mapped to dynamical attractors bounded in distinct regions of phase space, and logic inputs encoded by a very small bias parameter, we explicitly demonstrate that the system hops consistently in response to an external input stream, operating effectively as a reliable logic gate. This system offers the advantage that very low-amplitude inputs yield highly amplified outputs. Additionally, different dynamical variables in the system yield complementary logic operations in parallel. Further, we show that in certain parameter regions noise aids the reliability of logic operations, and is actually necessary for obtaining consistent outputs. This leads us to a generalization of the concept of Logical Stochastic Resonance to attractors more complex than fixed point states, such as periodic or chaotic attractors. Lastly, the results are verified in electronic circuit experiments, demonstrating the robustness of the phenomena. So we have combined the research directions of Chaos Computing and Logical Stochastic Resonance here, and this approach has potential to be realized in wide-ranging systems.
Description:	Only IISERM authors are available in the record.
URI:	https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0209037 (https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0209037) http://hdl.handle.net/123456789/1649 (http://hdl.handle.net/123456789/1649)
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