From Coupled Pendulums to Quantum Searching

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Quantum search is a quantum mechanical technique for searching N possibilities in only $O(\sqrt{N})$ steps. This is achieved by transferring amplitude to a state that has a different oscillation frequency. Similar effects show up in a purely mechanical setting when there are N pendulums, one of which is of a slightly different length. By coupling the pendulums together in a very simple way and letting them oscillate, it is possible to identify the different one in only $O(\sqrt{N})$ cycles. This provides a simple way of understanding the quantum search algorithm, also it leads to novel applications.