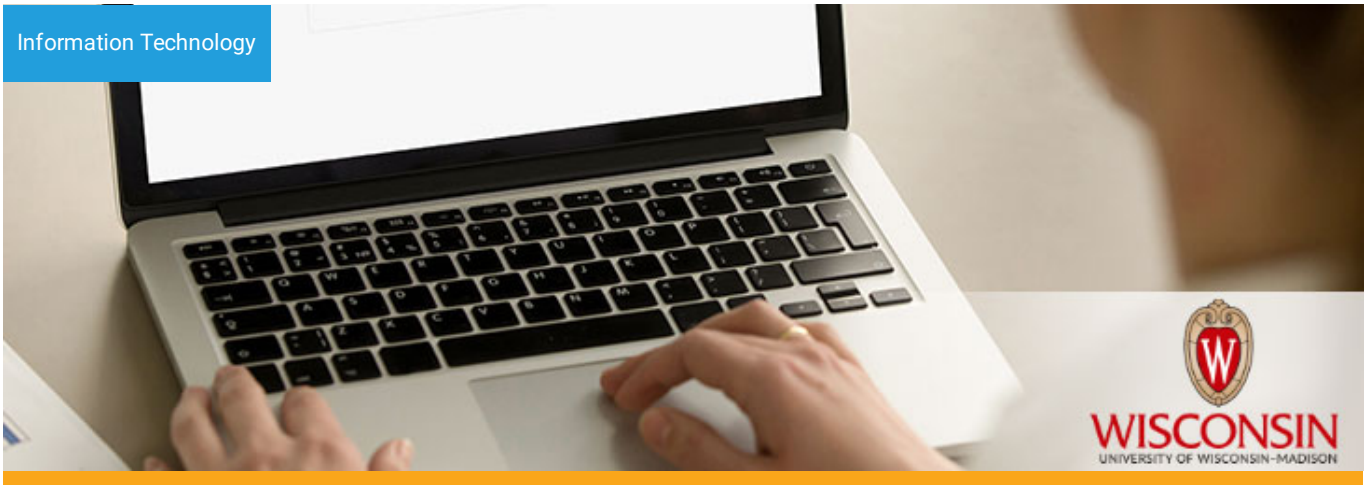
Information Technology



Spin-Bus for Information Transfer in Quantum Computing

View U.S. Patent No. 8,164,082 in PDF format.

WARF: P04370US

Inventors: Mark Friesen

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method of linking distant qubits to allow spin transfer to occur accurately and quickly along the length of the qubit array.

Overview

Quantum computing uses packets of information called quantum bits, or qubits, which can have a value of zero and one at the same time, allowing operations such as prime factorization to be performed much more quickly. The spin of a single electron, trapped inside a semiconductor quantum dot, is a promising candidate for scalable qubits. In conventional quantum computing architectures, the spin information must be passed from qubit to qubit in a linear array. However, the error potential is great during spin transfer, and increases with the length of the line.

The Invention

A UW-Madison researcher has developed a method of linking distant qubits, allowing spin transfer to occur accurately and quickly along the length of the qubit array. Each qubit is reversibly linked to a one-dimensional array of quantum dots called a spin-bus. Each dot in the spin-bus contains one electron that has a strong, consistent link to all of the others. Information can be transferred from a qubit to the spin-bus and then to another qubit, however distant, in a two-step process.

Applications

- Financial computing
- National security

Key Benefits

- Quantum computers can create an exponential increase in speed for operations such as quantum physics simulations and prime factorization, useful for national security and financial computing
- Reduces error correction requirements, which can slow the process or require finely tuned correctional instruments
- Provides quantum computing architecture for system of many qubits
- Less affected by physical environment than previous bus schemes

Additional Information

For More Information About the Inventors

- Mark Friesen

Tech Fields

- Information Technology : Computing methods, software & machine learning

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842