



Southern Illinois University System

Applications

- Integrated circuit design
- Complex threshold logic circuits
- Circuit design software

Inventor(s)

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Higher-Order Complex Threshold Logic Gates

Threshold logic gates are an increasingly popular option for digital circuit design due to attractive delay, power, and area characteristics. Boolean threshold logic functions can be implemented by coupling each of a series of inputs to a corresponding active weight, where input patterns generating a total weight in excess of a specified threshold evaluate to 1. The one-to-one relationship between inputs and weights, however, mean that the size and complexity of threshold logic circuits grows rapidly as function sophistication increases.

Invention

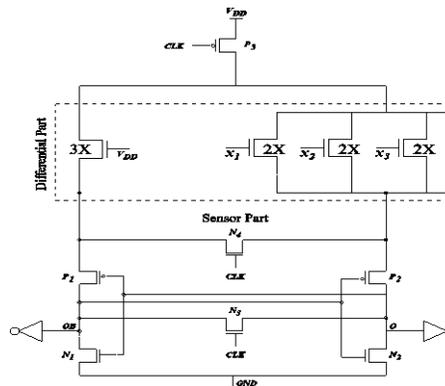
SIU researchers have developed a new paradigm for complex current-mode threshold logic gates wherein the number of input weights may exceed the number of binary inputs. As function/circuit complexity increases, this additional degree of freedom can allow for significant simplification and streamlining of circuit design.

Key Advantages

- Simplified circuits respond more quickly, draw less power, have reduced spatial requirements, and have fewer potential failure modes.
- Accompanying automation framework identifies relevant threshold functions and circuit design
- Physical parameters/tolerances of components incorporated in automation framework for to ensure reliable operation

Status

A provisional patent (application No. 62/445,505) was filed for this technology in January 2017. The technology is available for license.



Current-mode threshold gate implementation for $F_2 = x_4x_3 + x_3x_2 + x_3x_1 + x_2x_1$ with a second-order threshold gate.

Other opportunities related to this technology, included but not limited to sponsored and/or collaborative research, may be available. Please reach out to the designated contact identified at left for more information.