Two Transistor Ternary Random Access Memory

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The limitation of the speed of a computer is the access speed of its Random Access Memory (RAM). The growing disparity between CPU speed and RAM access times in computation is known as the memory wall. The memory wall is the current frontier in computing. Two Transistor Ternary Random Access Memory (TTTRAM) was developed to overcome limitations imposed by the memory wall. TTTRAM is a new type of RAM that utilizes pseudomorphic heterojunction bipolar transistors. TTTRAM was built on a circuit board and was compared to SRAM and DRAM. Dropout speed was measured with an oscilloscope at frequencies of 10 Hz, 3.33 MHz, 13.30 MHz, 53.20 MHz, 88.67MHz, 133.00 MHz. Oscilloscope data shows the decay of DRAM and SRAM but no deterioration of TTTRAM could be determined. Power consumption was determined via modeling with T-SPICE with transistor models provided by NXP. Modeling showed TTTRAM power consumption in femtoampere range, DRAM in picoampere range while SRAM on average operates in nanoampere range. TTTRAM uses considerably less current than competing technologies. If each type of RAM were to consume one amp of current, then the total amount of memory cache per amp for each are as follows: TTTRAM, 1.19 TB; DRAM, 97.0 GB; SRAM, 6 MB -14.55 GB. Research shows that this technology can be implanted on Silicon-Germanium or Silicon allowing for TTTRAM to be cost effective. This new technology has been proven to have ultra-low power consumption, high speed and low cost. Additional testing on a Silicon-Germanium wafer would further prove the hypothesis. The future of computing is here.

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