

ASIC² Project: Automatic Creation of In-Memory Controller

Background: Nowadays, the performance of computer systems is significantly limited by the speed of the memory. Data transportation between the memory and the processor is time consuming and wasteful in energy.

One of the leading ideas for solving these issues is to transfer part of the processing capabilities of the processor into the memory itself. For data-intensive applications, this means a significant increase in computing processing power, while saving a significant amount of time and energy.

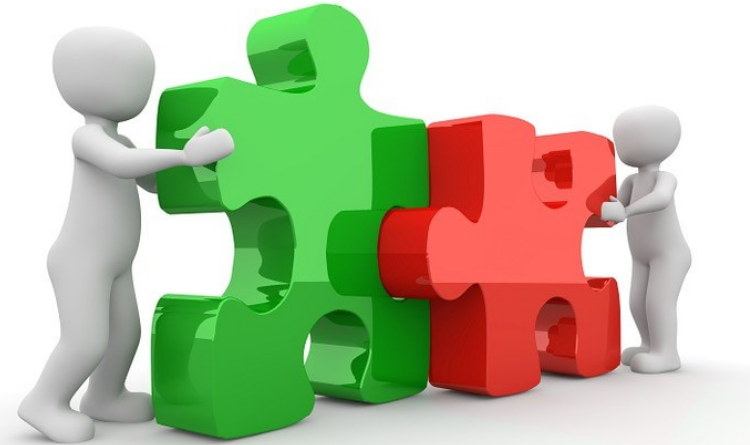
A new computer architecture approach, based on a memristor-based memory, enables performing computations within the memory.

The memristor is a passive circuit element, predicted in 1971 by the circuit theorist Leon Chua. The first prototype of this element was unveiled in 2008 by HP labs. The device remembers its history, by varying its own resistance, so it can be used for memory applications. It also enables the formation of basic logic circuits, based on the MAGIC logic gate. The combine of memory with logic enables to perform logic operations within the memory itself, thus to explore advanced non-von Neumann architectures.

In previous work, we developed a tool which outputs the execution sequence of any desired logic operation. Additionally we designed a VHDL controller for controlling the in-memory computation. Now a combination of the two is desired.

Project Description:

- In this project, the students will generate a code (c, python,...) which automatically creates the state machine of a controller, according to execution sequence which is provided as input.



Contacts info:

Rotem Ben Hur

rotembenhur@tx.technion.ac.il

VLSI LAB