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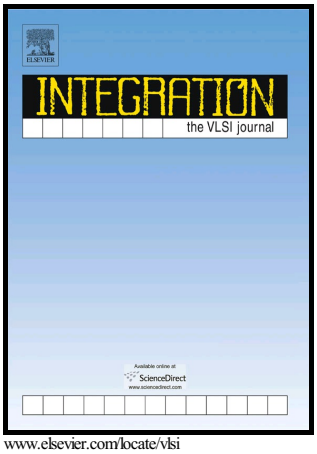

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Arduino-Controlled HP Memristor Emulator for Memristor Circuit Applications

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Abstract

In this paper, we present a memristor emulator made up of an digital potentiometer (DigPot) and a micro-controller (Arduino). The mathematical equations which govern the HP memristor model are programmed onto the Arduino which in turn communicates with the digital potentiometer through the Serial Peripheral Interface (SPI) ports updating it based on the implemented equations. The arduino samples the voltage difference between the two terminals of the potentiometer's resistance network, then calculates the resistance using the implemented mathematical equations of the memristor and then updates the potentiometer through the SPI interface. Data is collected through the serial port and plotted in real time on a serial monitor on a computer. This hobbyist-style do-it-yourself approach which has been made simple and easily replicable can be used to initiate students into the basic theory of memristors. The emulator composed of off-the-shelf electronic components come in handy at a time where reliable physical devices are yet available for testing.

Keywords: memristor, emulator, digital potentiometer, resistor network, programmable network, arduino, microcontroller, modelling, memristor network, memristor mathematical equation

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