

Memristor

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Abstract: In 1971, the electrical resistance, the three key elements of the inductor and capacitor has been known. 1971 Reonchua Professor proposing theoretically requires significant electronics district «memristor». Memristor, the amplitude of the voltage applied on the resistor, two terminals depending on the direction and length of this element. This item, open a wide range of research and the potential application of memristor later, will take place in 2008 by HP Labs, Inc. In this article, machine, manufacturing, describes the characteristics of some of the possible future extension of the memristor approach. Also, in some applications, check the memory of the static digital and analog application and improvement of the future.

Keywords: memristor

1. Introduction

A memristor recently attracted great interest in research, we found many applications. In this article, an overview of the structural basis of memory operations will occur in construction and modeling. Furthermore, non-volatile memory memristor The neuromorphic architecture has no place in a variety of applications including logic and analog applications. In this study, the reader an overview of the device, the main model, we must provide the latest results of the memristor technology research. Besides the summary, which is a strong future for many improvements in memory models and applying stars.

The memristor compound is passive the power supply terminal becomes non-linear load, and the flow connection of the basic circuit elements. Memristor has analog and digital, and many applications are considered, particularly memory chips, a promising device in neural networks and logic.1971, the key information that the fourth Professor memristor (resistor abbreviation memory) is called, as shown in Fig. 1. Reonchua driven by symmetry.

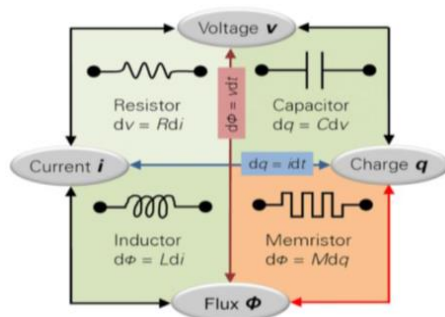


Fig. 1. Basic variable circuit ratio

In 2008, announced the members of HP Labs, the physical characteristics of success can be explained by the theory of measuring nanoscale memristor, we have the above electronic components. HP memristor, as shown in Fig. 2 is amplified and a solid device containing TiO₂ thin layers of non-doped regions nanoscale between two platinum electrodes.

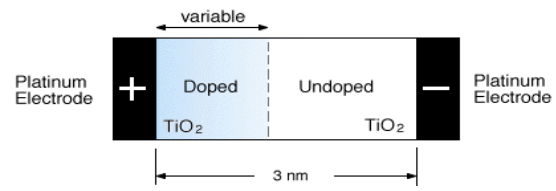


Fig. 2. Memory star titanium dioxide

Since 2008, many applications have been proposed for the memristor. Memristor a cellular structure in the memory chip industry, uses a random access memory (RRAM), may be resistant to the combination of associative memory is used (MCAMs) memristor and MOS devices based memristor. In fact, memristor is a neural network, you can use the memristor and the chain in the direction of reducing the tolerance of the advantages of the region and the neuromorphic circuit that produces a "function to be saved." In the logic sector, based on a new kind of static memory, means for implementing logic circuits. memristor basic rationale is, has a unique ability that can be made to the memory cells on the same chip.

The paper is defined as follows. Describes the properties of ordinary static memory device in the section 2. The section 3, the device properties and future expansion. Section 4 contains the advantage memristor.

Memristor radically different when different ratios of basic circuit elements, unlike the latter, which results in the past is that the memories. When you turn off the circuit, memristor was still used on the way and remember before that. This memristor, the resistivity as compared with the circuit base member is effective can reproduce a combination of one of the circuits of capacitors and inductors, the. Some regulating these basic circuit components that we use in our daily life, will be the basis almost all electronic devices. Thus, the signal from the discovery of new basic circuit element has the potential not to be taken lightly.

2. Tangible assets

As described above, the memristor load (Q) of the magnetic

flux (F). memory Star provides the relationship between Q-z reference Phi & QE is not constant, non-linear.

Memristor said resistor memory control M (Q) «equal load.

$$(Q) \frac{df}{dq} \tag{1}$$

Similarly, has memductance memristor, the flow is controlled, W (phi) is equal to ".

$$(F) = \frac{dq}{df} \tag{2}$$

From (1) and (2) can be derived.

$$V = (Q).i \tag{3}$$

$$= I (z).v \tag{4}$$

voltage characteristics (IV) – Current, the current four major components - shows the difference in voltage characteristics. As shown in the figure, has a hysteresis characteristic memristor (IV). Memristor is to consider not receiving the combination of three other key components of the base components, it should be noted that the features memristor IV used. Fig. 1 shows the theoretical approach to different categories memristive device, such as a non-linear dynamic system such.

This new circuit element or the same unit of measurement (ohms) share several resistors and sharing capabilities. However, the resistance is the custom resistor permanently connected, the power of memories, based on the history of voltage to the material resistance of memory, or applied to different impedance situations, switching program can. This behavior, which may occur between the current flowing through the memristor, to understand the basic voltage ratios with respect memristor graphics.

Normal resistance or current and voltage, the linear relationship between the linear voltage, a graph comparing no current results. However, similar to the memristor graph is a bit more complicated. This shows the voltage behavior with the power of memory.

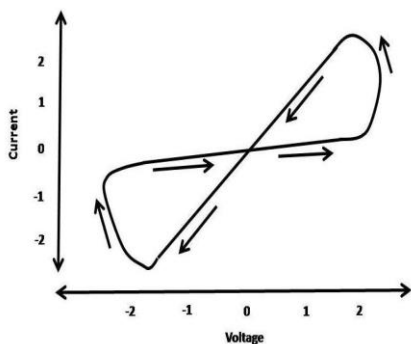


Fig. 3. A memory resistor voltage hysteresis curve effect

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The main portion opposite the line O is the expected behavior memristor resistance appears close to those observed in the magnetic material, and the hysteresis curve. As described above, the linear portion of the two detected straight lines, which are formed on the inner side of the curve. These two curves as two different resistance states can also be interpreted as the rest of the curve as a transition zone between these two members.

3. Possible application

A. Nanometer Nature

The main purpose of creating electronic chip in the chip calculated control limits physical movement and silicon. For decades, improvements in chip performance took place more transistors to turn on the circuit remains substantially. However, higher density, increased disease problems and drawbacks, and the fundamental physics of the effect of the device. As an alternative to increasing the number of transistor circuits, a number of hybrid transistor circuit may be provided is reduced, it can be added by adding the function of memristor. Moreover, memristor technology, it is possible for a higher energy density circuit. The memristor effect is why William depend only on the motion at the atomic scale that seemed nanoscale devices, He has not seen before. The information can be written and energy-- memristor nanosecond state resistance bell issue as something Picojoule. And what is written in the write buffer if stuck again power.

B. Exchange flash

important potential use of memristor is, the characteristics of writing rewritten at high speed, digital camera or USB stick, is a powerful replacement for The types of flash memory for applications that require it. Stable memristiev memory flash memory is the movement of people, before causing a disconnect device, you can write about a thousand times. And you can improve the strength of the memristor.

C. DRAMs exchange for C.

than conventional computers D-RAM used has the ability to retain information when open. If the power supply to the DRAM-based computer is restored, the process is slow, it is necessary to make the energy needed to "start" data stored on the magnetic disk, the work in the system will not be restored. Whenever needs computer basics, that your logic, then deactivate the device to be able to keep the restart was connected. Memristor is because it is possible to save the trend, however, memristor-driven computer may not have restarted. - You are, but you can open all text files and spreadsheets, reduce.

D. Type brain System

For the characteristics of the brain, such as memristor technology human model, associated with the computer system

of the road, and the day you remember that people do. This is, or substantially improve facial recognition technology, there is an effective limit, can be used to create access to personal information of more complex biological recognition systems. The same pattern matching operation is, it is possible to experience and decision-making, you can turn the device to learn computer. composite electrical response signal based on the frequency and power synapses may change its response, the ebb and flow of potassium ions and sodium membrane by each cell should be noted that synapse.

4. Advantages

- It is possible to start up a computer.
- Do not use the information lost when you turn off the camera.
- Density, will be able to store more information.
- It is a point that has the ability to store a charge that flows through it.

5. Conclusion

This paper presented an overview on memristor.

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