DESIGN OF SMART ANTENNA SYSTEM BASED ON MEMCAPACITOR PHASE SHIFTERS

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ABSTARCT

Memcapacitors are used for the design of memory devices since it isdependent on flux i.e voltage over a particular time period without biasing. In this proposed system, memcapacitors are used to design phase shifter for Phased arrays. The memory phase shifter is proposed using the transmission lines loaded with memcapacitors. Intelligent RF circuits and systems canpotentially be enforced with memory bias. The specific memcapacitor and its operation to RF band are Specified. The phase shift over 360 ° is achieved with a low insertion loss whenmemcapacitors are operated in a particular input -output conditions. A smart antenna system incorporated with the proposed memory phase shifters is designed. This system produces a radiation pattern in the required direction.

I. INTRODUCTION

A memcapacitor is a device in which the capacitance is detected from the past input. The phase shifter is a device where two antennas are passed with a input wave and the waves are interchanged between each other. Using the memcapacitor, the phase shifter is directed to rotate at the angle of 360 degree which causes an phased array.Memory devices, such as memristors and memcapacitors, can keep their states when the biasing turns off. They are useful for information storage and they can also be used to construct neuromorphic circuits and systems. A mutator was proposed in to transform a memristor to a memcapacitor, but for relatively low frequencies. Thus, intelligent RF applications can potentially be implemented with memcapacitors, which can be integrated into RF circuits, such as RF resonators, phase shifters, tuning elements, matching networks,and so on. The status may be controlled by artificial intelligence algorithms in controllers. A memory phase shifter is proposed with memcapacitor-loaded transmissionline. The phase shift is tuned by changing the capacitance values of memcapacitors. Then, asmart antenna system is designed using the proposed memory phase shifters, which is ableto adjust its main beam to the direction of arrival automatically.

II. RELATED WORK

The research of **Renyuan Zhang[1]** An efficient calculation unit is developed on the basis of programmable neuromorphic circuit for implementing arbitrary Mathematical functions. To retrieve any specific function approximately, the regression algorithm through neural network (NN) is realized by a compact analog circuitry. The memcapacitor technology is associated to Neuron-MOS structure, which couples multiple memcapacitors on the floating gate of a MOS transistor to achieve multiply-accumulation (MAC) operation. In this manner, each synapse of NN is emulated by only one memcapacitor device and the weight is post-fabrication programmable due to the memcapacitive characteristics of memcapacitor. Two types of neurons including sigmoid and linear are implemented by differential pairs with Neuron-MOS transistors. For proof-of concept, the memcapacitor-based approximate calculation unit (MC-ACU) for arbitrary two-operand computations is achieved with 461 devices. From the real circuit simulation results, all the example functions are retrieved with the maximum inaccuracy of 7:8%. The energy- and device-count of MC-ACU are only 36:7% and 15:7% of that of state-of-the-art works in approximate computing, respectively.

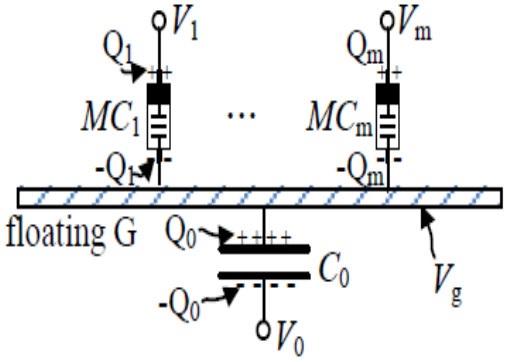

Fig 1 Block diagram of Memcapacitor

The memcapacitor is one of the new memory circuit elements although it is not found on the market as a discrete circuit element. They were developed using active circuit elements. These proposed circuits are both electronically controllable. The relationship between charge and flux depending on different frequencies was obtained for both presented memcapacitor circuits. To demonstrate the experimental response of the circuit, discrete circuit elements were used to build the first proposed circuit on the breadboard. All experimental results showed good agreement with the theoretical analyses. The research of **Hanh Dang-Ngoc [2]** In summary, an aerial based forest fire detection method has been examined through a large database of videos of forest fires of various scene conditions. To enhance the detection rate, at first the chromatic and motion features of forest fire are extracted and then corrected using rule to point out the fire area. Secondly, to overcome the challenge of heavy smoke that covers almost the fire, smoke is also extracted using our proposed algorithm. Our framework proves its robustness with high accuracy rate of detection and low false alarm rate in practical application of aerial forest fire surveillance. The Research of **Zhang Guo[3]** In this paper, a simulation model of the charge-controlled memcapacitor is realized, and fractional calculus is used to analyze it. An interesting phenomena found out is that the curve is bent downward as the parameter order decreases. And then, the fractional-order memcapacitor Chua's differential equations are presented. Theory analysis and simulation results show the influence of the fractional-order to the system dynamics. The nonlinear dynamics of the above fractional-order nonlinear system including phase graphs, time domain waveforms and bifurcation diagrams are studied in detail, during which many interesting phenomena are discovered. We observe that chaos seems to disappear as the order q decreases. Meanwhile, when q1 = q2 = q3 = 0.90, the chaos disappeared completely. Finally, corresponding bifurcation diagram of variable Y versus parameter q are presented respectively, and get a conclusion that the order q3 has the greatest influence on Chaos than q1 and q2.The Research of **Jill Arvindbhai Patel[4]** Ternary logic devices are expected to lead to an exponential increase of the information handling capability, which binary logic cannot support. Memcapacitor is an emerging device that exhibits hysteresis behavior, which can be manipulated by external parameters, such as, the applied electric field or voltage can achieve Metal-Insulator-Transition (MIT) phenomenon, which can be utilized to obtain a staggered hysteresis loop. For multivalued logic devices staggered hysteresis behavior is thecritical requirement. In this paper, we propose a new conceptual design of a ternary logic device by vertically stacking dielectric material interleaved with layers of graphene nanoribbon (GNR) between the two external metal plates. The proposed device structure displays the memcapacitive behavior with the fast switching metal-to-insulator transition in picosecond scale. The device model is later extended into a vertical-cascaded version, which performs as a ternary device. The Research of **Fatih Gul[5]** In this paper, a ZnO-based semiconductor thin film memristor (300 nm in thickness) device is fabricated using metallic top and bottom electrodes by direct-current reactive magnetron sputter. The memristive characteristics of the device were completed by time-dependent current–voltage (I–V-t) measurements, and the typical pinched hysteresis I–V loops of the memristor were observed. This paper is continued with the designing memristor emulator circuit, which has only four MOS transistors. The proposed circuit is suitable both for emulating the fabricated memristor and for using general memristor-based applications to obtain memristive characteristics. of the proposed memristor emulator circuit are compatible with general characteristics of the fabricated semiconductor device. The MOSFET-based proposed memristor emulator circuit is laid out in the Analog CMOS process parameters and its layout area is 366 μm2. So as to show its performance, the dependences of the operating frequency and process corner as well as effects of radical temperature changes have been investigated in the simulation results section.

III. PROPOSED SYSTEM

A. Software Requirements

- HFSS

B. Working

A memcapacitor is a device in which the capacitance is detected from the past input. The phase shifter is a device where two antennas are passed with a input wave and the waves are interchanged between each other. Using the memcapacitor, the phase shifter is directed to rotate at the angle of 360 degree which leads to an phased array, to alter its radiation pattern in the required direction with required beam width. Comparing the rectangular array and the pentagular array bandgap sources we produce both bidirectional waves and unidirectional waves using the HFSS software.

IV. RESULT AND DISCUSSION

The potential application of memcapacitors in smart RF circuits and systems is explored. The characteristic of memcapacitor in high frequencies is characterized. A smart antenna system is proposed using a phased array with the memory phase shifters, which is able to adjust its main beam to the direction of arrival of the incident wave to achieve an optimal reception .It is expected that the abilities of self-learning and evolution will be empowered to intelligent RF systems by memory devices.

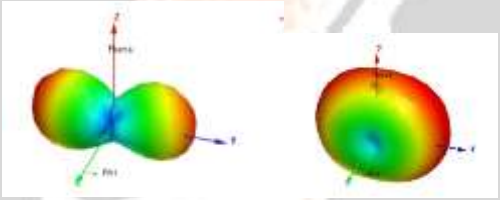

Figure 2 The simulated radiation patters of the 1-D 10-element smart antennasystem.

V. CONCLUSION

This paper consists an Micro patch antenna which produces an 360 degree and the characteristic of a memcapacitor and its application to RF band are discussed to produce Beamwidth signal using memcapatiors phase shifters where the two antenna are passed with signal leads to the phased array to rotate over its own direction for producing a complete beamwidth signal.

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