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DESIGN A HIGH-PRECISION VLSI ARCHITECTURE OF RECONFIGURABLE FFT PROCESSOR

C Manjunatha , Kiran P V , Venumadhava M

Assoc. Prof & HOD , Asst. Professor, Asst. Professor
gc.manjunatha@gmail.com , pv.kiran1977@gmail.com , venudsp@gmail.com
Department of ECE, Proudhadevaraya Institute of Technology, Abheraj Baldota Rd, Indiranagar, Hosapete, Karnataka-583225

ABSTRACT:

This article details the configuration of a reconfigurable fast-forward processor based on a very large-scale integrated (VLSI) architecture. Typically used in systems that involve long-term evolution, FFT essentially supports the bit size that is suited to the system. The size of the fault-free FFT processor may be customised using transport-triggered architecture. In this case, we use the gold standard of cell technology to assess both performance and energy efficiency. In order to access main memory, the computing address unit creates the address. To move bits around, a barrel shifter is used. The bits will be merged extremely well by the data merging block. The data memory blocks store all the combined and shifter data. When accessing the reconfigurable unit, data will be controlled by the memory access controller. The twiddle factor is a tool for making systems run faster. The simulation results show that the reconfigurable FFT processor does, in fact, provide useful results.

KEY WORDS: FFT, Data merger, Barrel shifter cluster, Memory Access controller, Twiddle factor.

I. TRODUCTION

Generally, discrete Fourier transform isintroduced in 1965. Basically, the discrete Fourier transform is taken from the fast Fourier calculation. All things considered,after practically 50 years, stays extremelyhigh because of key helpful properties ofDFT. The ongoing increase in such intrigue is because of correspondence applications, specifically Long Term Evolution (LTE) andSoftware Defined Radio (SDR) [1]. In these applications, productive usage of DFT are required so as to help very tight, commonly negating limitations, for example, hard ongoing necessities over low-control,Minimal effort and adaptable HW stages. In the OFDM images using the Discrete Fourier to obtain the high speed operation inthe system.Here the length of each image is considered as N and these produces complex quantities in the entire system. Hence the vector image is used with the length of N = 128. In the Meantime, the plan eases to be valuable and the primary target gadgets are compact purchaser Electronics, for example, portable (advanced cells,) workstations, and so forth. Then again, plans of action require adaptable programmable usage [2].

Basically, the main intent of filters is to use partial range of frequency to emphasize the signals. But here the signals are getting rejected because of selection of frequencyrange in alternate way. Coming to thedesigning part of circuit, the frequency isselected alternatively. Here the frequency range is connected to the electric network. This electric network works depending on the characteristics of signals. The characteristic

parameters are amplitude, frequency and time [3].

Depending on these parameters the entireelectric network works. Here this may come to know that, there will be no change inallotted frequency and as well as cannot add new frequency to the system. Filters are mainly used in the applications of medical, automotive. There is a unity of region with some very surprising bases of characterization channels and these cover in some unique ways; there is no direct hierarchical grouping. As the social properties of the sign change, separation strategies will be considered. FFT is an elective calculation procedure for discrete Fourier change as it register

rapidly. FFTs are utilized in countless applications extending from advanced sign preparing and furthermore in the calculations, for example, understanding the incomplete differential conditions, augmentation of enormous esteem whole numbers and so forth. FFT processor working recurrence decides the range for which the processor can be utilized. The processor is intended to figure countless complex increases both at rapid and withreliable throughput.

The other design challenges are found in the way in which, by changing the number of centers in FFT, the processor can be suitablefor several applications that work both from the structure and from sensitive applications.Despite the way in which this is apparently useful, the fluctuation of the number of centers emphasizes different changes both atthe registration level and through the changein the number of bits and the level of construction based on the variation in thelength of the displacement registers, analogously to regulation of the meaning of ROM.

II. FFT PROCESSOR

The below figure (1) shows the architecture of FFT processor system. In the memorybased FFT processor architecture is usingtwo modules and this can performs fast operations without zero padding. Here radix architecture is shown and multipliers are used. All these components combine together and give the specified output.

In this memory based FFT processor system,for the purpose of modular reduction andconditional sequences are using the number of multiple operations units. Here the pipeline architectures are designed inside theeach unit and the entire operation is performed sequentially. Next coming to the block butterfly unit, it performs the forward and inverse operation. In multiple adder unit, the component wise multiplication and addition operations are performed. Now for the time domain operations are using the ripple carry adder, subractor and shift module units. Control unit is used to generate the control signals in the system. Coming to memory, it consists of severalRAM sets which stores the recomputed data and intermediate results.

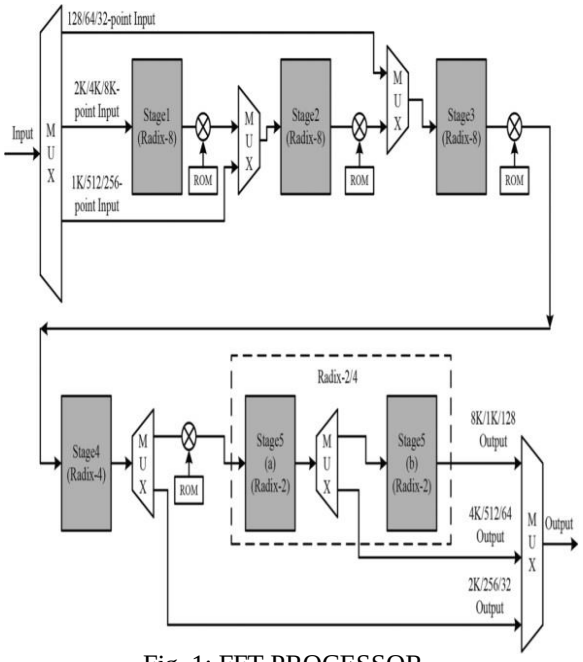

Fig. 1: FFT PROCESSOR

The first and principle significant part in the design is multiply and adder unit. This unit actualizes the segment insightful augmentation and expansion of FFT-RAM. To understand the segment savvy increase when operand size isn't bigger than couple of hundred bits then karatsuba technique is utilized. The multiplier and adder units works with pipeline of 3 bit data sources and one piece yield. Finally to improve the presentation of increase, karatsuba strategyis connected recursively. This is aboutduplicate and snake unit and let us examine about FFT unit.

Next it is connected to FFT calculation. The principle correlation of set up and consistent geometry FFT is it has same association arrange between each neighboring stages.

The FFT is structured with six data sources. In this the four contributions forward thedigits into BFSs for FFT calculation and the other two contributions forward the pre- registered upper bound imperatives intoFSO.

III. RECONFIGURABLE MEMORYBASED FFT

The below figure (2) shows the blockdiagram of proposed system. Data merging block will merge the bits very effectively.All the shifter data and merged data is saved in the data memory blocks. Memory access controller will control the data while accessing to the reconfigurable unit. Twiddle factor is used to speed the operationof system.

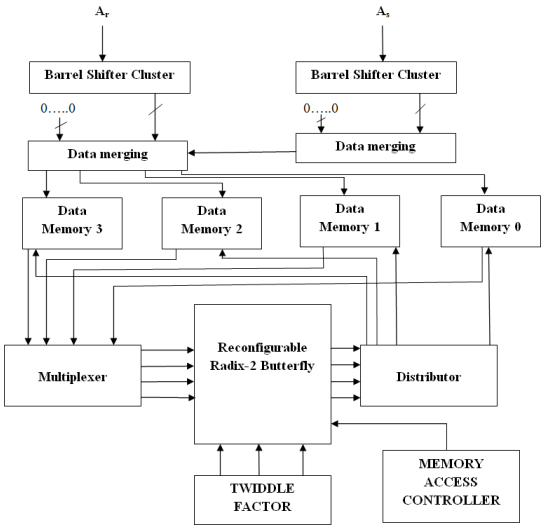

Fig. 2: RECONFIGURABLE MEMORY BASEDFFT PROCESSOR

A Fast Fourier Transform (FFT) is anestimate that represents the Discrete Fourier Transform (DFT) of a meeting or its round (IDFT). Fourier's examination changes on a sign of this extraordinary region(occasionally time or space) to arepresentation in the space of repetition and in a different way. DFT is obtained by breaking down a progression of characteristics in different frequency portions. This action is important in several fields, but its direct management from the definition is as frequent as possible, excessively moderate or possibly conventional.

Radix butterfly unit, is an execution unit inside Control Processing Units (CPUs) that ascertains addresses utilized by the CPU to get to primary memory. By having address estimations taken care of by discrete hardware that works in parallel with the remainder of the CPU, the quantity of CPU cycles required for executing different machine directions can be diminished, bringing execution upgrades. While performing different tasks, CPUs need to compute memory tends to required forbringing information from the memory; for instance, in-memory places of exhibit components must be determined before the CPU can get the information from genuine memory areas. Those location age computations include distinctive number- crunching tasks, for example, expansion, subtraction, modulo activities, or bit shifts.

The technique that is utilized to exchange data between inward capacity and outer gadgets is known as I/O interface. The CPU is interfaced utilizing unique correspondenceinterfaces by the peripherals associated with any PC framework. These correspondenceconnections are utilized to determine the contrasts among CPU and fringe. There exists extraordinary equipment parts among CPU and peripherals to administer andsynchronize all the info and yield exchanges that are called interface units.

Twiddle factors are utilized in direct current (DC) machines: dynamos (DC generators)and numerous DC engines just as widespread engines. In an engine the commutator applies electric flow to the windings. By switching the present bearing in the pivoting windings every half turn, a consistent pivoting power (torque) is delivered. At least two electrical contacts called "brushes" made of a delicate conductive material like carbon press against the commutator, reaching progressive sections of the commutator as it pivots. The windings (loops of wire) on the armature areassociated with the commutator portions.

IV. RESULTS

The below figure (3) shows the RTL schematic of proposed system.

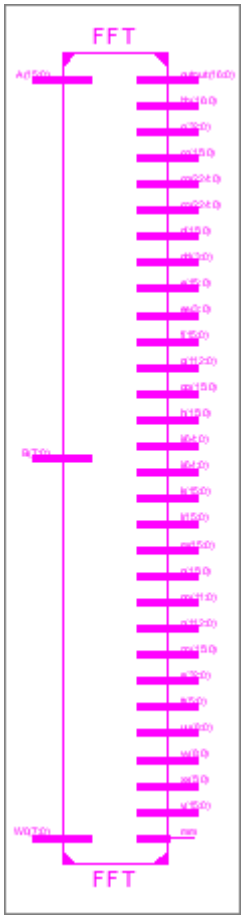

Fig. 3: RTL SCHEMATIC

The below figure (4) shows the technology schematic of proposed system.

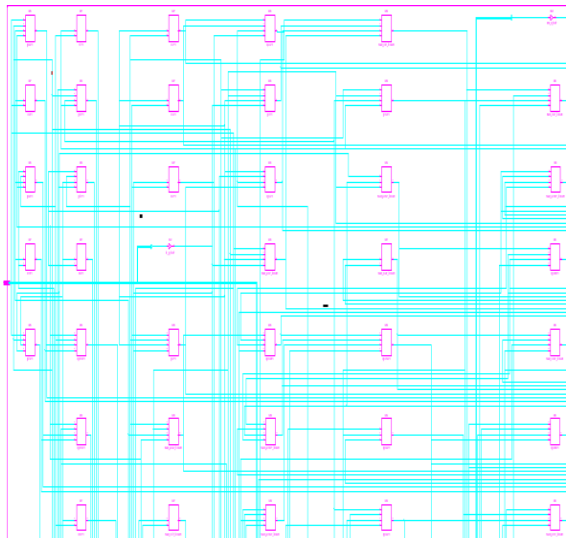

Fig. 4: TECHNOLOGY SCHEMATIC

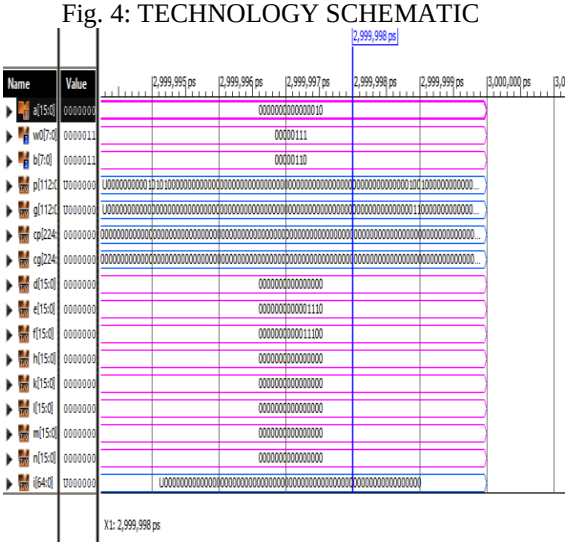

Fig. 5: OUTPUT WAVEFORM

V. CONCLUSION

Consequently, a reconfigurable FFT processor with a high-precision VLSI architecture was developed and implemented in this research. Multiple channels operating in parallel are often seen in modern signal preparation circuits. An efficient zone-based approach to finding and fixing individual errors is the reconfigurable memory-based FFT processor architecture. The bits will be merged extremely well by the data merging block. The data memory blocks store all the combined and shifter data. When accessing the reconfigurable unit, data will be controlled by the memory access controller. Use the twiddle factor.

to speed the operation of system. At lastfrom simulation result it can observe thatreconfigurable FFT processor gives effectiveoutcome.

VI. REFERENCES

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