Comparison of Multipliers for VLSI Application

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***Abstract*— Multipliers are very important component in Digital Signal Processing Systems and Embedded application. The performance of any multiplier will depend upon power, delay and area. Recent works in VLSI Design to reduce significant amount of Multiplier's power consumption. Multipliers perform one of the most frequently arithmetic operations. This spurious switching activity can be mitigated by balancing internal paths through combination of architectural and transistor-level optimization techniques. In this paper, deals with comparison of different multipliers are done for low power requirement. The power management has become a great concern due to the increased usage of multimedia devices. Multipliers are the main sources of power consumption in these devices. The area and speed of the multiplier is an important issue, increment in speed results in large area consumption and vice versa.**

Keywords*— *Partial Products, Digital Signal Processing, Multiplicand, Multiplier, Booth Algorithm.

I. Introduction

With the recent trends in increasing mobility and performance in small hand-held mobile communication and portable devices, among three thrust areas i.e speed, area and power, speed has become one of the significance in modern VLSI design. The objective of good multiplier to provide a physically compact high speed and low power consumption unit. Being a core part of arithmetic processing unit multipliers are in extremely high demand on its speed and low power consumption.

To reduce significant power consumption of multiplier design it is a good direction to reduce number of operations thereby reducing a dynamic power which is a major part of total power dissipation. In the past considerable effort were put into designing multiplier in VLSI in this direction. Parallel multipliers are used to speed up the processors compared to serial multipliers

Multipliers perform one of the most frequently encountered arithmetic operations in digital signal processors (DSPs). For embedded applications, it has become essential to design more power-aware multipliers. The power aware of multipliers uses new technology called Multi precision which include some characteristics (i) non negligible silicon and power overhead,(ii)Performance and throughput reduction brought by the shut-down of parts of the circuit and/or use of reduced supply voltage and(iii) restriction and great margins to the operating condition versatility of the multiplier. High performance energy efficient logic style is having crucial importance in VLSI circuits. Multiplication in hardware can be implemented in two ways either by using more hardware for achieving fast execution or by using less hardware and end up with slow execution [3]. Traditional hardware multiplication is performed in the same way multiplication is done by hand: partial products are computed, shifted appropriately, and summed. In this paper compare the performance of three multiplier structure like array multiplier, Booth multiplier and Wallace tree Multiplier. In all those technique

Booth Algorithm having superior Performance Parameter. This algorithm can be slow if there are many partial products (i.e. many bits) because the output must wait until each sum is performed. Booth's algorithm cuts the number of required partial products in half. This increases the speed by reducing the total number of partial product sums that must take place.

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Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

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- Use either SI (MKS) or CGS as primary units. (SI units are encouraged.) English units may be used as secondary units (in parentheses). An exception would be the use of English units as identifiers in trade, such as "3.5-inch disk drive."
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Number equations consecutively. Equation numbers, within parentheses, are to position flush right, as in (1), using a right tab stop. To make your equations more compact, you may use the solidus (/), the exp function, or appropriate exponents. Italicize Roman symbols for quantities and variables, but not Greek symbols. Use a long dash rather than a hyphen for a minus sign. Punctuate equations with commas or periods when they are part of a sentence, as in

$$a + b = \gamma \qquad (1)$$

Note that the equation is centered using a center tab stop. Be sure that the symbols in your equation have been defined before or immediately following the equation. Use "(1)," not "Eq. (1)" or "equation (1)," except at the beginning of a sentence: "Equation (1) is ..."

D. *Some Common Mistakes*

- The word "data" is plural, not singular.
- The subscript for the permeability of vacuum μ_0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter "o."
- In American English, commas, semi-/colons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
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- Do not confuse "imply" and "infer."
- The prefix "non" is not a word; it should be joined to the word it modifies, usually without a hyphen.
- There is no period after the "et" in the Latin abbreviation "et al."
- The abbreviation "i.e." means "that is," and the abbreviation "e.g." means "for example."

An excellent style manual for science writers is [7].

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Headings, or heads, are organizational devices that guide the reader through your paper. There are two types: component heads and text heads.

Component heads identify the different components of your paper and are not topically subordinate to each other. Examples include ACKNOWLEDGMENTS and REFERENCES, and for these, the correct style to use is "Heading 5." Use "figure caption" for your Figure captions, and "table head" for your table title. Run-in heads, such as "Abstract," will require you to apply a style (in this case, italic) in addition to the style provided by the drop down menu to differentiate the head from the text.

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TABLE I. Table Styles

Table Head	**Table Column Head**		
	Table column subhead	***Subhead***	***Subhead***
copy	More table copy[a]		

a. Sample of a Table footnote. *(Table footnote)*

b.

Fig. 1. Example of a figure caption. *(figure caption)*

Figure Labels: Use 8 point Times New Roman for Figure labels. Use words rather than symbols or abbreviations when writing Figure axis labels to avoid confusing the reader. As an example, write the quantity "Magnetization," or "Magnetization, M," not just "M." If including units in the label, present them within parentheses. Do not label axes only with units. In the example, write "Magnetization (A/m)" or "Magnetization (A (m(1)," not just "A/m." Do not label axes with a ratio of quantities and units. For example, write "Temperature (K)," not "Temperature/K."

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References

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