Channel Encoding using SOLS Technique for DSRC Applications

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Abstract— DSRC stands for dedicated short-range communication. The DSRC used for PC to PC communication and other application. The DSRC standards generally an adoptive technique from FM0 and Manchester codes to reach dc-balance, to increase the signal reliability. The similarity-oriented logic simplification technique is proposed to overcome the limitations of FM0 and Manchester code, i.e. it limits the potential to design a fully reused VLSI architecture. By using similarity oriented logic simplification technique (SOLS) circuit complexity is reduces, required low power consumption and also less time required. The dedicated short-range communication is an newly created technique to push the intellectual transportation system into our day to day life.This paper not only develops for a fully reused VLSI architecture, but also convey an effective performance compared with the existing works.

Key words: Dedicated Short-Range Communication (DSRC), FM0, Manchester, VLSI, Broadcast

I. INTRODUCTION

The Dedicated Short Range Communication supports in both vehicle to vehicle communication and vehicle to roadside communication. The vehicle to vehicle communication actually deals with the hard break warnings, collision alarms etc. Simultaneously the vehicle to infrastructure communication includes the highway-rail intersection warning, Electronic Toll Collection ,in vehicle signing etc. The priority of the dedicated short-range communication (DSRC) channel is collision detection and vehicular safety. In addition with it, it also supports in smooth traffic control. DSRC is a standard used for communication for a short range of distance, upto a few hundred meters. It is used to introduce intellectual transport system into our day to day life. In DSRC technique affects the performance of the system. Hence a new method of implementation a reusable VLSI architecture is proposed. This new method of designing is called the Similarity Oriented Logic Simplification (SOLS), which improves the hardware utilization rate of the useful architecture and also improving the performance and area footage.

The SOLS technique increases the hardware utilization rate from 57.14% to 100% for both encoding techniques. The maximum operating frequency is 2 GHz for Manchester and 900 MHz for FM0 encoding. The Manchester encoding required 1.58mW power consumption at 2GHz and FM0 encoding required 1.14mW power consumption at 900 MHz.

The microprocessors handles to scheduling the task of base band processing and RF front end and intercept the instructions. The RF front end responsible of the transmission and reception of data. Finally main function of the base band processing includes modulation, clock synchronization, and encoding, error correction. When DSRC technique that can be reused between the both encoding is implemented, because of that the hardware utilization rate is reduced also reducing the efficiency.

II. METHODOLOGY

A. *FM0 Encoding:*

There are many channel encoding techniques to represent the binary signal in a digital system. We are using FM0 encoding which is a type of non-return to zero code. The FM0 encoding can be use three basic rules, They are as follows [A]. There should be a transition for every logic zero input within a clock cycle [B]. There should be no transition for logic 1 input [C]. There should be a transition after every clock cycle irrespective of the input data.

These three rules are simply explained by using Fig1.

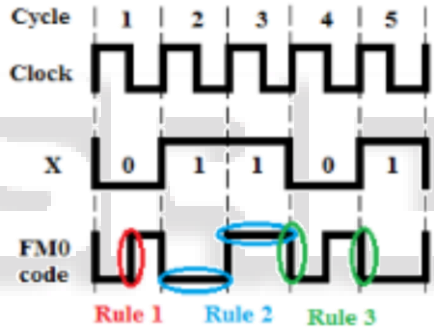

Fig. 1: FM0 encoding

It can be realized by using two flip-flops and multiplexers. The FM0 encoding is used to implement as shown below in fig 2. In the following block diagram, A (t) and B (t) signifies the two states.

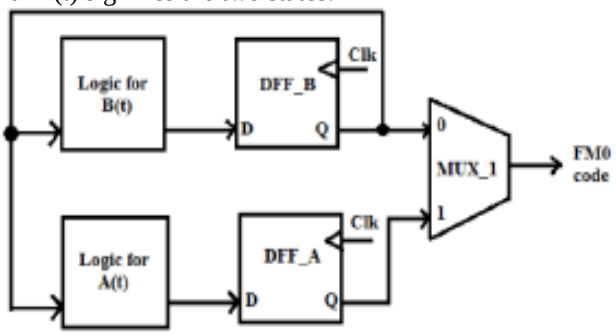

Fig. 2: FM0 Encoder

B. *Manchester Encoding:*

Manchester coding is useful method used today. It is used for combined together the data rate clock to the message to be used at the receiving end. The Manchester coding technique also used for proper synchronization between transmitter and receiver part. Manchester encoding techniques represent the binary values 0 and 1 in digital system. The Manchester code can be represented in binary

values by a transition rather than a level. Manchester encoding states that there will at always be a transition of the message signal at the mid-point of the data bit frame.

What occurs at the bit edges are depends on the state of the previous bit frame and does not always produce a transition. A logical 1 is defined as a middle point transition from low level to high level and a logical 0 is defined as a mid-point transition from high level to low level. For example of a Manchester encoding fig (3) is shown below.

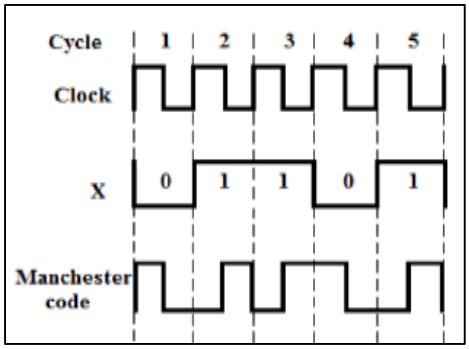

Fig. 3: Manchester Encoding

In the Manchester encoding two signals can be present clock signal and input signal. It can be implemented using an XOR gate because of adding the clock signal and input (data) signal and there will be display the encoded data. As shown in fig (4).

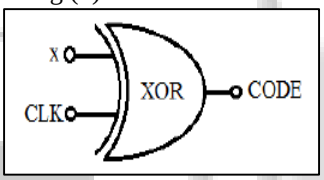

Fig. 4: Manchester encoder

C. SOLS Technique:

Dedicated short range communication encoders use both the FM0 and the Manchester encoding. Therefore from both the encoders same parts can be combined together to form a reusable encoder. Such a reusable encoder can be illustrated as shown in the figure 5.

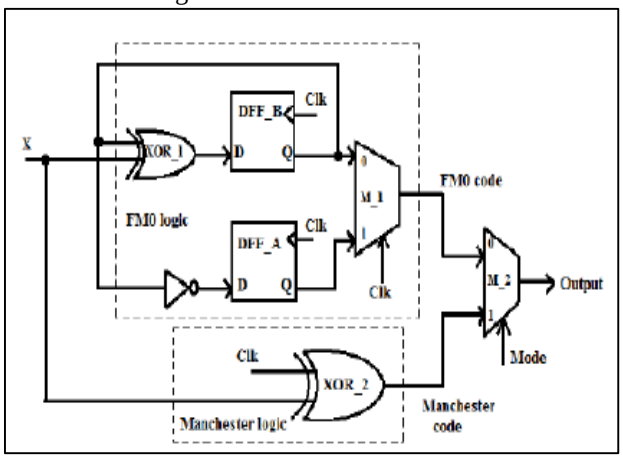

Fig. 5: SOLS Encoder

III. SIMULATION RESULT

The SOLS written in VHDL compiled and simulation using Xilinx ISE. The circuit simulated and synthesized. The simulated result for SOLS.

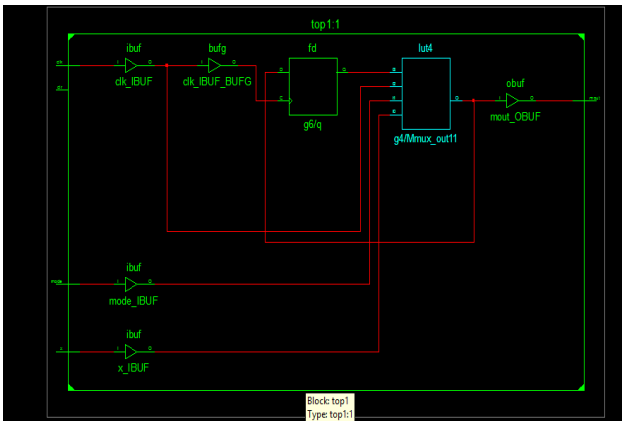

Fig. 6: Schematic view of SOLS

A. Graphical User Interface in MATLAB

A graphical user interface (GUI) is a graphical display in one or more windows containing controls, called components that enable a user to perform interactive tasks. Graphical user interface components can include Static text and slider, push buttons, radio buttons, Edit text.

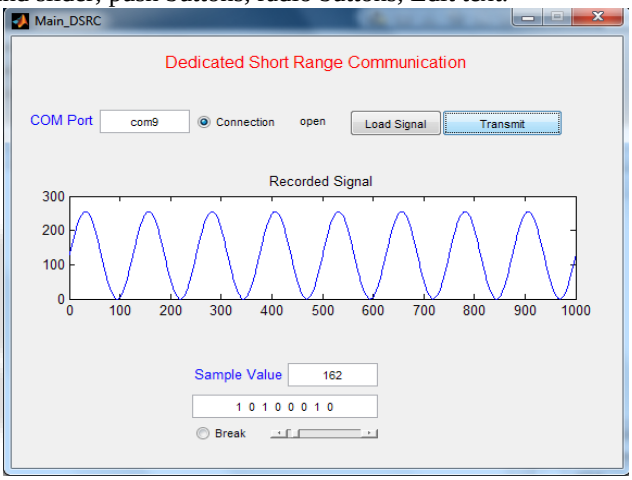

Fig. 7: Output of recorded signal with sample value

The Dedicated Short range Communication in MATLAB R2013a for the simulation, the first selects Com port. Then start the connection. Next button load signal to load recorded signal.

Above figure shows the GUI window which contain five parts

- COM Port
- Connection
- Load Signal
- Transmit
- Slider

IV. CONCLUSION

In DSRC technique we use FM0 and Manchester encoding but the code difference between FM0 and Manchester encoding reason the limitation on hardware utilization of VLSI architecture design, which also reduces the efficiency so to overcome this limitation we use a SOLS technique for both encodings. The SOLS technique eliminates the limitation on hardware utilization and it improves the efficiency by using two core techniques i.e. area compact retiming and balance logic operation sharing.In area compact retiming it reduces the hardware requires i.e. up to 22 transistor and balance logic operation sharing combines

FM0 and Manchester encoding efficiency with identical logic components.

The FM0 uses 1.14mW power consumption at maximum frequency and Manchester uses 1.58maximum frequency at 900MHZ.Also the it required core paper can fully support to American DSRC standard also Japan and European DSRC standards. So we conclude that by using SOLS we overcome the hardware utilization of DSRC.

V. FUTURE SCOPE

In future we will go for optimizing Power Consumption means we will try to reduce power consumption without significant increase in area. As DSRC is having wide applications in portable devices, and power consumption is very important issue in portable devices like Mobiles Phones etc. To resolve such problems in future we will go for optimizing Power Consumption means we will try to reduce power consumption without significant increase in area.

REFERENCES

[1] F. Ahmed-Zaid, F. Bai, S. Bai, C. Basnayake, B. Bellur, S. Brovold, et al., ―Vehicle safety communications—Applications (VSC-A) final report,‖ U.S. Dept. Trans., Nat. Highway Traffic Safety Admin., Washington, DC, USA, Rep. DOT HS 810 591, Sep. 2011.
[2] J. B. Kenney, ―Dedicated short-range communications (DSRC) standards in the United States,‖ Proc. IEEE, vol. 99, no. 7, pp. 1162–1182, Jul. 2011.
[3] J. Daniel, V. Taliwal, A. Meier, W. Holfelder, and R. Herrtwich, ―Design of 5.9 GHz DSRC based vehicular safety communication,‖ IEEE Wireless Communication. Mag., vol. 13, no. 5, pp. 36– 43, Oct. 2006.
[4] P. Benabes, A. Gauthier, and J. Oksman, ―A Manchester code generator running at 1 GHz,‖ in Proc. IEEE, Int. Conf. Electron., Circuits Syst., vol. 3. Dec. 2003, pp. 1156–1159.
[5] A. Karagounis, A. Polyzos, B. Kotsos, and N. Assimakis, ―A 90nm Manchester code generator with CMOS switches running at 2.4 GHz and 5 GHz,‖ in Proc. 16th Int. Conf. Syst., Signals Image Process., Jun. 2009, pp. 1–4.
[6] Y.-C. Hung, M.-M. Kuo, C.-K. Tung, and S.-H. Shieh, ―High-speed CMOS chip design for Manchester and Miller encoder,‖ in Proc. Intell. Inf. Hiding Multimedia Signal Process, Sep. 2009, pp. 538–541.
[7] M. A. Khan, M. Sharma, and P. R. Brahmanandha, ―FSM based Manchester encoder for UHF RFID tag emulator,‖ in Proc. Int. Conf. Comput.,Commun. Netw., Dec. 2008, pp. 1–6.
[8] M. A. Khan, M. Sharma, and P. R. Brahmanandha, ―FSM based FM0 and Miller encoder for UHF RFID tag emulator,‖ in Proc. IEEE Adv. Comput. Conf., Mar. 2009, pp. 1317–1322.
[9] J.-H. Deng, F.-C. Hsiao, and Y.-H. Lin, ―Top down design of joint MODEM and CODEC detection schemes for DSRC coded-FSK systems over high mobility fading channels,‖ in Proc. Adv. Commun. Technol. Jan. 2013, pp. 98– 03.
[10] I.-M. Liu, T. -H. Liu, H. Zhou, and A. Aziz, ―Simultaneous PTL buffer insertion and sizing for minimizing Elmore delay,‖ in Proc. Int. Workshop Logic Synth., May 1998, pp. 162–168.

