

Error free FM0/Manchester Encoding Technique for DSRC Applications

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ABSTRACT: Smart Transportation System is designed to give advanced administrations in traffic methods and transportation administration. Dedicated Short Range Communication is the procedure adopted to advance the smart transportation into our day by day life. DSRC standard utilize FM0 and Manchester codes for encoding. These codes improve the flag unwavering quality with dc adjust. The coding differences amongst FM0 and Manchester codes restricts the possibility to plan a completely reused VLSI design for both codes. This paper proposes an outline to combine the FM0 and Manchester encoding methods. This method removes the coding assorted qualities amongst FM0 and Manchester encoding for DSRC application. In this project the number of transistors that are used are reduced and the logic operation can be shared between both encoding methods. This project is essentially aimed at integrating the smart transportation system into the daily travel so that the traffic management can be effectively carried out. The SOLS system enhances the equipment use rate to 100%. Error correction in data transmitted is carried out with the help of Hamming Code. Hamming code makes use of the concept of parity and parity bits, which are bits that are added to data so that the validity of the data can be checked when it is read or after it has been received in a data transmission.

KEYWORDS: DSRC,FM0,Manchester,VLSI,Hamming code.

I. INTRODUCTION

Present day utilization of vehicles for transportation has turned out to be urgent into our everyday life, in the meantime individuals confront a few issues due to movement frameworks, mishaps and vehicle harms. The DSRC is the main answer for advance savvy transportation administrations. The DSRC can be characterized into two sorts. They are vehicle to-car furthermore, vehicle to-roadside. In car to automobile, the DSRC has the capacity of message sending and broadcasting among vehicles for security issues and open data declaration. The security messages incorporate blind side, convergence cautioning, between autos separation and impact alert. The vehicle to-roadside focus on transportation administration, for example, electronic toll collection. And so forth can be extended to the installment for stopping administration, and gas-refueling. Along these lines DSRC assumes an imperative part in most recent vehicle industry. The framework engineering of DSRC handset is appeared in Fig1. comprises of three essential modules to be specific microchip, base band handling and RF front-end. The car to-roadside concentrates on the transportation administration, for example, electronic toll collection (ETC) framework. With ETC, the toll collecting is electrically

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proficient with the contactless IC-card system. In addition, the ETC can be reached out to the installment for stopping administration, and gas-refueling.

Accordingly, the DSRC framework assumes an imperative part in current car industry. The framework engineering of DSRC handset is appeared in Fig. 1. The upper and base parts are committed for transmission and getting, individually. This handset is grouped into three essential modules: chip, baseband preparing, and RF front-end. The chip translates directions from media get to control to plan the errands of baseband handling and RF front-end.

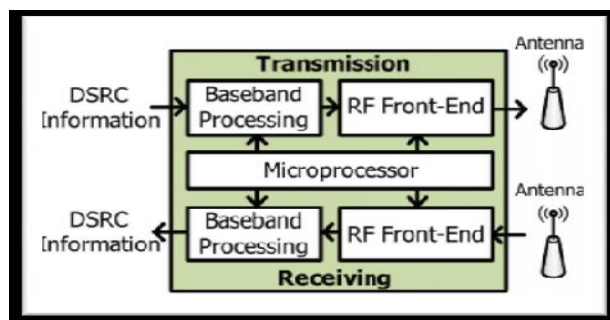


Fig1. DSRC transceiver

The baseband preparing is in charge of balance, error correction, clock synchronization, and encoding. The RF frontend transmits and gets the remote flag through the receiving wire. The modulation methods incorporate amplitude shift keying, phase shift keying, and orthogonal frequency division multiplexing.

II. RELATED WORK

The literature [4] targets a VLSI architecture of Manchester encoder for optical communications, implemented by 0.35- μm CMOS technology and its operation frequency is 1 GHz. The literature [5] further replaces the architecture of switch in [4] by the nMOS device. It is realized in 90-nm, CMOS technology, and the maximum operation frequency is as high as 5 GHz. The literature [6] develops a high speed VLSI architecture almost fully reused with Manchester and Miller encodings for RFID applications. This design is realized in 0.35- μm CMOS technology and the maximum operation frequency is 200 MHz. The literature [7] also proposes a Manchester encoding architecture for ultra high frequency (UHF) RFID tag emulator, realized into FPGA prototyping system, maximum operation frequency of this design is about 256 MHz. The similar design methodology is further applied to individually construct FM0 and Miller encoders also for UHF RFID Tag emulator [8]. Its maximum operation frequency is about 192 MHz. Furthermore, [9] combines frequency shift keying (FSK) modulation and demodulation with Manchester code in hardware implementation.

III. CODING PRINCIPLES OF FM0 AND MANCHESTER ENCODING

In the following discussion, the clock signal and the input data are abbreviated as CLK, and X, respectively. With the above parameters, the coding principles of FM0 and Manchester codes are discussed as follows.

FM0 Encoding

The FM0 code comprises of two sections: one for previous half cycle of CLK, A, and the other one for next half cycle of CLK, B. The coding standard of FM0 is recorded as the accompanying three guidelines.

- 1) If X is 0, the FM0 code must show a transition amongst A and B.
- 2) If X is the 1, no transition is permitted amongst A and B.
- 3) The transition is allotted among each FM0 code regardless of what the X is in every clock cycle.

A FM0 coding case is appeared in Fig. 2. At cycle 1, the X is 0; accordingly, a movement happens on its FM0 code, according to lead 1. For straightforwardness, this movement is at first set from 0 to -1. As indicated by lead 3, a

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move is allocated among each FM0 code, and along these lines the logic 1 is changed to logic 0 in the start of cycle 2. At that point, as indicated by lead 2, this logic level is hold with no transition in whole cycle 2 for the X of logic 1. Thus, the FM0 code of each cycle can be determined with these.

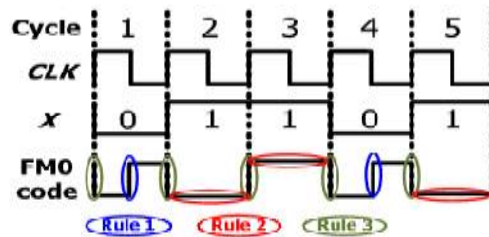


Fig. 2. Illustration of FM0 coding example.

Manchester Encoding

The Manchester coding example is shown in Fig. 3. The Manchester code is derived from

$$X \oplus CLK.$$

The Manchester encoding is acknowledged with a XOR operation for CLK and X. The clock dependably has a move inside one cycle, thus does the Manchester code regardless of what the X is.

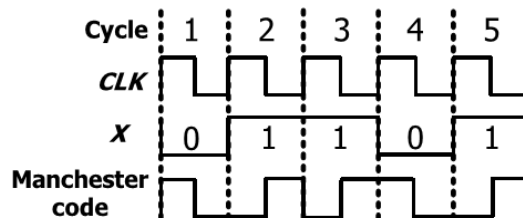


Fig. 3. Illustration of Manchester coding example.

IV. OUTLINE OF FM0 AND MANCHESTER ENCODER USING SOLS TECHNIQUE

The SOLS system enhances the HUR from 57.14% to 100%, regardless of whether the FM0 or Manchester code is received. Consequently, the SOLS system gives a completely reused VLSI engineering for FM0 and Manchester encodings with the HUR of 100%. The rationale elements of SOLS method can be acknowledged by different rationale capacities to advance more execution, for example, region, control, speed.

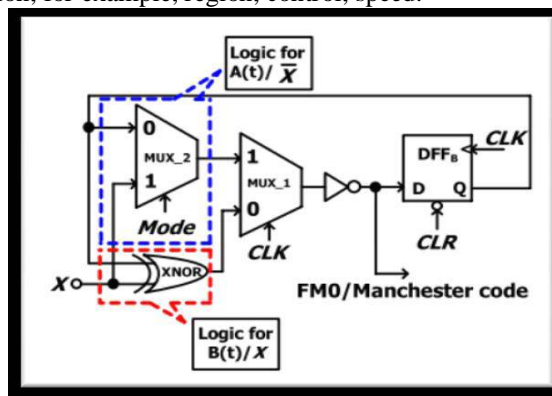


Fig 4. VLSI Architecture using SOLS Technique

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The proposed SOLS strategy is created from the engineering viewpoint to accomplish 100% HUR. On the off chance that the rationale parts in SOLS engineering are outlined utilizing static CMOS, the Manchester deferral is truly constrained inferable from an excessive number of transistors in the basic way of Manchester encoder. To additionally decrease the transistor tally in Manchester encoding way, the transmission-entryway rationale is considered in the circuit plans of MUX-1, MUX-2 and XNOR. The engendering deferral of transmission-entryway rationale is not as much as that of static CMOS. Applying the transmission entryway rationale can smaller the transistor check to diminish the engendering delay.

Hamming code error identification and amendment approach is utilized for error free correspondence in communication. In correspondence framework data information exchanged from source to destination by channel. In the middle of source and receiver information might be debased because of a error. To discover unique data we utilize Hamming code error discovery and remedy strategy. In hamming code mistake location and redress strategy to get error free information at receiver, we encode data information as indicated by even and odd equality strategy before transmission of data at source end. In this method we produce 5 parity bits for 25 bit data information to send 30 bit information string for transmission at source by utilizing even and odd parity check method. Suppose, we need to transmit 25 data information bit is "101111101110011001010110" = 25'h17EE656. For this 25 bit data information we require 5 repetition bits and these are "00111" (5h'07) and "11000"(5h'18) by utilizing even include odd equality strategy. Subsequent to creating repetition bits, add these bits to 25 bit data information for making 30 bit information string for transmission at source end. How we can create 5 excess bits for 25 bit data information for making 30 bit information string for transmission at source end by utilizing even and odd equality technique will be talked about in points of interest at correspondence with even equality strategy and correspondence with odd equality strategy section. At goal recipient gets 30 bit information string from channel and check it, will be it tainted or not? In the event that this information string is adulterated then collector discover the blunder area as indicated by equality check strategy (even equality check or odd equality check technique which one we use for discovering mistake). And correct this error bit.

V. RESULT AND ANALYSIS

The SOLS strategy coordinates Manchester and FM0 encodings into a completely reused equipment design. Clearly, the coding strategy of FM0 is more perplexing than that of Manchester. The information way of Manchester encoding is limited to that of FM0 encoding. At that point, the operation recurrence of Manchester encoding is likewise restricted by that of FM0 encoding. Our work focuses at a productive coordination of equipment gadgets for Manchester encoding and FM0 encoding rather than operation recurrence and power utilization. By and large, all the more coding techniques an equipment engineering can bolster, more equipment gadgets itrequires. An execution assessment is given under indistinguishable conditions for a more target assessment. A building piece that can perform FM0 and Manchester encodings is viewed as an assessment platform. The literary works [4], [5], and [7]– [9] are devoted for either FM0 or Manchester encoding. To make these literary works fit the assessment stage, the FM0 rationale of Fig. 6 is executed in full-custom to consolidate [4] and [5] and in FPGA to join [7] and [9].

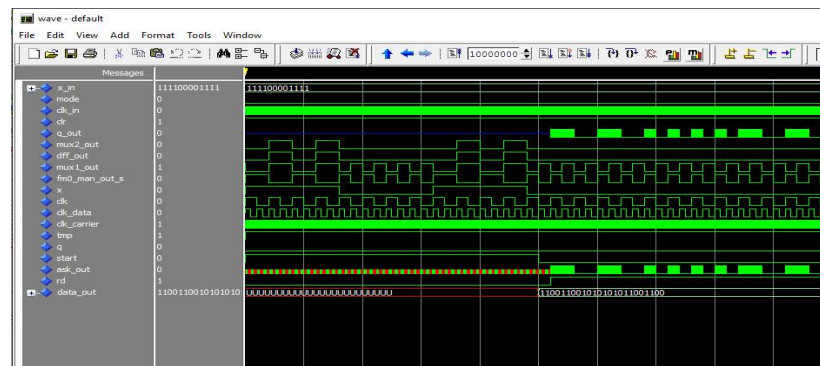


Fig. 5. FM0 Encoding Waveform

Fig.5 portrays the SOLS based plan of the encoding that works in the FM0 mode chose by the mode values as mode=0, the information is encoded in the FM0 encoding plan and transmitted in view of the UART convention. The result for FM0 encoding is appeared in Figure 5. At the point when the information X is 0, and the CLK is given as a rising edge

which creates a move in center of that FM0 cycle. At the point when the info X is 1, there is no change in the FM0 cycle. Additionally there is a move in among each FM0 code.

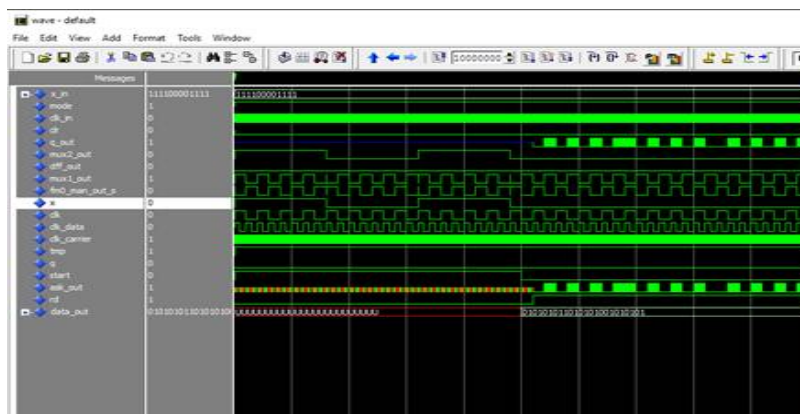


Fig. 6. Manchester Encoding Waveform

Fig.6 portrays the SOLS based plan of the encoding that works in the Manchester mode chose by the mode values as mode=1, the information is encoded in the Manchester encoding plan and transmitted in light of the UART convention. The reenactment result for Manchester encoding is appeared in Fig 6. The Manchester encoding is acknowledged with a XOR operation for CLK and X. The clock dependably has a move inside one cycle, thus does theManchester code regardless of what the X is.

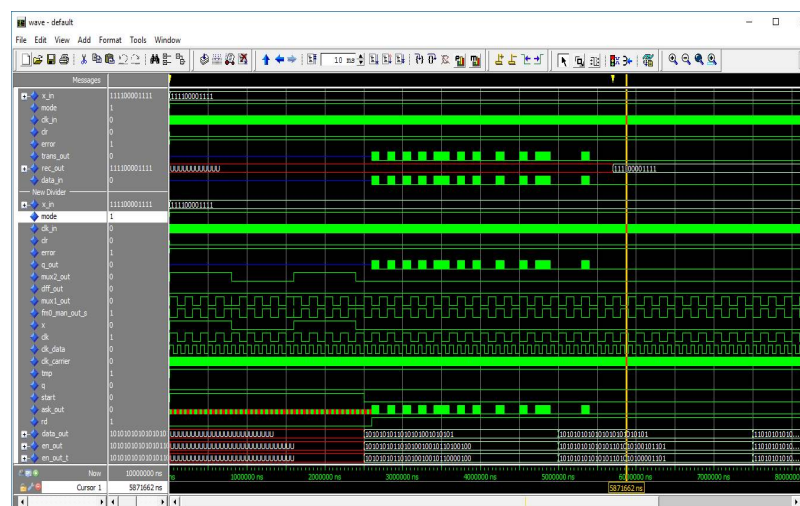


Fig. 7. Transmitter section

Fig.7. shows the transmitter section with error correction component.Hamming code error identification and amendment procedure is utilized for error free communication. In hamming code error discovery and redress strategy to get error free information at destination, we scramble data information as indicated by even and odd equality technique before transmission of data at source end. In hamming code with even and odd equality check technique by utilizing VHDL, we transmit 25 bit data information with 5 repetition bits from source and get this information at destination. To discover the estimation of these repetition bits we have two techniques, one of them is even equality strategy and

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another is odd equality method. At destination, we get 30 bit information, which was transmitted by source end. This gets information might be ruined because of noise. To evacuate this error we discover the address of mistake bit then correct them.

VI. CONCLUSION

The DSRC is a vital strategy to push the transportation network into our day by day life. The transmitted flag is expected to have zero mean for life issue and this is likewise alluded as dc-adjust. The FM0 and Manchester codes are utilized to achieve the dc-adjust in DSRC. The FM0 encoder and Manchester encoder structures are distinctive, so constrained to reuse the VLSI design for creating both the codes. In this work, the likeness situated rationale improvement (SOLS) plan is utilized to vanquish this constraint. The equipment usage rate (HUR) of FM0 and Manchester encoders are raised from 57.14% to 100% with SOLS procedure. From the Synthesis comes about, the SOLS system based FM0 and Manchester encoder structure yields essentially less Delay, Area and Power Consumption than the Conventional FM0 and Manchester encoder structure. With the implementation of Hamming code the data can communicated without error. Speed of correspondence framework can be expanded by utilizing this technique; we can transmit more blend of information (more data in a solitary frame). The unpredictability of circuit additionally decreased and we can utilize one IC set up of two IC's for recovering genuine data information from encoded degenerate information at goal end. Up to today we can transmit 7 bit data information string implies just 2^7 (128) mix of information, implies just 128 kind of data can be transmit at once. Presently by utilizing 30 bit hamming code error location and adjustment with odd and even equality check technique we can transmit 25 bit data information string implies 2^{25} (33554432) blend of information. Presently we can transmit 33554432 kind of data at any given moment.

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