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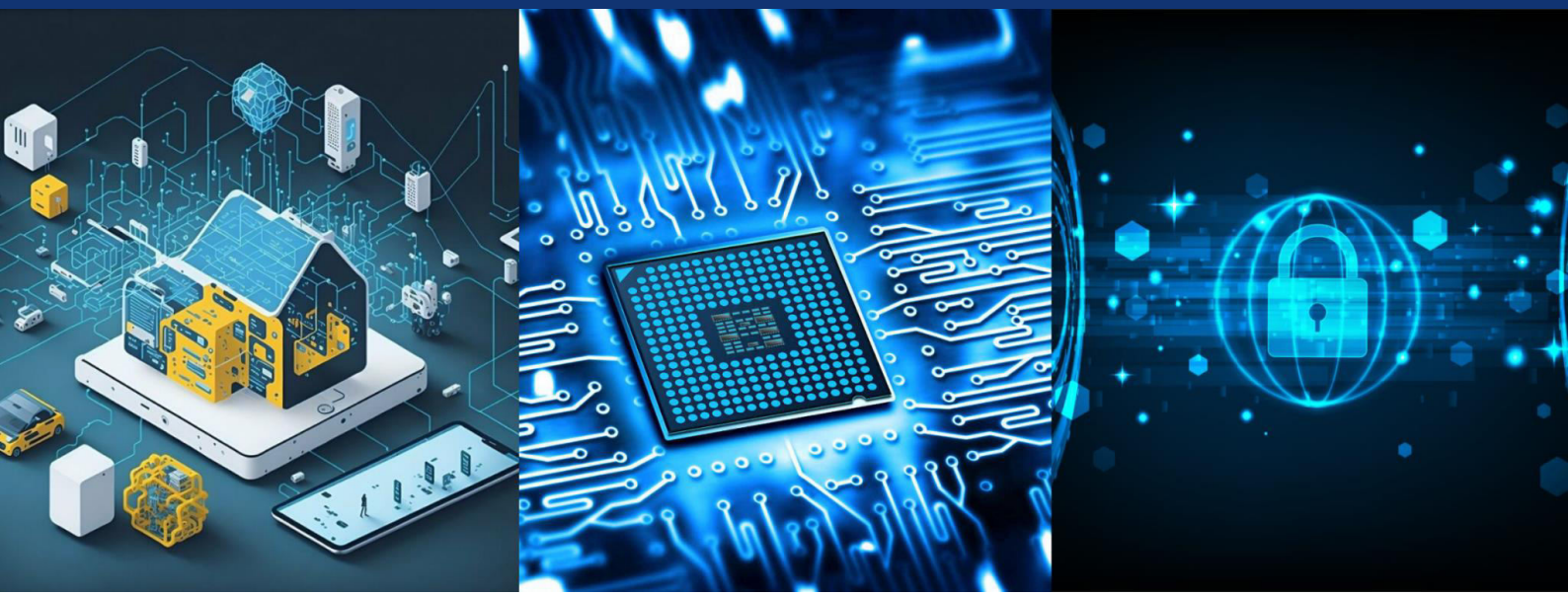

International Journal of Innovative Research in Computer and Communication Engineering

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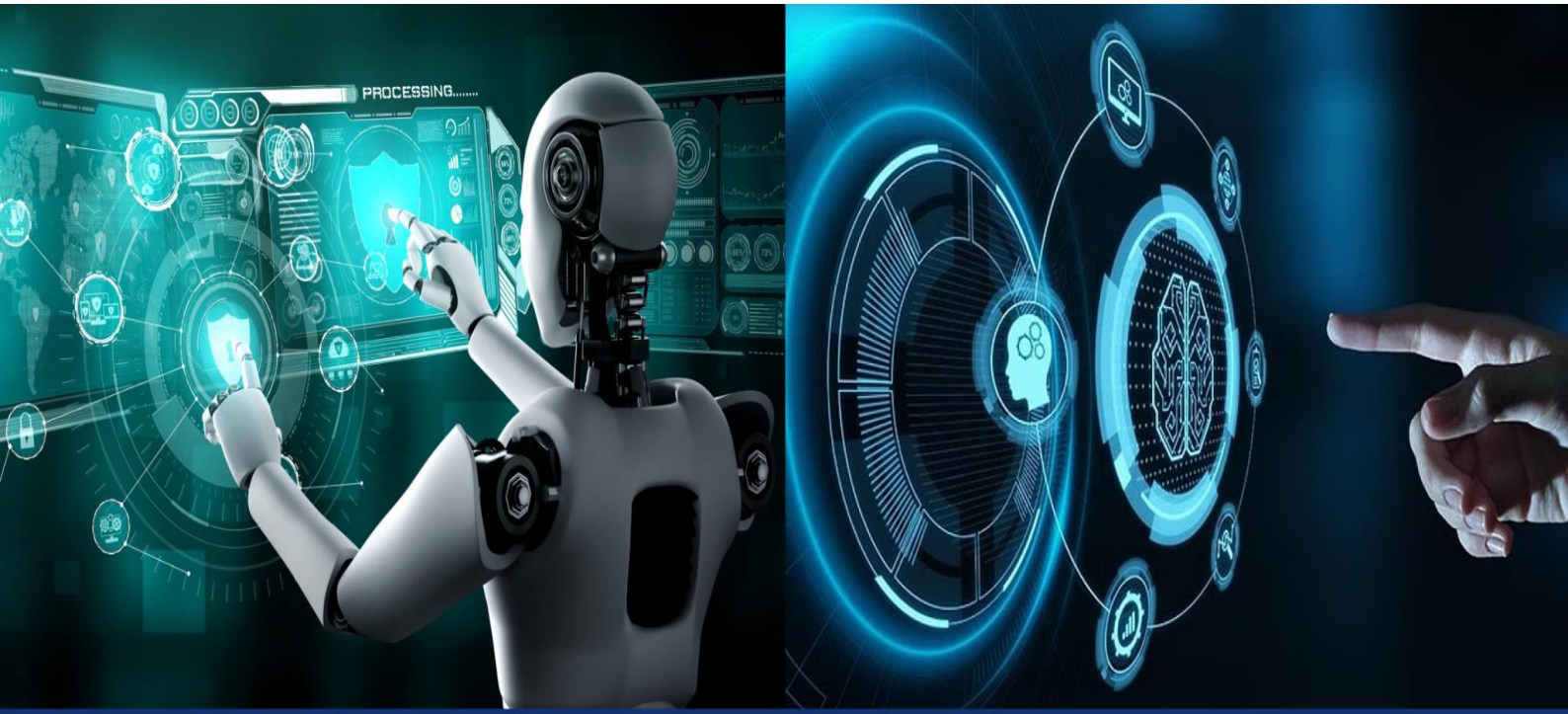

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International Journal of Innovative Research in Computer and Communication Engineering (IJIRCCE)

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Security Based Biometric Voting Machine Using Xilinx Tool

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ABSTRACT: This paper presents "FINGERPRINT BASED ELECTRONIC VOTING MACHINE IN VERILOG", Earlier voting was based on the ballot paper, through this system processvotingwaslongandtherehadchanceofmisusingtheballotpaperbygivingvotebetween two parties present on the ballet paper. To overcome come the issue raised in the ballot was to resolved by bringing in the system called Electronic voting machine (EVM) is easy to understand any anybody and secure method that takes minimum of our time. In this electronic voting machine, an unauthorized person can cast this vote in electronic voting through this tampering of an EVM was happened by this voting system becoming less safe and secure. In this project we are overcoming the problem of less safe and secure by introducing fingerprint based electronic voting machine in Verilog that is designing on Xilinx ISE using Verilog and for the real time application we are proposing on FPGA (Field Programmable gate array). fingerprint acts as security or password to cast their votes which provide safety and security to voting system. there will be unauthorized person cannot come and access this vote. Before, a person used to cast their more than once but now only on.

KEYWORDS: Biometric Voting, Electronic Voting Machine (EVM), FPGA (Field Programmable Gate Array), Secure Voting, Tamper-proof Voting, VLSI Design, Voter Verification, Xilinx ISE.

I. INTRODUCTION

The integrity of voting systems has become a subject of increasing concern, particularly in light of growing populations and the complexity of managing democratic processes in a secure and transparent manner. As the world moves toward more digitally enabled systems, traditional voting mechanisms face challenges such as impersonation, multiple voting, vote tampering, and delays in result processing. To overcome these issues, there is a pressing need for a secure, efficient, and technologically advanced alternative that ensures voter authenticity and reliability of results. One of the most promising approaches to address these concerns is the development of a biometric-based electronic voting machine, specifically utilizing fingerprint recognition technology. Fingerprints are unique to every individual and provide a reliable method of verifying a voter's identity, making them ideal for use in secure voting systems. Casting a ballot is the sole criteria for picking their agents by individuals in any vote-based system, along these lines, this whole procedure ought to be finished with most extreme consideration sojustareasonableand meritinghopefulischosenthatisexclusivelyfoundedonpopularconclusion. In prior days, decisions were led utilizing poll paper framework where by individuals threw their votes to their most liked challenger by setting stamp against his/her name however this strategy

Regularly experienced different defects for example, taking of votes and unjustifiable outcomes. Be that as it may theplanofstraightforwardelectroniccastingaballotmachinewithremovablememorycard was scarce as access to memory card for even an instant will alter all of the votes with same malignant code. So, we tend to need a frame work that might offer better technique for executing Electronic Voting Machine. Since we tend to understand that it is laborious to manage control signals, hence we have structured electronic casting a ballot machine in Verilog utilizing Xilinx ISE 14.7 which can be actualized on FPGA.

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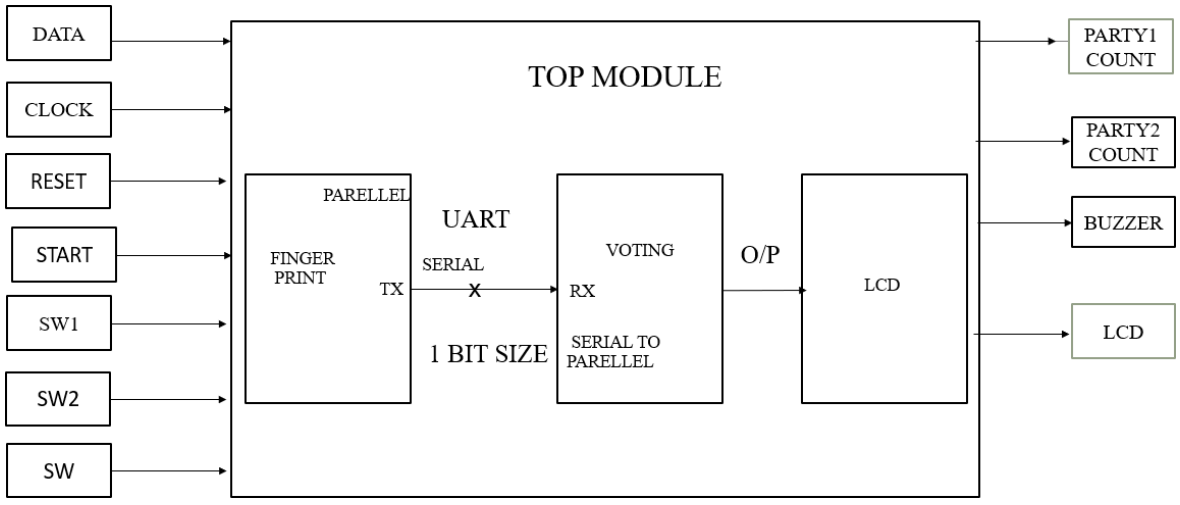
II.PROPOSEDSYSTEM

A novel fingerprint-based electronic voting machine that integrates biometric authentication with FPGA (Field Programmable Gate Array) technology using the Xilinx tool suite. The system is designed to authenticate users based on their fingerprint data before allowing them to cast their vote. Once authenticated, the voter is given the opportunity to vote for their chosen candidate or party. The vote is then recorded and counted in a secure manner, with the result displayed in real-time. By utilizing FPGAs, the system benefits from the inherent advantages of hardware-level speed, parallelism, and reconfigurability, which are essential for real-time operations and secure logic implementations.

The proposed system is implemented as a modular design on an FPGA platform. The core components include a fingerprint recognition module, a UART communication interface, a voting logic unit, and an output display mechanism. The fingerprint module captures the biometric data of the voter and converts it into a digital format. This data is then serialized using a UART (Universal Asynchronous Receiver/Transmitter) interface and transmitted to the central voting logic unit. The UART communication plays a crucial role in converting the parallel data obtained from the fingerprint sensor into a serial bitstream for transmission, minimizing the number of communication lines and enhancing system simplicity. The data is transmitted in 1-bit size units to maintain efficient bandwidth usage and ensure minimal hardware overhead.

Upon receiving the fingerprint data, the voting logic unit converts the serial input back to parallel using a serial-to-parallel converter. It then compares the fingerprint with the stored database of authorized voters. If the fingerprint matches a registered voter who has not yet cast a vote, the system allows the voting process to proceed. The voter is then prompted to cast their vote using designated input switches corresponding to different parties. For instance, SW1 and SW2 can be used to cast a vote for Party 1 and Party 2, respectively. Once a vote is cast, the system locks the voter's ID, preventing them from voting again, thereby ensuring the principle of one-person-one-vote is upheld.

The vote counts are stored and updated in real-time within internal registers or counters. These values are displayed through output ports, allowing for a real-time view of the election status. The system also features a buzzer to provide audible feedback in case of invalid input or repeated voting attempts. Furthermore, an LCD display module is used to provide a visual confirmation of the voting process, LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16×2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations andsoon.A16×2LCDmeansitcandisplay16charactersperlineandthereare2suchlines.InthisLCD each character is displayed in 5×7pixel matrix. This LCD has two registers, namely, Comm and and Data.



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The use of an FPGA ensures that the entire logic, including fingerprint verification, vote casting, and result tallying, can be handled efficiently at the hardware level, significantly reducing the latency compared to software-based systems. The Xilinx toolchain, including simulation, synthesis, and implementation tools, facilitates the development and verification of the system design. Using VHDL or Verilog, the modules are described behaviourally and structurally, tested in simulation environments, and then deployed onto a target FPGA board for real-time operation.

This fingerprint-based voting machine provides a reliable, secure, and user-friendly approach to modern electronic voting. It ensures that each vote is authenticated, counted accurately, and prevents any form of electoral malpractice. By integrating biometric authentication with robust digital logic design, the system enhances trust and transparency in the electoral process. Such an approach is not only scalable and adaptable to various voting scenarios—from institutional elections to governmental polling—but also sets the groundwork for future advancements in secure electronic voting systems.

III.EXPERIMENTAL RESULTS

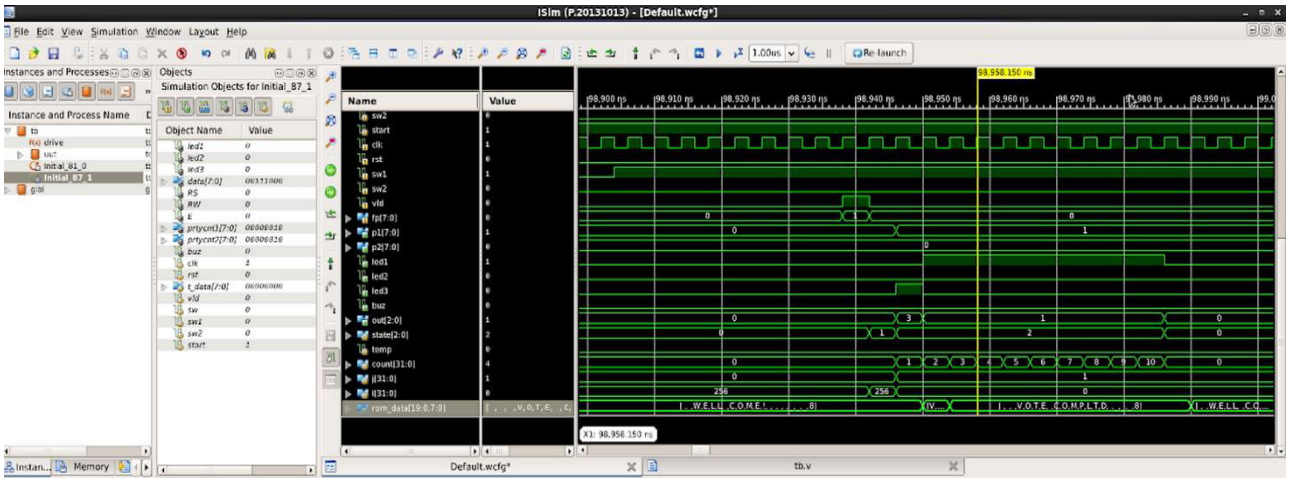
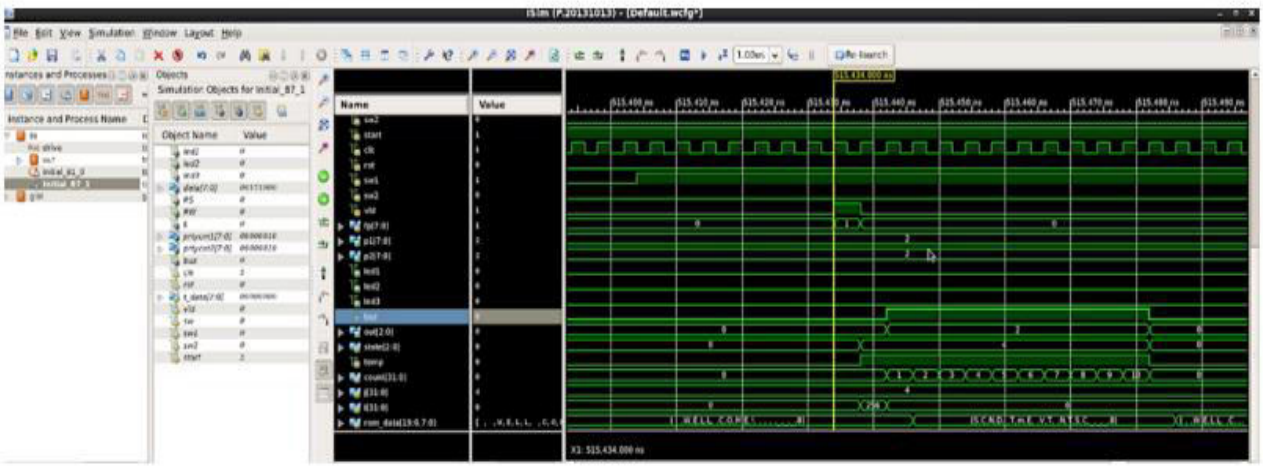


Fig.1 Fingerprint Verification, Vote Casting



FFig2: Buzzer alert due to failed authentication

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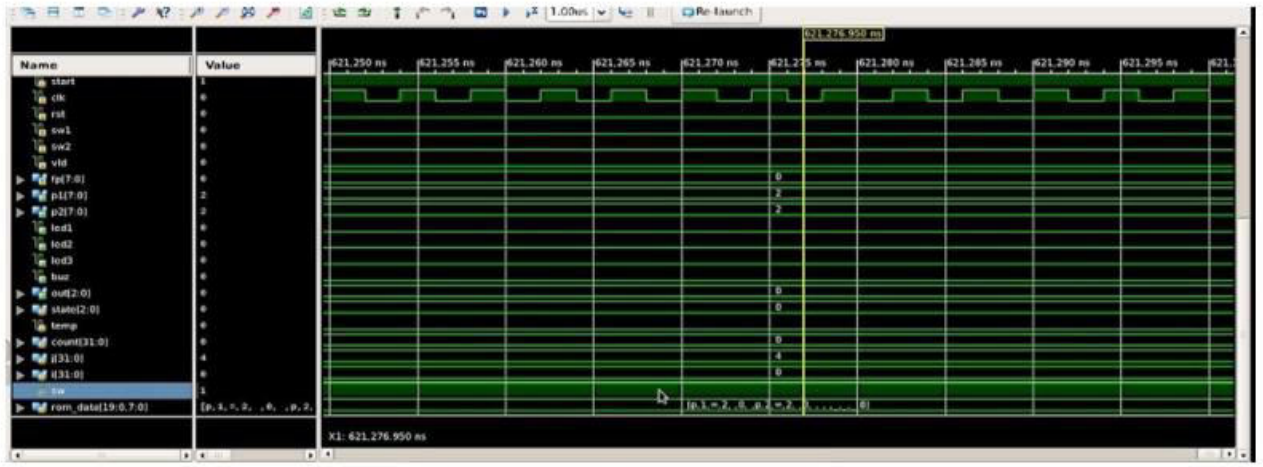

IV. CONCLUSION

TheFingerprint-BasedElectronicVotingMachineusingVerilogonFPGArepresents a significant step toward secure, efficient, and tamper-proof voting systems. It addresses the core challenges of traditional voting methods impersonation, vote duplication, and delayed results. The project showcases how biometric security and FPGA-based design can be effectively combined to improve democratic processes. With future enhancements, this system holds the potential to revolutionize voting at all levels.

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