INTEL UNNATI INDUSTRIAL TRAINING PROGRAM

PROJECT REPORT

**DESIGN AND IMPLEMENTATION OF AUTOMATED TELLER MACHINE (FSM) USING VERILOG HDL ON QUARTUS PRIME**

SUBMITTED BY

Sana Behl

DEPARTMENT OF ELECTRONICS AND COMMUNICATIONS ENGINEERING

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

**MANIPAL INSTITUTE OF TECHNOLOGY**

Manipal Academy of Higher Education

MANIPAL – 576104, KARNATAKA, INDIA

1. **INTRODUCTION:** ATMs are specifically designed to facilitate cash transactions and operate without human assistance, allowing customers to access their accounts 24/7. These self-service machines enable users to withdraw or deposit cash, provide transaction receipts, and feature a user-friendly touchscreen interface with multimedia capabilities. To initiate the process, customers insert their ATM card into the designated slot beneath the barcode scanner, prompting the ATM to begin automatically. Clear instructions are displayed to guide users through the transaction. By reading the barcode on the ATM card, the machine retrieves relevant data and displays pertinent information on the screen. Customers are then prompted to select their preferred payment method. Once the transaction amount is confirmed, the ATM provides instructions on how to complete either a cash withdrawal or deposit. Additionally, if a customer intends to withdraw an amount exceeding 10,000 units from their bank account, the ATM may require further authentication such as facial recognition or a one-time password (OTP) sent to their mobile device.
2. **APPROACH TO SOLVING THE PROBLEM:**

**Initial Proposed FSM:**A diagram of a diagram

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**STATES:**

Idle: Waiting for user input.

PIN Entry: Accepting PIN input from the user.

Account Locked: Account locked due to three invalid PIN entries.

Withdrawal: Processing a withdrawal transaction.

Facial Recognition: Performing facial recognition for withdrawals exceeding 10000.

Deposit: Processing a deposit transaction.

Balance Display: Displaying the account balance.

Mini Statement: Displaying recent transactions.

Inputs:

clk: Clock signal for synchronous operation.

reset: Reset signal to initialize the FSM.

user\_input: User input signal from the keypad.

amount: Amount entered by the user for withdrawal or deposit.

facial\_recognition\_result: Result signal from facial recognition module.

Outputs:

display: Signal for displaying information on the ATM screen.

cash\_dispenser: Signal to control the cash dispenser mechanism.

account\_lock: Signal to indicate if the account is locked.

balance: Signal for displaying the account balance.

mini\_statement: Signal for displaying recent transactions.

1. **BLOCK DIAGRAM:**

**A computer screen shot of a computer screen

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1. **FINITE STATE MACHINE:**

ATM's Finite State Machine (FSM) follows a structured flow of states to facilitate secure and efficient user transactions. Starting from the Idle state, users can enter their PIN in the PIN Entry state. Upon successful validation, the FSM transitions to the Balance Display state, where the account balance is presented. In case of an invalid PIN entry, the FSM increments a counter, and if it reaches three, the FSM moves to the Account Locked state, locking the account for 24 hours.

Within the Balance Display state, users have the option to choose between withdrawal, deposit, or mini statement functionalities. Opting for a withdrawal transitions the FSM to the Withdrawal state, while withdrawals exceeding 10,000 units trigger a transition to the Facial Recognition state. The Facial Recognition module verifies the user's identity, enabling the FSM to proceed with the withdrawal upon successful authentication. **A screenshot of a computer

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Similarly, selecting the deposit option guides the FSM to the Deposit state, where deposit transactions are processed, and the account balance is updated accordingly. Choosing the Mini Statement option transitions the FSM to the Mini Statement state, providing users with a display of recent transactions.

After completing a transaction, the FSM can loop back to the Balance Display state, allowing users to perform additional operations. It is important to note that implementing the detailed code for the ATM's FSM involves considerations such as Verilog syntax and FPGA-specific requirements, which are beyond the scope of this text-based conversation. Nonetheless, the provided outline offers a high-level design overview incorporating the specified functionalities.

1. **RESULTS:**

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Description automatically generated**ANALYSIS AND SYNTHESIS SUMMARY**

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**FLOW SUMMARY**

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**FLOW ELAPSED TIME**

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**FLOW LOG**

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**STATE MACHINE**

1. **SUMMARY:** ATMs are unmanned machines designed for cash transactions, allowing customers to access their accounts anytime. They provide withdrawal and deposit services, offer touchscreen interfaces, and display instructions to guide users. ATMs retrieve card data, display relevant information, and prompt customers to choose their payment method. For withdrawals exceeding 10,000 units, additional authentication like facial recognition or mobile OTP may be required.
2. **CONCLUSION:** In conclusion, ATMs have revolutionized the way customers interact with their bank accounts by providing convenient and accessible cash transaction services. With their unmanned operation and availability 24/7, ATMs offer users the flexibility to withdraw or deposit cash at their convenience. The user-friendly touchscreen interface and multimedia capabilities enhance the overall user experience. By incorporating features such as barcode scanning, data retrieval, and clear prompts, ATMs ensure smooth and secure transactions. Furthermore, the implementation of additional security measures like facial recognition and mobile OTP for higher-value withdrawals adds an extra layer of protection. As technology continues to advance, ATMs remain an essential component of modern banking, enabling individuals to manage their finances efficiently and independently.