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EIRTM 2026

European Congress on Interdisciplinary Research in Technology and Management

In association with EMLV – The Leonard De Vinci Business School, Paris, France and ESILV – Ecole Supérieure d'Ingénieurs, Léonard de Vinci, Paris, France

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About EIRTM 2026

European Congress on Interdisciplinary Research in Technology and Management (EIRTM, 2026) is a distinguished annual academic event that brings together scholars, researchers, and professionals from around the world to share insights and advancements in the fields of technology, innovation, and management.

Under this collaborative banner, there are 3 major Conferences,

One being Engineering Conference, titled "International Conference on Emerging Computing & Innovative Technologies" (ICECIT, 2026 – Paris, Europe).

 **ICECIT 2026 (Engineering)**

The 2nd one being Management Conference, titled "International Conference on Economics, Business and Management" (ICEBM, 2026 – Paris, Europe).

 **ICEBM 2026 (Management)**

The 3rd one being Science Conference, titled "International Conference on Emerging Trends in Physical Sciences and Sustainability" (ICETPS, 2026 – Paris, Europe).

 **ICETPS 2026 (Science)**

Important Deadlines

Final Paper Submission:
15th April, 2026

Acceptance Notification:
15th April, 2026

Registration:
17th April, 2026

Paper Presentation Submission:
20th April, 2026

Conference:
21st-23rd April, 2026

Design and Implementation of a Scalable FPGA-Based Vending Machine with Hybrid Payment Processing

Soumalya Maiti¹[0009-0007-1676-8291], Prawesh Sharma¹[0009-0005-0017-5518], Sudip Samanta¹[0009-0002-2565-9007], Rituja Sharma²[0009-0004-4446-201X], Anuj Dutta¹[0009-0000-7895-0768], Jatin Kumar Sinha¹[0009-0005-3913-5011], Vikash Kumar Jha¹[0009-0009-3193-2875], Indranil Maity²[0000-0002-4919-3072], and Malay Gangopadhyay²[0009-0005-3250-8209]

¹ Department of Electronics and Communication Engineering (ECE), Institute of Engineering and Management (IEM), Kolkata, West Bengal, India

² Department of Electronics and Communication Engineering (ECE), Institute of Engineering and Management (IEM), University of Engineering and Management (UEM), Kolkata, West Bengal, India

soumalyamaiti18@gmail.com

Abstract. Automated retail sectors increasingly require scalable, low-power control systems to securely process hybrid transactions. This paper proposes a hardware-efficient, scalable Field Programmable Gate Array (FPGA)-based vending machine architecture optimized for multiple payment methods. It integrates a Universal Asynchronous Receiver-Transmitter (UART) interface for QR code-based digital transactions, employing a Finite State Machine (FSM) core controller. Developed in System Verilog, the design is implemented on an AMD Xilinx-7000 System-on-Chip platform. A parameterized memory-mapping procedure incorporates combinational. RAM for price storage and distributed RAM for dynamic inventory tracking, allowing the system to track up to 40 products without additional hardware. The architecture achieves highly dependable operation at a low hardware cost. Specifically, it utilizes only 1% of Look Up Table (LUT) resources and consumes just 114 mW of power.

Keywords: FPGA, FSM, System Verilog, Hybrid Payment System, Hardware Resource Optimization First Section.

1 Introduction

Significantly, automation in merchandising and services has changed the face of the field. Vending machines that operate independently in the dispensation of merchandise have become a major component in the retail sector. They ensure instant access to merchandise in public spaces such as shopping centers, transport hubs, and workplaces. The modern retail sector is characterized by developments in embedded systems technology. This development has transformed vending machines from simple machines to highly sophisticated machines that can control the entire process of merchandise selection.

References

1. X. Wei, A. Manori, N. Devnath, N. Pasi, and V. Kumar, "QR code based Smart Attendance system," *International Journal of Smart Business and Technology*, vol. 5, no. 1, pp. 1–10, Mar. 2017.
2. M. F. Karin, K. S. Noor, and H. U. Zaman, "Hardware based design and implementation of a bottle recycling machine using FPGA," *2016 IEEE Conference on Systems, Process and Control (ICSPPC 2016)*, pp. 43–46, Dec. 2016.
3. G. Verma, A. Papreja, S. Shekhar, S. Maheshwari, and S. K. Virdi, "Low power implementation of FSM based vending machine on FPGA," *International Conference on Computing for Sustainable Global Development*, pp. 2054–2058, Mar. 2016.
4. S. A. Anil and R. K. Megalingam, "A comparative analysis of a navigation platform designed in Arduino and FPGA," *International Conference on Communication and Signal Processing*, pp. 1306–1310, Apr. 2016.
5. N. Govindanunni and R. K. Megalingam, "Intelligent FPGA-Based Vending Machine: Enhancing quality, efficiency, and sustainability in automated retail," *2025 International Conference on Circuit Power and Computing Technologies (ICCPCT)*, pp. 751–756, Aug. 2025.
6. R. Sati, V. Mishra, and G. Verma, "Simulation of Vending Machine Design using Verilog HDL," *2022 2nd Asian Conference on Innovation in Technology (ASIANCON)*, pp. 1–5, Aug. 2022.
7. S. Anuar, D. Mirza Madrawi and F. H. Mukhtar, "Safety features and inventory management for vending machine using IoT," *Turkish Journal of Computer and Mathematics Education*, vol. 12, no. 3, pp. 2242–2252, 2021.
8. I. Maity, S. Maity, and S. Bhattacharya, "Development of foreign atom decorated ZnO nanotube-based sensor devices for accurate detection of NH₃ gas leakage," *Microsystem Technologies*, vol. 31, no. 12, pp. 3679–3694, Oct. 2025.
9. A. Chopde, B. Thombre, V. Khodake, and N. Yeware, "Vending Machine Using Verilog (FPGA)," *2024 4th Asian Conference on Innovation in Technology (ASIANCON)*, pp. 1–4, Aug. 2024.
10. M. S. Mustafa, M. H. N. Al-Mayyahi, and N. H. Barnouti, "Design and implementation of vending machine embedded control system using FPGA," *ICICT '19: International Conference for Information and Communication Technology*, pp. 25–30, Apr. 2019.
11. K. C. Kumar, D. Srikanth, P. V. Vardhan, M. Vivek, and T. S. Kiran, "QR Code-Based Vending Machine using FSM," *Proceedings of the Second International Conference on Edge Computing and Applications (ICECAA 2023)*, pp. 372–376, Jul. 2023.
12. E. Kho and M. Kumar, "Design and Implementation of FPGA based Vending Machine for Integrated Circuit (IC)," *International Conference on Communication and Signal Processing*, pp. 0246–0251, July. 2020.
13. G. Mahajan, Vaibhav Phale, Sanket Mane, and Ajit B. Patil, "Vending machine with cash and cashless payment support," *International Research Journal of Engineering and Technology (IRJET)*, vol. 7, no. 6, pp. 341–348, June. 2020.
14. A. Gaur, Dilip Mathuria and Rashmi Priyadarshini, "A simple approach to design reverse vending machine." *International Journal of Electronics, Electrical and Computational System*, vol. 7, no. 3, pp. 110–119, March. 2018.
15. R. S, N. S, and R. K. Megalingam, "User-friendly vending machines: A Moore FSM perspective," *2024 5th IEEE Global Conference for Advancement in Technology (GCAT)*, pp. 1–6, Oct. 2024.



Ankit Biswas <ankitbiswas594@gmail.com>

Fwd: [EIRTM 2026] Your paper #1571270639 ('Design and Implementation of a Scalable FPGA-Based Vending Machine with Hybrid Payment Processing')

1 message

Soumalya Maiti <soumalyamaiti18@gmail.com>
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Mon, Apr 27, 2026 at 8:44 PM

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From: <satyajit.chakrabarti@iem.edu.in>

Date: Sun, 5 Apr 2026 at 13:27

Subject: [EIRTM 2026] Your paper #1571270639 ('Design and Implementation of a Scalable FPGA-Based Vending Machine with Hybrid Payment Processing')

To: Soumalya Maiti <soumalyamaiti18@gmail.com>, Prawesh Sharma <praweshsharma9091@gmail.com>, Sudip Samanta <sudipsamantadetce03@gmail.com>, Rituja Sharma <ritujasharma6@gmail.com>, Anuj Dutta <duttaanuj666@gmail.com>, Jatin Kumar Sinha <jatinsinha2004@gmail.com>, Vikash Kumar Jha <vikashjha378@gmail.com>, Indranil Maity <indmilmaity026@gmail.com>, Malay Gangopadhyaya <malay.ganguly@iem.edu.in>

Dear Mr. Soumalya Maiti:

Congratulations - your paper #1571270639 ('Design and Implementation of a Scalable FPGA-Based Vending Machine with Hybrid Payment Processing') for EIRTM 2026 has been **accepted** and will be presented in the session titled ____.

The reviews are below or can be found at [1571270639](#).

EIRTM 2026 1**Detail Review Report (EIRTM 2026):- Select an option from following**

Accept (4)

Comments for reviewers: write at least 100 words regarding this review

The manuscript presents a well-designed FPGA-based vending machine architecture with a clear focus on scalability, hybrid payment integration, and hardware efficiency. The system is technically sound, and the implementation details reflect strong understanding of digital design and embedded system principles.

The parameterized FPGA architecture with FSM-based control and hybrid payment integration (coin + UART-based QR system) is a robust and scalable solution, demonstrating efficient resource utilization (~1% LUT usage) and low power consumption (~114 mW), as validated through implementation results

EIRTM 2026 2**Detail Review Report (EIRTM 2026):- Select an option from following**

Accept (4)

Comments for reviewers: write at least 100 words regarding this review

The paper addresses a practical and relevant problem in embedded system design by proposing a scalable and efficient hardware-based solution for automated retail systems. The presentation is clear, and the methodology reflects a strong focus on system validation and performance analysis.

The comprehensive validation through simulation scenarios (coin, overflow protection, hybrid/digital transactions) along with timing closure and resource analysis strengthens the reliability and practical applicability of the design

27/04/2026, 21:02

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The conference chairs



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Thanks and Regards,

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Assistant Professor,
Electronics and Communication Engineering (ECE) Department
Institute of Engineering & Management (IEM), Kolkata
Y-12, Salt Lake Electronics Complex,
Sector- V, Salt Lake, Kolkata -700 091,
West Bengal, India.