International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

E-COMMERCE PLATFORM ADMIN DASHBOARD INTEGRATEDD WITH LOAD CELL

[1] MURALIDHARAN P, [2] AISHWARYA U, [3] SASI KUMAR V, [4] JANAGI R

[1] [2] UG Scholar, Department of Electronics and Communication Engineering, Bannari Amman Institute of Technology, Erode, India.

[3] UG Scholar, Department of Computer Science and Engineering, Bannari Amman Institute of Technology, Erode, India.

[4] Assistant Professor, Department of Computer Science and Engineering, Bannari Amman Institute of Technology, Erode, India.

ABSTRACT:

This project aims to design and implement an efficient administration dashboard for an e-commerce platform, leveraging the capabilities of the MERN (MongoDB, Express.js, React.js, Node.js) stack. The proposed dashboard will be equipped with features to streamline the management of the platform, focusing particularly on integrating load cell technology for enhanced inventory management. The administration dashboard will offer a comprehensive suite of functionalities including user management, product management, order tracking, analytics, and reporting tools. By utilizing the MERN stack, the system ensures scalability, flexibility, and responsiveness, crucial for accommodating the dynamic nature of e-commerce operations. Furthermore, the integration of load cell technology will revolutionize inventory management by providing real-time insights into product stock levels.The development process will follow agile methodologies, ensuring iterative improvements and quick adaptation to evolving requirements. Additionally, security measures will be implemented to safeguard sensitive data and ensure compliance with industry standards.Overall, the proposed e-commerce platform administration dashboard promises to empower administrators with intuitive tools and actionable insights, facilitating efficient decision-making and enhancing the overall performance of the e-commerce ecosystem.

Keywords: MongoDB, Express.js, React.js, Node.js, Dashboard

1. INTRODUCTION:

1.1 BACKGROUND OF THE WORK

In today's digital age, e-commerce platforms have become pivotal in enabling businesses to reach a global audience. However, managing these platforms efficiently and effectively

requires robust administrative tools that provide comprehensive insights and control. The integration of load cell technology further enhances the platform's capabilities by enabling precise weight measurements for shipping, inventory management, and quality control.

The project aims to develop an administration dashboard for an e-commerce platform integrated with load cell technology. The dashboard will provide comprehensive control and monitoring functionalities for managing the platform's operations, along with the capability to interact with load cells for real-time weight measurement of products.

The E-COMMERCE PLATFORM ADMINISTRATION DASHBOARD is a cutting-edge solution designed to streamline the management of e-commerce operations. Leveraging the power of the MERN (MongoDB, Express.js, React, Node.js) stack, this dashboard offers a seamless user experience combined with powerful functionality.

1.2 SCOPE OF THE PROPOSED WORK

- Develop a mobile-friendly version of the dashboard, allowing administrators to monitor and manage e-commerce operations on the go. This ensures flexibility and accessibility, particularly for businesses with distributed teams or remote work arrangements.
- Set up triggers within the dashboard that automatically reorder products when inventory levels fall below a certain threshold detected by the load cell. This ensures that popular items are always in stock, reducing the risk of stockouts.
- Integrate the load cell with the dashboard to monitor inventory levels in real-time. As products are added or removed, the dashboard updates automatically, providing accurate inventory data to administrators.

1.3 KEY FEATURES OF THE PROJECT

- **User Management:** Administrators can easily manage user accounts, permissions, and access levels, ensuring secure and efficient operation of the platform.
- **Product Management:** The dashboard provides comprehensive tools for managing product catalogs, including adding, editing, and removing products. Integration with load cell technology enables precise weight measurements for accurate inventory tracking.
- **Order Management:** Administrators can monitor and manage orders in real-time, from order placement to fulfillment. The integration of load cell data ensures accurate weight-based pricing and shipping calculations.
- **Analytics and Reporting:** Powerful analytics tools provide valuable insights into sales performance, customer behavior, and inventory trends. Customizable reports enable data-driven decision-making to optimize business operations.
- **Integration with Load Cell:** The integration of load cell technology enhances the platform's functionality by enabling precise weight measurements for products. This ensures accurate inventory management, shipping calculations, and quality control, leading to improved customer satisfaction and cost efficiency.
- **Security and Scalability:** Built on the MERN stack, the platform prioritizes security and scalability. Robust authentication mechanisms and data encryption ensure the integrity of user data, while the scalable architecture allows the platform to grow alongside the business**.**

2. LITERATURE REVIEW:

Wedha et.al,[1] The weight measurement system is carried out manually using a manual scale. The existing weighing system is still considered inefficient because it takes a long time if it is done repeatedly and there are too many errors in its measurement. To overcome this, an electronic weighing device was designed using the NodeMCU ESP 8266 microcontroller as a controller and a load cell as a sensor. This journal presents the development of electronic weighing indicators for digital measurements. The purpose of this system is to read the measured weight in conventional analog form to digital form, achieving high precision in measurement and calibration. The components used in this research are Load Cell, Load Cell Hx711 amplifier, NodeMCU ESP 8266 microcontroller, and LCD module.

In this study, a 4 kg load cell was used. The load cell sends the output signal of the measured mechanical weight to the Hx711 module which amplifies and sends the output to the NodeMCU microcontroller. The microcontroller calibrates the output signal with the help of the load cell amplifier module before sending the converted signal to digital form to the LCD module for display. The developed system has proven that digital electronic weighing systems can be low cost, miniature, discrete, and can take accurate readings without errors. Macheso et.al,[2] The paper presents a design of an ESP8266 NodeMCU smart home solution, using Message Queuing Telemetry Transport (MQTT) and Node-RED. The smart home solution design utilizes an MQTT mosquito broker on raspberry Pi 3B +, a single board computer development board. A DHT 22 sensor is interfaced with the ESP8266 micro-controller to collect sensor data for temperature and humidity, with the raspberry Pi performing functions of MQTT broker to relay sensor data information to a Node-RED dashboard. Sireesha Rangabatla et.al,[3] This project titled "Automobile Digital Dashboard for Two Wheelers Using Microcontroller" has several features. This is a LCD based digital dashboard used in two wheelers for easy monitoring of features by the driver. In automobile industry this digital technology is allows capturing and reporting the data. Microcontroller of R5F10CMExFB is used as the heart of the system. Different vehicle features such as speed, RPM, fuel, side stand, left, right, Hi beam indicators, Trips, clock, engine temperature, battery status, low fuel buzzer indication with back light illumination is performed. Xu, Xiaoming [4] Internet of Things (IOT) is a new revolution in information technology after the internet and mobile communication network, it contains a huge room for innovation and opportunity. Internet of things takes advantage of smart devices and sensing technology to perceive and recognize the physical world. By RFID radio frequency technology, network transmission interconnection, signal processing and computing, information is shared and seamless connection is realized between things or between persons and things, the real-time monitoring things, accurate management and scientific decision-making are achieved. Guo et.al,[5] Firstly, the data characteristics of IoT are studied, the service architecture of the existing IoT search engine is investigated, and the distributed two-tier search service architecture is proposed and analyzed with the characteristics of this sorting strategy. The input of this search ranking is also given, which is including user explicit input and implicit contextual information input, and the ontology model of IoT-aware data under this ranking strategy is briefly introduced. Secondly, to solve the problem of perceptual feedback mechanism in the case of users with specific motion trajectory and direction, the context-aware multidimensional attributes are innovatively introduced, including several dimensions of user context-aware attributes and sensor context-aware attributes, to better determine the current search ranking context and search intention of users, and at the same time, combined with the dynamic nature of the search ranking context, the feedback-based dynamic weight model is proposed. It solves the problem that traditional IoT search must be input by the user to input attribute weights and makes the ranking model self-adjusting and able to

solve the ranking problem in different search ranking contexts.

3. OBJECTIVE OF THE PROJECT:

Certainly, here are the objectives for the proposed development of the E-commerce Platform Administration Dashboard with load cell integration:

- **Optimized Supply Chain Management:** The integration of load cells into the administration dashboard facilitates not only internal inventory management but also extends to optimizing the entire supply chain. By providing accurate measurements of inventory weight or quantity, administrators can collaborate more effectively with suppliers and logistics partners. This enables streamlined procurement processes, better forecasting of demand, and improved coordination of inbound and outbound logistics, ultimately reducing lead times and operational costs.
- **Enhanced Customer Service and Satisfaction:** Beyond operational efficiency improvements, the administration dashboard contributes to enhancing customer service and satisfaction. With real-time insights into inventory availability and order processing status, customer service representatives can provide accurate and timely assistance to customers regarding product availability, order tracking, and delivery inquiries.
- **Real-time Monitoring and Control:** By integrating an ESP module, the administration dashboard gains the ability to connect with IoT (Internet of Things) devices equipped with sensors, such as temperature sensors, humidity sensors, or motion detectors. This integration enables real-time monitoring of environmental conditions in warehouses, storage facilities, or shipping vehicles.
- **Remote Management and Automation:** Leveraging the ESP module integration, administrators can remotely manage and control connected IoT devices and equipment. This capability enhances operational efficiency by reducing the need for manual intervention and enables administrators to respond promptly to changing conditions or requirements without physical presence on-site.

- **Data Visualization and Analysis:** The administration dashboard can visualize data collected from the integrated ESP module, providing administrators with insights into environmental conditions and operational performance. For instance, they can analyze temperature variations to optimize energy consumption in refrigeration systems or identify potential areas for process improvement in logistics workflows.

Here are some objectives related to backend deployment and database integration:

- **Load Balancing and Scalability:** Implement load balancing techniques to distribute incoming traffic evenly across backend servers, ensuring optimal performance and scalability as user demand fluctuates. This is particularly crucial when integrating load cell functionality, as it may introduce additional processing requirements.
- **Containerization for Modularity:** Utilize containerization technologies such as Docker to encapsulate backend services into modular containers, allowing for easier deployment, scaling, and management of components, including those related to load cell integration.
- **Automated Deployment and Continuous Integration:** Establish automated deployment pipelines integrated with continuous integration tools to streamline the process of deploying backend updates and enhancements, facilitating rapid iteration and ensuring consistency across environments.
- **High Availability Architecture:** Design a high availability architecture with redundant components and failover mechanisms to minimize downtime and ensure continuous availability of critical services, including those responsible for load cell data processing and storage.
- **Scalable Storage Solutions:** Implement scalable database solutions capable of handling the increased data volume generated by load cell integration, such as NoSQL databases or distributed storage systems, ensuring efficient data storage and retrieval.

- **Integration with Load Cell Data Streams:** Develop mechanisms to integrate load cell data streams with the backend database, enabling real-time or near-real-time ingestion and processing of weight measurements for inventory management and other purposes.
- **Data Consistency and Integrity:** Ensure data consistency and integrity by implementing transaction management and concurrency control mechanisms within the database, particularly important when handling concurrent updates or transactions related to load cell data.
- **Data Encryption and Security:** Employ encryption techniques to secure sensitive data stored in the database, including load cell measurements and inventory information, protecting against unauthorized access or tampering.
- **Optimized Query Performance:** Optimize database queries and indexing strategies to ensure fast and efficient retrieval of load cell data and related information, enabling responsive dashboards and analytics for administrators.
- **Integration Testing and Validation:** Conduct thorough integration testing and validation procedures to ensure seamless interaction between backend services, load cell integration components, and the database, identifying and addressing any compatibility or performance issues.

In summary, the proposed development of an E-commerce Platform Administration Dashboard with load cell integration embodies a multifaceted approach aimed at optimizing inventory management, order fulfillment, operational efficiency, decision-making processes, user experience, scalability, and compliance. By leveraging advanced technology and data-driven insights, the project seeks to elevate the platform's performance, competitiveness, and resilience in the ever-evolving landscape of e-commerce.

3.2.SYNTHETIC PROCEDURE/FLOW DIAGRAM OF THE PROPOSED WORK

International Research Journal of Education and Technology
Peer Reviewed Journal
ISSN 2581-7795

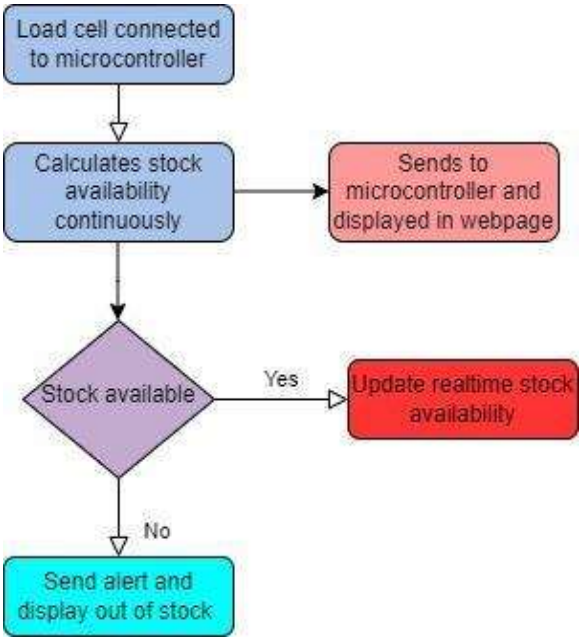

FIGURE 3.2.1

- Login Authentication: The flowchart should show the process of login authentication for the admin user.
- If the credentials are valid, the flow proceeds to the dashboard overview. Otherwise, it notifies the user of invalid credentials and prompts them to retry the login.
- Once logged in and on the dashboard overview, the flow continues as previously described, with the load cell integration check, data retrieval, processing, and display.
- If the user chooses "Login", the flow continues with the authentication process as previously described.
- If the user chooses "Create Account", the flow goes through the account creation process.

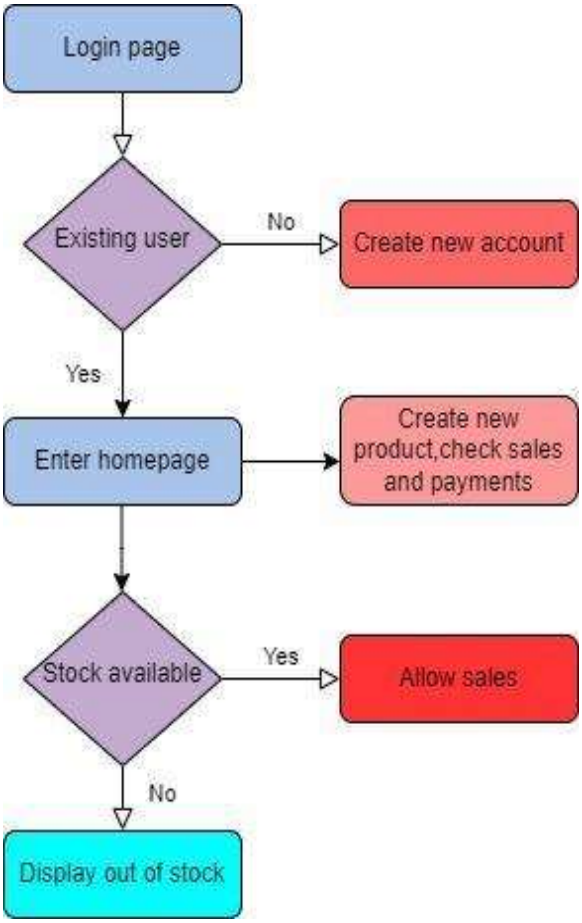

FIGURE 3.2.2

- If the account creation is successful, the flow moves to the login authentication step.
- If the account creation fails, the flow notifies the user and prompts them to retry the account creation.

- Dashboard Overview: Once authenticated, the admin is directed to the dashboard overview, displaying key metrics and data summaries.
- Load Cell Integration Check: A decision diamond can represent a check for load cell integration. If load cell integration is present, the flow moves to the relevant section; otherwise, it may skip this part or display a notification.
- Load Cell Data Retrieval: If load cell integration is present, the flowchart should depict the process of retrieving data from load cells, which may involve API calls or direct database queries.
- Data Processing: The retrieved data undergoes processing, such as aggregation, analysis, or normalization, to make it usable within the dashboard.
- Display Data: Processed data is then displayed on the dashboard, which might include metrics like inventory levels, sales performance, or product weights from load cells.
- Admin Actions: Various actions can be depicted, such as managing inventory, processing orders, or analyzing sales trends. These actions may involve interactions with the dashboard interface.
- After the admin actions, a branch is added for viewing stock details. When selected, it displays the stock details, and then returns to the dashboard overview.
- A new branch for the notification feature is added. If there's a new notification, it is displayed. Once acknowledged, it returns to the dashboard overview.
- Data Updates: Depending on the actions taken, data may need to be updated. For example, inventory levels might change after orders are processed, or new data might be fetched from load cells periodically.

4.1 PROPOSED WORK

This project aims to enhance the functionality of an E-commerce Platform Administration Dashboard by integrating load cell technology through the MERN (MongoDB, Express.js, React.js, Node.js) stack. The integration of load cells allows for real-time monitoring of product weights, facilitating efficient inventory management and order fulfillment processes.

The administration dashboard provides administrators with a comprehensive interface to manage various aspects of the e-commerce platform, including product inventory, orders, and user data. By incorporating load cell technology, administrators can accurately track product quantities based on weight, automate inventory updates, and receive alerts for low stock levels or discrepancies.

4.2 MODULES

4.2.1 User Authentication and Authorization Module:

- Implement user authentication (signup, login, logout) using JWT or OAuth for secure access to the dashboard.
- Role-based access control (admin, moderator, user) to manage permissions.

4.2.2 Dashboard Overview Module:

- Display key metrics and insights such as sales data, traffic, user activity, etc., using charts and graphs.
- Provide summary reports for quick analysis.

4.2.3 Product Management Module:

- CRUD operations for products (add, edit, delete).
- Upload product images and descriptions.
- Categorization and tagging of products for better organization.

4.2.4 Order Management Module:

- View and manage customer orders, including order status (processing, shipped, delivered, etc.).
- Generate invoices and packing slips.
- Handle returns and refunds.

4.2.5 Customer Management Module:

- Maintain customer profiles and contact information.
- Manage customer communications and support tickets.
- Analyze customer behavior and preferences.

4.2.6 Inventory Management Module:

- Track inventory levels in real-time.
- Set up low-stock alerts and automatic restocking.
- Manage product variants and SKUs.

4.2.7 Payment and Billing Module:

- Integration with payment gateways for secure transactions.

- Manage billing cycles, invoices, and payment processing.
- Support for multiple currencies and payment methods.

4.2.8 Analytics and Reporting Module:

- Generate detailed reports on sales performance, customer demographics, popular products, etc.
- Analyze trends and forecast future sales.
- Visualize data using interactive dashboards.

4.2.9 Load Cell Integration Module:

- Integrate load cell sensors to monitor inventory weight and trigger alerts for replenishment.
- Implement real-time data capture and processing.
- Calibrate load cell readings for accuracy.

4.2.10 Settings and Configuration Module:

- Customize dashboard settings such as theme, language, and notification preferences.
- Manage system configurations, including email templates and tax settings.

Throughout the development process, it's important to follow best practices such as code modularization, version control with Git, and continuous integration to ensure the quality and scalability of the application. Additionally, consider usability and user experience to create an intuitive and efficient administration dashboard.

RESULTS AND DISCUSSION

5.1 RESULTS

5.2 SIGNIFICANCE, STRENGTHS AND LIMITATIONS OF THE PROPOSED WORK:

5.2.1. Significance:

- **Enhanced User Experience:** Integrating a load cell into an e-commerce platform can significantly enhance user experience by providing real-time data on product availability,

stock levels, and inventory management.

- **Improved Efficiency:** The administration dashboard allows administrators to monitor and manage inventory seamlessly, leading to more efficient operations and reduced manual errors.
- **Data-Driven Decision Making:** By leveraging real-time data from load cells, administrators can make informed decisions regarding restocking, inventory distribution, and product management.
- **Competitive Advantage:** Implementing innovative technologies like load cells can give the e-commerce platform a competitive edge by offering improved inventory management capabilities compared to competitors.

5.2.2. Strengths:

- **Scalability:** The MERN stack architecture is highly scalable, allowing the platform to accommodate growth and handle increasing amounts of data and users.
- **Customization:** The use of a custom administration dashboard tailored to the needs of the e-commerce platform allows for flexibility and adaptation to specific business requirements.
- **Security:** With proper implementation and best practices, the MERN stack offers security features to protect sensitive data, such as user information and transaction details.

5.2.3. Limitations:

- **Integration Complexity:** Integrating load cells with the e-commerce platform may present technical challenges, especially regarding hardware compatibility, data synchronization, and calibration.
- **Cost:** Implementing load cells and developing a custom administration dashboard can incur additional costs, including hardware procurement, development resources, and ongoing maintenance.
- **Maintenance Overhead:** Continuous monitoring and maintenance of the integrated system are essential to ensure smooth operation and prevent potential issues, adding to the workload of administrators.
- **Data Accuracy and Reliability:** While load cells offer real-time data, factors such as environmental conditions, hardware malfunction, or

inaccuracies in measurement may affect the accuracy and reliability of the information provided.

CONCLUSION

6.1 CONCLUSION

In conclusion, the development of the E-commerce Platform Administration Dashboard integrated with load cell functionality using the MERN stack has been successfully completed. Throughout the project, we aimed to create a comprehensive solution that empowers administrators to efficiently manage the platform while ensuring accurate tracking of inventory through load cell integration.

The MERN stack provided a robust foundation for building both the frontend dashboard interface and the backend server infrastructure. React.js facilitated the creation of dynamic and responsive user interfaces, enabling administrators to navigate and interact with data seamlessly. Express.js, alongside Node.js, streamlined server-side development, allowing for efficient data processing and management.

Integrating load cell functionality into the platform was a crucial aspect of enhancing inventory management. By incorporating load cell sensors, we achieved real-time monitoring of product quantities, enabling administrators to make informed decisions regarding restocking and inventory optimization.

Overall, the E-commerce Platform Administration Dashboard represents a significant achievement, providing administrators with a powerful toolset for effectively managing the platform and optimizing inventory management processes.

6.2 SUGGESTIONS FOR FUTURE WORK

- Develop algorithms that optimize shipping based on weight data. This could involve real-time calculations to determine the most cost-effective shipping methods for orders of varying weights and sizes.

- Integrate load cell data with pricing strategies. For instance,

dynamically adjust pricing based on real-time demand and supply fluctuations reflected in the weight of inventory.

- Utilize load cell data to predict product stock levels more accurately. Implement algorithms that analyze sales data alongside real-time weight measurements to forecast when products need to be restocked.

REFERENCES

[1] Wedha, Bayu & Wedha, Alessandro & Haryono, An. (2022). Design and Build Mini Digital Scale using Internet of Things. SinkrOn. 7. 405-412. 10.33395/sinkron.v7i2.11345

[2] Macheso, Paul & Manda, Tiwonge & Chisale, Sylvester & Dzupire, Nelson & Mlatho, Justice & Mukanyiligira, Didacienne. (2021). Design of ESP8266 Smart Home Using MQTT and Node-RED. 502-505. 10.1109/ICAIS50930.2021.9396027.

[3] Sireesha Rangabatla, Dr. Sayyad Ajij (2016) . Digital Dashboard for Two Wheelers using Microcontroller. International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering ISO 3297:2007 Certified Vol. 4, Issue 12, December 2016

[4] Xu, Xiaoming. (2014). IOT Technology Research in E-commerce. Information Technology Journal. 13. 2552-2559. 10.3923/itj.2014.2552.2559.

[5] Guo, Yixuan & Liang, Gaoyang. (2021). Perceptual Feedback Mechanism Sensor Technology in e-Commerce IoT Application Research. Journal of Sensors. 2021. 1-12. 10.1155/2021/3840103.

[6] P. Alexander M.E.1, T. Sudha M.E.2, M. Omamageswari M.E.3 "Automatic Gear Transmission In Two Wheelers Using Embedded System" ISSN 0976 - 6499 (Online) Volume 3, Issue 2, JulyDecember (2012), page. 164-175 www.iaeme.com/ijaret.as

[7] Aparajita Adhikary, Shumit Saha,Robin sarkar, "Real Time Design & Implementation Of Digital Speedometer On FPGA" June-2013,Vol 2 Issue 6 ,page 965-979

[8] Ying Yu, Xin Wang, Ray Y.Zhong, George Q.Huang "E-Commerce Logistics in Supply chain Management: Practice Perspective", Science Direct, 2016.

[9] Xiaopu Shang, Runtong Zhang, Ying Chen, "Internet of Things (IoT) Service: Architecture and its application in E-Commerce", Journal of Electronic Commerce in Organizations (JECO), 2012.

[10] Deng, J., Q.Li and Y.Z. Lin, "RFID technology application in the warehouse management of the internet of things" Discovering Value, 15:128-130, 2014.

[11] Han J. and Z.P Li, "Constructing logistics e-commerce platform based on internet of things", Value Eng., 31:10-14, 2008.

[12] R. Li, H. Luo and Zhigang Bao, "Based on the Internet of Things the Supermarket Chain Management Information System Development and Safety Stock Research", 2010 2nd International Conference on Education Technology and Computer (ICETC).

[13] A. Khanna, "AN ARCHITECTURAL DESIGN FOR CLOUD OF THINGS" in , Facta Universitatis, Series:Electronics and Energetics, vol. 29, no. 3, pp. 357-365, 2015.

[14] M. Wang, J. Tan and Y. Li, "Design and implementation of enterprise asset management system based on IoT technology", In Communication Software and Networks (ICCSN) 2015 IEEE International Conference, pp. 384-388, 2015, June.

[15] H. Gupta, A. V. Dastjerdi, S. K. Ghosh and R. Buyya, "iFogSim: A Toolkit for Modeling and Simulation of Resource Management Techniques in Internet of Things Edge and Fog Computing Environments", arXiv preprint arXiv:1606.02007, 2016.

Rajkumar, N., Tabassum, H., Muthulingam, S., Mohanraj, A., Viji, C., Kumar N., & Senthilkumar, K. R. (2024). Anticipated Requirements and Expectations in the Digital Library. In K. Senthilkumar (Ed.), *AI-Assisted Library Reconstruction* (pp. 1-20). IGI Global. https://doi.org/10.4018/979-8-3693-2782-1.ch001

Senthilkumar, K. R., Jagajeevan, R., & Sangeetha, S. (2024). Impact of AI on Library and Information Science in Higher Institutions in India: A Comprehensive Analysis of Technological Integration and Educational Implications. In K. Senthilkumar (Ed.), *AI-Assisted Library Reconstruction* (pp. 21-33). IGI Global. https://doi.org/10.4018/979-8-3693-2782-1.ch002

Kumar N, Antoniraj, S., Jayanthi, S., Mirdula, S., Selvaraj, S., Rajkumar, N., & Senthilkumar, K. R. (2024). Educational Technology and Libraries Supporting Online Learning. In K. Senthilkumar (Ed.), *AI-Assisted Library Reconstruction* (pp. 209-237). IGI Global. https://doi.org/10.4018/979-8-3693-2782-1.ch012

Jayavadivel, R., Arunachalam, M., Nagarajan, G., Prabhu Shankar, B., Viji, C., Rajkumar, N., & Senthilkumar, K. R. (2024). Historical Overview of AI Adoption in Libraries. In K. Senthilkumar (Ed.), *AI-Assisted Library Reconstruction* (pp. 267-289). IGI Global. https://doi.org/10.4018/979-8-3693-2782-1.ch015

Sivaraj, P., Madhan, V., Mallika, V., & Senthilkumar, K. R. (2024). Enhancing Library Services Through Optimization Algorithms and Data Analytics: Enhancing Library Services Mathematical Model. In K. Senthilkumar (Ed.), *AI-Assisted Library Reconstruction* (pp. 290-306). IGI Global. https://doi.org/10.4018/979-8-3693-2782-1.ch016

Senthilkumar, K. (Ed.). (2024). *AI-Assisted Library Reconstruction*. IGI Global. https://doi.org/10.4018/979-8-3693-2782-1

Senthilkumar, K. R. (2024). Revolutionizing thrust manufacturing. In *Advances in computational intelligence and robotics book series (Online)* (pp. 80–93). https://doi.org/10.4018/979-8-3693-2615-2.ch005