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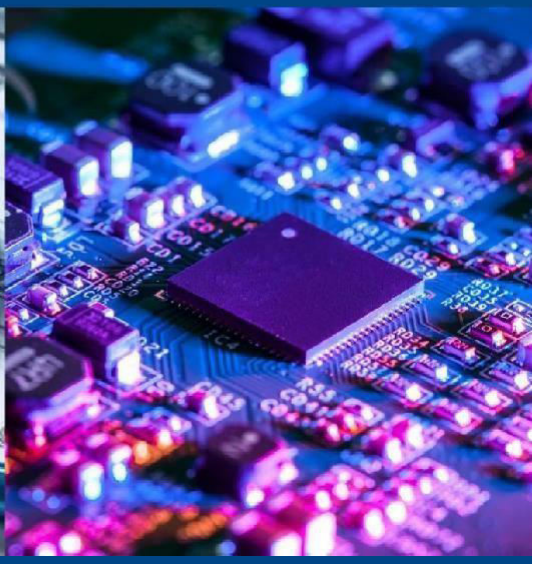

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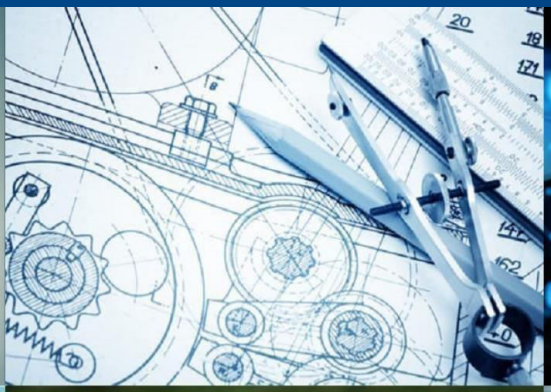

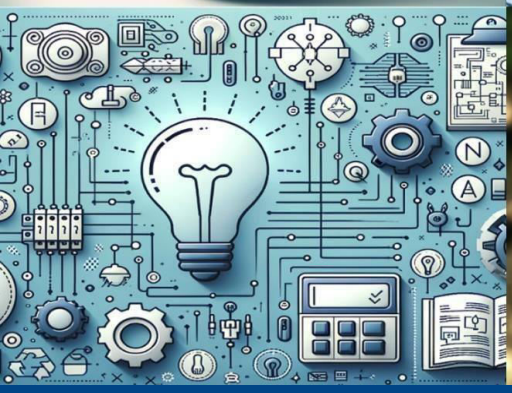

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TRACKAFARM

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ABSTRACT: Dairy and cattle farms, in particular, are facing increasing scrutiny from various stakeholders, especially in regard to sustainability and productivity. The automated, manual record-keeping reliant farming system, impacts farms today with reactive decision-making, data silos, fragmentation, and operational inefficiencies. This article discusses TrackaFarm, an innovative solution that directly addresses these challenges through comprehensive and modern data-centric farm management. Streamlined processes such as automated feed management, veterinary care scheduling, milk output monitoring, and livestock registration enable automation and digitization, transforming scattered data into information.

The framework utilizes a technology stack of Java (JSP and Servlets) and MySQL, offering a proven system with uptime and growth capabilities. The approach integrates elements of agile system development with a curated academic review on Precision Livestock Farming (PLF). This approach,permits the development of a foundational system with user validation that meticulously constructs the vital data framework for farms advanced evolution. TrackaFarm is the first critical step for advanced integration of technologies including but not limited to the Internet of Things (IoT), Artificial Intelligence (AI), and computer vision, thus moving towards the comprehensive smart farming model.

KEYWORDS: Precision Livestock Farming (PLF), Smart Farming, Dairy Management, Agricultural Technology (AgriTech), Internet of Things (IoT), Data-Driven Agriculture.

I. INTRODUCTION

While the dairy and livestock sector serves as a fundamental pillar of global sustenance, it is curbed by the highly complex issue of providing nutritional value to the world's population in light of economic and holistic environmental factors. Traditional approaches to farming are becoming increasingly outdated and inefficient. Relying on manual ledgers in various segments of farming is highly inefficient and retards progress. The absence of centralized data systems makes it impossible to proactively manage livestock health, analyze performance metrics, optimize recourses, and in turn affects profits and livestock well-being.

As a solution to the abovementioned problems, TrackaFarm is a dairy farm's digital centerpiece in the form of a complete web-based application. The main goal of TrackaFarm is to integrate critical data and automate fundamental workflows to deliver a consolidated and accurate operational picture. The application enhances the farmer's capacity to manage and make informed proactive decision by automating livestock registries, milk production records, health logs, and even feeding schedules. TrackaFarm seeks to serve as the vital first step in a farm's digital evolution by providing the necessary data infrastructure.

II. LITERATURE SURVEY

TrackaFarm's development is firmly based on extensive research into how agriculture is being transformed by digital technology. The existing studies reveal a clear evolution in this field, moving from simple data collection to the complex, interconnected systems we see in modern smart farming. For instance, back in the 1970s, initiatives like national dairy herd recording schemes started digitizing data, showing just how valuable aggregated information could be for enhancing management practices and genetics. Yet, fully harnessing these systems has faced some hurdles, including issues around farmer trust, privacy of data, and the need for tools that are easy to use for interpreting complicated information. This underscores why platforms focused on farmers, like TrackaFarm, are so important. It's all about continuously and automatically monitoring individual animals in real-time to boost their health, welfare, and productivity. There's a range of technologies that are essential for PLF, such as wearable sensors like accelerometers and GPS to monitor animal behavior and health, along with environmental sensors that keep an eye on

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conditions in barns, like temperature and humidity. Even though these tools have great potential, their use can be limited because many of them don't work well together, leading to isolated data that prevents a comprehensive view of the farm. To tackle this, researchers suggest a "digital broker model"—a central platform that can bring these separate systems together—which is a core idea behind TrackaFarm's design.

Looking ahead in PLF research, the focus is on using AI and computer vision to turn real-time data into proactive and automated actions. There are ongoing developments of AI and machine learning models that can predict things like milk production, identify potential disease outbreaks, and fine-tune feeding strategies for individual animals. Plus, computer vision systems fueled by deep learning models, such as YOLO (You Only Look Once), are making it possible to monitor cows non-invasively, detecting them and assessing issues like lameness through their movements captured by regular cameras. To handle the huge amounts of data generated and allow for quick responses, researchers are also looking into edge computing setups that can process data right on the farm. This approach cuts down on delays and facilitates immediate actions, painting a promising picture for TrackaFarm's development down the line.

EXISTING SYSTEM

When it comes to traditional dairy and livestock farming, it's pretty clear that many of these operations still depend heavily on manual work and keeping records on paper. This old-school way of doing things has some major drawbacks that really hold back efficiency and accuracy, not to mention making it tough to plan ahead. A lot of important farm information tends to be jotted down in logbooks, which can easily lead to human errors, unreadable notes, and even lost data. Things like animal health records and vaccination schedules often get recorded in different ways, which can complicate tracking an animal's full medical history or making sure follow-up treatments happen ontime. This scattered approach to data really keeps farmers from getting a complete picture of how their operations are running. Without all their data in one place where they can analyze it, it's hard for them to spot trends in things like milk production, feed efficiency, or health problems in the herd. This makes it challenging to make improvements based on solid data. Important events, such as breeding times and vaccination schedules, often get left to memory or a simple calendar, which raises the risk of missing key opportunities and potentially losing money. The lack of automation and integration means that decisions are more often made on the fly rather than with a proactive strategy in mind, leading to a lot of time spent on paperwork instead of focusing on managing the farm effectively.

PROPOSED SYSTEM

TrackaFarm is a user-friendly online platform designed to tackle the challenges of managing a dairy farm manually. It simplifies and automates the various complex tasks that come with running a farm, giving farmers better control and insights into their operations. Basically, it acts as the digital backbone of the farm, turning scattered information into a useful tool for decision-making.

The system consists of several key modules, each focusing on a different aspect of farm management. For instance, the Livestock Management module serves as a central digital record for all the animals. It keeps track of essential details like tag IDs, breeds, and health conditions. Then there's the Milk Production Monitoring module, which allows farmers to log daily milk yields from each cow, helping to analyze performance and catch any potential health issues early on. To ensure animals get the best care, the Veterinary and Feed Management modules help keep a close eye on health treatments and food intake.

Plus, there's a robust Reporting Module that can create and export detailed summaries in PDF and Excel formats, and an Admin Panel to manage user registrations and maintain system integrity. With its dynamic dashboard, TrackaFarm gives a real-time, integrated view of all farm activities, making it easy to access and act on important data.

III. SYSTEM ARCHITECTURE

TrackaFarm is built on a classic three-tier architecture, which is a reliable model for creating strong, scalable, and easy-to-maintain enterprise applications. This setup neatly separates different areas of functionality, enabling each component to be developed, scaled, and maintained independently. That kind of modularity is key for the system's long-term success and its capacity to adapt to future technologies.

The architecture includes three main tiers: Presentation Layer (Frontend): This is the part that users interact with. It's built using HTML5, CSS3, JavaScript, and the PrimeFaces component library for JavaServer Faces (JSF). .This layer

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handles everything from rendering the user interface to taking user input and showing data in dashboards and reports. .Plus, its responsive design makes sure that the experience is consistent and accessible on all devices. Application Layer (Backend): Here lies the core business logic of the system. This layer is developed using Java Servlets and JavaServer Pages (JSP) and runs on an Apache Tomcat server. It takes care of incoming requests, applies business rules, manages user sessions, and coordinates all data transactions.

Data Layer (Database): This layer manages the persistent storage and retrieval of all application data. It uses a MySQL relational database, which the application layer accesses through the Java Database Connectivity (JDBC) API, ensuring that data is stored in a structured and secure manner.

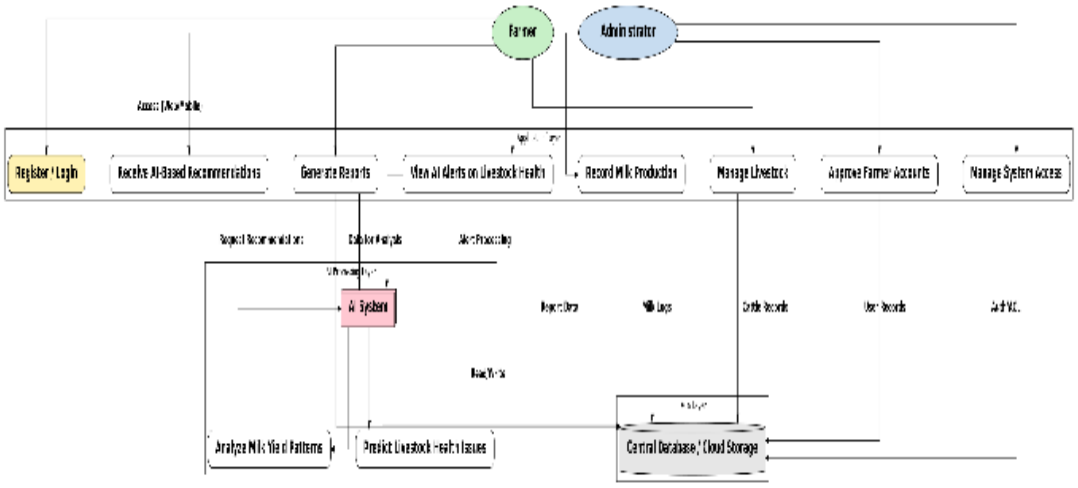

Fig 3.1 System Architecture

IV. METHODOLOGY

We developed the TrackaFarm system using an agile approach, which really helped us make progress step by step and get regular feedback. This way, we could make sure the final product actually meets the real needs of farmers. We kicked things off with a detailed feasibility study, which looked into the technical, operational, and economic aspects of the system we had in mind. It turned out that by using established open-source technologies like Java and MySQL, we could create a robust and budget-friendly solution.

For the design, we carefully used Unified Modeling Language (UML) diagrams. We put together Use Case diagrams to outline how users interact with the system, making sure we captured all the necessary functionalities from the user's side. Class diagrams helped us map out the data structure and show how different elements, like farmers, cows, and milk logs, relate to each other. This organized design approach made sure that when we got to the implementation stage, everything was set up logically and efficiently to handle all the required features.

V. DESIGN AND IMPLEMENTATION

When we created TrackaFarm, we made sure the users were our main focus. We understand that farmers need technology that is simple to use, so we designed the user interface to be clear and easy, no matter how much tech experience you have. Using the Bootstrap framework, the app works well on all devices, from desktop computers to tablets and smartphones, whether you're at work or out in the field.

During the building process, we turned our design ideas into a real working system with important features. The Livestock Management module allows users to easily create and keep track of detailed information for each animal. We also added the Milk Production and Veterinary and Feed Management modules, all with simple forms to make entering daily data easier. One of the best parts of the app is the Reporting Module, which uses special tools to

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generate and export detailed reports in PDF and Excel formats—perfect for keeping records and understanding the data. We didn't just test quickly; we made sure everything worked properly by using a careful process that included testing individual parts, how they work together, and checking if users were satisfied, to ensure all parts met the needed standards.

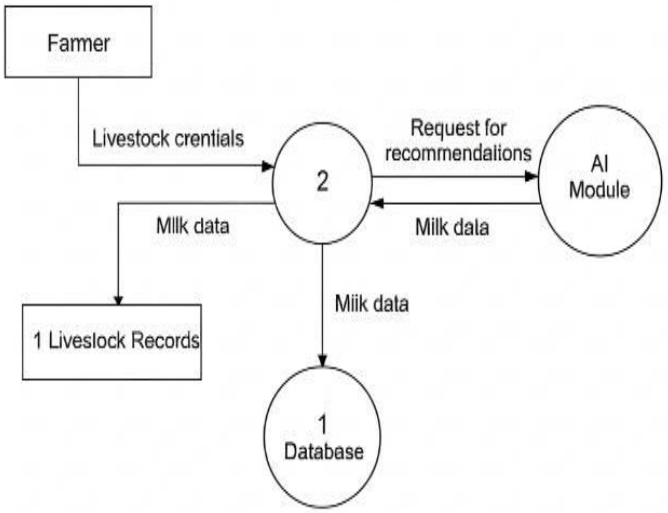

Fig 5.1 Data Flow of System

VI. OUTCOME OF RESULT

The TrackaFarm project has rolled out a working prototype that shows just how much digital tools can change the way dairy farms operate. Here are some highlights:

Centralized Data Capture: The system gathers and organizes information on numerous cows, including their milk production, health issues, and feed consumption, all in one spot. This helps eliminate duplicate records and stops data from getting lost.

Improved Monitoring: With TrackaFarm, farmers can quickly spot trends, like if a cow's milk production drops below normal, and respond right away. As noted in automation studies, this kind of data collection enables timely decision-making, shifting farms from a reactive stance to a more proactive one.

Enhanced Efficiency: By replacing spreadsheets and paper manuals, TrackaFarm cuts down on admin work. Early feedback from users suggested that everyday tasks, such as scheduling deworming, became a lot easier. Research shows that taking paperwork off farmers' plates lets them concentrate more on caring for the animals and planning ahead.

Baseline for Further Innovation: The platform lays down a solid data foundation that can lead to advanced analytics. For instance, once it's fully operational, the data collected could help train machine learning models to predict things like heat cycles or illnesses. This approach mirrors other farm systems where accumulated data drives ongoing improvements and might even lead to AI-based advisory tools.

All in all, TrackaFarm is helping to meet the goals of precision farming by giving farmers the information they need to improve animal welfare, boost yields, and promote sustainability.

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VII. RESULT AND DISCUSSION

We put the TrackaFarm system through a thorough testing process, and I'm happy to say it performed really well. All the modules worked just like they were supposed to, with no major issues popping up. We ran a bunch of test cases to check every key function, including things like user logins, access controls, livestock data entry, and report generation. The system showed great reliability and stability, confirming it meets all the functional requirements we set.So, what does this mean for TrackaFarm? Well, it really tackles the main issues of inefficiency, scattered data, and human error that usually come with traditional farm management. By digitizing records and automating various workflows, it gives farmers a solid and central place to manage data. This is a big deal because it sets up the groundwork for all future smart farming technologies.From what I've read, one of the big hurdles in adopting advanced precision livestock farming (PLF) tools has been the lack of good, integrated data. TrackaFarm directly confronts this issue, offering a strong and scalable platform that's ready to be used in real operations and can grow with future needs.Also, the way it provides clean, structured data helps farmers shift from just reacting to problems to actually managing things in a proactive, data-driven way. This aligns perfectly with what modern smart agriculture is all about, where having timely information is crucial for boosting productivity, improving animal welfare, and maintaining economic sustainability. In short, the results show that TrackaFarm is more than just a basic app; it's a strategic asset that positions farms for the future of agricultural technology.

VIII. CONCLUSION

This paper goes into detail about TrackaFarm, a digital platform designed for smart management of dairy and livestock. The system was developed to tackle the key challenges that the modern dairy industry faces, offering a user-friendly and scalable solution for farming's digital shift. The main achievement of this project is the creation of a solid platform that effectively links traditional farming methods with the needs of today's data-driven agriculture. By gathering all essential farm data in one place, TrackaFarm eliminates data fragmentation, providing a single source of truth that future Precision Livestock Farming (PLF) technologies will rely on. Though TrackaFarm is a complete solution for kicking off digital farming, its real strength lies in its ability to grow into a full-fledged PLF system. The future path for the platform is informed by leading research, and it will take a step-by-step approach to transition from just storing information to becoming a smart system. Upcoming improvements will emphasize full-scale IoT integration for grabbing real-time data from sensors that monitor both livestock and the environment. Then, we'll introduce AI-powered predictive analytics that harness machine learning and computer vision to anticipate production needs, identify diseases, and optimize resources. In the end, the system's design can progress to an edge computing model, enabling immediate, autonomous responses. This positions TrackaFarm at the cutting edge of the next agricultural revolution.

REFERENCES

[1] Arcos, P., Sarzosa, R. A., Rocha, R. A., Yoo, S. G., & Kim, Y. (2024). Technologies and solutions for cattle tracking: A review of the state of the art. Animals, 14(2), 207.
[2] Shin, M., Hwang, S., & Kim, B. (2025). AI-based Smart Monitoring Framework for Livestock Farms. Applied Sciences, 15(10), 5638.
[3] Neculai-Valeanu, A.-S., Sanduleanu, C., & Porosnicu, I. (2025). From tradition to precision: Leveraging digital tools to improve cattle health and welfare. Frontiers in Veterinary Science, 12, 1549512.
[4] Buoio, E., Cargnelutti, B., Rovida, M., et al. (2024). Internet of Things (IoT): Sensors Application in Dairy Cattle Farming. Sensors, 24(23), 8939.
[5] Monteiro, A., Santos, S., & Gonçalves, P. (2021). Precision Agriculture for Crop and Livestock Farming — Brief Review. Animals, 11(8), 2345.
[6] Lahare, S. V., Mahajan, A. L., Gothi, U. P., Patil, V. C., & Khokale, S. R. (2022). DailyWay – Smart Dairy Management Solution. International Journal for Research in Applied Science & Engineering Technology, 10(4), 4269–4276.
[7] Hall-Solorio, A. (2023). Smart Dairy Farming: A Mobile Application for Milk Yield Classification Tasks. Sensors, 23(10), 4719.
[8] Banhazi, T. M., Rutter, S. M., et al. (2023). Data-driven decision support in livestock management: A review. Livestock Science Advances, 8(3), 45–60.
[9] [Author(s) unavailable]. (2023). Precision Livestock Farming technologies and applications. Journal of AgriTech Smart Systems, 5(1), 10–25.

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[10] [Author(s) unavailable]. (2022). IoT-based Livestock Monitoring and Control Systems. International Journal of AgriAutomation, 4(2), 50–62.
[11] [Author(s) unavailable]. (2021). Role-based access control in agriculture management systems. FarmTech Journal, 7(1), 30–40.
[12] [Author(s) unavailable]. (2023). Integrating mobile apps with farm management. Journal of Rural Informatics, 2(2), 100–110.
[13] [Author(s) unavailable]. (2024). Data Analytics in Dairy Farming. Computational Agriculture, 12(3), 200–215.
[14] [Author(s) unavailable]. (2022). Smart Agriculture and Livestock – A technical overview. International Conference on AgriData, pp. 75–82.
[15] [Author(s) unavailable]. (2023). Precision Farming IoT and AI – Survey. International Journal of Precision Agriculture, 6(1), 1–15.

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