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GUI Development For RFID Based Farm Management System

Anurag Bhatt[1], B.H Chandrashekar[2]

Student, Dept. of MCA, RV College of Engineering, Bengaluru, Karnataka, India[1]

Associate Professor, Dept. of MCA, RV College of Engineering, Bengaluru, Karnataka, India[2]

Abstract: The importance of livestock management systems has increased recently as a result of concerns about food safety. In addition to inadequate production and food safety, improper livestock management also puts thesecurity of the animals and traceability at risk. Complete documentation for the livestock management system is now required due to the growing problems. In order to handle the cattle effectively, a Graphical User Interface(GUI) will be suggested in this study. Bovine animals are divided into four groups by the GUI: dairying, feedlot-fattening, breeding, and killing. Visual Studio Code(VS Code) will be used to design the GUI.In the context of sound agricultural practise, many farmers today have embraced a variety of strategies to maintain the health and well-being of their cattle. Animal deaths and decreased productivity would result from failing to maintain the health of cattle. Traditional methods, which include recording animal data on paper, are a significant time waster and unsafe, making them ineffective for good farming practise. As a result, electronic-based livestock management systems are required to assist farmers and livestock veterinarians in exchanging information in order to avoid harmful diseases from infecting their cattle before they become serious problems. The project at hand A quick and effective technique has been developed thanks to the widespread use of Radio Frequency Identification (RFID) technology for livestock health management in the creation of animal profiles, but there are a few requirements that must be met, such as the RFID frequency selection and the quantity of animals on the farms. The study has effectively shown the efficiency of RFID technology when it comes to solving common difficulties on farms, despite the fact that using RFID devices in animal raising is not a novel technique in currentpractise. The development of this monitoring system has made use of integrated methods for reporting and recording animal health records using web-based application platforms like Postgres, Node.js, Express.js and React.js. Additionally, Postgres SQL and JavaScript programming function as scripts.The RFID Based Livestock Health Management System was created utilizing open source software to ensure that system development costs may be minimized as much as feasible. Farmers can now more easily obtain real-time animal health information and share it with other interested parties thanks to the usage of computers and portable RFID readers.

Keywords: GUI, Livestock, VS Code, RFID, Health.

I. INTRODUCTION

Domesticated animals raised in an agricultural context to generate goods like food, fibre, and labour are referred to as livestock. Examples of such animals include cattle, pigs, and goats. In terms of output value, the cattle industry in Malaysia is the largest food industry sub segment. The majority of the livestock industry is comprised of the farming of poultry and pigs, while the ruminant sector—which includes the farming of cattle, goats, and sheep—lags far behind. The majority of livestock are still owned by individual farmers who raise these animals as part of their larger rural agricultural activities [1].

Farmers consistently encounter two major challenges when entering data on the health of their livestock, namely the need to spend excessive time identifying cattle using traditional numbering tags and the likelihood of making frequent errors as a result of human negligence. As a result, the goal of this project is to use RFID technology to solve those issues. RFID, a type of automated identification which represents the short form of radio frequency Identification relies on the use of devices known as RFID tags or transponders for data storage and distant data recovery.

RFID is currently a fashionable and well-liked technology since it allows for wireless identification. RFID Reader, host, and RFID Tag are typically the three main components of an RFID system. This technology has stimulated a huge amount of research andbeen widely developed. Indirectly, this will lead to the creation of numerous new research areas and applications in the future. On the other hand, this sudden interest in RFID will raise concerns, particularly with regard to the safety and protection of those who use or work with tags on a regular basis [2].

The majority of farmers in underdeveloped nations still utilize the outdated approach of signing out a flock book made

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of paper to record livestock data. The process then proceeds with a manual analysis of the livestock's sex, breed, and weight by the veterinarian or the buyer. As a result, the work process will become inefficient [3].

As the system develops and is put into use, it should be able to assist farmers in organizing their livestock records more effectively. The system must have a central database that links animal profiles, be able to assist farmers in storing information, analyzing it, and electronically transferring it, as well as a dependable user interface to make it easier to use [4].

For commercial purposes, the animal health system must also be user-friendly. This project will concentrate on sound agricultural practise and the construction of a system that uses RFID technology to automatically manage all animals.

II. LITERATURE SURVEY

To include an complete examination of SQL injection, we studied papers from various journals, conferences, and acquired data. The following is how the various papers are organized

This project introduces an RFID based livestock management system for efficient monitoring of animal health. It utilizes a web-based application platform and open-source software for recording and reporting livestock health records, enabling real-time access to information.[1]

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The vast majority of farmers in underdeveloped nations still utilize the outdated approach of signing out a flock book made of paper in order to measure the parameters of their animals. The next step in the process is for the veterinarian or the buyer to manually assess the livestock's weight, breed, and sex. This will consequently result in an ineffective work process [3].

The farmers should be able to better organize their livestock records with the system's evolution and implementation. The system must have a central database that links animal profile and the capacity to assist farmers in electronically storing, analyzing, and transferring database information, as well as a dependable user interface that makes it easier to use [4].

A 2009 study by Joseph et al. [5] suggested a strategy to stop livestock rustling in East Africa. The central database for the project will house the animal's data. A PHP-based application server and database server employing MySQL, Java, and Linux Shell Scripts are used to build the central system.

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III. SYSTEM OVERVIEW

A GUI serves as the hardware and computer interface. It includes graphical symbols like text boxes, labels, command buttons, combo boxes, and more. Each graphic icon will be coded to serve a particular function, such as database retrieval and tag detection. The reader will interact with tags containing unique ID information.
Development of the graphical user interface (GUI) for the livestock management system consists of the following main components.

- A central database where all of the cattle's data will be kept. Postgres SQL will be used to create the database, as shown in Figure 1.
- MERN will be used as the user interface for the Graphical User Interface (GUI). GUI for four sections of databasedevelopment.

Each segment of the database contains a unique, significant attribute. Information about the cattle, including breed

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kinds, sex, age, date of birth, and Livestock ID—which is used to uniquely identify each cattle—is included in the breeding section. The database for the body weight of the livestock for the purpose of determining the health state of the cattle for the purpose of early illness identification and isolation of the cattle are all included in this area. This qualitycan genuinely guard against theft and loss. It can also offer historical information and cattle genealogy.

Cattle ID, feeding quantity, feeding type, and feeding frequency are all included in the feedlot fattening section. In this section, the body temperature will also be gathered to determine the health status. The meat's productivity can be
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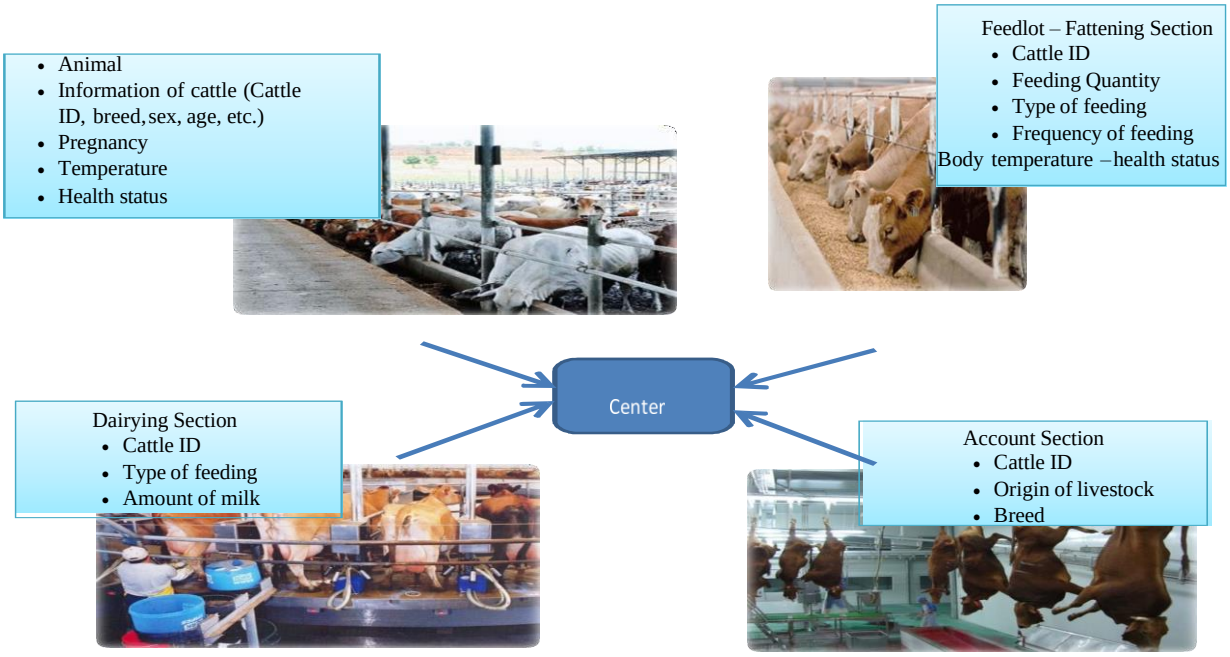

Figure1:Central database for 4 sections

IV. PROPOSE OF LIVESTOCK HEALTH SYSTEM DESIGN

RFID is a modern term used to describe a system that wirelessly receives and transmits an object's label identity via electromagnetic waves. The item or tag does not need to be manually connected through or touched, and is hence also known as a contact less media.

The original uses for the RFID technology in livestock monitoring were limited to identification needs [7–8]. However,it has gained a growth potential exploration on RFID systems coupled with sensors to create other sophisticated applications in animal rearing sections, such as for monitoring a livestock's health status, breeding climate changes, and real-time monitoring on livestock location using GPS [9–10]. Additionally, a number of significant general health indicators, such as heart rate, feed intake, head movements, and body weight, can be evaluated using sensors to providea fast assessment of livestock health [11].

Livestock Health Management Systems are created using modules, which are made up of both hardware and software components. The architecture of this gadget, which is separated into four parts: a laptop, RFID tags, a reader, and database.. The graphical user interface (GUI) serves as a platform for user interaction and can send any data required by a user from the RFID system to the laptop. The data collected from the RFID reader by mobile desktop will be storedin a Postgres SQL database and then transferred via web services. Additionally, if any health problem is infecting livestock, this information can be examined by farmers, office employees, and veterinary professionals for quick action.The administrator, farmer, user modules are shown in Fig. 2 as being involved in this system.

The farmer activities, livestock profiling, and prescription records are managed by the administrator module. This option makes it simple for the admin to add, delete, and update all of this data. Additionally, by adding additional menus to the

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system, the administrator of this system can send alert reports to farmers and other users regarding news, farm manuals, and prescription instructions.The animal health data for the farmer module can be easily and rapidly taken utilizing this method. Farmers just need to manually update the vital livestock data, such as body temperature, weight, prescription records, and extra comments about the medical examination on the farm, after scanning their livestock's RFID tags using an RFID reader. Every medical record that a farmer wants to insert into the database must first have permission from the administrator module in order to ensure that the system is more effective, for example in prescription records. As a result, it can guarantee that the livestock receives the proper care, including antibiotics, vitamins, and tablets.

This system was established and created to manage access to data information of interested third party users, such as such stockman, breeder, buyer, and department of veterinary where livestock was evaluated. This allows for connectionto the history of livestock prescription profiles. Adopting internet cloud storage and a central server does not require significant changes to the software architecture of the system for managing the health of cattle. Therefore, the third party user has the option of viewing the appropriate livestock summary profile by scanning the livestock RFID tags or by simply inputting the livestock ID given by the administrator.

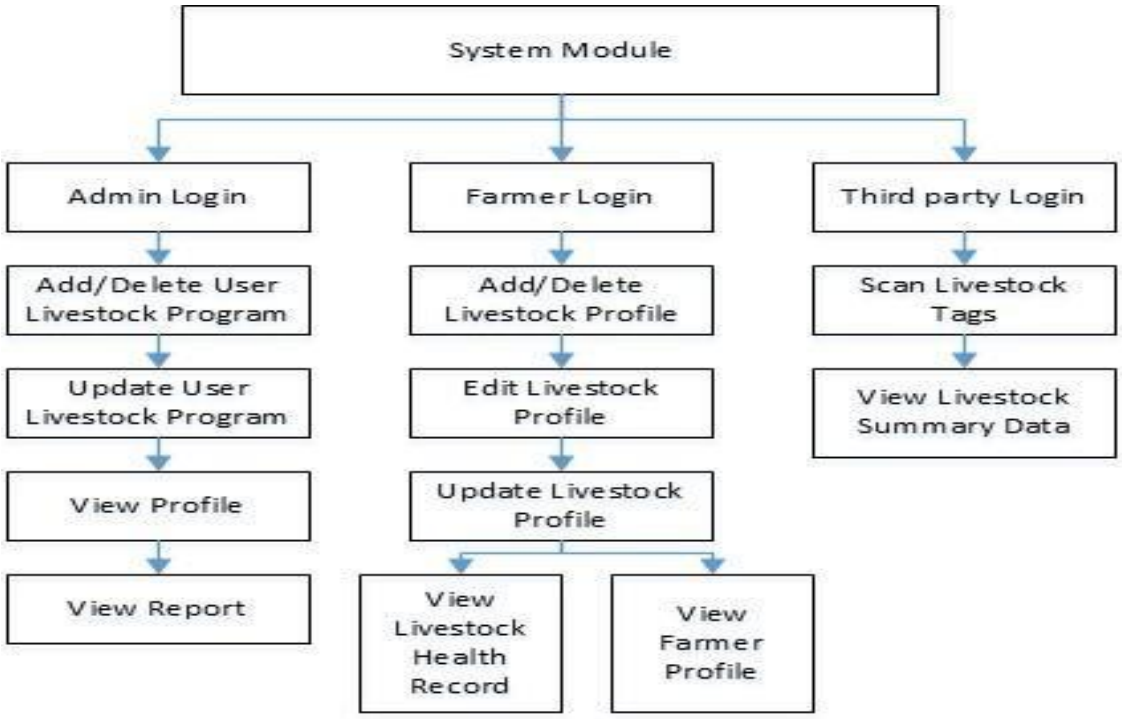

Figure2:.System module for the Livestock Health Management System.

V. HARDWARE

A. Laptop

Component	Minimum Specification
Processor(CPU)	Intel Core i3, 2.3 GHz
Memory(RAM)	256 MB
Hard Disk	10 GB
Input Device	Mouse, Keyboard and CD drive
OutputDevice	Monitors

Table 1. Minimum Specification Of Laptop

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computer that can run well-known operating systems (OS), like Windows, Linux. The top producers of these gadgets are HP, Apple, Dell, and Acer. Today, there are an increasing number of laptops on the market that are powerfully tooled and capable of multitasking like a desktop computer. Table 1 lists the minimal laptop requirements that were employed in this research. In an RFID system, a laptop also serves as the host.

B. RFID Reader UHF

Data from the RFID tag can be sent and received using an RFID reader. The SmartR400 device can scan UHF RFID tags and is Bluetooth-compatible with laptops. The RFID Reader is displayed in Fig. 3. This product's RF protocol adheres to the EPC C1G2 / ISO 18000- 6C standard.

VI. SOFTWARE

A. JavaScript Programming Language

The programming language JavaScript gives your website liveliness. This occurs in video games, in the way that buttons react or how data is entered on forms, in dynamic styling, in animation, etc.

B. Node.js

An open-source, cross-platform runtime environment and library for JavaScript is called Node.js, and it is used to run web applications outside of the client's browser. It was created by Ryan Dahl in 2009, and the most recent version, 15.14, was made available in April 2021.

C. Express.js

A node js web application framework called Express offers a variety of features for creating both web and mobile applications. A single page, multi page, or hybrid web application can be created with it. It is a layer added to Node js that aids in managing servers and routes.

D. Postgres SQL

The robust, free PostgreSQL object-relational database system combines the SQL language with a number of capabilities to reliably store and scale even the most challenging data demands. The POSTGRES project at the University of California, Berkeley is where PostgreSQL first emerged in 1986, and the basic platform has undergone more than 35 years of active development.
Because of its well-proven architecture, dependability, data integrity, extensive feature set, extensibility, and the commitment of the open source community behind the software to continually delivering performing and cutting-edge solutions, PostgreSQL has established a solid reputation. Since 2001, PostgreSQL has been ACID-compliant and is compatible with all popular operating systems. It also features robust add-on like the well-liked PostGIS geographical database extender.

E. React.js

A reliable JavaScript library used in the creation of dynamic web applications is called ReactJS. Among other advantages, it makes JavaScript development simpler and enhances the SEO and speed of your application. ReactJS uses one-way data binding to speed up the debugging process and lower the chance of errors.

F. Graphical User Interface

The Livestock Information System's menu is covered in this part, where users can store, modify, and retrieve animal data.The graphical user interface (GUI) menu for the livestock health monitoring system is displayed in Table 2.

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Menu	Function
1) Medical Staff	Show the contact information for the medical staff, including name, phone number, email address, and location of the animal health centre.
2) Livestock	contains information about the animals including their sex, birth date, farm location, status, breed, name of the breeder, infection date, and disinfection date.
3) Shed	Contains an overview of data about farm animals in groups, such sheep and cattle.
5) Vaccination	contains the name and dosage of the medications given to the animals. Names of the carers are also included in this section.
7) Analytics	This section will display the charts based on the above parameter

Table 2.Menu For The Livestock Health Monitoring System

Figure 3 depicts how an actual laptop's GUI menu would look. Through the Postgres SQL storage platform, users of this menu can send report data to other third parties including stockman, breeders, buyers, and veterinary departments. Postgres SQL Storage enables the sharing of this cattle data at any time and from anywhere in the world.

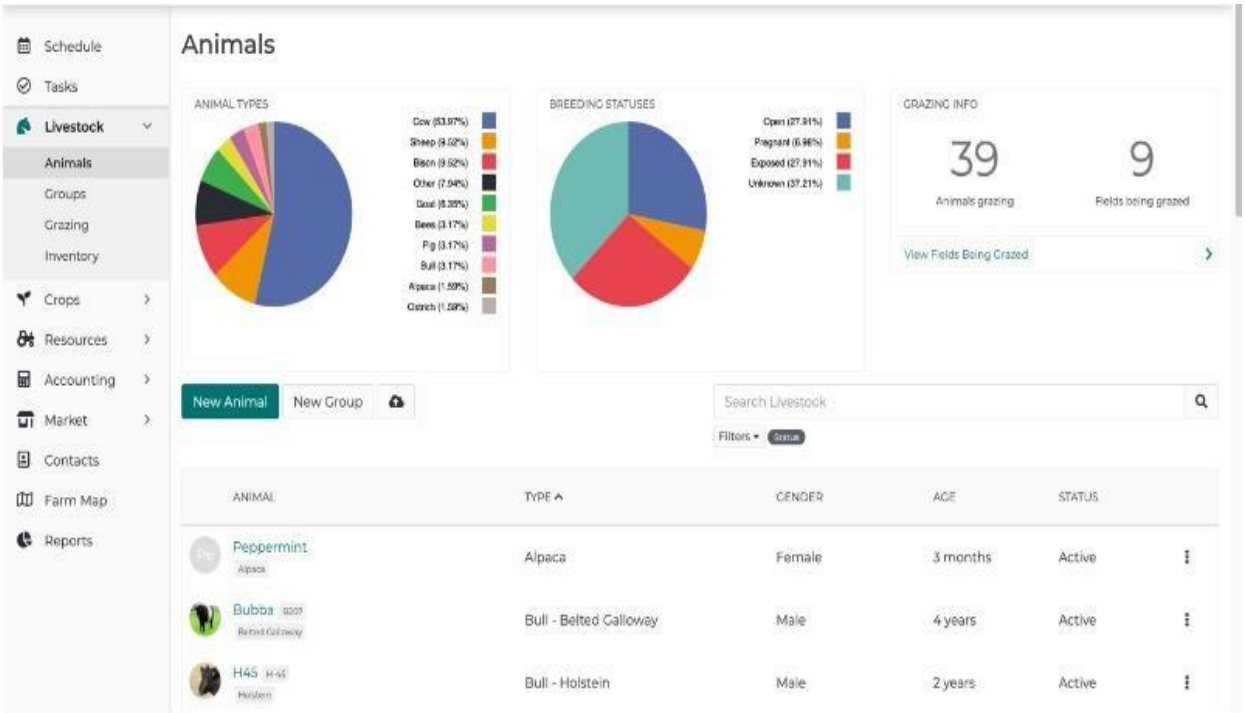

Fig.3. GUI of the main menu.

The livestock system shown in Fig. 4 has the ability to retrieve information, and the graphical user interface for this system has the ability to present a quick measure result, such as the expense type,income type, amount, Date, Payee, Category, Check number, keywords, and description.

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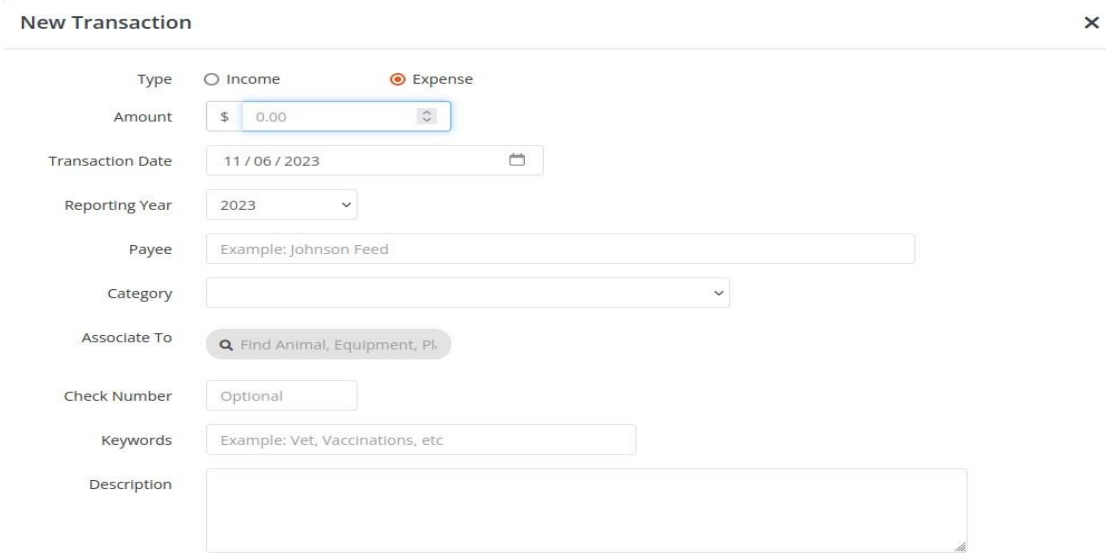

Fig.4. GUI to record transaction

Additionally, GUI aid in producing the total loss or total profit report. The farmer can determine what steps to take to ensure the profitability of the farm by keeping track of all expenses. The farmer can keep track of the money spent on various things, such as food, medical expenses, upkeep, etc., as well as the income generated by the farm, such as money made from selling livestock, making milk, raising livestock for hair, and producing livestock manure. To better comprehend, all of this is calculated collectively and then shown analytically as seen in Figure 5.

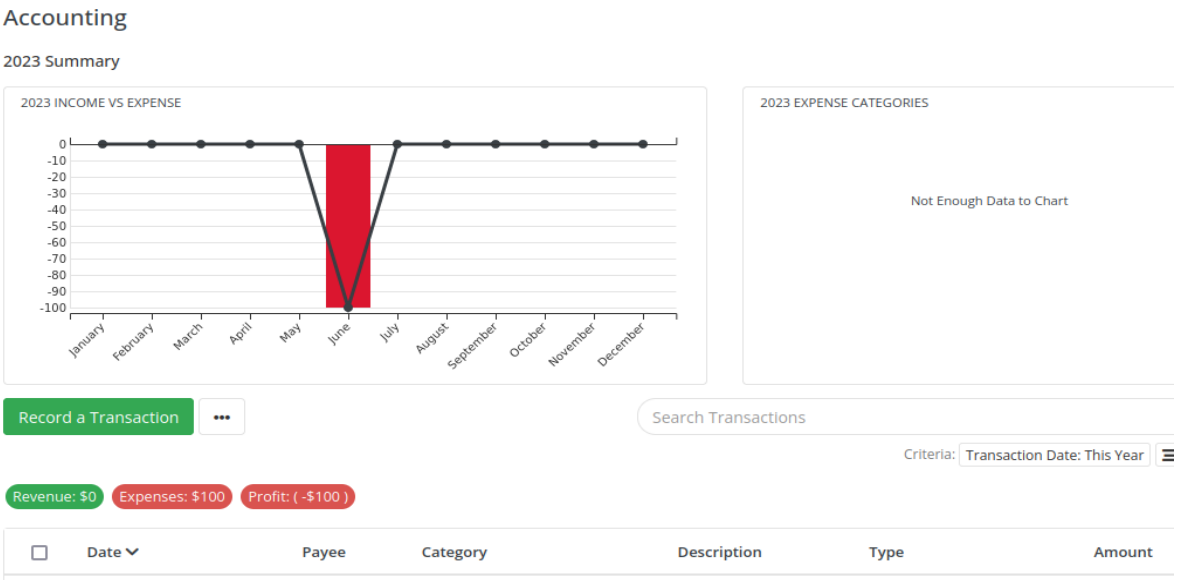

Fig.5. GUI to represenet Accounting

The medical history of livestock is crucial for veterinary professionals when diagnosing and determining the best course of therapy for that livestock. In some instances of livestock,n one livestock is not gaining weight that can be diagnosed earlier and can improve the profitability of the farm and also yield healthy livestock.

VII. CONCLUSION

The study focuses on the creation of the livestock management system's database and Graphical User Interface (GUI) using MERN also to ascertain the health status of the cattle, the "RFID Based Systematic Livestock's Health Management System".. Establishing a connection between the host (computer) and RFID with database development is the primary

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goal of the GUI development. The hardware and middleware for this cattle health care system's design and embodiment are completely documented. The device, which runs on the Linux operating system, provides certain details on the animal profile, livestock movement, and medications consumed by the animals.

This gadget sets itself apart from similar ones by integrating a number of features and functions. A manual flock book will be used to determine the health, weight of the livestock in many items, and some devices need extensive settings before measurements can be taken because it draws power from a laptop battery system, this system is simple, dependable, and can be used on a livestock farm for a considerable amount of time.

REFERENCES

[1] M. H. Ariff, . Ismarani, N. Shamsuddin RFID Based Systematic Livestock Health Management System 2014 IEEE Conference on Systems, Process and Control (ICSPC 2014), 12 - 14 December 2014, Kuala Lumpur, Malaysia.

[2] “M. Conti, S. K. Das, C. Bisdikian, M. Kumar, L. M. Ni, A. Passarella., "Looking ahead in pervasive computing: Challenges and opportunities in the era of cyber–physical convergence," Pervasive and Mobile Computing, vol. 8, pp.2-21, 2012.

[3] “A. Samad, P. Murdeshwar, and Z. Hameed, "High-credibility RFID-based animal data recording system suitablefor small-holding rural dairy farmers," Computers and Electronics in Agriculture, vol. 73, pp. 213-218, 2010.

[4] “P. Chaoa, H. Dongjianb, L. Changyuea, H. Chaob, and Z. Lipengb, "A study of modern dairy farm based on integrating of RFID and wireless sensor network," Journal of Agricultural Mechanization Research, vol. 1, p. 052, 2012.

[5] “Qizhen Zong, Wenxing Bao, “The Dairy Cattle Data Acquisition System Based onPDA”, World Automation Congress (WAC), 2010, Pages 65-69.

[6] Zaiqiong Wang, Zetian Fu, Wei Chen, 2010. “A RFID-based Traceability System for Cattle Breeding in China”. 2010 International Conference on Computer Application and System Modeling (ICCASM 2010), 567-570.

[7] C. Bauckhage and K. Kersting, "Data mining and pattern recognition in agriculture," KI-Künstliche Intelligenz, vol. 27, pp. 313-324, 2013.

[8] T. J. Mutenje, J. C. Smithers, and T. Kgaphola, "The development and evaluation of a radio frequency identification (RFID) based cattle handling system," Proc. CIGR-Ageng, vol. 2012, pp. 08-11, 2012.

[9] M. E. Theurer, D. E. Amrine, and B. J. White, "Remote noninvasive assessment of pain and health status in cattle," Veterinary Clinics of North America: Food Animal Practice, vol. 29, pp. 59-74, 2013.

[10] Á. Gutiérrez, N. I. Dopico, C. González, S. Zazo, J. Jiménez-Leube, and I.Raos, "Cattle-powered node experiencein a heterogeneous network for localization of herds," Industrial Electronics, IEEE Transactions on, vol. 60, pp. 3176-3184, 2013.

[11] I. Halachmi, M. Klopčič, P. Polak, D. Roberts, and J. Bewley, "Automatic assessment of dairy cattle body condition score using thermal imaging," Computers and Electronics in Agriculture, vol. 99, pp. 35-40, 2013.