Livestock Weighing System Using the Internet of Things (Iot) for Caribi Marketplace

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Abstract. The livestock investment system, or *Maro*, is one form of investment in great demand. *Maro* is a livestock-rearing system in which owners entrust their livestock maintenance to others for profit sharing. However, many potential investors have difficulty finding breeders willing to cooperate. This research aims to create a system where potential investors and prospective breeders can be met through a marketplace to facilitate cooperation between the two. To create a unique marketplace for the livestock row system, necessary to build a system that can record the profile of each farm animal. From the animal's age and weight to the latest photo of the farm animal. Therefore, it is necessary to build a system that can transmit livestock data to the marketplace database as consideration for potential investors before investing there. The results of this research, the system can read data on the RFID installed in livestock. The system also successfully weighs livestock and then sends livestock weight data to the server to be processed into livestock product information.

Keywords: investment · IoT · livestock · marketplace · *Maro*

1 Introduction

A profit-sharing agreement in livestock maintenance is an agreement or agreement made between the livestock owner or business owner and the cultivator, keeper, herder, or fisherman with a profit-sharing system [1]. A person who owns livestock, but is unable to maintain it himself, can cooperate with someone willing to give up his energy to maintain the livestock, provided that after being kept for a long time, the profits are divided in two, partly for the owner and part for the keeper.

Profit sharing is where both parties will share the profits following the agreed agreement. If the profits are large, the providers of funds and workers enjoy together according to the agreement, and if the losses must be shared, this is perfect justice. The benefits are equally appreciated, and the losses are equally felt. Profit sharing requires the capital owner's cooperation with the breeder for the mutual benefit of both parties [2]. As a consequence of collaboration is to bear the risk, both profit and loss.

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Maro goat is one of the most popular forms of investment in Indonesia. Unfortunately, potential investors often find it difficult to find prospective breeders, especially potential investors who live in urban areas.

They have to spend quite a lot of time just looking for information regarding people willing to become partners in this *Maro* system. Therefore, there needs to be a breakthrough in the *Maro* system that can make it easier to bring together potential investors and prospective breeders.

After investors get goat breeder partners, another problem arises the distance between the breeders' location and the investors themselves. It will make it difficult for investors to monitor livestock development. Therefore, it is necessary to create a system to overcome these problems.

As technology develops, there are more and more ways to obtain information. One of them is by utilizing Internet of Things (IoT) technology. With IoT, we can monitor and control an object. As in research [3–6] that implements IoT to monitor vehicles. Then research [7–9] conducted research related to the integration of RFID with IoT, which can send the ID of an object to the server in real-time. The utilization of IoT can make it easier for us to connect in real-time with the thing we want to monitor. The protocol to create this IoT-based system can use MQTT, with three main actors: publishers, MQTT brokers, and subscribers [10].

By utilizing IoT, it is possible to create a system that can connect investors with their livestock. So that investors can find out the latest developments of each goat he owns without having to come directly to the cage, starting from the development of the weight of the livestock to the condition of the latest photos.

2 Methods

2.1 System Architecture

The system architecture designed in this study can be seen in Fig. 1. The hardware system consists of the input, process, and output sections. There is an RFID tag and a reader for the identification process at the input. This RFID tag will be placed on the ear of the animal to be weighed.

2.2 System Design

Figure 2 shows the design of the weighing tool made. The scale consists of an entrance, an exit, and a weight sensor. The door has a red and green light as a sign for sheep to enter. The exit also has red and green lights to indicate that the sheep have finished weighing. The weight sensor consists of 4 load cells installed under the base of the scales.

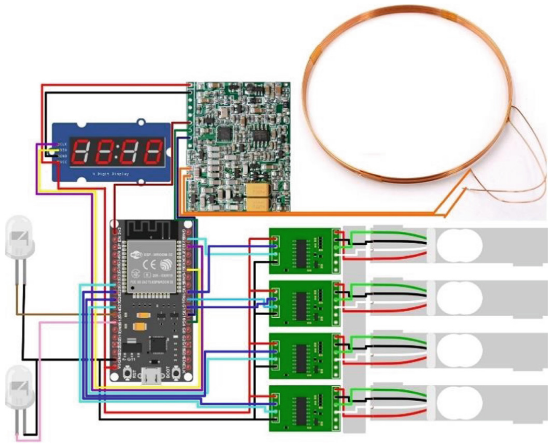

Fig. 1. System Architecture

2.3 How it Works

Figure 3 shows the flow from sending livestock weight data to being received in the database server. The publisher is ESP32, while the subscriber is a PC whose desktop application has been made to receive data from the publisher. The data is then sent to the database server to be processed into product information.

Figure 4 shows when the animal enters the scale, the RFID reader will read the ID data of the farm animal. Furthermore, the system measures the weight of livestock. The ID and weight data are then sent to MQTT Broker via ESP32. From MQTT Broker, the data is sent to a desktop application that acts as a subscriber. The application sends the data to the database server as material to be processed into information.

3 Result and Discussion

3.1 The Weighing Tool

Figure 5 shows an IoT-based livestock weighing tool still in packaging refinement. The scale consists of an entrance, an exit, and a weight sensor.

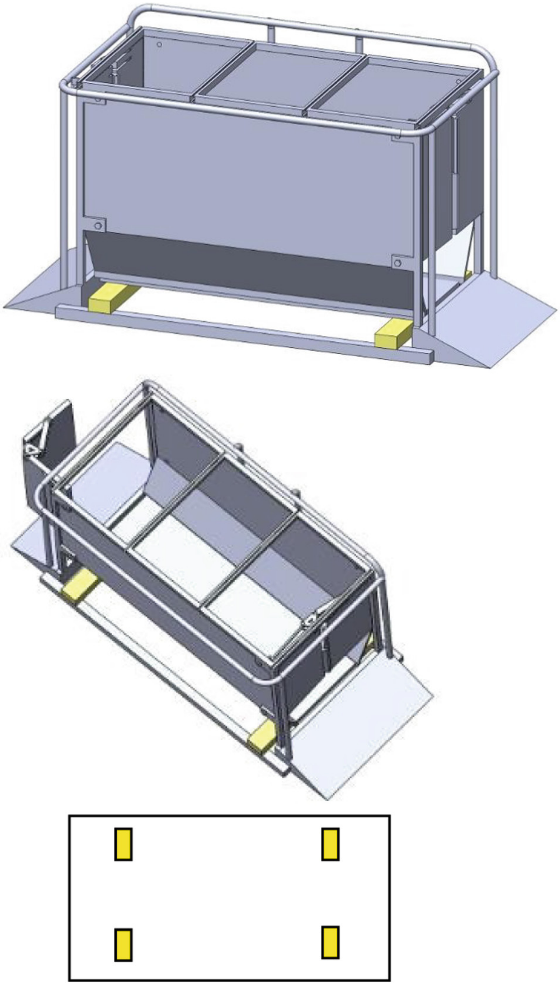

Fig. 2. Weighing scale

3.2 Weight Measure Test

The test is carried out using a load in the form of goods previously measured using a weighing device to be compared with the results of system measurements. The results are shown in Table 1, where the average measurement error rate is 4.59% (Table 2).

3.3 Data Sending Test

In the experiment that was carried out six times sending data from the microcontroller to the database server, all data sent by the system was successfully received by the database.

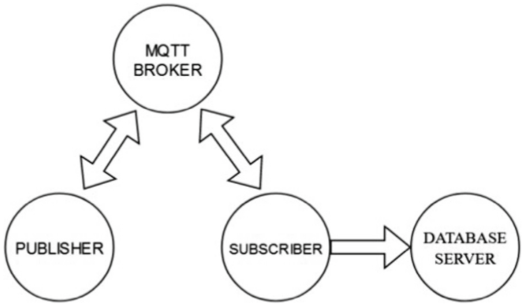

Fig. 3. Data flow system

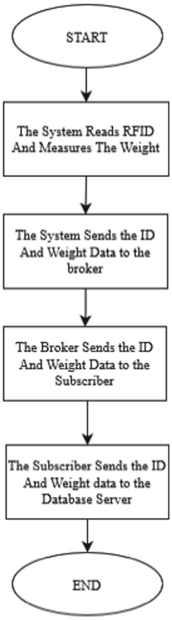

Fig. 4. Flowchart system

Fig. 5. IoT-based weighing equipment

Table 1. Weighing test

No	Goat ID	System Measuring Result (Kg)	Measurement Results of Measuring Instruments (Kg)	Error Rate (%)
1	124fahvf	31	29	6,45%
2	QadZ145	12	12	0,00%
3	124fahvf	31	30	3,23%
4	QadZ145	12	11	8,33%
5	134ASALDCW	21	20	4,76%
6	134ASALDCW	21	20	4,76%
Error Rate Average				**4,59%**

Table 2. Database system test

No	Goat ID	System Measuring Result (Kg)	Database Status (Receive/Not)
1	124fahvf	31	Receive
2	QadZ145	12	Receive
3	124fahvf	31	Receive
4	QadZ145	12	Receive
5	134ASALDCW	21	Receive
6	134ASALDCW	21	Receive

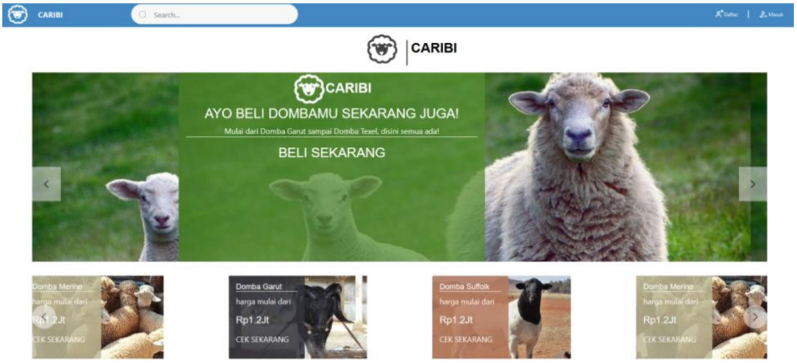

Fig. 6. The home page of the CARIBI marketplace

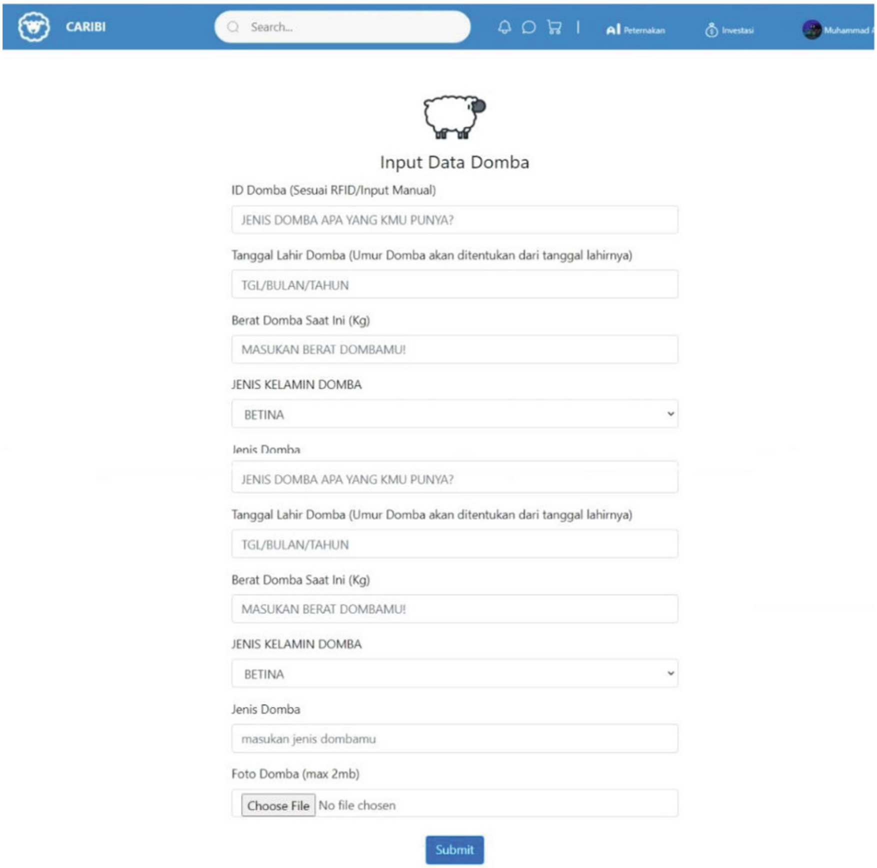

Fig. 7. Breeder input page

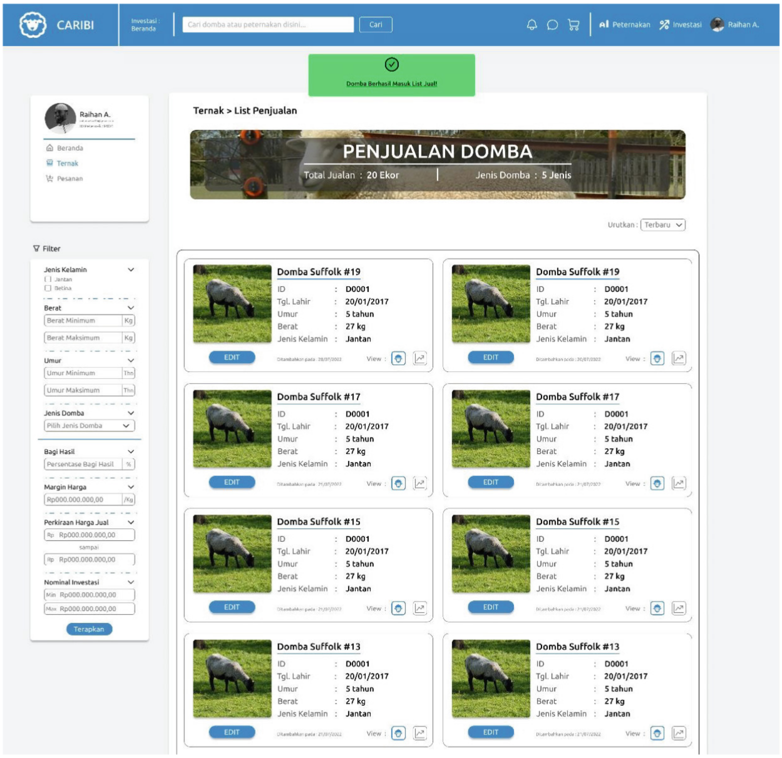

Fig. 8. Breeder's Sheep Collection Page

3.4 Web User Interface Display

Figure 6 shows the main page of the marketplace. Figure 7 is a view from the farmer's side where several parameters must be inputted before the sheep are affixed with RFID as an identity that will be used when weighing. Parameters inputted include sheep ID, birth month, weight, sex, breed of sheep and photo of sheep. Figure 8 shows the sheep collection page owned by the farmer. And finally, Fig. 9 is an analysis page of livestock weight growth and income estimation for investors.

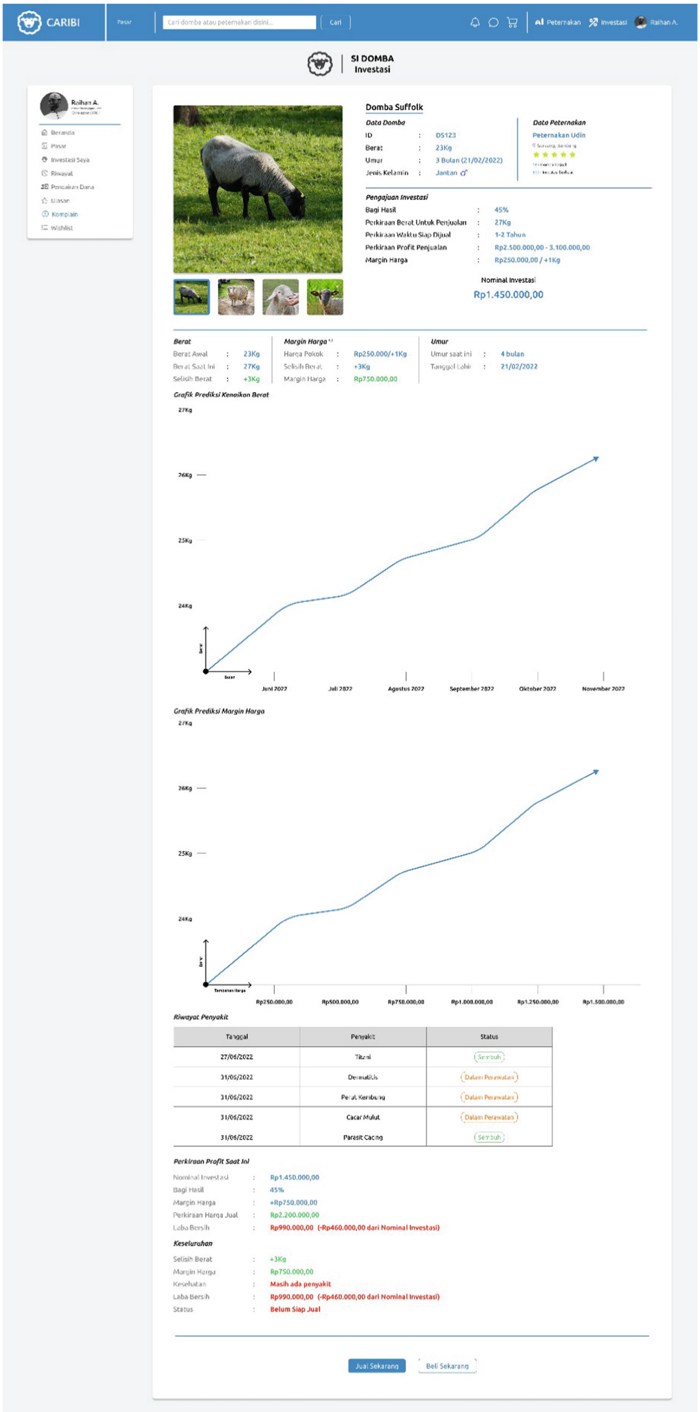

Fig. 9. Analysis page of livestock weight growth and estimated income

4 Conclusion

From the problems that occur, this IoT-based livestock weighing device can be a solution. This tool supports farmers in updating their livestock growth regularly. The tests showed that the livestock weighing equipment successfully weighed with an error rate of 2%. The microcontroller also managed to send weight data to the database server. In the future, this data can be used as product information in the marketplace. Information that can be displayed as product information includes the livestock's current weight, the cage's position, the cage, the owner of the cage, the graph of livestock growth, and the current price of livestock. This marketplace is expected to boost the economy, especially in livestock investment.

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References

1. Putriantiwi, I. . Pelaksanaan Perjanjian Bagi Hasil Pemeliharaan Sapi Di Kelurahan Saigon Kecamatan Pontianak Timur Kota Pontianak. *J. Huk.* 5, (2016).
2. Sastra, P. A. ., Sembiring, R. Sembiring, I.. Perjanjian Bagi Hasil (Maro) Dalam Pemeliharaan Ternak Kambing (Studi Di Kota Kisaran Kabupaten Asahan)," Bul. Konstitusi. *Bul. Konstitusi* 3, (2022).
3. Rahayu, A. ., Nursuwars, F. M. ., Risnandar, M. ., Taufiqurrahman, I., Faridah, L. Speed Warning System Pada Taksi Online Berbasis Iot Menggunakan Obd II. *J. Energy Electr. Eng* 3, (2022).
4. Rahayu, A. . Sistem Monitoring Perilaku Pengendara Mobil Berbasis Internet of Things. *J. Inf. Technol. Comput. Eng.* 5, 18–24 (2021).
5. Husni, E. *et al.* Applied Internet of Things (IoT): Car monitoring system using IBM BlueMix. (2017) doi: https://doi.org/10.1109/ISITIA.2016.7828696.
6. Srianusha, K., Saddamhussain, S., Kumar, K. . Biometric car security and monitoring system using IOT. *Int. Conf. Vis. Towar. Emerg. Trends Commun. Netw.* 1–7 (2019).
7. Chanafi, M. F. ., Hiron, N., Nursuwars, F. M., Rahayu, A. . Sistem identifikasi kendaraan dengan teknologi RFID UHF berbasis Internet of Things: Vehicle identification system with UHF RFID technology based on Internet of Things. *J. Ilmu Telekomun. Elektron. dan Tenaga List.* 2, 111–118 (2022).
8. Landaluce, H. *et al.* A review of IoT sensing applications and challenges using RFID and wireless sensor networks. *Sensors* 20, 2495 (2020).
9. Khan, S. . Health care monitoring system in Internet of Things (IoT) by using RFID. *Int. Conf. Ind. Technol. Manag.* 198–204 (2017).
10. Soni, D., Makwana, A. A survey on MQTT: a protocol of internet of things (IoT). *Int. Conf. Telecommun. power Anal. Comput. Tech.* 20, 173–177 (2017).