Design and Implementation of ICT-Based System for Information Management of Livestock Farm

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Abstract

This paper proposes ICT based system for information management of livestock farm to provide efficiency operation in livestock farm by managing information of livestock farm such as livestock information and environment information and fire information. Proposed system provides optimal breeding environment by monitoring real-time information of livestock farm and manage overall information of livestock such as disease forecasting and estrus detection and delivery time. It is expected to increase productivity and earnings rate in livestock farm by systematically managing livestock information and economically operating livestock farm.

Keywords: WSN, ICT, Middle ware, Livestock, Livestock Farm

1. Introduction

Information and communications technology (ICT) is often used as an extended synonym for information technology, but is a more specific term that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals, computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information [1, 2].

The Information and communications technology has been applied through a variety of fields including defense, medicine, road transport, security and realizes advancement of the living standard. So the Information and communications technology has applied to livestock industry for increasing productivity [3, 4].

The current domestic livestock industry competes with advanced countries of livestock industry because of inevitable circumstance such as FTA agreement and increase cost of feed. livestock farms have received significant damages from contagious livestock diseases such as foot-and-mouth disease and AI, which lead to increased mortality rate and financial damage of livestock farms[5].

In order to solve such problems, livestock farms make optimal breeding environment using systematically scientific technology and need integration system of livestock farm to increase productivity by reducing produce cost and mortality rate. However, the existing developed systems lake integration technology about information of livestock farms [6].

Accordingly, This Paper proposes ICT based system for information management of livestock farm by managing information of livestock farm such as livestock information and environment information and fire information. Proposed system provides optimal breeding environment by collecting real-time environment information installed environment sensor in

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livestock farm and monitoring service to detect fire information. In addition, It generally manages livestock information such as estrus detection and delivery time by collecting activity information of livestock.

Therefore, it is expected to reduce labor force and systematically operate livestock farm.

The composition of this paper is as follows. Chapter 2 explains design of ICT based system for information management of livestock farm. Chapter 3 explains implementation of proposed system. Lastly, Chapter 4 will conclude this paper by describing conclusion.

2. Design of Proposed System

This paper proposes system that livestock farms could be economically operated by making disease forecasting and estrus detection and delivery time based on information of livestock activity. Also, Optimal breeding environment of livestock could be provided by monitoring and collecting environment information in livestock farm. The fire detection sensors are deployed such as spark detection sensor, smoke sensor, temperature sensor in livestock farm. Fire detection server stores collected fire information in database and provides fire detection service to user in real time.
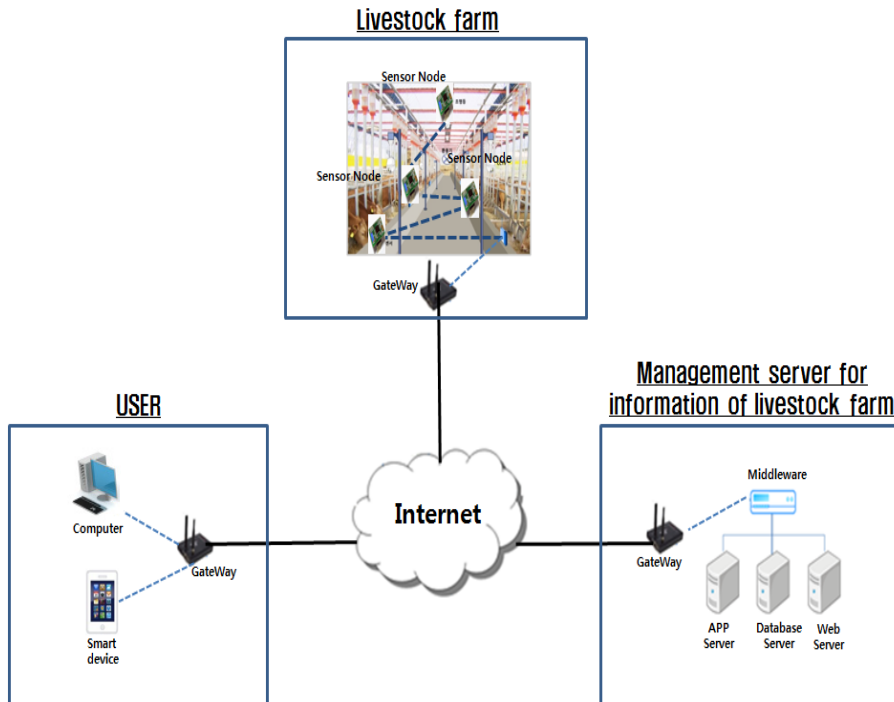

Figure 1. The Structure of Proposed System

Figure 1 is structure of ICT based system for information management of livestock farm. It consists of livestock farm, management server for information of livestock farm and User.
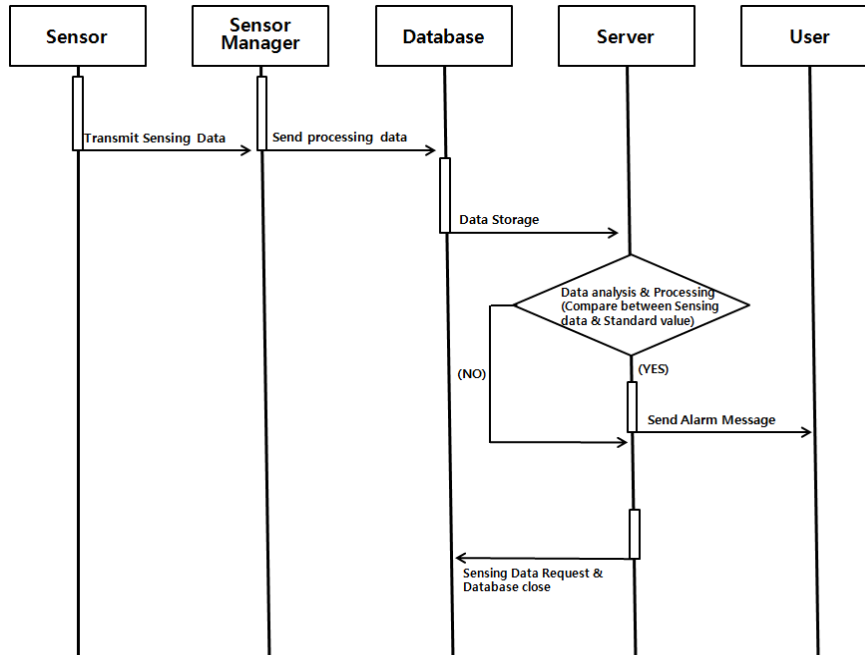
Figure 2. The Process of Proposed System

Figure 2 is process of proposed ICT based system for information management of livestock farm. This process consists of fire environment sensor node, sensor manager, database, management server for information of livestock farm and user. Sensor node for collecting information of livestock farm like fire detection and livestock information transmits collected information to sensor manager. A sensor manager formats information collected from sensor node so as to save in database and converts units suiting to measuring factors and saves processed data in database using update query. Management server for information of livestock farm is updated from database in real time and provides alarm service like disease forecasting, estrus detection and delivery time to user.

3. Implementation of Proposed System

Figure 3 is The Middle ware for information management of livestock farm. Alphabet A is section of environment information such as temperature, humidity, illumination in livestock farm. Alphabet B is section of spark detection, smoke data in livestock farm. Through establishment of test bed of ICT based system for information management of livestock farm, the study confirmed that data collected from a variety of sensor node was normally stored in database through middleware without malfunction. If fire detection device detect fire, fire alarm is worked well.
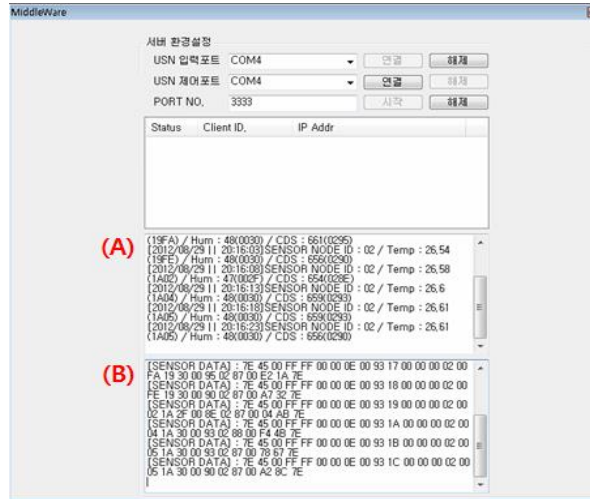
Figure 3. The Middle Ware for Proposed ICT based System

Figure 4 is The System for information management of livestock farm. Environment setting of system consists of input port, control port and port number to connect middle ware. Alphabet A and B is section of monitoring real time livestock farm to detect novel anomaly. Alphabet C and D is section of collecting environment information like temperature, humidity, illumination, wind and fire information such spark, smoke to manage efficient livestock farm.

Figure 4. The System GUI for Proposed System

4. Conclusion

Livestock farms reduce cost of production for increasing rate of return to investment and need to operate efficient livestock farm by using ICT based system.

This paper proposes ICT based system for information management of livestock farm to provide methodical and efficiency operation in livestock farm. Proposed system aim to provide a variety of alarm service such as livestock information, environment

information and fire information by storing collected data from livestock farm in database using the wireless sensor network.

It is also expected that this system could efficiently manage livestock farm and avoid economic losses by rapidly detecting livestock farm fire.

Acknowledgements

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