

Livestock Disease Counseling System using Android Smartphone

Jeonghwan Hwang¹, Hoseok Jeong², Hyun Yoe³

¹²³ Department of Information and Communication Engineering, Sunchon National University, 255 Jungang-ro, Suncheon, Jeollanam-do, Republic of Korea
{jhwang, hsjoeng, yhyun}@sunchon.ac.kr

Abstract. This paper proposes a livestock disease counseling system using Android-OS based smartphone by which people can effectively prevent possible abuse of antibiotics and animal medicines through a smart phone and diagnose livestock disease status in an early stage for fast response. The proposed system is structured in a mobile application capable of informing abnormal health status of livestock and its counseling, an integrated database for managing livestock health status data and expert counseling data, and livestock disease management server that identifies any disease of livestock based on the collected data. If any health symptom is detected, the proposed model uses a mobile application based on android OS to produce livestock health abnormality information and sends it to an expert to make possible fast response and counseling.

Keywords: Livestock, Disease, Counseling, Android OS, Mobil application

1 Introduction

South Korea's livestock industry faces lots of difficulties such as market opening by FTA conclusions, decreasing number of rural households, aging population and manpower shortage, production cost rise due to feed and energy cost increase, rising demand for high-quality livestock products along with social development and its safety issues [1][2][3].

And the recent foot-and-mouth disease and avian influenza hit livestock farms seriously in the country. The foot-and-mouth disease hit in 2010, in particular, resulted in damages of 1.6 billion dollars [4][5]. As such, if a livestock disease outbreaks, not only infected animals have to be destroyed, leading to a primary loss, but also customers develop distrust and anxiety over livestock products and reduce their livestock product purchase, blowing a serious hit to the domestic livestock industry [6].

Presently, South Korea's livestock industry is turning to an environment with higher risk of livestock diseases because of increasing number of professional farming households more commercialized in large scale [7]. The industry has no system to

³ Corresponding author.

early respond livestock diseases, etc. as of now, exposed to a huge risk of livestock disease-led damages [8]. Therefore, to minimize livestock disease damage, we need to develop a livestock IT convergence technology with which we can swiftly and actively respond to any livestock disease outbreak.

In this paper, we propose a livestock disease counseling system a user can activate through a mobile application whenever they spot abnormal livestock health status and counsel experts for fast response.

The proposed system bases on a mobile application providing both producer mode and expert mode, a server application offering integrated control over livestock disease based on collected data, a livestock disease control server identifying if a disease is occurring or not by building database of abnormality information, expert diagnose data and counseling information while supporting the communication between servers and user application, and an integrated database managing the collected abnormality data and expert counseling data.

Producers, if any abnormality is spotted in livestock, generate an alert via an android-based mobile application and send it to experts. In this mechanism, they can consult experts in real time and control livestock disease.

Through the proposed system, we can prevent possible abuse of antibiotics and animal medicines by farmers without proper knowledge, and help them respond against livestock diseases faster to minimize its following damages while securing the safety of livestock products.

This paper is organized as follows. Chapter 2 explains structures and service process of the proposed livestock disease counseling system using android OS based mobile application, Chapter 3 describes a result of implementing the proposed system, and finally Chapter 4 finishes this paper through a conclusion.

2 Design of the Proposed Livestock Disease Counseling System

2.1 System Architecture

The proposed livestock disease counseling system in this paper, utilizes an android OS-based mobile application to allow users spot and inform abnormal symptoms of livestock and provide counseling service with experts on livestock disease diagnose and responses based by the informed data. The system also offers an application capable of controlling livestock diseases in a comprehensive manner while, in terms of a server, it supports communication with a user application. It is also programmed to database abnormality information, expert diagnose and counseling data in order to determine livestock disease outbreak through a livestock disease control server.

The mobile application provides producer mode and expert mode, and each mode consists of various function modules for creating and providing information. Internal module summons web service through the URL(Uniform Resource Locator) that corresponds to each function. Upon performing the transmission function for collecting after creating information such as livestock disease related abnormal symptom information, experts diagnosis information and expert response method

information, it summons the URL that corresponds to the function with the return of XML(eXtensible Markup Language) according to result processing.

The livestock disease management server collects and manages the livestock abnormal symptom information collected through producer and the response method and diagnosis of expert based on the livestock abnormal symptom information according to the systematic structure of integrated database. In addition, it has REST(Representational State Transfer)-based web service that utilizes URL and XML for the livestock disease information service function.

The integrated database consists of user table for storing and managing user information, livestock disease information table that connectively has livestock object information, location information, livestock disease information and livestock disease diagnosis information, and image table for systematically managing the livestock image information.

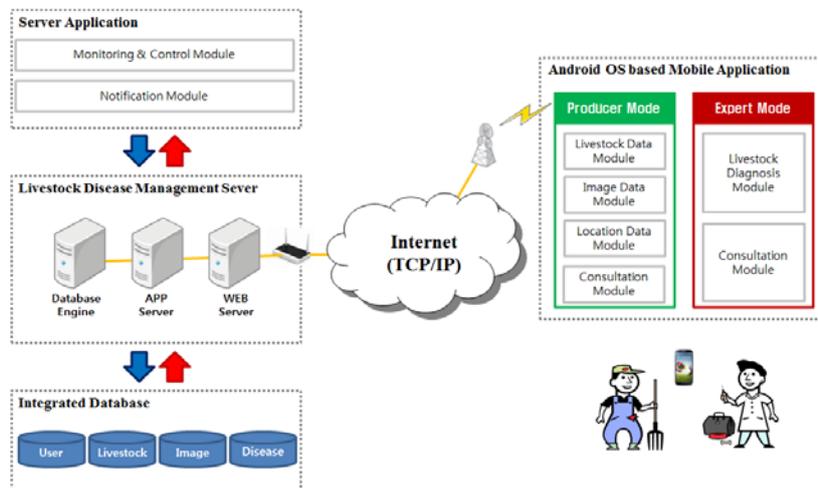


Fig. 1. Block Diagram of the Proposed Livestock Disease Counseling System

2.2 Service Process

One of the main services offered by the livestock disease counseling system is a real-time livestock disease diagnosis service. The real-time livestock disease diagnosis service is made once a user generates an alert by the mobile application's producer mode and sends it to the livestock disease control server, then the server alerts an expert so that the expert is informed via the mobile application's expert mode to generate and provide in real time his/her professional opinion, diagnose, responses, etc. for proper counseling on livestock disease. Figure 2 shows the real-time livestock disease counseling service flow.

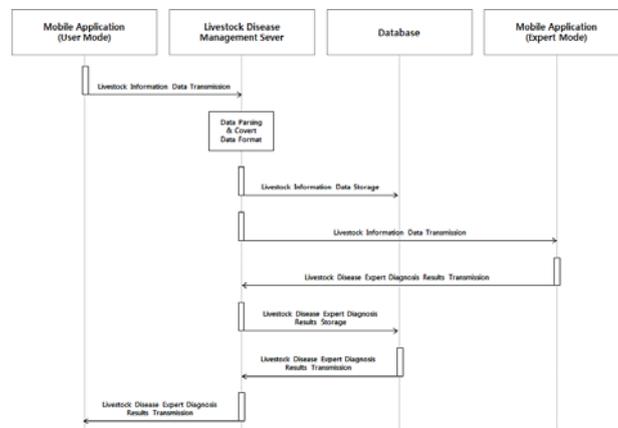


Fig. 2. Flowchart of the Livestock Disease Counseling Service Process

3 Implementation

To verify the proposed livestock disease counseling system, we have implemented and tested a server application and mobile application.

As for an environment to develop a server application, we used C#.Net Framework in Window XP Service Pack3 OS. Tomcat-6.0.20 was used for WAS and mysql 5.0 for database. The server application can receive the real time information from the producer mode and expert mode to control the status of livestock disease and based on the received information it identifies the status of the suspected disease progress and alert to the user and other relevant organizations.

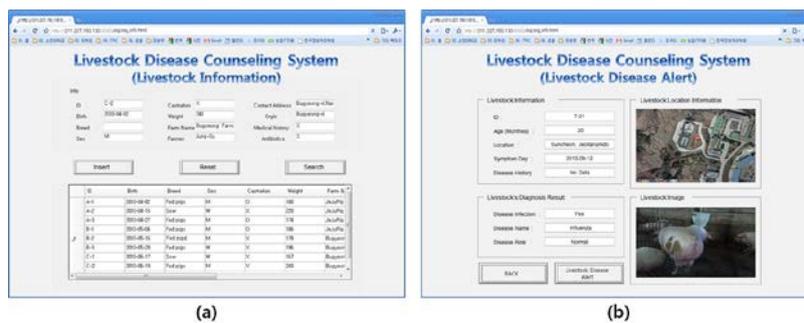


Fig. 3. Server Application GUI

JDK 1.6 version was run in Window XP Service Pack3 OS for system development for the mobile application. We used Eclipse 3.6 as a basic tool for android development and developed android SDK 4.3 version regarding android OS. The realized application offers a producer mode and expert mode.

The producer mode is structured to utilize a smart phone and generates diverse information on individual livestock via one single interface in a systematic manner. Producers, according to such a structure of UI(User Interface) and its each connected function module, can fast and accurately acquire, generate and send individual livestock information, its image, location, disease affected or not, etc. regarding any detected abnormal livestock health information.

Its data storing function can be activated if a user generates a database through SQLite, selects a configuration menu then customized data setup menu, further, if a user selects save the system enters each corresponding values into tables and saves. If necessary, information saved in tables can be retrieved for auto search. Single image of individual livestock or multiple images can be acquired and sent in the system and it can also retrieve past stored images and sent them. In consideration of various environmental variables, for location, the system also automatically gain information both outdoors and indoors as well by using GPS(Global Positioning System) and AP(Access Point). And its producer mode informs users of export diagnoses based on abnormal livestock health status information and how to respond to a livestock disease and the status of suspected disease progress from the livestock disease control server in real time. The real time alert function utilizes the notification function of android to inform upon any message receipt via mobile phones in real time. Users also can select between sound/vibration modes based on Preference.

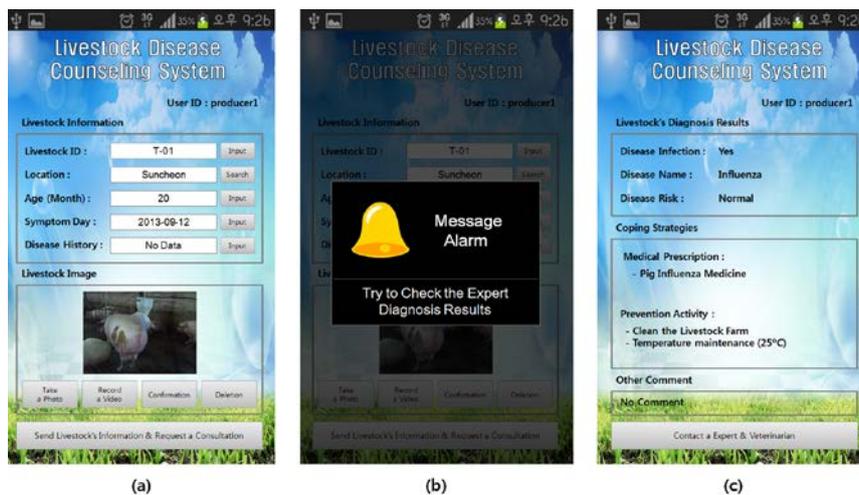


Fig. 4. Mobile Application GUI of the Producer Mode; (a) Livestock Information Input GUI of the Producer Mode, (b) Notification GUI of the Producer Mode, (c) Livestock Disease Expert Diagnosis Results GUI of the Producer Mode

The expert mode receives data from the livestock disease control server livestock image, video, location, the point of time when abnormality was detected, whether the animal is diseased or not and others and it generates information of livestock disease experts' opinion, diagnose, way of response, etc. to send to the livestock disease control server.

The whole implemented systems were tested for errors then modified. First of all, the problem in deleting resources was resolved by removing unnecessary sources and images and UI design issue was solved by re-structuring it.



Fig. 5. Mobile Application GUI of the Expert Mode; (a) Livestock Information Received Notification GUI of the Expert Mode, (b) Livestock Information GUI of the Expert Mode, (c) Livestock Disease Diagnosis Results Input GUI of the Expert Mode

4 Conclusions

In this paper, we proposed a livestock disease counseling system based on an android OS-using mobile application that can prevent abuse of antibiotics and animal medicine and enable early livestock disease diagnose and fast response.

The proposed system is structured in a mobile application generating abnormal livestock health status information and offering real time counseling, an integrated database for abnormality data and expert counseling data, and a livestock disease control server identifying disease outbreak or not based on the collected data. To test the proposed system, we, in this paper, implemented a server application and android OS-based mobile application. As a result, we found the system operated without an error.

With the proposed livestock disease counseling system in place, we believe livestock farming households can counsel experts on livestock abnormal symptom to avoid antibiotics and animal medicine abuse without proper knowledge and respond to livestock diseases swiftly to minimize its caused damages while safeguarding livestock products.

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