

# Livestock Health Monitoring System Design

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**Abstract:** With the development of animal husbandry, livestock feeding mode has changed, the former extensive breeding has been unable to meet the requirements. But under the feeding mode of large-scale enterprises, the breeder cannot do real-time monitoring of all livestock, causing that disease cannot be handled in a timely manner, which will often delay the best treatment time. In this paper, a kind of livestock health monitoring system is designed, the system uses the three-axis acceleration sensor, to detect motion of livestock, monitoring data will be transmitted to the PC through the Xbee module. Through experimental verification, the system can meet the requirement of health monitoring.

**Keywords** Livestock; Health monitoring; Three-axis acceleration sensor; Xbee module

## INTRODUCTION

According to the International Federation of Robotics (IFR), “A service robot is a robot which operates semi or fully autonomously to perform services useful to well being of human and equipment, excluding manufacturing operations” [Xie *et al.*, 2010]. In recent years, more and more people have researched in this area [Chella *et al.*, 2010]. Now intelligent service mobile robot (ISMR) is mainly used in the fields such as cleaning, entertainment, education, rehabilitation of older persons and nursing, which can help people finish specific task successfully. Some examples have shown it can assist people successfully such as housekeeping, entertainment and surveillance [Muciente *et al.*, 2010]. But how to design an ISMR efficiently and scientifically is a challenging work. After all, the robot is classical information system and complex system, so its core problem is the system modeling. So far, there are still no unified modeling methods for it because of the complexity of applications. The lack of integrated methods of modeling leads robotic developers to analysis and design systematically so hard.

## SOFTWARE DESIGN

### 2.1 Software overall scheme

In order to ensure the system's real-time and scalability, the software design adopts modularization design way. As shown in Figure 1, the software is divided into management module, data acquisition

module, transmission module. The SCM is programmed in host computer, the written program can run independently in SCM. AVR SCM supports the C language, BASIC language to compile. The C language code is small, running speed is fast, it is flexible in use, in this paper the C language is used for AVR SCM programming.

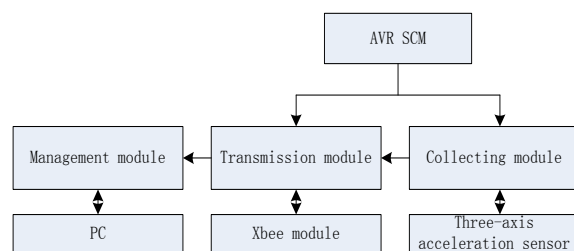


Figure1. The modular design of software

### 2.2 Management module design

Management module of this system is the critical work, collecting module takes the daily activities of cattle through the three axis acceleration sensor, then the data is transferred to the management module of PC machine through a transmission module, management module does statistical analysis, once it is abnormal, the system will automatically alarm, then carries on the inspection to the designated veterinary cattle. VBA is used in the management module in this paper (Visual Basic For Application) development, VBA is Microsoft developed

implementation of general automation in the desktop application (OLE) task programming language. As shown in Figure 5, the VBA management module interface is written based on Excel, management module can record the data each time, carry on the analysis, and get the relevant data. (See Figure 2)

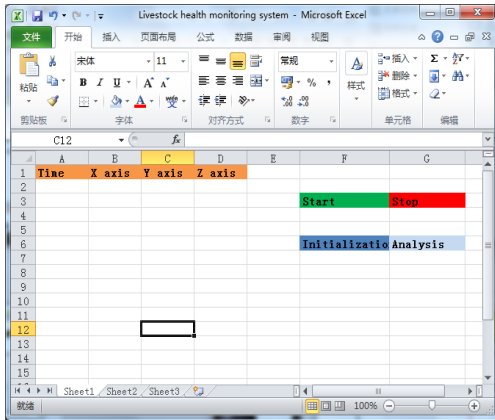


Figure 2. The design of management module

### TESTING EXPERIMENT

#### Merits of Agent-oriented modeling

In order to validate the effectiveness of the system, system testing experiment is carried out in a barn, figure 3 is the collar, the collar is hung in cattle to detect the active state, data in a period of time in the test is shown in Figure 4, comparing the data with normal data ,there is not obviously abnormal, the cattle is in good health. Figure 5 is an analysis of active state of healthy cattle every day through the system, experiment shows that the system software and hardware can meet the detection of cattle health requirements, measurement is accurate, it has good real-time performance, it can also carry on the related analysis according to the data.



Figure 3. The collar

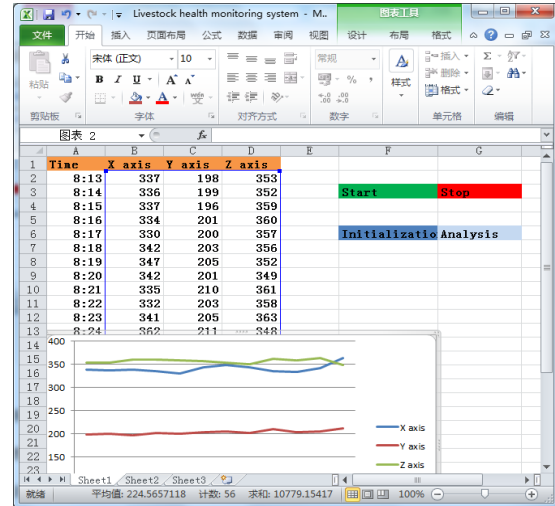


Figure 4. Data in the test

#### The behavior of the cattle

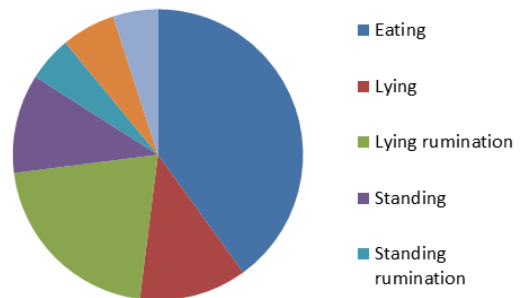


Figure 5. Analysis through the system

### CONCLUSION

The development of animal husbandry has changed the traditional feeding methods, large-scale enterprises feeding has become the inevitable trend of development of farming animal husbandry. Among them, disease of livestock is a major obstacle for the development of animal husbandry, the prior processing mode is only remain in the animal living environment management level, which is unable to find problems in time, it will often delay the best treatment time. In order to change this situation, in this paper, a kind of animal health monitoring system is designed, detection of activity patterns uses three axis acceleration sensor on the cattle in the three direction detection, if there are problems, system will do automatic alarm to monitor animal health real-time. The system is tested in the barn, the test result is good, it can satisfy the requirements of health monitoring. The system has a certain practical significance on the development and food safety monitoring on animal husbandry..

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