

# AMIS - Animal Monitoring and Information System

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The ANEMON company has developed a miniaturized device that measures physiological markers of mammals, which reflect fertilizable states or diseases. Each animal is equipped with such an embedded device that transmits wirelessly the measurements to a server. The AMIS project aims at developing a web-application for the monitoring of animals. Besides the acquisition and the storage of the measurements, the AMIS application is responsible for analyzing the measurements and alerting the breeder or the veterinarian by means of SMS or e-mails whenever a measure reaches trigger values. A typical example is the detection of the right time for the artificial insemination of cows. This depends on changes in physical activity and a rise in body temperature.



Raoul Adler

## Introduction

The AMIS project is related to a research project conducted by the ANEMON (Animal Estrous Monitoring) company, the «Tiergesundheit und -haltung» division of the BFH-SHL, the Electrical and the Computer Science divisions of the BFH-TI. The research project aims at measuring some physiological markers (body temperature and physical activity) of mammals allowing the breeder or the veterinarian to detect, for example, the right moment for artificial insemination increasing the probability of success. The AMIS project aims at developing a web-application dedicated to the monitoring of markers measured by an electronic device embedded in each animal. The embedded device is developed by the ANEMON company and is composed of a micro-controller, a temperature sensor, an accelerometer and a GPRS module that enables communication over the GSM network.



Sathesukumar

Uthayakumar

## Objectives and Features

The AMIS application is in charge of acquiring the measured markers sent by the embedded device, storing them into a database, and initializing/stopping the device by sending messages back to it. Beside these fundamental functionalities, AMIS provides an alerting mechanism including automated delivery of SMS and/or emails to inform the breeder about important markers, e.g. a body temperature rise of 0.5 degrees and some specific changes of physical activity. These may be an indication that the monitored animal is ready for an artificial insemination. Users of AMIS are the breeders and the administrators who interact with the system by means of a web browser. Through the web browser the users can manage data of animals and display graphical/textual representations of measured markers for monitoring purposes as well.

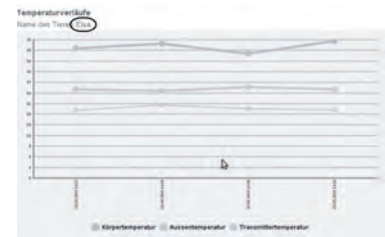


Figure 01: Display measurements

## Technology

The above described requirements demand a flexible and scalable application with a web-based user interface. In order to build a modern, secure, extensible and efficient system we have chosen the Java EE software architecture. The Java EE's key technologies we use are the JSF framework, Enterprise Java Beans and the Java Persistence API. AMIS is a multi-user application. Different users use AMIS concurrently by accessing the application over the AMIS web-interface.

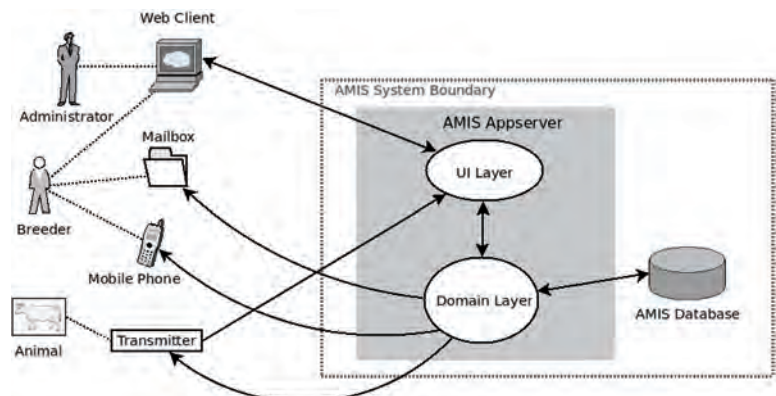


Figure 02: System Architecture of AMIS