

# Animal Welfare Monitoring Using IOT : A Review

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## ABSTRACT

Currently Smart farming addresses basic needs of farmers , such as helping farmers to automate farming. In the proposed approach an open and low cost concepts used for smart fog(edge) system to create smart farm animal welfare monitoring. The position of the animals are collected for analysis purpose. Different sensors are used for sensing the temperature, humidity, animal behavior and disease detection of animal like cattles, poultry farms, stables. Our system will use Arduino as edge devices to monitor farm environment and animal. we emulate the cloud with a web-based database and will save sensors data that enables communication between mobile application and work station. We developed an low-cost and open computing and sensing system can effectively monitor multiple parameters related to animal welfare.

**KEYWORDS:** IOT, Image Processing, Fog Computing, Sensors, Arduino

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## I. INTRODUCTION

Smart Farming relays on basic needs of farmers, such as helping farmers to make farming. Instead of Farmer visiting the cattle or Poultry farms again and again for observing their health condition, we are using a computing and sensor based methods controlled by arduino module. To Achieve this, we have installed our system in the Poultry farms and cattle sheds through sensors. The measured data is stored at the consumers database , the consumer is allowed to extract this data through an android application installed in his/her mobile. It includes another feature of alarming i.e., if temperature of poultry farm exceeds or increases, sensor senses the temperature and arduino compares it with the prescribed safe range and if not in range signals an alarm, further the cloud pushes it to the consumers mobile app and notifies

him by a notification. Smart computing and sensing technologies, have become common terms to describe next generation computing, communication, and sensing technologies and systems.

## II. LITERATURE SURVEY

We have first summarized about smart farming and then animal health monitoring. The findings of this review are to motivate future research in computer science and engineering, as well as contribute to data, information, and communication management for animal welfare.

### A. Smart Farm Computing Systems for Animal Welfare Monitoring:

In this paper, author Marcel Caria[1], explains the system of animal welfare. The Farm controller is center part of overall system architecture, which is connection layer between cloud and edge

devices. A Low cost and open computing and sensing system can effectively monitor multiple parameters related to animal welfare this paper two types of sensors are use wearable and non wearable. The wearable sensors are fixed on the animal body movements and transmit it to the farm workstation.

The sensors measures several values like temperature, humidity. The farm controller receives all measured values then evaluate it and classifies them.

#### *B. Internet of Things(IoT) Enables Smart Animal Farm:*

The above Titled Paper, author Menon[2] explain the Systematic implemented automatic smart animal Farm which monitors and controls the animal health parameters. The method uses sensors. The methods uses sensors which enables automatic feeding , watering and exhausting access bio-gas also protecting farm and animal from farm. System incorporates the first module contains water level sensors ,biogas sensor, Temperature and humidity sensors. Farm sensor and two microcontroller to sense system parameters and send it with an IP to User and perform respective function In real time automatically.

This intelligent system should also do surveillance of the entire farm. this smart Farm cultivate comprises of subsystems comprises of bio gas control framework, feed control framework, hatchery control system, IP camera, fire distinguishing framework ,and water control framework.

#### *C. Ad Hoc Wireless sensor Network in Studies of Animal welfare:*

In this paper, author McCauley[9] explains , It is easier to develop ,deploy and maintain the sensor arrange utilizing sensicast DV and that there were huge issues when Tiny DB was looked with substantial measure of inspecting. Sensicast was moderately simple to set up and keep up and worked in an ecological researchers. Some noteworthy PC bolster is accessible and flexible, sensing application is arranged, TinyDB a sufficient device for agrarian detecting tests.

Where some critical PC bolster is accessible and an adaptable yet straightforward detecting application is arranged, TinyDB would be a satisfactory instrument for rural detecting tests. Where capital expense isn't a flat out farthest point, and processing skill is constrained or where

complex sensor systems are to be sent, Sensicast DV would be the better decision.

#### *D. Smart Health Monitoring system for Animals:*

In this paper, author A. Patil [12] clarify propelled cows wellbeing checking framework for cows. Here sensors are utilized for identifying different wellbeing parameters of the bovine, for example, body temperature, mugginess and breath and so forth The sensors are interfaced with Arduino UNO and after that it will show the diagram on the I graph application through ESP8266 Wifi module. This propelled cows wellbeing checking framework can swap this manual procedure for perceiving the different maladies. This framework is especially useful for ranchers and furthermore for specialists since it is exact than manual perception.

The true objective to overcome diverse therapeutic issues and issue related to animal, we have proposed a splendid animal prosperity checking structure. This system includes diverse sensor modules which will upgrade the animal prosperity and their distinctive issues. The structure will be useful for testing nonstop checking of body temperature, rumination and beat and also including temperature. This structure similarly uses Zigbee for the utilization of animals prosperity.

#### *E. Advance Cattle Health Monitoring System Using Arduino and IOT:*

In this paper,. the author Meenakshi .M[15] explains In the Wireless Sensor Based cattle health monitoring system, critical parameters affecting cattle health which includes body temperature, respiration, humidity, heartbeat and rumination are continuously monitored. This advanced cattle health monitoring system can replace this manual process for recognizing the various diseases. This system is very much helpful for farmers and also for doctors because it is accurate than manual observation.

Animals struggling in illness by sending the exact location in form of message attached with link of location to the nearby animal welfare organizations. So they get location information of animal using GPS and take necessary actions. The application user data including mobile number will be stored in cloud using Firebase. It reduces man power and avoids disturbances in finding the location of the victim animal. Thereby any animal welfare associations can get to the victim in short span of time. This increase the possibility of saving the animal's life which is in need of help. This application can avoid human animal conflict in

cities, urban areas, densely populated zones, rural areas.

**F. Smart Computing and Sensing Technologies for Animal Welfare:**

In this Paper, Author Admela Jukan[3] explains, Homestead creatures are a basic piece of the worldwide nourishment store network, and there is expanding shopper enthusiasm for naturally encouraged and compassionately raised domesticated animals, and how it impacts our wellbeing and ecological impression .He has reviewed smart technologies for domestic animals, indoor and outdoor animal farming, as well as animals in the wild and zoos. They have characterized creature welfare in non exclusive terms, perceiving that frameworks assessed serve to enable creatures to remain solid, free of torment and enduring, and likewise being emphatically empowered in their condition.

**G. Animal Health Monitoring System using Raspberry Pi and Wireless Sensor:**

In this paper Author L.narayan[7] explains, In the creature Health observing framework, continuous checking of creature parameters, for example, rumination, body temperature alongside coterminous temperature and mugginess has been produced. The system also includes analysis of stress level of animal in terms of thermal humidity index. Raspberry Pi Model B+ is used as a web server. Graphical display is possible for analyzing rumination process and stress level of animals. GUI is implemented using PHP.

**III. PROPOSED SYSTEM**

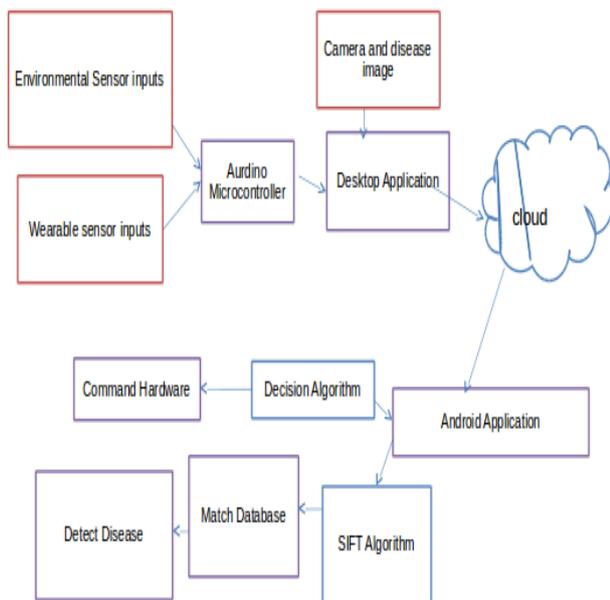


Fig 1. The architecture of Proposed System.

In the present situation, agriculturist visiting the steers or poultry cultivates over and over for watching their well being condition. It's anything but a legitimate method to check animal welfare physically.

In the proposed framework we are utilizing two sorts of sensors like ecological sensors and wearable sensors.

- Cowshed administration (Environmental sensor):-

The natural sensor measure the few qualities like control byre temperature, measure humidity, open/close gate, create live camera sustains the creature.

- Health Monitor (Wearable sensor) :-

Wearable sensors are settled on the creature body,it measures the body temperature, follow the development and movement of the creature and screen gadget battery status.

These sensors are associated with the workstation,

- Homestead control :-

Homestead control deal with the database of dairy animals shed control, animal wellbeing status, cultivate status, live camera feed, information sources of info and framework setup .The homestead control is associated with the cloud (framework backup, long term statistics,vet interface)

- Cell phone (Android application) :-

It incorporates creature wellbeing status, dairy animals shed caution, cultivate status, live camera feed, agriculturist take choice by utilizing choice calculation and send it to the PC equipment utilized the work area application for the picture preparing

**IV. SYSTEM MODULES**

- Application
- Smart Device
- Image Processing on leaf
- Cloud storage

**A. Application:**

Firstly farm controller sends the request for the system startup. If any disease and problem about farm/cow shed found then it will be notified to the Android application for approval of the Farmer.

**B. Smart Device:**

The smart device is integrated with camera module which captures images of the animal motion and animal health . Later, those images are given for Image processing.

C. *Image Processing on Animal:*

Images captured from the camera by the animals for recognizing the Skin diseases and Scars, wound on the animal body then are further given for image processing for checking whether the Animal have any skin problem rather not.

D. *Cloud Storage:*

All the Wearable or environmental sensors, farm controller are connected to the cloud and databases of animal Health and farm status database are stored in the cloud.

**V. MATHEMATICAL MODEL AND ANALYSIS**

A. Input: Camera, Temperature, Humidity Sensors.

B. Output: Controlling, Alert.

C. Identify data structures, classes, divide and conquer strategies to exploit distributed/parallel/concurrent processing, constraints.

1. Sensor Embedding

2. Temperature Extraction

3. Humidity Extraction

4. Live Camera.

5. Open/Close gate

6. Animal Motion Detection

7. Alert Generation

D. Distributed computing:

It is a concept of using components at remote locations and providing an illusion that the *processing is being done at the same place. Different components are connected by high speed communication links.*

E. Concurrency:

Each client connection to server is handled by a separate thread. So many users can connect at a time and get response without waiting for previous user's request. So, simultaneously 'n' number of connections can be served without delay where 'n' is the capacity of the server.

F. Functions : Identify Objects, Morphisms, Overloading in functions, Functional relations

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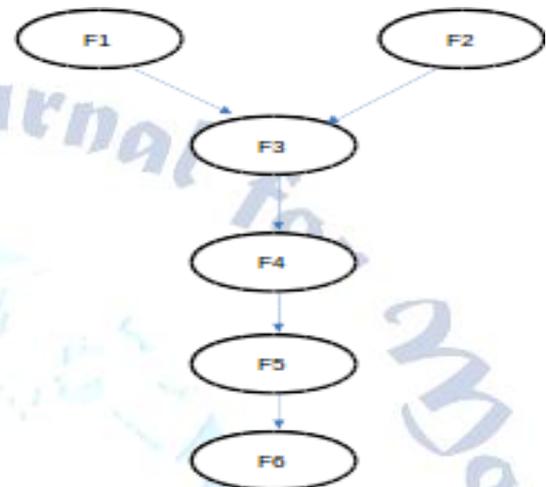


Fig 2. Mathematical Module

F1: Humidity/ Temperature Sensors

A humidity sensor senses, measures and reports both moisture and air temperature. Humidity sensors work by detecting changes that alter electrical currents or temperature in the air.

F2: Camera Inputs

Camera captures the images and these are accessed send as a input for image processing.

F3: Animal Motion Extraction

All movements of animal are gathered.

F4. Cow shed Control

The natural sensor measure the few qualities like control byre temperature, measure humidity, open/close gate, create live camera sustains the creature.

F5. Monitor Animal/Farm.

Animal are monitored by their position ,movements

F6: Alert User

G. System Description:

Let s be system:

S= {D, CI, AM, CC, MF, AU}

S: is a System.

D: is the set of Sensor Inputs.

CI: Camera Inputs

AM: Animal Motion Extraction.

CC: Cow shed Control.

MF: Monitor Animal/Farm.

AU: Alert User

## VI. CONCLUSION

In this paper we have given a brief literature review study of different systems implemented for animal health monitoring through their used techniques and advantages. The system will be useful for testing animals real time body temperature as well as surrounding shed temperature, the camera live feed for the workstation and mobile app for the user to get notifications of animal's health status and environment data. It reduces man power and avoids disturbances in finding the location of the victim animal. The whole prerequisite can be satisfied, if framework is produced by IOT concepts. Thus IOT based animal's health observing framework is more conspicuous in above conditions. We demonstrate that a low-cost and open system can effectively monitor multiple parameters relevant to animal health monitoring system using the sensors.

## VII. ACKNOWLEDGMENT

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