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# Livestock Health Monitoring and Tracking

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***Abstract* – Health Monitoring of dairy cattle plays a vital role of increasing the dairy products supply worldwide. Nowadays farmers are showing less interest in dairy sector as animals are suffering from various ailing health issues, unpredictable killing disease, and advance breeding cost. The main objective of this project is to develop an automatic veterinary system for monitoring the cow. The IOT based cattle health and environment monitoring system monitors various cattle health parameters such as body temperature, heartbeat, location of animals and environmental parameters such as temperature, humidity. These all are connected devices to monitors animal's health, environment of shed and these edge devices communicate with the shed controller through mobile application. Monitoring the activities and health of the cattle continuously and taking corrective measures help in increasing the milk productivity. This helps in preventing the cattle from diseases at early stage and also increases the milk yield.**

***Keywords*– Sensors, Edge Devices, Wireless Transmission, GPS, Temperature & Humidity.**

## I. INTRODUCTION

Nowdays therehas been strong relationship between humans and animals thought the last decodes ago. We depend on animals in many aspects of life the first is our basic need is food, therefor the goods care of animals is very important now a day. The variation in cattle temperature health has harmful effect that leads to disease such as foot and mouth diseases etc. Due to these condition a system is to be in continuous monitoring for animal health. Mostly researches are concentrating in animal health system. It mainly depends on two methods one is direct contact and another one is indirect contact. Currently smart farming addresses basic needs of farmers using automatic farming. In this Automatic sector animal welfare is currently addressed through animal health care monitoring. The term Internet of Things(IOT) is new paradigm about the ability of connected devices to sense and gather the information, and then share their data to fulfil the requirements of the users. There can be many IoT applications such as smart home, smart parking, smart waste management system etc.

In this paper we design low-cost and open system for animal welfare monitoring. In our system we use popular low-cost microcomputer Arduino as an edge device, which is placed at environment(shed) and another one is mobile device to monitor the animals as well as stables, and that devices are communicated with local work station which is managed by farmer. This open source architecture and the prototypes are ready to be installed on environment where we perform experiment. With multiple features of this system are capture the animal's movement, stable temperature, as well as display the results of the environment.

## II. RELATED WORK

In [1] this project, the extensively use of Radio Frequency Identification (RFID) technology for livestock health management in the preparation of animal profile has created a fast and efficient method, but several conditions have to be set such as the RFID frequency selection and numbers of livestock in the farms. In current practice, even though the RFID systems in animal rearing is not a new approach, but this project has successfully demonstrated the effectiveness of RFID technology comes to solve daily problems on farms. In developing this monitoring system, web-based application platform likes MySQL, Apache and JSP has been used in an integrated methods for reporting and recording of livestock health records.

In[2] This system should be intelligent enough to message the owner of the pet with the current situations, it should be able to supply animals with required amount of food and water, maintain the room temperature favoured by the animal, live streaming of animals movement and behaviour and should also be able to locate animal at a remote distance. Here we have developed the system with all this above mentioned features. In[3] The proposed system is build up of recent technologies to screen the physical condition of the animals continuously from anywhere and at anytime. The vital parameters like body temperature, heart rate and position tracking are acquired using respective sensors. The collected data are transmitted wirelessly over internet and are stored in a database using IoT technology. The system also alerts the farmers/care takers at the critical conditions. The records that reflect the physical condition of animals collected in the database helps veterinary doctors to

provide effective treatment. In [4] This author proposed open computing, low cost and data sharing system for animal welfare monitoring. We developed an open source system which enables edge devices to networking, computing and also produces data at server. These all are connected devices to monitors animal's health, environment of shed and these edge devices communicate with the shed controller. This system is connected with cloud system and mobile application which effectively monitor multiple parameters related to animal welfare.

## III.EXISTING SYSTEM

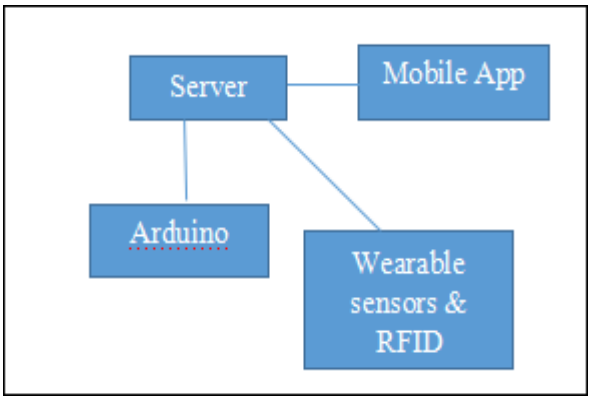


Fig.1. Existing System.

Fig. 1 depicts the overall architecture and setup of the whole idea of this paper. It shows how animals can be tracked, monitored and cared using various technologies all together. Technologies such as RFID, IOT and sensors are been used. All animals in this have to be tagged or implanted with RFID. This helps and makes it easier in locating and tracking the animals. These tags are embedded with sensor for mobile tracking with GPS (Global positioning system). And hence a remote sensing can be done even if the animal is at a far distance from the zone or area it belongs to. For tracking such animals the satellite emits signal and this signal is reflected back by the sensor which is embedded in the tag. This gives the exact location of that animal. The owner then can track such animals at far distance. An animal inside the zone or area can be tracked, but does not actually need to be tracked rather they need to be monitored. For monitoring, cameras are distributed over the area for capturing there movement. These movements are analysed for better understanding of their behaviour. The cameras can detect the animals with their motions. For taking care of animals not only monitoring is required but also keeping track of the food and water of animal is required. Specific amount of water and food level is to be maintained to keep the animal healthy and not letting them starve or over feeding. A libelium's sensor is attached with the food dispenser and the water dispenser of animal. This sensor sense and analyse the level of the water or food in the dispenser. If the water or food is below the expected level the sensor sends messages to the owner and the owner then respond in order to refill the feeder to the appropriate level. All this happens over internet and it is possible because of IOT. If the animal is obese then a limited amount of food should be supplied to the animal. Excess of food can lead to pressure on animal's kidney, which will be harmful for that animal. Sensors which are attached to the animal's body have the capability of monitoring the body temperature and health of animal. This help in identifying if the animal is sick, diseased or perfectly fit. Accordingly, actions can be taken to improve their health. Data from camera and sensors (attached to food feeder, water feeder and embedded tags) are stored on the server. This data can be used
for analysing behaviour and health of the animals. This information can be viewed on computers which are connected to the internet. When the devices are connected to the internet, it has to be secured. The security of devices and appliances is managed by CUJO[2] .

## IV. PROPOSED SYSTEM

In this section, we present the overview of implemented system architecture of animal welfare monitoring smart farming system, which is shown in figure 2. We differentiate between two basic subsystems first is wearable device for animal and another one is environmental Arduino for shed. This two are an integral part of the system, these systems send their overall measured data to the server (workstation). The shed controller (server) is the central part of the system. Shed controller synchronizes data using network application.

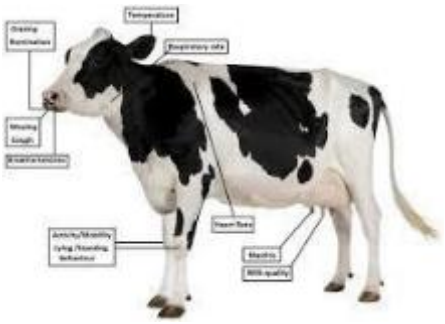

Fig. 2. System Architecture.

The Network provides the connectivity with the farmer's mobile application. In our system we design health monitoring and environment subsystem on node MCU 1.0 based on Arduino which are micro-computers with windows operating system. Advantages of Arduino is low end pricing and low power consumption. Wearable device is developed using node MCU 1.0 which are placed on animal's body. This wearable device having sensors like temperature and humidity. The work station is implemented using java application. At the current state we assume farm control (work station) to be located at

farm. And the last one is mobile application which is developed using android studio which is light weight app. In which we design multiple parameters Following implemented factor which are used in system development are as follows.

**1. Wearable Device (Arduino Uno)**

Fig.3 shows that the Node MCU- 12E module which is based on Arduino. It has special chip ESP8266 with WIFI connectivity with DTH sensor which is placed on animal's body to sense the body temperature and humidity. We measure health related data with the node MCU- 12E, with the help of this device we measured health related status of animal's body. Animal health status is typically based on Animal Welfare Monitoring Smart Farming System wearable devices. Our implementation measures the animal's body temperature and shows the possible disease with the temperature sensor. We note that the communication to the server requires the connectivity using WIFI, and that power supply relies on battery to keep the wearable device on mobile device.

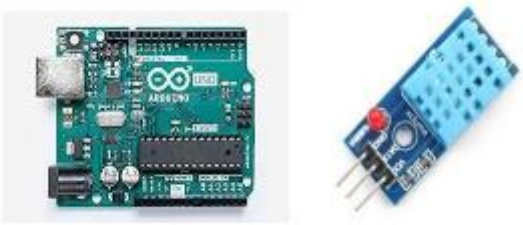

Fig. 3. Node MCU 1.0 with DHT 11 Sensor.

**2. Farm Application**

The farm application is based on the Android Studio framework in Java. The main window shows Animals data, and the parameter shows the body temperature, humidity, and live camera feed of shed. Next window shows room temperature, humidity of environment, and another parameter are fan On-off, Open-Close door. User can control the environment temperature using fan on-off function.

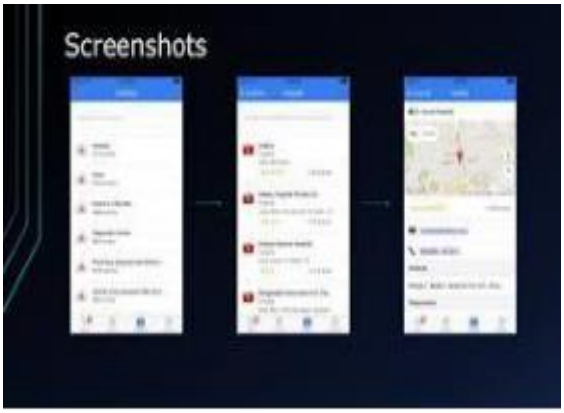


Fig. 4. Design of the Mobile Application.

The Farm Mobile application is illustrated in Figure 4 For the whole system, controller plays an important parts it a connection layer between the user and server and the Arduino device.

**3. Data Management**

Information is currently stored in a MySQL Database, which can be accessed via SQL queries by the server, by the mobile application, with the help of database management tool. However, due to the modularity of our framework, the database can be exchanged easily. We defined one table per type of sensor for simplicity. We currently use the Ethernet MAC id of the Arduino as data base identifiers. It is an important design decision to monitor and store the data. It is furthermore unnecessary to save the raw data of an animal's body acceleration.

## V. RESULTS

The normal temperature of healthy cow is stated on average 38.6 degree Celsius. The changes in body temperature of cow. In mobile application it's by default 35.6 degree Celsius. Mostly it increases in afternoon. The temperature of the Environment is high in day time. It low especially in evening hours.The results reveal that it can be maintained using this smart farming system. The humidity of the Environment is low in day time. It rises especially in evening hours. The results reveal that it can be maintained using this smart farming system.

## VI. CONCLUSION

This paper is to increase the farm productivity, it is required to take care of health of the cattle and also use various operation of farm automation which is not harmful for environment. Cattle health monitoring system is current research topic in farm automation. Many advance technical devices like mobiles and wireless sensor networks are available to monitoring any system. The proposed monitoring system includes the infrastructure, hardware, software and representative physiological instruments. The sensors base device must be moderate in size and weight. However the sensors use in such device must able to detect body temperature and heart beats which is play important role in medical treatment and diagnosis. Another constraint is such device shall be controller and access remotely. Basically our project is divided into three domains (sensors technology, communication and wireless sensor networks)

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