"Smart Husbandry System "

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***Abstract—Agriculture and animal husbandry is one of the most common sources of income for most of the population** of rural life in India.Smart husbandry have become important concept in the last few years, creating opportunities in the new sector of smart agriculture. In this paper, we focus on open and low-cost concepts for smart husbandry systems to create a smart farm animal monitoring system. Our system focuses on the measurement of physical parameters using IoT technology such as soil moisture content, cattle shed temperature, animal body temperature, animal heart beats, automatic cleaning of shed, automatic fan and light system, fire alarm . Wireless sensor networks are used for monitoring the farm condition and microcontrollers used to control and automate the farm process .A smart phone empowers farmers to keep updated with the ongoing condition of his agricultural land using IoT at any time and any part of the world .This project can reduce the manpower, efforts, time, cost and improves working of traditional farming.*
***Keywords-** Smart Agriculture, IoT, Smart husbandry, Arduino, automation.*

I. INTRODUCTION

So, the current position of the farming in India is really diffic*ult. Hence the today's requirement for the Husbandry* to be smart and connected is the effective use of the IoT technology in agriculture and husbandry. In this fast developing world, the farmers need to be connected and smart. Hence the use of Smart Husbandry is essential these days. The objective of this paper is to propose a Smart Husbandry System that enables farmers of smart cowshed, automatic cleaning of the cowshed, smart irrigation, and automatic health monitoring of the cattle. This smart husbandry system will allow the farmer to monitor his farmer and cattle even if he's far away from his farm and that too in low cost.

Our system focuses on the measurement of physical parameters using IoT technology such as soil moisture content, cattle shed temperature, cow body temperature, cow heart beats, automatic cleaning of shed, automatic fan and light system, fire alarm and automation. Wireless sensor networks are used for monitoring the farm condition and microcontrollers used to control and automate the farm process .A smart phone empowers farmers to keep updated with the ongoing condition of his agricultural land using IoT at any time and any part of the world .This project can reduce the manpower, efforts, time, cost and improves working of traditional farming.

Agriculture and animal husbandry is one of the most common sources of income for most of the population of rural life in India.

But there are a lot of problems in the villages today. The income of farmers having cattle gets affected adversely due to improper management of livestock and crops. We detected the problem from the farms and various villages where medium and large scale livestock is managed and the fields or farms where the production of crops is affected due to pests, crop diseases and the rapid changes in climatic conditions and where it is difficult to handle the agricultural procedures. The upcoming challenge for India is the forever increasing need of food. Efficient use of water, reduction of energy used, automation in farming are the ways to face these challenges. The Indian farmers are facing very crucial problems these days in terms of farm size, technology, climate changes etc.Agriculture these days requires a lot of activities to be done such as animal health monitoring, plants monitoring, monitoring of environmental conditions such as soil moisture and temperature etc. Smart Husbandry helps in boosting the quality and quantity of the product and also reduces the burden on the farmers. Smart husbandry is the concept that enables to manage the husbandry using the modern technology to enhance quality and quantity of the agricultural and animal products. Smart husbandry system allows the user to use various sensors in order to collect information and this will be helpful for the farmers to enhance the yields, be connected with the farm no matter where he is, use water in an effective way to reduce water usage and gather the required data and hence resulting in the reduction of the wastage of various parameters in the farm.

The main objective of this paper is to produce intelligent farms, reduce the costs and improve the quality of the crops as well as the animals and animal products as well as the quantity of the products is enhanced.

The structure of the paper will contain:
Section II will contain overview of technology used, definition and concept of smart husbandry, applications of Smart Husbandry System, benefits of Smart husbandry system etc.
Section III will contain "Smart Husbandry System- Overview and working.
Section IV will cover applications, future scope and conclusion of the project.

TECHNOLOGY USED
In this project, we are using IoT and RFID technology as the solution to the stated problem. Animal tagging will help the users to have ability to trace the cattle and collection of data of all the animals in the cowshed. Automatic cleaning, disease management of the cattle can be done by using a simple RFID tag. The RFID tags are the specially programmed tags which can be programmed as per the user's needs. The RFID tags and readers are the only components required for the above task. Various sensors which collect data and processes using RFID and IoT technologies and provides to the particular user. By using this, we can do advancement in precision farming.

II. BRIEF DESCRIPTION OF TECHNOLOGY:
The internet of things(IoT), is a network of devices connected by means of internet which are able to collect data as well as exchange the collected data without any human interaction.
RFID refers to Radio Frequency Identification. In RFID, the data is collected with the help of RFID reader and the data which is in digital form, is encoded by the RFID tag and sent to RFID receiver via radio waves. RFID technology belongs to AIDC. The RFID system consists
of RFID tag, RFID reader and an antenna. The RFID reader collects the data, RFID tags are used to transmit the data. The reader converts the radio waves in the form which is desired by the user. The integrated circuits and an antenna are fitted inside the RFID tag. There are two types of RFID tags- 1) active tags 2) passive tags. The passive tags are most widely used in various applications and they can be powered up. The passive RFID tags are small in size and low cost.
The project is beneficial specifically for the farmers and the people who are related to agriculture and primary occupations. The target beneficiary group is the rural people and farmers whose income is totally dependent on agriculture and primary occupation such as animal husbandry.This project will be useful for the people who are willing to increase their income and increase the quality and quantity of their production.

- **Definition and concept of Smart Husbandry System-**
Definition- A Smart Husbandry System is the system which is proposed to manage and monitor the husbandry using modern technology in order to enhance the agricultural and animal products.
The smart husbandry system includes automation in the cattlesheld, automatic cleaning of the cowshed, temperature control in the cowshed, health monitoring (heart rate and temperature)of the cattle and smart irrigation. This system will allow the farmer for effective and sustainable use of the modern technology for the agriculture and animal husbandry too.

- **Benefits of Smart Husbandry System-**
1) This system enables easy monitoring of the farm and cattle with the help of various sensors,
2) The animal and farm can be monitored from anywhere and everywhere in the world.
3) The system is very accurate.
4) This will help in enhancing the crop yield and the animal products.
5) One time investment.
6) The system will reduce the manpower required by the farmer for taking care of the farm and the cattle. This will help in reducing the expenses by the farmer.
7) it is eco-friendly.
8) The system is very easy to handle. Anyone can handle the system with ease.
9) Entire system is based on solar system.

III. SMART HUSBANDRY SYSTEM- OVERVIEW AND WORKING
In today's constant developing world, the technology is changing every second. But the farmers are using the traditional techniques of farming even today. Hence, the Smart Husbandry System can be developed in order to help the farmers to move from the traditional ways of agriculture to the modern, smart techniques of

agriculture and husbandry. This system will help the farmers to reduce manpower, increase the crop yield and the yield of animal products, increase the quality of farm and animal products, reduce expenses etc. Husbandry is the place where the cultivation or production of plants or animals is done. In our project, we are going to demonstrate smart husbandry which will help the farmers and other who are dependent on the farm and animal products to increase their income as well as will be beneficial for the development of the rural life.

Working principle-

In this system, we are going to use IoT, RFID, controller, various sensors for automation. To control the various parameters like irrigation, cleaning of shed, health monitoring of cows and equipment control (light, fan) using IoT automatically depending on the information we get on our mobile phones (i.e. through Bluetooth module) from the sensors.

This system is a network of hardware, communication, and electronic interfaces that work to integrate the devices with one another via the Internet. Each device has sensors and is connected through Bluetooth, so you can manage them from your smartphone or tablet whether you're at home, or miles away. This allows you to control and monitor the cattle shed and farm, no matter where you are.

There are three main elements- sensors, controllers, and actuators.

There are 4 main applications of this system viz. smart cowshed, automatic cleaning of the cowshed, smart irrigation and health monitoring of the animal (cows).

Working-

1. Smart cowshed-

The smart cowshed will include the a)Smart fans, b)Smart lights,c)counter, d)fire alarm.

a) Smart fans: temperature is one of the important aspect to be maintained in the cowshed. So, the temperature in the cowshed is measured using senor and if it exceeds above a limit the fans are automatically turned on or vice versa if the temperature goes below the mentioned limit the fans are switched off automatically. DHT11 sensor is used for determining the temperature of the cowshed. If the temperature of the cowshed increases above 45 deg.cel., then the fans in the shed will turn ON automatically and if it goes below 40 deg.cel. the fans will be turned off.

b) Smart lights: In this system the light gets automatically turned on when the light intensity goes low. In order to detect the light intensity LDR sensor is used over here. As the intensity of light increases, the corresponding voltage from the LDR will also increase. Means, when the intensity of light in the cowshed decreases, the lights will turn ON automatically and when there is enough light in the shed, the lights will remain turned OFF.

c)Counter: This system the count record of the cows inside and outside the cattle-shed RFID technology is used for this purpose.

RFID tags and readers are used in the cowshed as the counter. The tags are connected on the legs of the cows. When the cows enter the shed, the RFID reader that is connected at the entrance of the shed, will read the tag and hence act as a counter. And the information read by the reader is sent to the antenna and there onwards sent to the mobile of the user thus, the data monitoring can be done from anywhere.

d)Fire alarm: Similar to the fan system uses the same sensor i.e. DHT11. The same DHT11 sensor is used of fan system as well as fire alarm system. When the temperature exceeds the mentioned limit the buzzer starts ringing and the user will get a notification on the phone. Thus, this will provide a security to the animals in the cowshed.

2. Automatic cleaning-

This system first checks the number of the cows since no cow should be present inside the shed while cleaning. For cleaning purpose, a wiper is being used. When there are no cows in the shed, the cleaning of the shed will be started. The wiper motor is turned on and the mechanism starts. The cow dung is separated by pushing it into a pit with the help of wiper. This cow dung can be used as fertilizers for the yields. These fertilizers will help the crops to grow healthier thus increasing the income of the farmers.

3. Smart irrigation-

There are some crops which continuously need the moisture soil so of that purpose the farmer has to monitor it continuously in order to eliminated that we have come up with the solution of smart irrigation system. So, a soil moisture sensor is the sensor which is placed inside the soil in order to sense the moisture in the soil. The soil moisture sensor senses the moisture in the soil and accordingly if the moisture goes below the mention level the irrigation motor turns on and if the moisture is enough the motor gets turned off.

4.Health monitoring (heart beat and body temperature)-
The health of the cows needs to be monitored time to time. In this project, we are monitoring two basic aspects heart rate and the body temperature of the cows. For measuring the heart rate of the cows, we have used the heart rate sensor. The heart rate sensor will monitor the heart beats of the cows continuously and will notify the owner by time to time. Similarly, LM35 temperature sensor is used to measure the cow's body temperature. The body temperature of the cow will also be monitored continuously and will be notified to the owner.With the help of the continuous monitoring, the health of the cows will be maintained. If there is any unusual changes in the body temperature and the heart beats of the cows, the owner will get the notification and will get to know about their health so that the owner will take more care of the cow. This will reduce the frequency of the cows to fall sick and enhance the product quality.

Section IV- applications, future scope and conclusion
Application of System –
It can be used for following:
 Automatic cleaning of cow shed
 Automatic turning of light
 Automatic cows washing.
 Automatic irrigation according to the moisture content
 Automatic turning of fan as per requirement.
 Temperature and heartbeat monitoring of cows.
 Fire alarm system.
 Total system can be made based on solar energy.

Future scope-
* Wi-Fi module can be used instead of Bluetooth module in order to access it world wide.
* The collected cowdung and be processed and used as fertilizer.
* After detecting the fire the fire can be stopped by turning on the water pump or a message can be can be sent to the fire extinguisher group.

IV.   CONCLUSION-

We hereby conclude that our project 'Smart husbandry' will be very much beneficial for the people whose livelihood depends mainly on agriculture and the animal husbandry. By making farming and animal husbandry smart, these people will be able to enhance their income. Due to the healthy natural fertilizers, the crops will grow healthier. This will enhance the quality and quantity of the products. As well as provide the healthy environment to the animals so that the animals be healthier. Thereby increasing the income of the people and help for the betterment of the rural life.

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