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Develop Cattle Health Monitoring System

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Abstract -Nowadays, farm productivity increases in large amount because of farm automation and advanced technological techniques. The current research area in farm automation is cattle health monitoring system. Mobile, wireless sensor networks are able to bring a new level of monitoring into many industries. The proposed monitoring system includes the infrastructure, hardware, software and representative physiological instruments. The key point to increase the farm productivity is health of cattle. Many dairies contain large number of cattle's. Therefore it is too difficult to take care of them and to monitor routinely the health of dairy cattle. So this work is very adamantine to the owner of dairy and regional authorities. The main aspect of health monitoring system is to check continuously the health of individual of cattle, easily diagnosis and treatment of sick cattle as early as possible. In that system we use sensor technology which maps the special aspects of animal behavior like temperature, heart rate etc. this data is aggregating and reporting to the health care center. This reduces the minimal health inspection and long term animal healthcare cost.In light of such observing data, we can distinguish every animal's conduct and exercises effectively.

Key Words:Android App, Bluetooth Module,Microcontroller, LM35 Temp Sensor, Humidity Sensor, Heart Beat Sensor.

1.INTRODUCTION

Now a day's food features is not only decided by the overall environment and security of the ending product but also by the animal's welfares status by which the food is produced. When we will develop the animal'shealth on that time it will affect the quality of product, pathology and safety. The financial and common activities of human culture is very important in developing countries where many people depends on livestock based activities and this livestock production will stay for many years.Dairy ranchers produces greatest staple sustenance in the world i.e. Milk. The quality and security of milk and its results are completely related to provisions of sanitization and atmosphere. Good sanitization does help to increase the quality and importance of the product and basically establish accomplishment or failure of a dairy ranch. At this stage security of cattle health and safety is important for providing extreme quality milk. In the primitive days skilled ranchers use to observe their cattle for several hours because to understand their health complications but at the present stage the observation is reduced.Dairy cattle's are homoeothermic and necessary to maintain continuous body temperature, respiration, humidity, heart beat and rumination. The regular temperature of cow is 38.5-39.5oC. When the temperature is below 38.5-39.5oC the diseases arises are indigestion, milk infection etc. and when the temperature is above 41oC the diseases arises are influenza and anthrax. When the temperature of the animal is very high on that time it may die. Humidity can reduce heat exchange and have enervating impact on the cattle. When the stress will be more on that time milk quality will reduce. So using this technique we can help dairy ranchers to improve milk profit, quality and it will reduce the infection stress on the dairy herd and provide great level of animal security.A wireless sensor network (WSN) is a system obtained by a huge amount of sensor nodeswhere every node is armed with a sensor to identify physical sensations such as temperature, stress, light etc.

The sensor node is key part of a WSN. The sensor node contains hardware part which includes four sections: power and power administration unit, a microcontroller, a sensor and Bluetooth Module (wireless data transfer). The sensor is the link of a wireless sensor network node which will give the atmosphere and tool status. The sensors are used to collect and transmit the signs, such as sensations, lightand natural signs and then transfer it to the microcontroller. In this paper microcontroller receives the content from the sensor and development the content accordingly. The HC-05 Bluetooth module will transfer the content, so that the physical accomplishmentof interaction can be achieved. We can monitor cattle body parameters on our smartphone using some android app. So to monitor cattle health 3 sensors are used i.e. body temperature, humidity, and heartbeat.

1.2. LITERATURE REVIEW

In[1]The prerequisite for individual and group wide checking of creatures from a physical and physiological perspective rises up out of the method for the inconveniences required with directing farms with broad brushing regions. To explore these issues, they have instrumented a direct utilizing three MICA2 Berkeley Motes [a assortment of sensors, and a Ultralite GPRS unit by making a little remote system, which researches the inward workings of the creature without essentially meddling with it. It filled two needs, first to test the capacities of bits and remote sensor systems for creature wellbeing observing, and to give a preparatory examination concerning development in a creature's rumen. The rumen is viewed as the creature's 'motor room', and givesthe statusof the creature wellbeing. Another most essential wellbeing variable is the interior temperature which is picked as the parameter in the analysis. Other wellbeing parameters that fill in as a reason for ranchers and veterinarians to decide the dairy cattle wellbeing incorporate weight, pH level, conductivity and other bio estimations.

In [2] it is demonstrated that in the dairy cattle checking framework, the availability between each neckline with inbuilt sensors worn by the steers is be sporadic prompting an unsteady directing way which brings about expanded bundle delay. To beat the issue, an Implicit Routing Protocol (IRP) is displayed in the paper for the steers checking frameworks. The proposed convention works in the diverse stages: setup stage and information sending stage. In the arrangement stage, the base station intermittently surges a TIER message to every one of the hubs in the whole system. This TIER message has a base station's ID field, and a bounce tally field. The jump check field is utilized to tally the quantity of bounces the TIER message has gone from the base station. Thelevels are numbered beginning from the base station. A neckline in a given level, n, which speaks to it is thelevel far from the BS. This basic data is characterized as TIER ID. As creatures are freeto move around, the base station is required to send a TIER message intermittently.. At the information sending stage, if the neckline is desired toreport its deliberate information back to the base station, it will shape a parcel containing its current TIERID and estimation information. This bundle is then communicated information to its region. Just collars whichhave a littler TIER ID will react with an affirmation (ACK).

In [3] they outlined LMS that comprise of a biosensor module to gauge bio-signs of cows and a Zigbee module to transmit the biometric information to the gaugingframework on the remote sensor organize. LMS utilizes an electrocardiogram (ECG), a drive detecting resistor (FSR), and an accelerometer to quantify the bio-signs of every individual cows. The crude information is separated utilizing a Band Pass Filter (BPF), a Low Pass Filter (LPF), and a High Pass Filter (HPF) to make advanced biometric information. The biometric information is then transmitted to a coordinated administration framework that stores the fundamental steer's data utilizing a Zigbee WSN module after the signs are opened up utilizing a handling speaker. We executed both the biosensor module andthe Zigbee WSN module as a coordinated gadget on a solitary board. We secured the coordinated module gadget and battery with a defensive aluminium box and after that connected the band containing FSR to the storage compartment of the steers. For lower control operation, we quantified information for one moment after power is on. On the off chance that a flag has no issue, we killed the mistake LED and provided energy to the Zigbee module

2. PROPOSED SYSTEM

In this proposed system in order to monitor the health of cattle we measure two of the major health parameters which are body temperature and heartbeat. This system consists of two units first one is hardware unit means sensor unit which connect on cattle. Second unit is monitoring unit where smart phone with android app is present. The PIC microcontroller is used to gather data from the sensors.In this proposed system in order to monitor the health of cattle we measure two of the major health parameters which are body temperature and heartbeat. This system consists of two units first one is hardware unit means sensor unit which connect on cattle.

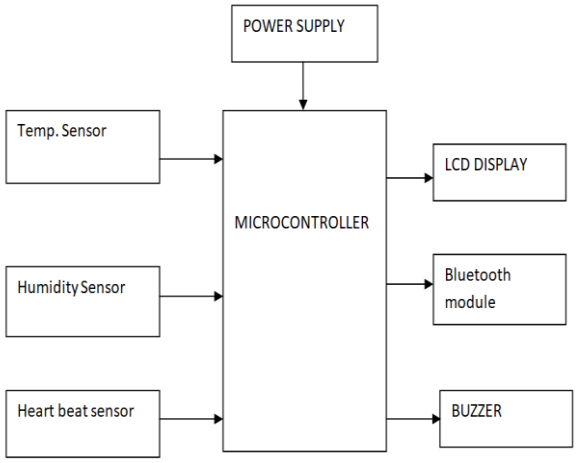

Fig -1: Block Diagram

Second unit is monitoring unit where smart phone with android app is present. The PIC microcontroller is used to gather data from the sensors. The body temperature and heartbeat of the cattle increases when it is affected by any disease. When the temperature increases the Bluetooth module is used to notify the farmer with notification on android app. The environment condition of the farm also plays amajor role in maintain the cattle's health. So humidity also monitor here. Entire system require 5v power supply so we using here LM 7805 regulator IC.

2.1PIC 16F886microcontroller:

The PIC16F range of microcontrollers from Microchip are 8-bit MCUs that incorporate Microchip's PIC® architecture into a variety of pin and package options, from space efficient 14-pin devices to feature-rich 64-pin devices. Devices with Baseline, Mid-Range or Enhanced Mid-Range architecture are available with numerous different peripheral combinations, giving designers flexibility and choice for their applications.

The PIC16F88 family of microcontrollers is based upon Microchip's Mid-range core with an 8 level deep hardware stack and 35 instructions. These MCUs provide up to 5 MIPS, up to 7 Kbytes program memory, up to 256 bytes RAM and Data EEPROM of up to 256 bytes. On board is a configurable oscillator factory calibrated to ±1% accuracy.

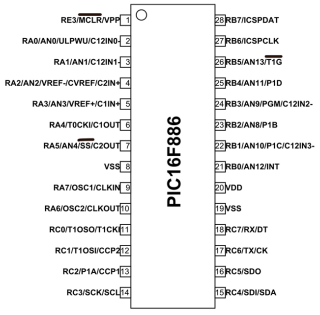

Fig -2: PIC 16F886 Microcontroller

2.216*2 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs.

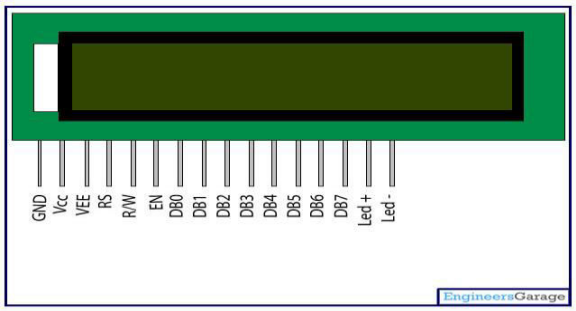

Fig -3: LCD Display

The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

2.3Heart Beat Sensor:

Pulse Sensor is a well-designed plug-and-play heart-rate sensor for controller. In pulse sensor we are using KG011 to sense the heart rate of cattle. The standard heart rate of cattle is 48 to 84 bits per minute. The working of the **Pulse/Heart beat sensor** is very simple. The sensor has two sides, on one side the LED is placed along with an ambient light sensor and on the other side we have some circuitry. This circuitry is responsible for the amplification and noise cancellation work. The LED on the front side of the sensor is placed over a vein in our cattle body.

- Biometric Pulse Rate or Heart Rate detecting sensor
- Plug and Play type sensor
- Operating Voltage: +5V or +3.3V
- Current Consumption: 4mA

Fig -4: Heart Beat Sensor

2.4. HC05 Bluetooth Module:

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration. Bluetooth serial modules allow all serial enabled devices to communicate with each other using Bluetooth. HC-05 has red LED which indicates connection status, whether the Bluetooth is connected or not. Before connecting to HC-05 module this red LED blinks continuously in a periodic manner. When it gets connected to any other Bluetooth device, its blinking slows down to two seconds.This module works on 3.3 V. We can connect 5V supply voltage as well since the module has on board 5 to 3.3 V regulators.

As HC-05 Bluetooth module has 3.3 V level for RX/TX and microcontroller can detect 3.3 V level, so, no need to shift transmit level of HC-05 module. But we need to shift the transmit voltage level from microcontroller to RX of HC-05 module.

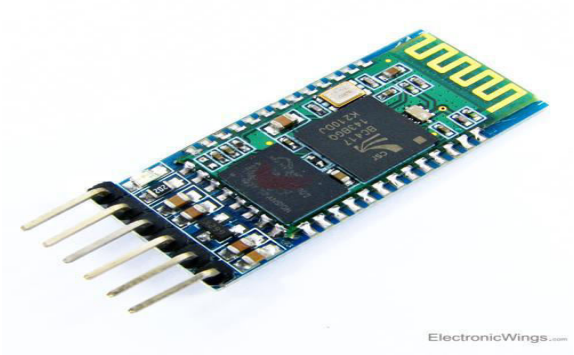

Fig -5: Bluetooth Module

2.6. Temperature Sensor (LM35):

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling.

Features:

- Calibrated directly in Celsius (Centigrade)
- Linear + 10.0 mV/ C scale factor
- 0.5 C accuracy guarantee able (at +25 C)
- Rated for full -55 to +150 C range

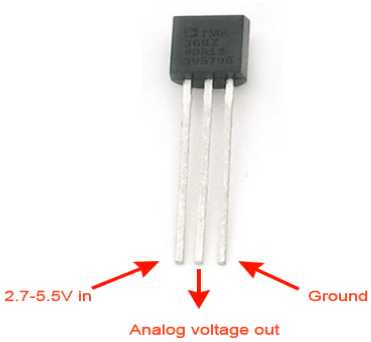

Fig -6: Temp sensor

2.7. Humidity Sensor:

A humidity sensor is an electronic device that measures the humidity in its environment and converts its findings into a corresponding electrical signal. Relative humidity is calculated by comparing the live humidity reading at a given temperature to the maximum amount of humidity for air at the same temperature.DHT11 is a new kind of humidity-sensitive resistor made from organic macromolecule materials; it can be used in occasions like: hospitals, storage, workshop, textile industry, tobaccos, pharmaceutical field, meteorology, etc.

Fig -7: Humidity Sensor

3. CONCLUSIONS

In this paper we have developed advanced cattle health monitoring system for cows. Here sensors are used for detecting various health parameters of the cow such as body temperature, humidity and respiration etc. The sensors are interfaced with PIC Microcontroller and then it will send to user smartphone via Bluetooth module. Then it will display on given android app. 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.

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