

# Automated Dairy Farm in Small Scale

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**Abstract - Nowadays large number of cattle shed are increasing. In that, we going to develop automated system in the dairy farm. Automation system for controlling the temperature for cattle by using temperature sensor, cleaning the shed by pressurized water and water feeding to the cattle in regular intervals. By this labours wages has been reduced and also work done in proper period.**

## I. GENERAL

Agriculture is claimed to be the backbone of Indian economy. However, every Indian farmer own a cow in order to earn an additional income and meet the nutritional requirements of the family. In India farmers did not do any special arrangements for the cow rearing, mostly the stanchion barn will be the part of their house wall. Hence, it can be stated that dairy cows are the part of their family and even it considered the part of their spiritual belief. India has the tremendous milk production in the last 40 years and has become the largest milk-producing nation among the world countries due to its liberalisation in this field. India is known as the 'Oyster' in the global milk industry.

Out of 37 pure cattle breeds Sahiwal, Gir, Red Sindhi, Tharparker, Rathias high milking producing powers. In addition, few others such as Kankerj, Ongole and Haryana are known as dual breeds they are both the milking and draught qualities. Under normal conditions, the Red Sindhi produced 1700 kg of milk average per lactation after suckling their calves but under optimum or controlled conditions red Sindhi have been produced 3400 kg of milk per lactation. Hence, India is a sub-continent it experience a varying temperature all through the year, it leads to result in heat stress in the cattle. An automated system was developed to monitor the temperature change and to reduce it to normal.

## II. OBJECTIVE

The main objective is to develop the cost efficient automated system, which requires less maintenance work. The dairy farm i.e., cattle rearing is done in India as an additional income work. The feeds to the cattle is given the fodder that grown in the field and the residual remain in the field after the harvest of the crop. India is the sub continental country where it experiences a high temperature every year. At the time of the high temperature, the dairy cows get affected. As the global warming increases, there will be constant increase in the temperature day by day. Indian farmers won't have enough time to look into the matter.

- Due to the increase in the temperature, the cows are prone to the heat stress. The heat stress affect the feed intake of the cow then soon reduces the milking rate and affect the fertility of the cows. This system can help in the monitoring temperature and control it by an automated system. It is a pre-programmed microcontroller, which senses the temperature with the help of the temperature sensor and guides the fogger system to switch ON automatically and automatically switched OFF when the temperature is normal.
- Cleaning the shed by pressurized water with submerged pump automatically with the help of Arduino IDE program. It has the relay to control the fluctuations and the water has pumped 2hrs interval the cow dung was converted into liquid by pressurized manner. It leads to keep clean shed.
- Water feeding is necessary for cows to stabilize the body temperature and producing the milk. Water feeding for cows should be in time and perfect interval for that we made the automation system for water feeding to the cows in the interval of 4hrs, 4hrs and 16hrs automatically the water cup has filled in 3minutes. By this method, the water has feed interval is perfect and there is no human to work.

## III. METHODOLOGY

**START:** To give power of all components and check all components are worked well condition.

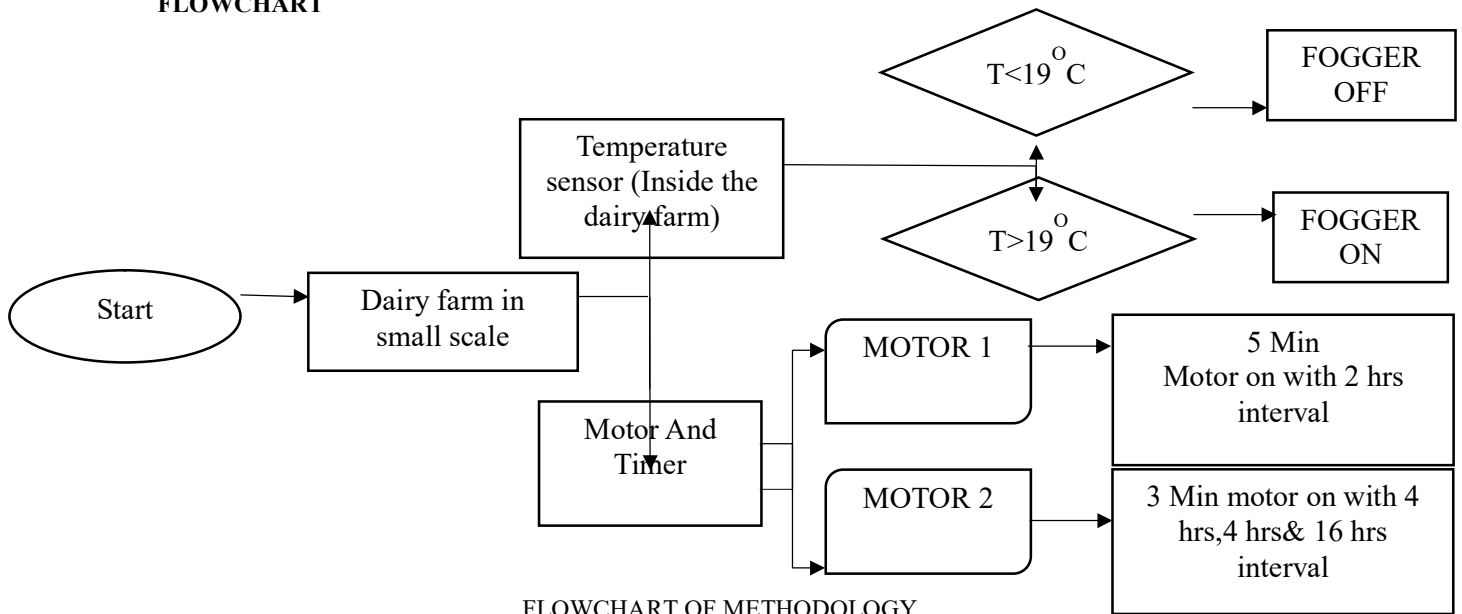
**TEMPERATURE SENSOR:** Temperature sensor is measured temperature range in outside greenhouse and signals are send to Arduino UNO.

**T<19°C:** When a temperature range inside the shed are less than 19° C, the fogger is OFF.

**T>19°C:** When a temperature range in inside the shed are greater than 19° C, the fogger is ON.

**MOTOR (SUBMERSIBLE PUMP) :**It was used for water feeding and cow dung was cleaned in between the duration by pressurized pump automatically with the help of Arduino IDE program.

**FLOWCHART**



FLOWCHART OF METHODOLOGY.

**MATERIALS REQUIRED AND THEIR PROPERTIES**

- Hardware requirement
- Arduino-UNO.
- Temperature sensor.
- Submerged pump.
- LCD display 16\*2.
- IC2 module.
- Relay.
- RTC Timer.
- Fogger.
- Piping system.
- Software requirement
- Arduino-UNO.

**HARDWARE ANALYSIS**

➤ Arduino-UNO.

Arduino UNO is an open-source microcontroller and its supported the microchip ATmega328P microcontroller, it had been developed by Arduino software. The board consist of 14 digital pins, 6 analog pins (input/output), GND pins and it has various expansion boards (shields) and other circuits. It has programmed with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery or upto 20 volt battery.



**PROPERTIES OF ARDUINO-UNO**

- Microcontroller: Microchip ATmega328P.
- Operating Voltage: 5Volts.
- Input Voltage: 7 to 20Volts.
- Digital I/O Pins: 14.
- Analog Input Pins: 6.
- DC Current per I/O Pin: 20mA.
- DC Current for 3.3V Pin: 50mA.
- Flash Memory: 32 KB.
- SRAM: 2KB.

- EEPROM: 1KB.
- Clock Speed: 16MHz
- Length: 68.6mm
- Width: 53.4mm
- Weight: 25g,

#### ARDUINO BOARD

##### TEMPERATURE SENSOR

DS18B20 stainless steel temperature sensor is a pre-wired and waterproof version of the DS18B20 sensor. It has 1-wire interface by that it was easy to communicate with devices. It has the ability to convert the temperature to a 12-bit digital word in 750ms(max). it can measure  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$  ( $-67^{\circ}\text{F}$  to  $+257^{\circ}\text{F}$ ). The stainless steel probe suitable for any wet or harsh environment and it will free from rust formation.

##### FEATURES

- PSR- 3 – 5.5 V
- Operating temperature range -  $-55^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .
- Temperature limit alarm system.
- $\pm 0.5^{\circ}\text{C}$  Accuracy from  $-10^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .
- 9 to 12 bit selectable resolution.
- 1 wire interface needs one digital pin for communicate.

#### TEMPERATURE SENSOR



##### SUBMERSIBLE PUMP

Submersible pump is a device to pump the water by electric source and it is a device which has hermetically sealed motor close coupled to the pump body. The pump has fully dipped into the water for pump the water or fluid. It has various advantage that it prevent pump cavitation, it has high elevation between pump and fluid surface. It is more

efficient than jet pumps. Hydraulic sumersible pump (HSP's) use pressurised fluid from the surface to hydraulic motor downhole.



##### SOFTWARE

##### ARDUINO IDE

Arduino Integrated Development Environment is cross platform application and it is written in the programming language Java. It will help to write and upload the program to Arduino board and it has different base programmes and large amount of libraries. The program is varied according to function. It supports C and C++ rules of code structuring. Program has compile and upload in the Arduino board by connecting cables. It has tool chain

- It is a politician Arduino software, making code compilation too easy that even a standard person with no prior technical knowledge can get their feet wet with the training process.
- It is definitely available for operating systems like MAC, Windows, Linux and runs on the Java Platform that comes with inbuilt functions and commands that play an important role for debugging, editing and compiling the code within the environment. A range of Arduino modules available including Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro and lots of more.

##### ANALYSIS

- Each of them contains a microcontroller on the board that's actually programmed and accepts the knowledge within the sort of code. The main code, also referred to as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded within the controller on the board.
- The IDE environment mainly contains two basic parts: Editor and Compiler where former is employed for writing the specified code and later is employed for compiling and uploading the code into the given Arduino Module.
- This environment supports both C and C++ language

ALGORITHM

- |                          |                                       |
|--------------------------|---------------------------------------|
| 1.                       | Start.                                |
| 2.                       | Check the dairy shed or farm          |
| shed temperature.        |                                       |
| 3.                       | Conclude the temperature.             |
| 4.                       | $T < 19^{\circ}C$ the fogger is off.  |
| 5.                       | $T > 19^{\circ}C$ the fogger is On to |
| control the temperature. |                                       |
| 6.                       | Then again to step 2.                 |
| 7.                       | The timer has conclude the time.      |
| 8.                       | Water has feeded to the watertub      |
| at specific interval.    |                                       |
| 9.                       | Water has supplied to the floor by    |
| timer.                   |                                       |
| 10.                      | Then again to 7.                      |
| 11.                      | The processes continue.               |

RESULT AND CONCLUSION

By using the automation, it is possible to monitor the agriculture and its allied sector. The large number of farmers are now wanted a caution alert system. The combination of Arduino UNO and temperature sensor can able to monitor the surrounding temperature. By implementing these monitoring systems there will be more benefits to the farmer. The cattle rearing is carried out every farm as for their additional income. Hence this Automation of dairy farm can also be a key to maintain their income. This system can also be applicable for goat and sheep rearing. We conclude that this automated dairy system is very useful for farmers to reduce their labour wages and utilizing the time also. Further this project can be extended by using a separate sensors & Arduino UNO board by Arduino IDE software for the whole shed.