SMART SYSTEM BASED ON INDUSTRY MONITORING

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Abstract : **This Paper proposes the working condition of the Exhaust Fan under the temperature control of the machines in industries. Based on that, the temperature is monitored using DHT11Temperature Sensor and further the recorded data send to ThingSpeak through NodeMCU8266. It proposes a low cost intelligent system for monitoring and controlling the industrial machines. The proposed system senses the different temperature values from the sensors and hence the average value increases over the surrounding temperature, then the Exhaust Fan turning ON either manually or automatically using NodeMCU8266. The recorded values are monitored using ThingSpeak App in our mobile and also ThingSpeak website in our system. This is mainly helps to reduce the power consumption level of Exhauster Fan in continuous usage of industries.**

*IndexTerms - **Temperature sensor, Thingspeak(Internet of Things), NODEMCU8266**.*

I. INTRODUCTION

Sensor based Temperature monitoring system is an important part of the proposed framework for an environmental monitoring strategy in industry. The Temperature sensors should be placed at a distance of 20m for an individual machine to measure the heat being generated. The entire process is approached within Arduino and ESP8266 WI-FI provider is used. NodeMCU is an eLua based firmware for the ESP8266 WiF SOC from Espressif. The firmware is based on the Espressif NON-OS SDK and uses a file system based on spiffs. The code repository consists of 98.1% C-code. ESP8266 does the processing as well as the WI-FI activities but with pretty low power consumption. The device uses a solid state relay, since it is silent in operation and more durable than using a mechanical relay. The data fetched by the sensors are sent to ESP8266 which then can be analyzed and processed by ESP8266 on board microcontroller itself with the help of the firmware loaded into its flash memory. Wi-Fi of ESP8266 connects to Wi-Fi Router as a station node and can push the live sensor data to Thingspeak cloud platform in the internet at regular intervals. This results into faster processing and transmission. To resolve this challenge, number of industries consider various new designs and integrated production techniques in combination with automated systems.

II. SYSTEM OVERVIEW

A.SYSTEM COMPONENTS

DHT11 sensors send the temperature data to the ESP8266. DHT11 Temperature and Humidity Sensor features a calibrated digital signal output with the temperature and humidity sensor capability. It is integrated with a high-performance 8-bit microcontroller. Its technology ensures the high reliability and excellent long-term stability. This sensor includes a resistive element and a sensor for wet NTC temperature measuring devices. It has excellent quality, fast response, anti-interference ability and high performance. Each DHT11 sensors features extremely accurate calibration of humidity calibration chamber. The calibration coefficients stored in the OTP program memory, internal sensors detect signals in the process, we should call these calibration coefficients. The single-wire serial interface system is integrated to become quick and easy. Small size, low power, signal transmission distance up to 20 meters, enabling a variety of applications and even the most demanding ones. The product is 4-pin single row pin package. Convenient connection, special packages can be provided according to users need. For every single test location, 2 sensors are placed to validate the received sensor data as well as to provide device redundancy at the sensor level. ESP8266 is loaded with the firmware program written in C that does all the interfacing with sensors, processing the sensor data and interfacing with ThingSpeak platform and finally uploading the data to ThingSpeak platform ideally once every one minute. Regulator is mainly used to provide a required power supply to the NODEMCU. Relays control one electrical circuit by opening and closing contacts in another circuit. Arduino IDE is used to write the code and upload it to the ESP8266. This process is usually carried out by the microcontroller along with the supporting components on ESP8266 board.

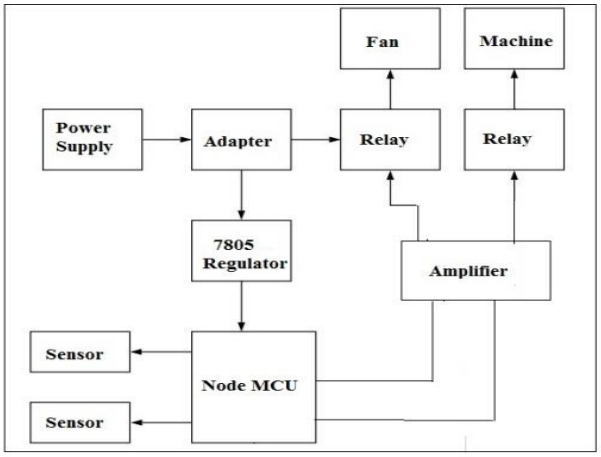

Figure 1:Block Diagram

B.HARDWARE IMPLEMENTATION

In the Hardware implementation process, Measurement range of DHT11 is from 0 degree centigrade to 50 degree centigrade with response time of 6 to 30 seconds. Its small size, low power consumption and maximum 20 meter signal transmission makes it the suitable for this application. ESP8266 is a system-on-a-chip (SoC) designed by Espressif Systems which is based on 32-bit RISC CPU with the Tensilica Xtensa LX106 processor. It has features like inbuilt Wi-Fi, GPIO (General Purpose Input / Output), InterIntegrated Circuit (I^2C), Analog-to-digital conversion, Serial Peripheral Interface (SPI), UART (Universal asynchronous receiver/transmitter), and Pulse-width modulation (PWM). ESP8266 has a number of versions with varying capacities.

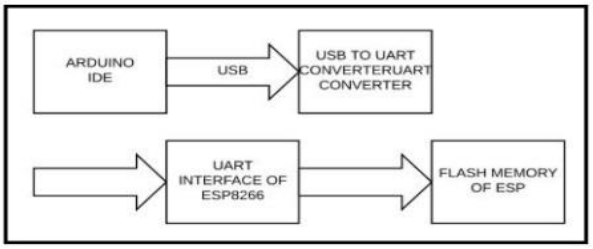

Figure 2: Uploading firmware to ESP8266

C. SOFTWARE IMPLEMENTATION

Arduino IDE (Integrated Development Environment): Arduino is an open source platform which consists of both a physical programmable circuit board(often referred to as a microcontroller) and a piece of software or IDE that runs on the computer. IT is used to write & upload the computer code to the physical board. The firmware is written in C language including required header files to integrate DHT sensors. Also the program includes header file required to interact with the Thingspeak platform.

ThingSpeak: "ThingSpeak" is an open source IOT application and API to store & retrieve data from sensors using HTTP protocol over the internet or via a Local Area Network (LAN). ThingSpeak enables the creation of sensor logging applications, location tracking applications & a social network of things with status updates. Channel ID has been created for each kind of application and it is more confidential.

Figure 3: ThingSpeak Platform

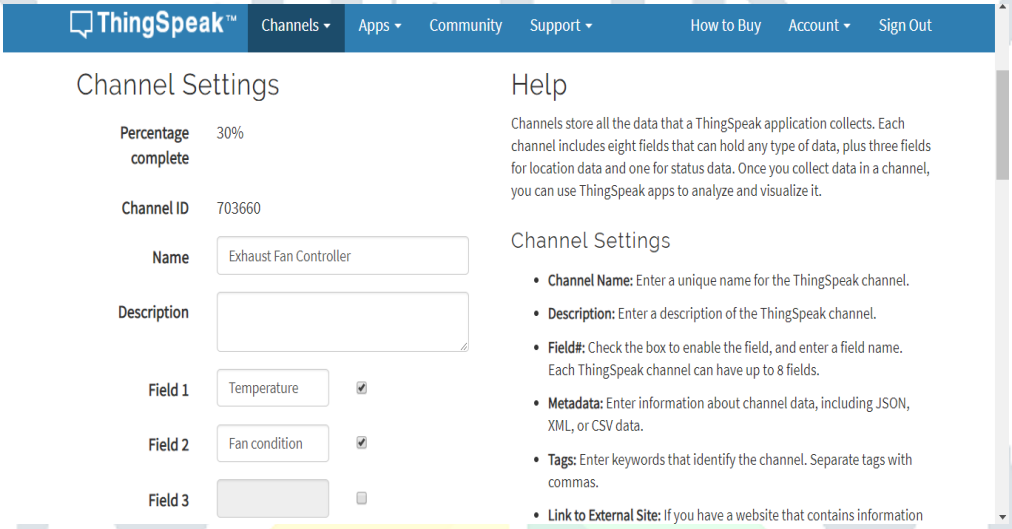

Figure 4: Channel ID creation

D. FLOW STEPS

The temperature is sensed with the help of two sensors placed at a distance of 20m for individual machines.

•ESP8266 receives the data from the sensors through its GPIOs (General Purpose Input Output).

•The temperature is received from the 2 sensors and hence the average temperature is calculated. The temperature at which the fan should be turned ON for the specific condition. The fan will remain ON as long as temperature and it will turn OFF when the temperature decreases to the certain level and the Machine should be OFF when it comes above temperature range based on the condition of the machines the code will be applied.

•ESP8266 connects to the Wi-Fi router using SSID and password.

•ESP8266 also establishes connection to the ThingSpeak platform.

•ESP8266 posts the temperature data to the ThingSpeak platform using the token assigned.

•The ThingSpeak platform shows the live real time data on the private view.

III.RESULT

A low cost smart industrial system for remote monitoring, control and security was implemented in this project. The system was capable of taking actions on abnormal parameter readings. As the prototype system is deployed at a setup, the live data is being monitored over the ThingSpeak dashboard. The ThingSpeak alert system sends out SMS alert to preconfigured cell phone as the temperature touches the alarm setting value. The condition of the Machine and Fan can be monitored and it can be controlled based on the Temperature range values in the given criteria of the specific machines. The dashboard continuously presents the live data in your mobile app also.

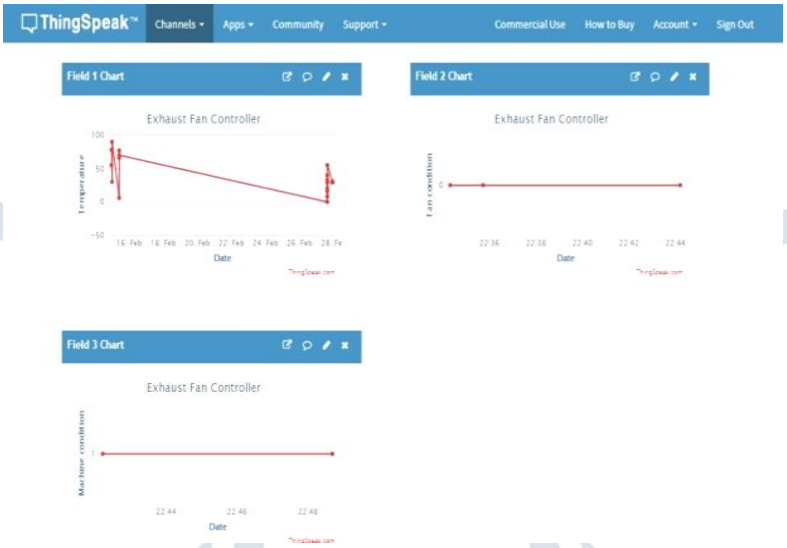

Figure 5: Temperature, Fan & Machine condition in Private view

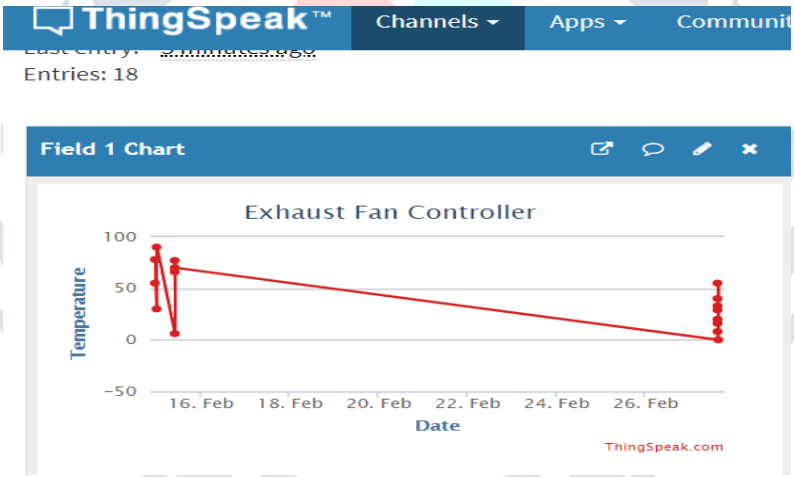

Figure 6: Recorded Temperature values in channel

IV. CONCLUSION

A prototype wireless sensor network for data center temperature monitoring is developed with the help of ESP8266. A continuous test run of more than 24 hours shows steady performance of ESP8266. This system not only adds up value to the existing on site monitoring system available at data centers but also provides lot of comfort to the higher authority of Data Center management to monitor the parameters from remote anytime with the help of the private view.

V.REFERENCES

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