INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

**ISSN: 2454-132X**
**Impact factor: 4.295**
***(Volume 5, Issue 1)***
Available online at: www.ijariit.com

# Temperature-humidity monitoring using PLC and HMI

*Sneha Kamble*
*ssnehakamble08@gmail.com*
*Dr. D. Y. Patil College of Engineering, Pune, Maharashtra*

*Rushikesh Sagar*
*rushisagar1997@gmail.com*
*Dr. D. Y. Patil College of Engineering, Pune, Maharashtra*

*Vaibhav Masenwar*
*masenwarv@gmail.com*
*Dr. D. Y. Patil College of Engineering, Pune, Maharashtra*

## ABSTRACT

***This paper presents the monitoring system for warehouse which consists, temperature and humidity. Temperature and humidity sense by HTS711 sensor and monitor by PLC. These values display on HMI. This system also detects any unwanted movable object entering in warehouse by using Proximity sensor.***

***Keywords***— *Programmable logic controller, Human-machine interface, Proximity sensor, HTS711, IF2OF2 analog input-output module*

## 1. INTRODUCTION

Temperature and humidity monitoring system is one of the most important systems for industries. PLC is the programmable logic controller used in industries for automation. In our project PLC used as a controller part. HTS711 sensor is used to detect both temperature and humidity at a time. The values detected by this sensor is stored in PLC and display on HMI. HMI is human-machine interface. IF2OF2 analog digital module takes only digital values from the sensor. Temperature and humidity transmitter converted the temperature and humidity values into a voltage signal of 0-10V and stored in PLC. Proximity sensor is used to detect the unwanted movable object in ware-house. In many industries, we can use this application for monitoring temperature and humidity. By using this we can monitor the temperature in many more small scale industries, ware house, green house and control the humidity. PLC has become a very important part of the industrial application. A PLC is a digital computer used for control of hydraulic drives, pneumatic systems, conveyor systems and various industrial drives using electromechanical automation.

## 2. BLOCK DIAGRAM OF PROJECT

PLC stands for the programmable logic controller. A PLC is user-friendly, microprocessor-based specialized computer that carries out control instructions of many types and level of complexity. A purpose of PLC is to monitor the process, parameters and adjust process operation accordingly. The software that is used for PLC programming is "RsLogix-500" and the programming language is ladder logic. In the above fig HTS711, i.e. temperature and humidity sensor is given to the IF2OF2 analog input/output Model as an input.

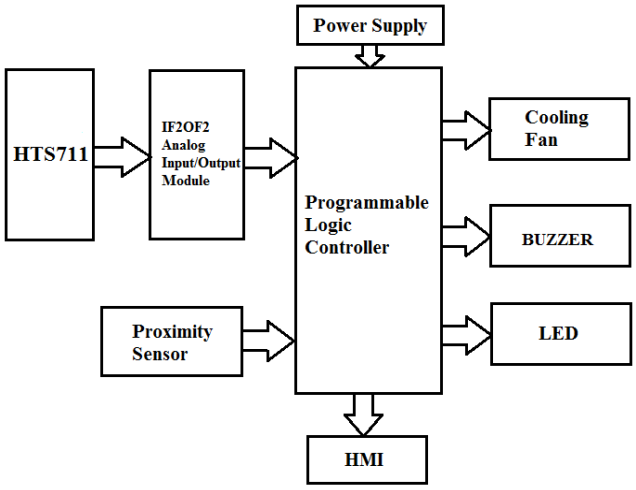


**Fig. 1: Block Diagram**

IF2OF2 analog input/output model is connected to the PLC as the input. At another side Proximity Sensor is also given to the PLC as an input. The output of both the sensors is taken by PLC for further processing. Power Supply of 24 volts DC is also given to the PLC. PLC and HMI are connected to each other via Ethernet cable. Temperature and Humidity value which is sensed by HTS711 sensor stored in PLC but that is not visible so we used HMI for display these values. At the Output side of PLC detects the output using cooling Fan, Hooter, and LED. Regulator IC is connected between PLC and LED for converting 24V into 12V because of the LED works on 12 Volt. The proximity sensor is given to the PLC which is used to detect human presence in Ware-House. A proximity sensor is a sensor which is used to detect the presence of any nearby objects without any physical contact.

## 3. CIRCUIT DESCRIPTION

### 3.1 Circuit description

Figure 2 shows the circuit diagram for Temperature and Humidity Monitoring system Ware-House using PLC and HMI. The input of our system is HTS711 sensor and it is a temperature and humidity transmitter. This sensor is used since both temperature and humidity. Its working range is 0-100%RH and temperature range is 0-50 degree celsius. Analog card is connected between HTS711 sensor and IF2OF2 analog card.

 

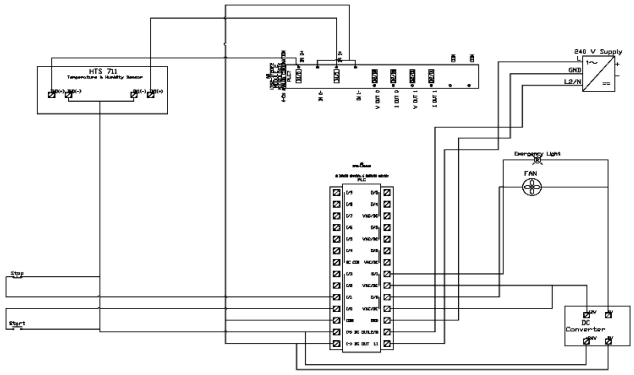

**Fig. 2: Circuit Diagram**

Analog card takes an only analog card from the sensor. Analog card is both current and voltage supported. Analog card support's voltage 0-10V and current 4-20mA. This values then are given to the PLC and stored in it. That values which are stored on PLC that will be monitor by HMI (Human Machine Interface). HMI and PLC are connected by using Ethernet cable. The output side of the system shown on LED and FAN. Regulator IC is connected to PLC to operate LED. Regulator IC is used to convert 24V into 12V. The programming language used for PLC is "ladder logic". This programming is done on RS-Logix software. HMI programming is done using DOPSoft software.

### 3.2 Working

Figure 2 shows the circuit diagram for Temperature and Humidity Monitoring system Ware-House using PLC and HMI. HTS711 sensor which is temperature and humidity sensor is connected to the IN0 of analog card and it works on the 24V power supply. 24v dc input voltage is connected to the start switch, stop switch and proximity sensor. Start and Stop Push button work with the two terminals one terminal is connected to the 24v dc connecting tray and other terminal is connected to the output terminal of PLC. Micro-Logix 1400 programmable logic controller is used. Proximity sensor input is connected to the IN1 of PLC. Temperature and humidity sensor work on the analog card and monitoring by human interface machine. Sensor output we have connected to the PLC Input. PLC compares these values with set values ($T_{max}$ & $T_{min}$). If the room temperature is greater than $T_{max,}$ then the fan will be turned on & if the room temperature is less than $T_{min}$, then the heater will be turned on. Temperature & Humidity values are displayed on HMI. Our output side three parameters are connected which is Fan, Buzzer and Emergency Light. All outputs are connected to the output terminal blocks of PLC. The proximity sensor is also connected at the input side. Proximity sensor work on the principle of physical presence. Led is work with Regulator IC. Regulator IC is used to convert the 24V supply into 12V. When Humidity of system increases then the LED will get ON. Both LED and FAN work on the values which is sensed by HTS711 sensor and stored on PLC.

## 4. SYSTEM SPECIFICATIONS

### 4.1 Hardware requirement

- Programmable Logic Controller
- HTS711 Sensor (temperature and humidity sensor)
- Proximity Sensor
- IF2/OF2 analogue Input Output module
- Human Machine Interface
- LED
- SMPS Power Supply
- Fan
- Ethernet Cable

### 4.2 Software requirement

#### 4.2.1 RSLogix-500

- RSLogix-500 ladder logic programming package for the MicroLogix processor.
- This software only supports the MicroLogix series of controllers.
- A programming language is Ladder Diagram.
- RSLogix-500 8.30.00 version is used.

#### 4.2.2 RSLinx-Classic

- RSLinx-Classic is used for communication.
- Communication is done between programming devices to PLC.
- RSLinx-Classic 2.57.00 version is used.
- RSLinx Classic, a family of industrial communication software for Rockwell Automation networks and devices.

#### 4.2.3 RSLogixEmulate-500

- RSLogix Emulate500 is industrial Programming Software for Rockwell Automation SLC and MicroLogix Controllers.
- RSLogix Emulate500 6.00.00.07version is used.
- Offline simulation is done via this software.

#### 4.2.4 DOPSoft

- This software is used for HMI programming.
- DOPSoft 3.0100 version is used.

## 5. RESULT

We are implementing a warehouse monitoring system that has temperature and humidity sensor and a proximity sensor which detect the temperature and humidity in the environment and any movable object in the warehouse then we get the display result of temperature and humidity values on HMI (Human Machine Interface). Hardware result display on FAN, LED and HOOTER. When the temperature increases for cooling FAN will ON. When Proximity sensor detects the object then buzzer gets ON, Using this system our warehouse will be secured.

## 6. REFERENCES

[1] Guo Shaofeng, Mao Jianlin, Wang Xiaodong, "A Temperature and Humidity Monitoring System Based on LabVIEW", Fourth International Conference on Digital Manufacturing & Automation, Qingdao, China, 16 September 2013.

[2] Waluyo, Nandang Taryana, Andre Widura "Implementation of wireless temperature, humidity, lighting and active power online monitoring using PLC for the early stage of miniature energy savings", 2017 International Conference on High Voltage Engineering and Power Systems (ICHVEPS), Bali, Indonesia,21 December 2017.

[3] Yanping Wang, Zongtao Chi, "System of Wireless Temperature and Humidity Monitoring Based on Arduino Uno Platform", 2016 Sixth International Conference on Instrumentation & Measurement, Computer, Communication and Control (IMCCC), Harbin, China, 08 December 2016.

[4] Wu Zhuang, Li Guo Hong, "Temperature and Humidity Measure-Control System Based on CAN and Digital Sensors", 2009 International Forum on Information Technology and Applications, Chengdu, China, 04 September 2009.

[5] Jasmin Velagic, Kemal Lutvica, Nihad Kadic, "Incubator system identification and temperature control with PLC

 

& HMI", Proceedings ELMAR-2010, Zadar, Croatia 21 October 2010.

[6] Gabriela Rata, Mihai Rata, "Temperature control solution with PLC", 2016 International Conference and Exposition on Electrical and Power Engineering (EPE), Iasi, Romania, 12 December 2016.

[7] Li Feng, Zhou Hui, Tao Yan, "Automatic Temperature and Humidity Control System Using Air-Conditioning in Transformer Substation", 2012 Asia-Pacific Power and Energy Engineering Conference, Shanghai, China, 20 September 2012

[8] M. Machida, A. Benzaouia, F. Tadeo, "Temperature and humidity control in greenhouses using the Takagi-Sugeno fuzzy model", 2006 IEEE Conference on Computer Aided Control System Design, 2006 IEEE International Conference on Control Applications, 2006 IEEE International Symposium on Intelligent Control, Munich, Germany, 06 February 2009.

[9] Li Feng, Tao Yan, "Automatic Temperature and Humidity Control System Using Air-Conditioning in Transformer Substation", March 2012.

[10] Prashik Satish Dhakne, Vivek Dattu Aldar, Sandip Jayavantrao Patil, Chetan Laxman Ghuge, "PLC-based Greenhouse Automation", IJRASET, ISSN: 2321-9653, Volume 5 Issue IV, April 2017, pp 1746-1749.

 