Early Warning Detection System for Fire Disaster Using Virtual Instrumentation With Lab view and Arduino

Hendrianto Husada[1]

[1]Electrical Engineering Department
School of Engineering PLN
Jakarta, Indonesia
[1]hendrianto.husada@sttpln.ac.id

Samsurizal[2]

[2]Electrical Engineering Department
School of Engineering PLN
Jakarta, Indonesia
[2]samsurizal@sttpln.ac.id

Abstract

Fire Disaster is one of many disasters that can be happened in big cities and towns all over the world .It can take not just much money and material loss ,but also take somebody life. For this reason we need the system that can give early warning to the people around the area that is happened fire disaster so that the risk would be minimized as small as possible and woulbe handled as soon as possible. Our system in this Article using virtual instrumentation with lab view and arduino. We can monitor on the temperature and humidity environment continuously 24 hour and on big display screen. Our system consist of computer with software lab view, arduino and sensor DHT11 as temperature and humidity sensor. Early Warning Detection System is achieved by Changing in The Temperature and Humidity as fast as possible as an indicator of a fire disaster.

Keywords: Arduino,VirtualInstrumentation,Labview,firedisaster,temperature,humidity

I. INTRODUCTION

The development of computer technology in hardware and software change very fast, so now many new system has been created by scientist, researcher and student in all over the world .One of the computer based system that is change rapidly is arduino system. Arduino system is used for many people for making prototype of new system technology that never known before. So in the world many scientist, researcher and student are looks like doing racing in invention of the new system based on computer technology. Beside that there are software that help hardware to built a new complete system that is smart and reliable. And in this research we try to combine technology of the development new computer, and traditional instrument become a new system that can help people in the office, control room , In the factory and also in the laboratory for detection fire disaster as early as possible using this new combination technology. The new System Is built using some sensor, arduino system as an acquisition data for capturing temperature and humidity around the system that is located. Then result data is displayed in the screen computer using one of National Instrument Software which is called Labview. With this new system we can monitor the temperature and humidity in the environment on big screen. The indication of the changing in this case we mean is increasing in temperature and decreasing humidity value within the short time maybe just only 10 minutes. We can make a statement that could be tend to happened fire disaster.

II. METHODOLOGY

1. BLOCK DIAGRAM

On figure 1 below, we can see the block diagram of Early Warning Detection Systemfor fire disaster as our research project.
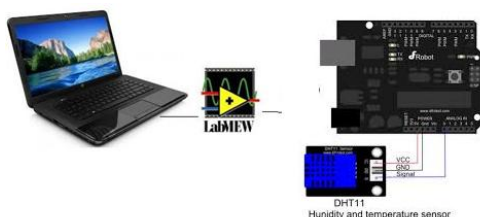

Figure 1. The Block diagram of

The Early Warning System Detection for Fire Disaster

2. COMPONENTS

- **DHT11 (HUMIDITY AND TEMPERATURE SENSOR)** [5]

Dht11 (Figure2) is an electronic component that consist of temperature and humidity sensor and give output A quite accurate digital signal. It uses a sensor that captured technology to Ensure high reliability product and good long term stability. The Sensor is consist of a resistive component and a NTC temperature measurement sensor and with a good microcontroller.

Figure 2. Sample of DHT11

Technical Specification:

Table 1. General Specification

Item	Measurement Range	Humidity Accuracy	Temperature Accuracy	Resolution	Package
DHT11	20-90%RH 0-50 ℃	±5％RH	±2℃	1	4 Pin Single Row

Table 2. Detail Specification

Parameters	Conditions	Minimum	Typical	Maximum
Humidity				
Resolution		1%RH	1%RH	1%RH
			8 Bit	
Repeatability			±1%RH	
Accuracy	25℃		±4%RH	
	0-50℃			±5%RH
Interchangeability	Fully Interchangeable			
Measurement Range	0℃	30%RH		90%RH
	25℃	20%RH		90%RH
	50℃	20%RH		80%RH
Response Time (Seconds)	1/e(63%)25℃, 1m/s Air	6 S	10 S	15 S
Hysteresis			±1%RH	
Long-Term Stability	Typical		±1%RH/year	
Temperature				
Resolution		1℃	1℃	1℃
		8 Bit	8 Bit	8 Bit
Repeatability			±1℃	
Accuracy		±1℃		±2℃
Measurement Range		0℃		50℃
Response Time (Seconds)	1/e(63%)	6 S		30 S

VDD=5V, T = 25℃ (unless otherwise stated)

	Conditions	Minimum	Typical	Maximum
Power Supply	DC	3V	5V	5.5V
Current Supply	Measuring	0.5mA		2.5mA
	Average	0.2mA		1mA
	Standby	100uA		150uA
Sampling period	Second	1		

Note: Sampling period at intervals should be no less than 1 second.

- **ARDUINO UNO** [6]

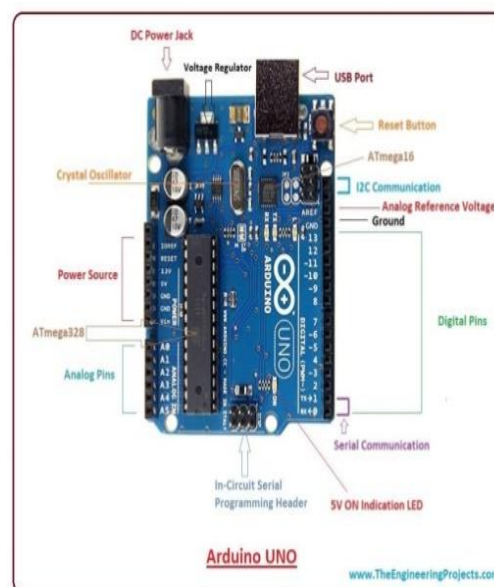Arduino Uno is a board of microcontroller and work under Atmega328(Figure 3)..

Figure 3. Arduino Uno

- **ARDUINO IDE** [6]

Arduino IDE is a software that is used for writing and compiling the code into the ArduinoBoard. It is an original Arduino software, making code compilation too easy that even a ordinary people

with no background technical knowledge can get knowledge with the learning process. It is available for operating systems like MAC, Windows, Linux and works on the Java Platform that comes with built in functions and commands that play a important role for debugging, editing and compiling the code in the environment. The program code, also known as a sketch, made on the IDE platform will generate a Hex File which is then transferred and uploaded in the arduino on the board.The IDE environment(Figure 4.) is consist of two basic parts: Editor and Compiler where the first is used for writing the required code and the second is used for compiling and uploading the code into ArduinoBoard.This environment work for both C and C++ languages.

Due

Figure 4. The Display of Arduino IDE Software

- **LABVIEW[4]**

LabVIEW (**Lab**oratory **V**irtual **I**nstrument **E**ngineering **W**orkbench) is a programming software that works using graphical environment. Labview has already become familiar in research labs, academia and industry. Labview is a instrumentation system software that has advantage and analysis capability for measurement andautomation. Labview is a *G programming (programming language using graphic)* and worked on agraphical block diagram that translates into machine code and removed a lot of the commanddetails. LabVIEW give more

flexibility than standard laboratory instruments due to it is

A software based. UsingLabVIEW, the user can use virtual instrument and programmers can program easily data or control inputs.. LabVIEW consist of a three main sections—the front panel, the block diagramand the icon/connector pane. The two first of LabVIEW windows are the front panel (consist of controls and indicators) and block diagram (consist of terminals, connectionsand graphical code)., After you make the user interface, you can add program usingVIs and structures to control objects of the front panel . The block diagram consist of this code. Insome ways, the block diagram looks like a flowchart.

Front Panel Windows

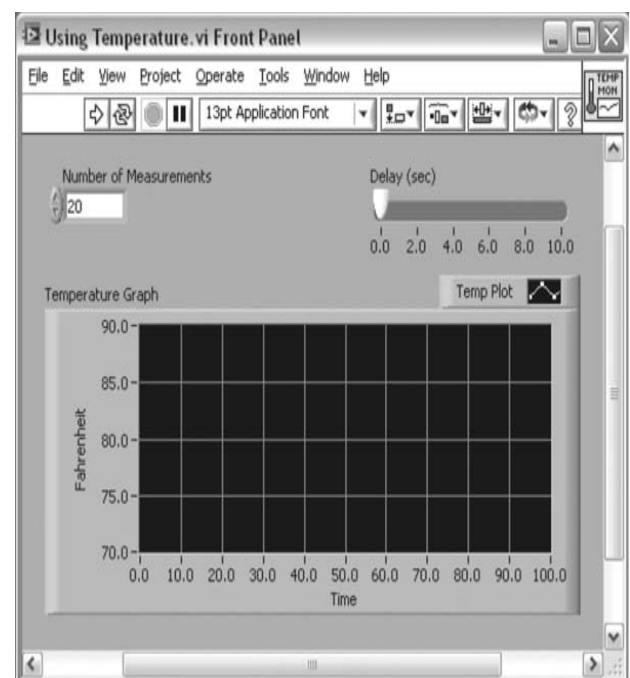The display of front panel using controls and indicators as shown in Figure 5.

Figure 5. The Display of Front Panel Labview

The front panel can provide knobs, push buttons, graphs and various other control and indicators .The front panel is set up to emulate control panels of traditional instruments, create custom test panels, or visually represent the control and operation of processes.

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Block Diagram Windows

The block diagrams attach with the program for the front panel. The objects of the front panel appear asterminals on the block diagram and the components wired together. The block diagram consist of the graphical source code composed of nodes,terminals, and wires. The block diagram is the real executable program as shown in Figure 6. The sections of a block diagram are lower-level VIs, built-in functions, constants andprogram execution control structures. Wires have to be drawn to connect the correspondingobjects together to indicate the flow of data between each of them.
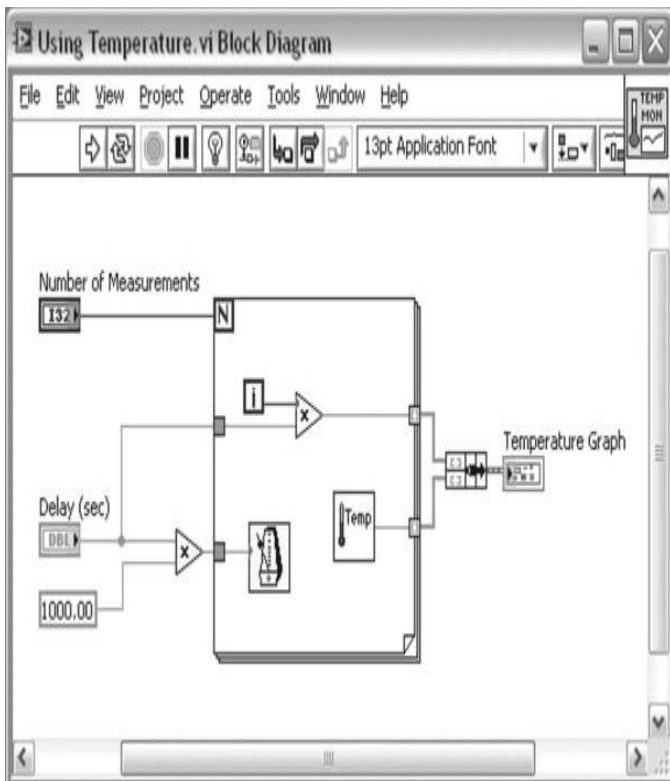

Figure 6. Block Diagram Window Labview

Icon/Connector Pane

To use a VI as a subVI, it must have an icon and a connector pane. Each VI displays an icon in the upper-right corner of the front panel and block diagram windows. An icon is a graphicalrepresentation of a VI. The icon can consist of both text and images. To use a VI as a subVI, you need to build a connector pane. The connector pane is a collection of terminals that correspond to the controls and indicators of that VI.

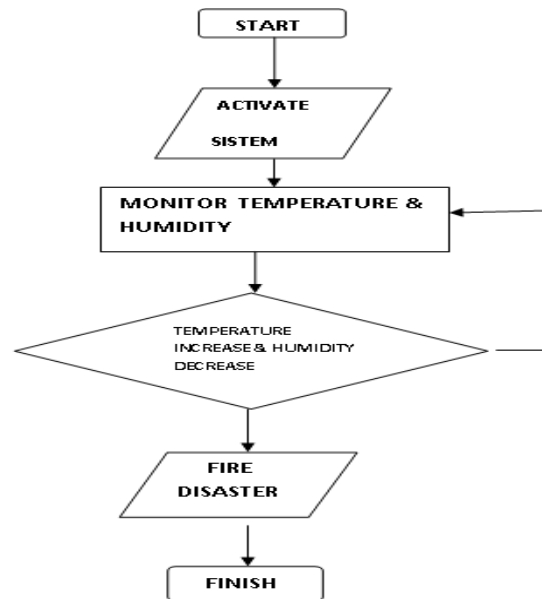## 3. FLOW CHART OF EARLY WARNING DETECTION SYSTEM FOR FIRE DISASTER

Figure 7. Flow Chart Of Early Wrning Detection for fire disaster

III. RESULT
1. TESTING INTEGRATION SYSTEM WITH THE SYSTEM INSIDE OVEN AS IF THERE IS A FIRE DISASTER

The fire disaster happened is simulated with put the system inside an oven (figure8) then increase the temperature in a short time around ten minutes.

Figure 8. The System is put inside an oven

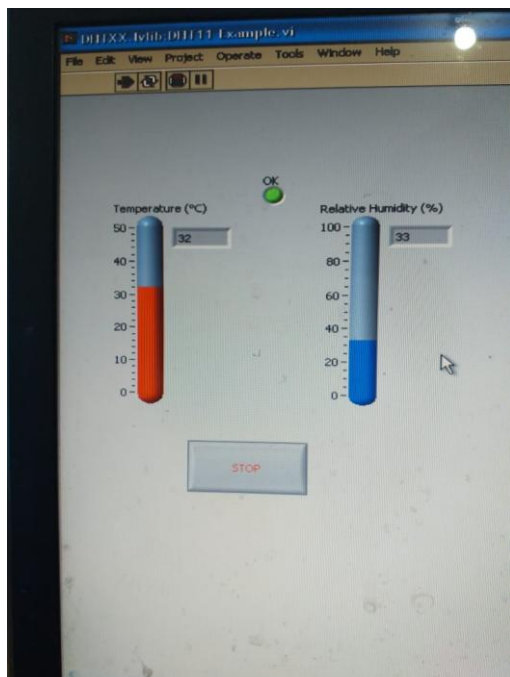The result of monitoring temperature and humidity can be seen on figure 9

Figure 9. The display of temperature and humidy in labview

2. THE CHANGING OF TEMPERATURE AND HUMIDITY IS RECORD IN TABLE

The increasing in temperature and decreasing humidity when the system put inside an oven are recorded on table 3.

Table 3. The result of temperature and humidity when fire disaster is happened

No	Waktu	Temperatur [o C]	Kelembaban [%]	Keterangan
1	12:00	32	33	
2	12:05	33	32	
3	12:10	34	32	
4	12:15	38	31	
5	12:20	39	30	
6	12:25	41	29	
7	12:30	43	28	
8	12:35	45	27	
9	12:40	46	27	
10	12:45	48	22	

3. GRAPHIC OF THE RELATION BETWEEN TEMPERATURE AND HUMIDITY (Figure 10)
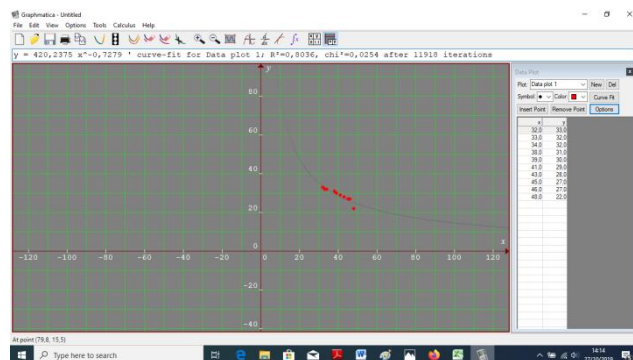

Figure 10. Gtraphic that show the relation temperature and humidity

IV. CONCLUSION

1. Monitoring Temperature and humidity can be seen using Labview
2. Increasing in temperature always is followed by decreasing humidity
3. Early Warning for fire disaster happened when temperature increased and humidity decreased

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