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CELLAR VENTILLATION SYSTEM WITH AUTO DETECTION AND CONTROL

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Abstract **-** CO based ventilation automation system, Auto Vent, is specially designed PLC based control unit or programmable control unit for ventilation monitoring & control. It receive to signals from various gas detector units, process the signals and generate control events based on pre-defined parameters. Based on pre-defined logic, it will operates, regulate, stop-start axial / jet fans, alarm units, ventilation system – dampers etc. Auto Vent system is designed on digital communication based programmable logic controller (PLC) system. Due to its unique features, Auto Vent laying cost), but also on design, implementation, integration and maintenance. With its advance feature, it can remotely control onboard potential free relays can fetch signals from as high as 96 detector units, connected in daisy – chain fashion. Thus, this architecture not only save huge capital investment on system installation (cable purchase cost, on detector unit, thereby remote triggering alarms / fan control etc. It also offers signal readout of each detection units, fault recognition in the system, location of fault, location of alarm, in text as well as graphical matter. Auto Vent is equipped with colored LCD display, thus offering onsite user friendly control and system configuration. With its inbuilt digital output, it can be integrated with fire alarm system to generate fire signal. As well it can be connected to BMS System.

I. INTRODUCTION

A programmable logic controller (PLC) or programmable controller is an industrial digital computer which has been ruggedized and adapted for the control of manufacturing processes, such as assembly lines, or robotic devices, or any activity that requires high reliability control and ease of programming and process fault diagnosis.

PLCs were first developed in the automobile manufacturing industry to provide flexible, ruggedized and easily programmable controllers to replace hard-wired relays, timers and sequencers. Since then, they have been widely adopted as high-reliability automation controllers suitable for harsh environments. A PLC is an example of a "hard" real-time system since output results must be produced in response to input conditions within a limited time, otherwise unintended operation will result.

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II. PRINCIPAL OF OPERATION

This methodology of controlling the rpm of the motor w.r.t the smoke detection level is achieved by using the plc control system. In this system the smoke detection sensor i.e. the co sensor is connected to the plc. This sensor upon sensing the smoke will generate a voltage/current signal of either 4ma to 20ma or 0v to 10v. This signal is then sent to the controller as an analog input signal connected to analog input module. Then this signal is read by the plc which then starts executing a logic for controlling the speed of the motor. The logic is designed for required speed of the motor based on desired smoke level.

III. HUMAN MACHINE INTERFACE (HMI)

The HMI provides a textual or graphical view of system conditions and operations, vital information absent with simple push button panels or switch bank.

HMI offer robust (strong) monitoring, control, status reporting and many other functions.

HMI is most commonly used in the context of an industrial process.

It can be applied to any screen technically that allows a user to interact with a device

A Human-Machine Interface (HMI) is a user interface or dashboard that connects a person to a machine, system, or device. While the term can technically be applied to any screen that allows a user to interact with a device, HMI is most commonly used in the context of an industrial process.

IV. SOFTWARE REQUIRED

TIA Portal – more than an engineering framework

With the TIA Portal and the possibilities you benefit from a shorter time-to-market thanks to innovative simulation tools, boost the productivity of your plant thanks to additional diagnostic and energy management functions, and enjoy greater flexibility thanks to coordinated teamwork.

V. DIGITAL WORKFLOW

The digital workflow in the new TIA Portal increases the flexibility of machine builders and plant operators

Integrated Engineering

In the new TIA Portal, integrated engineering makes it much easier to optimize the performance, functionality, and efficiency of automation.

VI. SCADA

Supervisory Control and Data Acquisition (SCADA) is a control system architecture that uses computers, networked data communications and graphical user interfaces for high-level process supervisory management, but uses other peripheral devices such as programmable logic controller (PLC) and discrete PID controllers to interface

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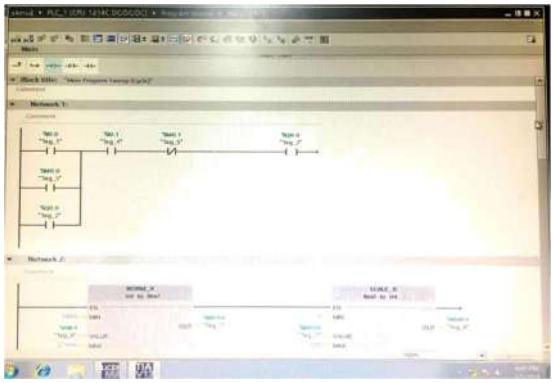
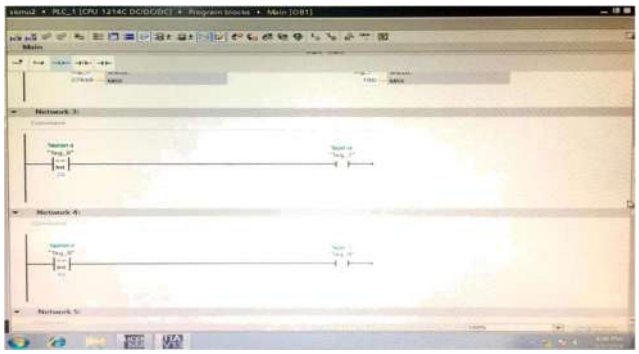
with the process plant or machinery. The use of SCADA has been also considered for management and operations of project-driven-process in construction.

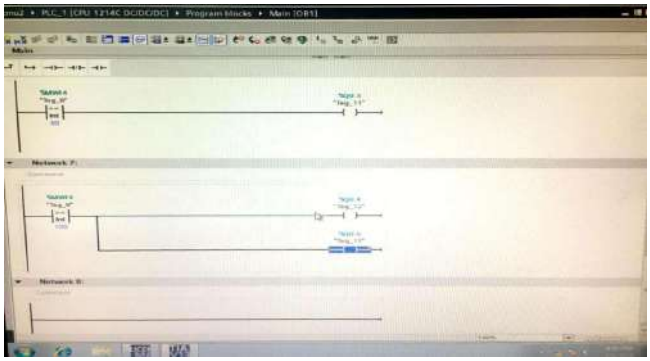
The operator interfaces that enable monitoring and the issuing of process commands, such as controller set point changes, are handled through the SCADA computer system. However, the real-time control logic or controller calculations are performed by networked modules that connect to the field sensors and actuators.

The SCADA concept was developed as a universal means of remote access to a variety of local control modules, which could be from different manufacturers allowing access through standard automation protocols. In practice, large SCADA systems have grown to become very similar to distributed control systems in function, but using multiple means of interfacing with the plant. They can control large-scale processes that can include multiple sites, and work over large distances as well as small distance. It is one of the most commonly-used types of industrial control systems, however there are concerns about SCADA systems being vulnerable to cyberwarfare/cyberterrorism attacks.

VII. RESULTS







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ADVANTAGES

- From this process of smoke detection safe and efficient evacuation of harmful gases is possible.
- The HMI screen acts as an interface which always provides the monitoring of the process.
- The power consumption is reduced due to the starting on and starting off fans is done with respect to the percentage of smoke detected by the sensor.
- External push start and stop buttons are provided in case of any emergency.
- The PLC eases the process as there is no manual controlling is required, hence everything is automated.
- It is also user friendly.

VIII. CONCLUSIONS

1) The PLC, in recent years have experienced uncalculated growth as universal element in industrial automation.

2) It can be used in application of simple control like replacing a small number of relays to complex automation problems.

3) Thus, its overview is done by SCADA, a software in which a person can control and supervise with a Laptop in home.

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4) Costs for basic SCADA components are expected to continue to decline in the future.

5) Simultaneously, larger organizations will take advantage of the growing number of value priced wide-area communications options to incorrect geographically dispersed SCADA and business systems.

6) Finally, the SCADA system will function more and more as a large control loop, able to operate autonomously at increasingly higher levels, based on fewer inputs from operational personnel.

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