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Smart Way of Energy Utilization and Measurement in Industry Using Labview

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ABSTRACT

The Smart way of Energy utilization and measurement refers to the automation in Industries. An automation is a system which uses the information technology to monitor the electric equipment and communicates it with the outer world. It is a technology which is developing. An automation system has been developed in order to achieve some of the activities performed frequently in daily life automatically so as to obtain more easier and comfortable life. The system is based on the LabVIEW software and can act as the security guard of the Industries. The system can monitor the temperature level, the intensity of light, the moisture of soil, detection of fire and smoke, automatic billing of the industry. The approach combines hardware and software technologies. The approach combines hardware and software technologies. Virtual instrumentation uses a general-purpose computer to mimic real instruments with their controls and displays. Test results of the system have shown that it can be easily used for the smart automation applications[1]

Keywords; LabVIEW, Lm35, LDR, Soil moisture sensor, Smoke sensor, Energy meter, Pump, DC motor, LED, Fan, Buzzer.

I. INTRODUCTION

The smart way of automation is a key for energy conservation that can be equipped in industries. Nowadays the demand for automation systems in industries and offices are invariably increasing. These systems directly work on the industrial appliances and provide effortless operation and control of the devices. In this project the concept of the smart way of automation in an effort to reduce the energy consumption and wastage using advanced graphical software called LabVIEW. It provides the programming tools to code power system applications more easily, which saves programming time. With the development of low-cost electronic components, automation gives utilization and smart way of energy consumption. To resolve the automation and control issues, industries use the ever-changing technology in control system for efficient production or manufacturing processes.

In recent times, industrial automation efforts are being exercised intensively as to set up standards for building an efficient smart system suited to custom and regional requirements. Automatic control of appliances is an important aspect to be considered for implementing automation and security systems. Industrial automation is the use of various control devices, used to have control on various operations of an industry without significant intervention from humans and to provide automatic control performance.

In industries, control, strategies use a set of technologies, which are implemented to get the desired performance or output, making the automation system most essential for industries. Furthermore, in industries security aspects, any hazardous fire accident that might occur in industries while the workers are busy doing their work need be alerted by taking rescuing measures. An automated industry possesses facilities such as Automatic control of the light lamp present at the industry by sensing intensity of light, Automatic control of fan or AC by sensing room temperature ,

Automatic switching on and off the pump to water the garden by sensing moisture level of the soil, By detecting smoke or fire in the industry and alerting the workers by giving buzzer alarm, Real-time monitoring of power consumed by industrial appliances is monitored.

II. METHODS AND MATERIAL

- ✓ To design graphical user interfacing that interacting with a human.
- ✓ To control various sensors and equipment that support Smart Automation.
- ✓ To monitor the real-time power consumption in the industry.
- ✓ Provide alert system like Fire, Smoke etc., in case of emergency.
- ✓ To develop an intelligent system that supports power saving.
- ✓ This overall controller is done using LabVIEW tool.

LabVIEW (Laboratory Virtual Instrument Engineering Workbench) is a platform and development environment for visual programming language from National Instruments.

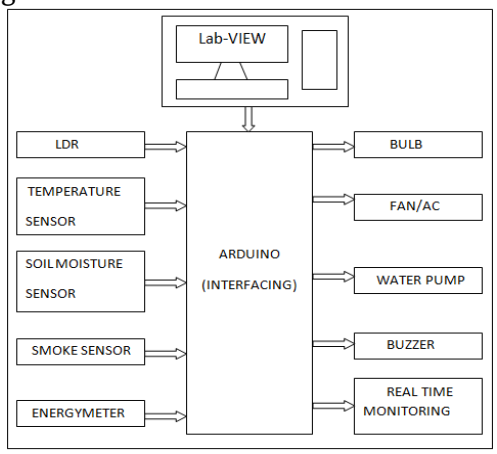


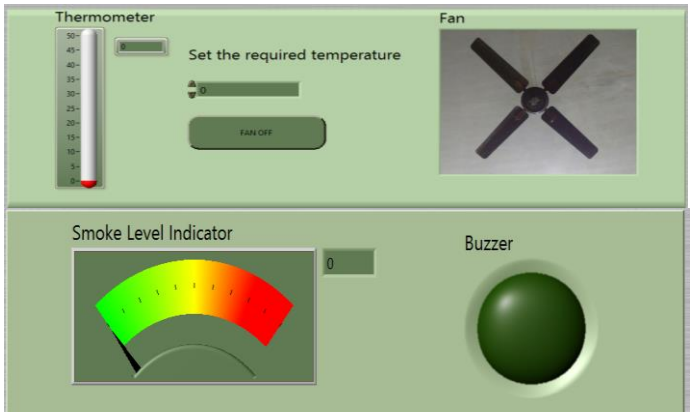
Figure 1.1. Block diagram

Figuer 1 shows the block diagram of Smart Home. In this, the programming has to be carried out in LabVIEW (Makerhub, LINX). Interfacing is done by using Arduino board which is able to carry out all controlling operation. As shown in the fig1, sensors detect the respective parameter and control the desired operation. LDR sensor is used to measure the intensity of light. The required intensity is set in the logic and when the condition met LDR gives the signal. Bulb which is interfaced with Arduino is operated depending upon the sensor output. That is if intensity present in the room less than required value bulb will switch on or if the intensity is greater than the set value it will switch off.

A temperature sensor (LM35) is used to measure the temperature inside the room. When the temperature inside the room is greater than the set temperature the Arduino switch on the fan/ac or if the temperature is less than the set value switch off. Soil moisture sensor is used to measure the water content present in the soil by measuring wetness of the soil. The user can select the type of plant which is on the farm, so it can automatically set the minimum water content required for the particular plant If the moisture content of the soil is less than the set moisture required for the plant the Arduino will turn on the Pump or else turn it off. The smoke sensor is used to detect the hazardous condition in the Industry. When a fire occurs it detect the smoke level which was set in the logic and when the condition is met Arduino operates buzzer which is interfaced with it and gives the alarm. Energy meter which is interfaced with the Arduino measures the amount of energy consumed in the Industry and stores the data for future reference.

III. RESULTS AND DISCUSSION

The front panel is also called as a user interface which consists of controllers and indicators. Controllers are a knob, push button, dials and other input devices. Indicators are graphs, LEDs, and other displays.



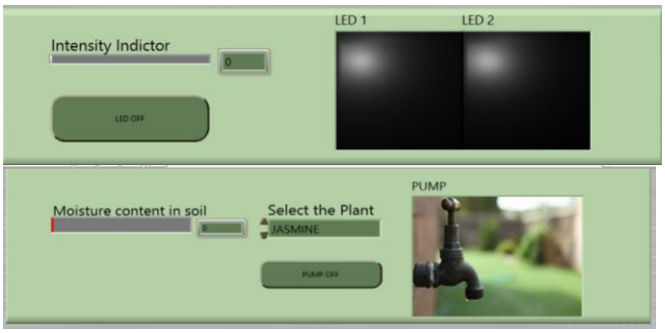


Fig 1.2 General arrangement of the front panel for fan, buzzer, light, and pump

Figure 1.2 a shows the general arrangement of front panel through which fan and lights are operated and also it indicates the output of the sensors.

In the controlling of a fan, the thermometer shows the present room temperature, and the user is provided with a controller through which the user can set the required temperature, and a Boolean switch is provided for the fan to remain in off state when it is not at all required.

The smoke sensor output is shown in the front panel also the buzzer turn to red color when there is a hazardous condition. The LED's are controlled by the sensors and the input programming and a Boolean switch is also provided for switching off of the light when it is not necessary.
The moisture level of the soil is indicated and the pump is operated according to the selected plant and also a Boolean switch is provided to switch off the pump when no crops are grown on the farm.

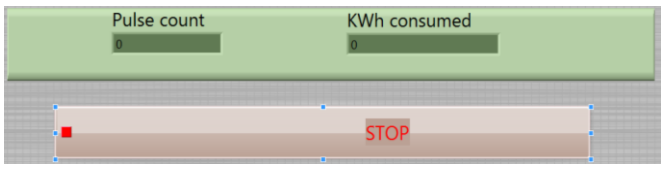
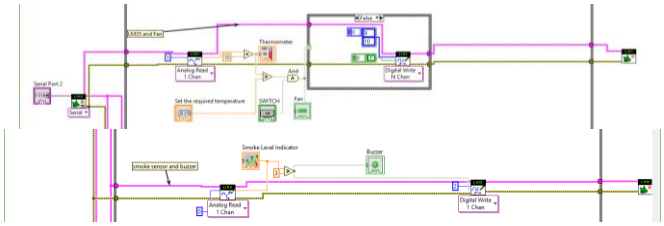


Figure 1.3 front panel for Energy meter reading

The Energy meter is interfaced with Arduino which acquire the data in the form of digital input and displays it in the front panel and also it can be stored in the excel sheet for further reference.



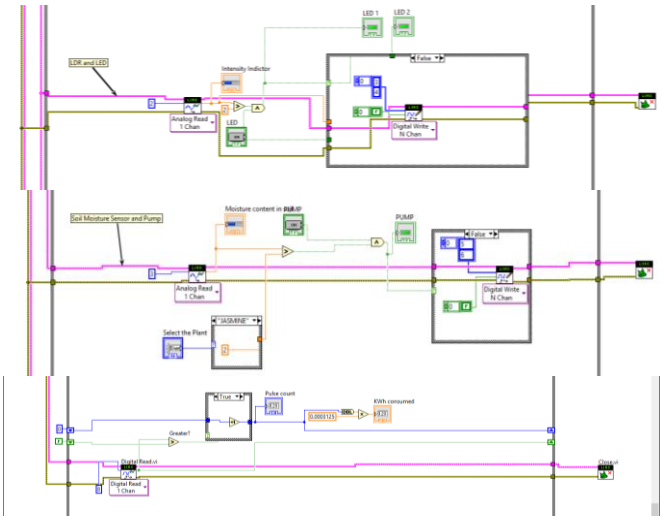


Figure 1.4 overall graphical programming

The above-explained conditions are all controlled accurately with the help of this graphical programming tool called LabVIEW. The logics are written on the while loop for the continuous operation and a stop button is provided to come out of the while loop. So it can stop the operation of all the programs.

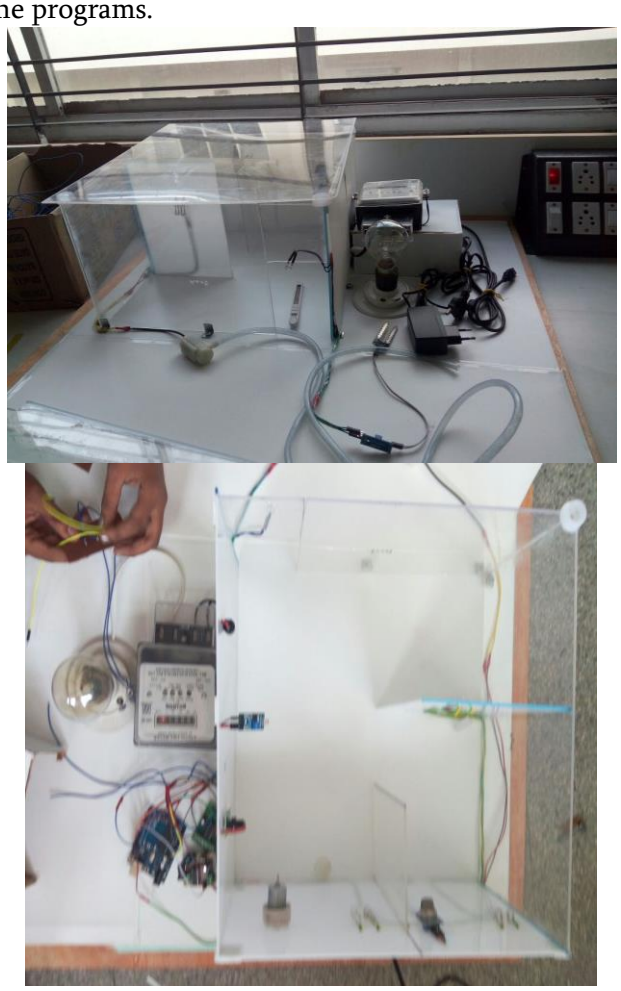


Figure 1.5 Working Model of the project

IV. CONCLUSION

From this project, we controlled the operation of Fan, LED's and Pump when it is not necessary by saving the Energy and also safety in the Industry is provided by introducing a smoke sensor with an alarm which can alert the workers. The energy meter is interfaced with Arduino and real-time monitoring is successfully achieved from it.

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