Temperature controlled automation and Data Acquisition In Atomic Power Station Using Labview And Arduino

Manoj M[1], Mohamed Anas S[2], Mohammed Jassim S[3], Nishanth M[4]
[1, 2, 3, 4] Dept of Electrical And Electronics Engineering
[1, 2, 3, 4] Sri Krishna College Of engineering And Technology

Abstract- *Automation play a important role in every field. It reduces the man power and by increasing productivity and safety. Here we are going to automate a major and more hazardous part of atomic power station. In this project we will clearly explain what happened in the past and what is happening at present and what we are going to automate in atomic power station. Our project is about automation in atomic power station in proposition with temperature value. Both atomic power station and nuclear power station are more dangerous in terms of exploitation. we have to ensure several safety measure. More exploitation of human in these stations are also dangerous due to radiation. To avoid that automation play a very important role to ensure safety in these stations. In this we are automating control rod in the reactor where we are controlling the feeding of neutron through temperature controlled automatic system. Our objective is to maintain safety in atomic power station in it's core working part where atomic is converted in to energy through nuclear fission reaction. To maintain timely record of temperature value through data acquisition tool in LabVIEW. Both atomic power station and nuclear power station are more dangerous in terms of exploitation. we have to ensure several safety measure. More exploitation of human in these stations are also dangerous due to radiation. To avoid that automation play a very important role to ensure safety in these stations. In this we are automating control rod in the reactor where we are controlling the feeding of neutron through temperature controlled automatic system.*

Keywords- Atomic power station, Arduino, Graphical programming, Labview technology, Temperature control.

I. INTRODUCTION

Atomic power is the use of nuclear reactions that release nuclear energy to generate heat, which most frequently is then used in steam turbines to produce electricity in a nuclear power plant. Nuclear power can be obtained from nuclear fission, nuclear decay and nuclear fusion reactions. Presently, the vast majority of electricity from nuclear power is produced by nuclear fission of uranium and plutonium. Nuclear decay processes are used in niche applications such as radioisotope thermoelectric generators in some space probes such as Voyager 2. Generating electricity from fusion power remains at the focus of international research. In a **nuclear power plant**, heat energy is generated by a nuclear reaction called as **nuclear fission**. Nuclear fission of heavy elements such as Uranium or Thorium is carried out in a special apparatus called as a **nuclear reactor**. A large amount of heat energy is generated due to nuclear fission. Rest parts of a nuclear power plant are very similar to conventional thermal power plants. It is found that fission of only 1 Kg of Uranium produces as much heat energy as that can be produced by 4,500 tons of high grade coal. This considerably reduces the transportation cost of fuel, which is a major **advantage of nuclear power plants**. Also, there are large deposits of nuclear fuels available all over the world and, hence, nuclear power plants can ensure continued supply of electrical energy for thousands of years. About 10% of the total electricity of the world is generated in nuclear power plants.

II. EXISTING METHOD

Control rods are used in **nuclear reactors** to **control** the fission rate of uranium or plutonium. Their compositions includes chemical elements, such as boron, cadmium, silver, or indium, that are capable of absorbing many neutrons without themselves fissioning. A system for controlling control rods which can be moved into and out of a reactor core of a nuclear power plant, includes a selector device, a monitor device and a rod control device. The selector device contains travel sequences which are selectable and defined for regulating the nuclear power plant, i.e. allocation and movement sequences of the control rods, and it transmits the selector signals allocated to each travel sequence to the rod control device. The monitor device checks the selector signals for acceptability while taking into account the structural features of the reactor core and the control rods, which are allocated to the respective travel sequence, in particular proximity relationships of the control rods. If the selector signals are acceptable, an enable signal is transmitted to the rod control device and the rod control device induces a displacement of the control rods according to the selector signals.

III. LABVIEW TECHNOLOGY

LabVIEW is a program development environment developed by National Instruments (NI), similar to C and BASIC development environments, but the significant difference between LabVIEW and other computer languages is that other computer languages use text-based languages to generate code, And LabVIEW uses the graphical editing language G to write programs, and the generated programs are in the form of block diagrams. The programming paradigm used in LabVIEW, sometimes called G, is based on data availability. If there is enough data available to a subVI or function, that subVI or function will execute. Execution flow is determined by the structure of a graphical block diagram (the LabVIEW-source code) on which the programmer connects different function-nodes by drawing wires. These wires propagate variables and any node can execute as soon as all its input data become available. Since this might be the case for multiple nodes simultaneously, LabVIEW can execute inherently in parallel. Multi-processing and multi-threading hardware is exploited automatically by the built-in scheduler, which multiplexes multiple OS threads over the nodes ready for execution.

IV. GRAPHICAL PROGRAMMING

LabVIEW integrates the creation of user interfaces (termed front panels) into the development cycle. LabVIEW programs-subroutines are termed virtual instruments (VIs). Each VI has three components: a block diagram, a front panel, and a connector pane. The last is used to represent the VI in the block diagrams of other, calling VIs.The graphical approach also allows nonprogrammers to build programs by dragging and dropping virtual representations of lab equipment with which they are already familiar. The LabVIEW programming environment, with the included examples and documentation, makes it simple to create small applications. This is a benefit on one side, but there is also a certain danger of underestimating the expertise needed for high-quality G programming. For complex algorithms or large-scale code, it is important that a programmer possess an extensive knowledge of the special LabVIEW syntax and the topology of its memory management.

V. WORKING

In this project we integrated LabVIEW and Arduino together to automate a desired application in atomic power station. Here logic of the automation is programmed in LabVIEW itself instead of Arduino programming. Temperature ratings (minimum & maximum values), data acquisition concepts, Arduino interfacing , temperature input and led output all these concepts are done and logic is setted in LabVIEW instead of writing and feeding the program in Arduino (microcontroller). Here the work of microcontroller is to get environmental data and send it to microcontroller (i.e Temperature value). LabVIEW will do all the logic one’s temperature value is given and react accordingly. The output from the LabVIEW is only in the form of pulse (0’s and 1’s), where “0” is OFF state and “1” is ON state. RGB and relay is connected with controller and LabVIEW also has virtual led and relay concept in it. Once process is done the output is shown in both LabVIEW and in components connected with Arduino. Pulse is send as an output to microcontroller where the components connected with the controller (i.e RGB led and relay) react according to the pulse from the LabVIEW. Here let’s imagine control rod is connected to the relay, once the temperature is normal nothing happen to the control rod it will do it’s process normally, when temperature value is high or low the pulse is send accordingly from the LabVIEW and control rod works proportional to the output pulse. Periodic temperature data is acquired and stored in the database for the future reference. Here data acquisition is also done by LabVIEW.

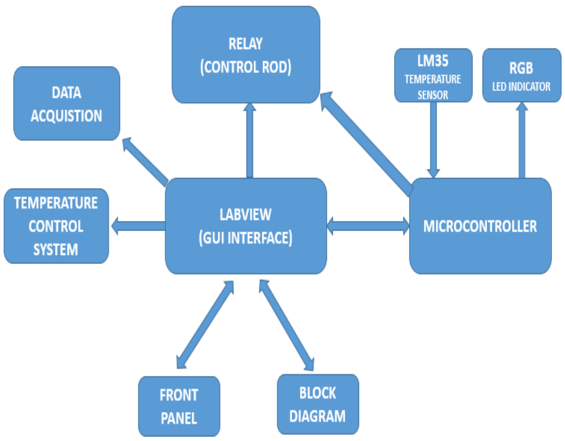
VI. ADVANTAGES

1) Easy to understand the logic.
2) Data acquisition option is available in LabVIEW, many industries get benefitted both economically and technically.
3) No need of complicated codes to change the logic in the future.
4) More efficient.

VII. DISADVANTAGES

1) Output is only in the form of pulse
2) Logic’s in LabVIEW should maintained properly.

VIII. BLOCK DIAGRAM



IX. CONCLUSION

In this project we discussed about the automation of control rod in atomic station thereby to prevent from the serious accident. Since atomic power station is highly dangerous if it is not properly maintained with safety measures. Thus automation proportional with temperature value is highly efficient in maintaining the safety standard in these kind of power stations.

REFERENCES

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