AN ENERGY EFFICIENT LIGHTING SYSTEM USING LabVIEW

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ABSTRACT

The search for an alternate and an efficient source to that of the conventional source is on the rising note. Saving energy by means of various control strategies have been proposed to solve this problem out of which we have chosen an integral cycle controller which varies the intensity of fluorescent lamp of a building. The control strategy is such that the level of surrounding light increases the supply voltage, hence electric power consumption, to the electric lighting system is reduced. Similarly, when the surrounding sunlight decreases the supply voltage, the electric power consumption to the electric lighting system is increased. The controller has been applied and verified using LABVIEW. The implementation of integral cycle control strategy could save up to 5.30% of electricity.

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INTRODUCTION

Incandescent bulb is used for lighting purpose in earlier days. Nowadays most of the offices using fluorescent bulb instead of incandescent bulb, since it is more energy efficient and it lasts 4 to 6 times longer than incandescent lamp. Using fluorescent bulb saves electrical energy in one perspective. Apart from electrical energy, there is an additional source of energy which reduces the use of electrical energy in another perspective. The additional free energy source consists of surrounding sunlight .when the sunlight intensity is high**,** lighting in the office is partially reduced. When the sunlight intensity is low, main electric supply is fully used.

RELATED WORK:

Based on indoor lighting system many projects have been done to overcome the demand of electricity, based on user's needs. Pan et al developed a project based on intelligent control system using wireless network. Uhm et al developed a project using LED light system using motion sensor and network interface. They control the intensity of light based on the ambience. Matt et al regulated light, using controller area network (CAN) bus for communication. Leccese et al developed a project to control the street lights using remote control, it uses ZigBee communication system. Delaney et al developed a wireless sensor evaluation tool that monitors and analyses the efficiency of light at a considerable cost. Denardin et al developed a wireless monitor and control of street lights that automatically communicates through ZigBee.

Control of light based on the automation is also done by varying the intensity. There are many control strategy in existing system and many different controller are used but it is difficult to control all the parameters .Although light is controlled by sensor excessively by central management system. The advantage of this work is to control the electricity due to demand.

COMPONENTS AND FUNCTIONS:

The lighting system consists of light dependent resistor (LDR), TRIAC, potentiometer, 6 pairs of lamp and DAQ. LDR is a light sensing device. It provides low resistance value when the level of surrounding light is high (i.e. bright environment) and high resistance value when the level of sunlight is low(i.e. dark environment).TRIAC from Triode for Alternating

Current, is a generalised trade name for an electronic component that can conduct current in either direction when it is triggered. The output of the triggering circuit is given to the gate terminal which is used to control the intensity of the light according to the LDR resistance. The potentiometer is used to adjust the voltage in the bulb. Brightness and contrast controls draw on the potentiometer function. Data acquisition card (DAQ) is the tool used to interface both the hardware and software in LabVIEW.

INTRODUCTION TO LabVIEW:

LabVIEW is a highly productive development environment for creating custom applications that interact with real world data or signals in fields such as science and engineering. LabVIEW is unique because it makes this wide variety of tools available in single environment. LabVIEW is the ideal development environment for problem solving accelerated productivity and continual innovation. LabVIEW itself is software develop the environment that contains numerous components. Providing comprehensive tools that you need to build any measurement or control application in dramatically less time. Combine the power of LabVIEW software with modular,
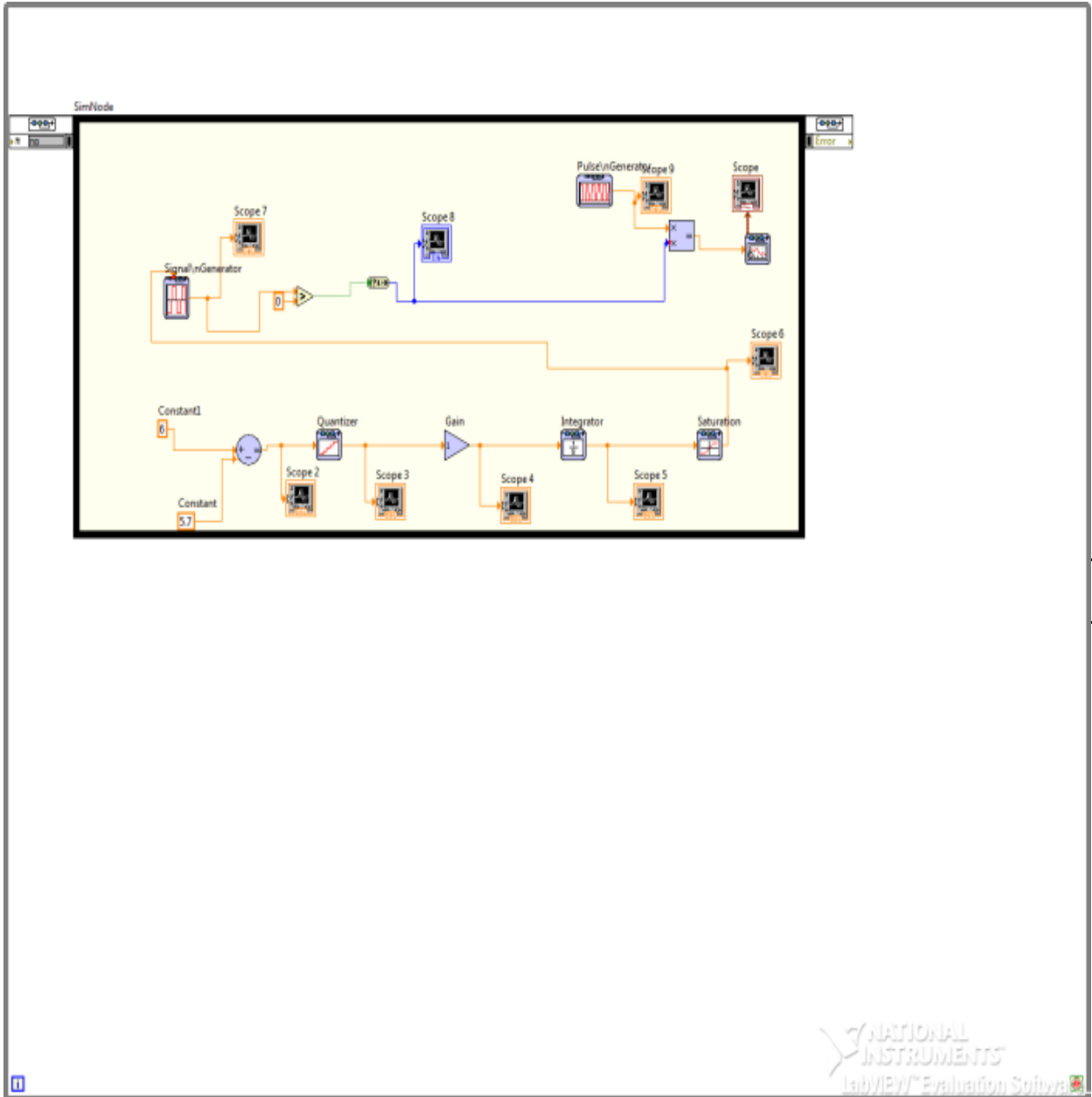
Fig: The block diagram used in LabVIEW

Analysing intensity of surrounding sunlight using
LDR

Duty cycle starts decreasing
and reaches 0%

False

True

Fig: Flow chart of the process involved.

CONCLUSION

The ambient sunlight energy present provides considerable amount of lighting to the room/office. This contribution could provide a significant cut off from the total power consumption thereby saving energy. Thus the major objective of this paper is achieved by implementing the integral cycle controller. By this method 5.37% of electric energy saving has been achieved, provided the office lighting was comfortable   for the residents. Though a slight flickering was encountered, it has its application in various real time   functions.

REFERENCE:

1. A Digitally Wireless Dimmable Lighting System for Two-Area Fluorescent Lamps by Chun-An Cheng, Hung-Liang Cheng, Kun-Jheng Lin ,Kuna-Lin Chu ,Chun-Hsien Yen.

 2. Intelligent Household LED Lighting System Considering Energy Efficiency and User Satisfaction Jinsung Byun, Insung Hong, Byoungjoo Lee, and Sehyun Park.

3. National Instruments Corporation (2008). Introducing LABVIEW 10 Austin, Texas, USA.

4. Radio Spares (RS) Components, Part 232-3816 (March 1997), Light Dependent Resistors.

5. Bhimbra P.S, "Power Electronics", 4th edition, Dhanpat Rai and sons, 2000.

6. Current Teaching and Research Projects using LabVIEW Control Design and Simulation, Kim Lankford, National Instruments, VIP 2005.

7. Introduction to Real-time Control using LabVIEW, Ch. Salzmann, D. Gilbert, P.Huguenin.