

Automatic Street Lighting using PLC

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Abstract : Street light controlling using PLC is a novel concept using XD26 PLC controller. In this system manual work is not required. Automatic switch ON and OFF of light in response to sunlight is done by using LDR, which plays a major role. Effect of seasonal variations; increased energy efficiency; low operating costs ; low maintenance costs are advantages of this method. The testing and analysis of this project with accurate operation of the street lights is done involving Crouzet Millenium software.

Keywords : PLC ; XD26 controller ; LDR; Millenium software.

I. INTRODUCTION

Conventional street lighting systems in areas with a low frequency of passersby are Online most of the night without purpose. The consequence is that a large amount of Power is wasted meaninglessly. In order to minimize it a number of street light control systems have been developed to control and reduce energy consumption of a town's public lighting system. These range from controlling a circuit of street lights and/or individual lights with specific ballasts and network operating protocols. These may include sending and receiving instructions via separate data networks, at high frequency over the top of the low voltage supply or wireless. The main aim of this project is that street lighting controller during seasonal variations can be done in two ways according to the survey given below.

Street Lighting Controlling is done by LDR. This component plays a major role. Since this is an hardware circuit to be constructed this also works on the PLC. The output of the LDR circuit is taken as input to the PLC.

II. SOFTWARE DEVELOPEMENT

The Software used for this project is MILLENIUM 3 Programming Language.

The programming language used is FBD (Function Block Diagram). Function Block Diagram Language use Predefined Funtion blocks such as Timers and Counters and specific Functions such as Time Management, Character String, Communication, etc

A. Operating Modes

There are several operating modes for the programming workshop:

Edit Mode: Edit mode is used to construct programs in FBD mode, which corresponds to the development of the application.

Simulation Mode: In simulation mode the program is executed offline directly in the programming workshop .In this mode, each action on the chart (changing the state of an input, output forcing) updates the simulation windows.

Monitoring mode: In Monitoring mode, the program is executed on the controller, the programming workshop is connected to the controller (PC « controller connection)

B. FBD Program in Edit Window

FBD mode allows graphic programming based on the use of predefined function blocks and pre-defined or archived Macros. In FBD programming, there are two types of window and two displays:

The Edit Window: It consists of Program View and Settings View.

The Supervision Window.

III. SIMULATION OF STREET LIGHTING CONTROLLER USING TIMER PROGRAM

Power Control Circuit:

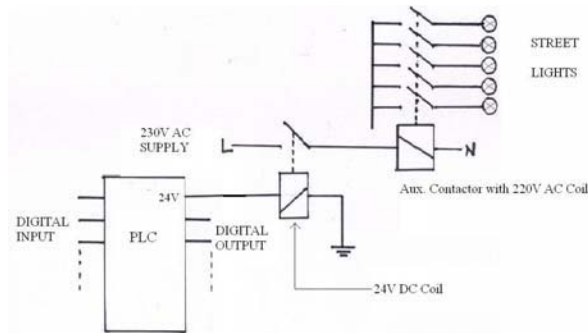


Figure1: PowerControlCircuit

Basic Block Diagram for Street Lighting System:

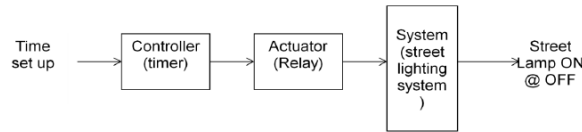


Figure2: BlockDiagram

Function Block Diagram using TIMER PROG Block, SUMMER/WINTER Block, Timer A-C Block and LOGIC GATES :

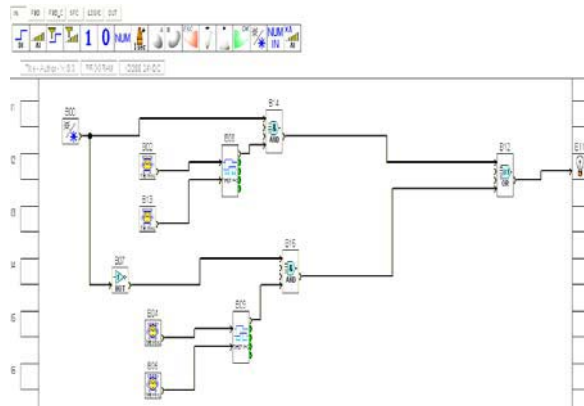


Figure3

TIMER PROG Block must be checked, whether the SUMMER/WINTER Time Change is Active or Inactive. Program Configuration of the same is shown:

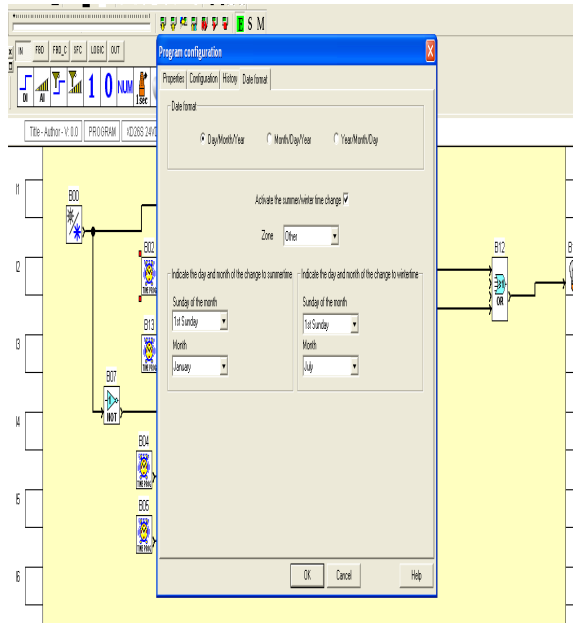


Figure4

To select the range of time during summer for which the Street Lights are made ON and OFF only during these time ranges. Similarly for the B04 Timer Prog Block the range of time during winter season must be SET.

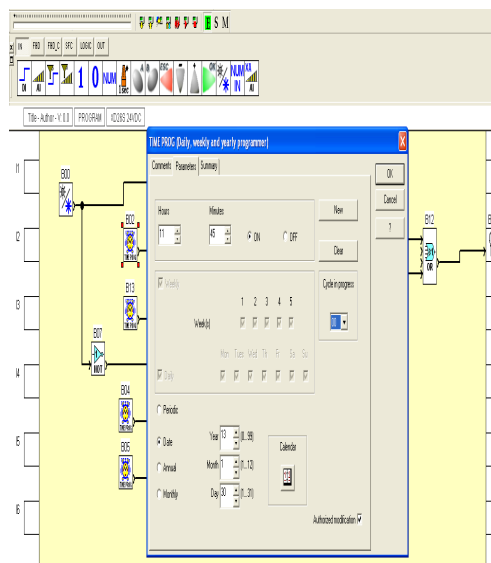


Figure5

Summer season:

Simulation Mode in ON time

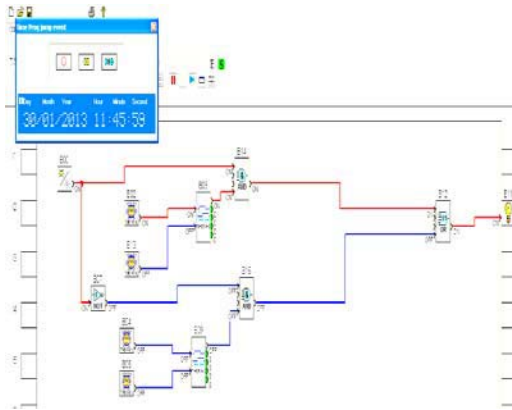


Figure6

Simulation Mode in OFF time:

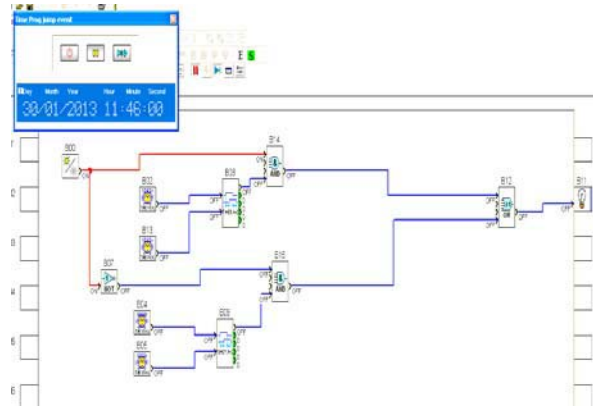


Figure7

Winter Season :

SIMULATION MODE IN ON TIME:

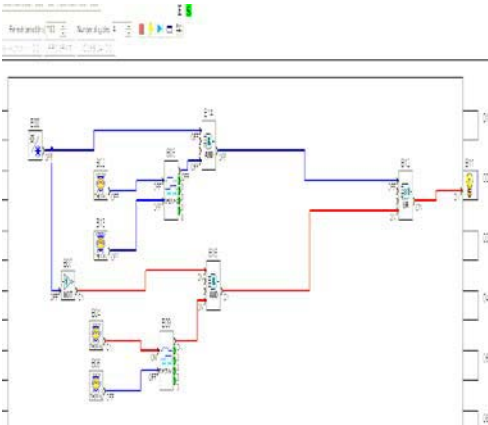


Figure8

SIMULATION MODE IN OFF TIME:

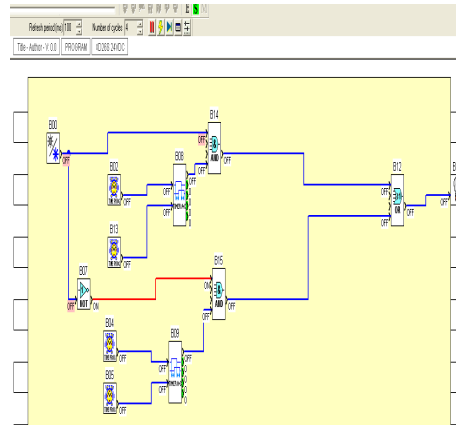


Figure9

IV. EXPERIMENTAL SETUP FOR STREET-LIGHTING CONTROLLER USING LDR

an 8-channel relay module, crouzet millenium plc (programmable logic controller), power supply module are shown on the panel. power supply (24v-dc) is connected to crouzet millenium plc (programmable logic controller). the inputs/outputs pins in plc are connected to the respective relays pins in relay module.



Figure10

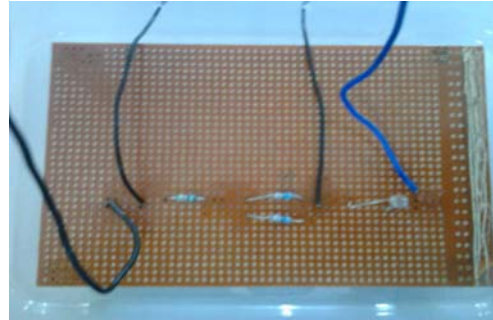


Figure11:LDR hardware circuit

The hardware setup of the Street Lighting Controller using LDR consists of :
 Crouzet Millenium PLC (Programmable Logic Controller) ; Light Dependent Resistor (LDR) Circuit ;
 Power supply (24V-DC) ; Personal computer ; Street Bulbs

V. BLOCK DIAGRAM FOR STREET LIGHTING SYSTEM USING LDR

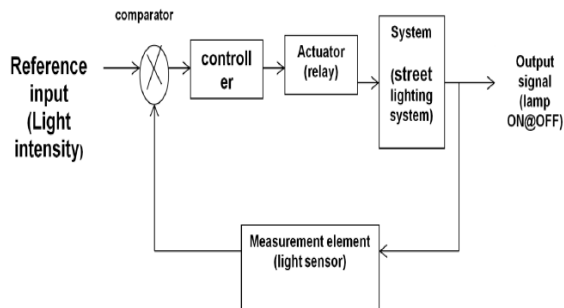


Figure12: BlockDiagram

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