Street Light Control based on Light Intensity using Arduino
Overview

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Introduction

• Light emitting diodes are used as street lights

• A light dependent resistor (LDR) is used to sense the atmospheric light

• LDR has high resistance when it is dark

• Arduino microcontroller is used to control the system
Block Diagram

- Power Supply
- LDR
- Arduino Microcontroller
- LEDs
Hardware requirements

• Microcontroller board – Arduino Uno

• Light Dependent Resistor (LDR)

• Light Emitting Diodes (LEDs)

• Power Supply
Arduino Uno Features

- ATmega328P microcontroller
- Input voltage - 7-12V
- 14 Digital I/O Pins (6 PWM outputs)
- 6 Analog Inputs
- 32k Flash Memory
- 16Mhz Clock Speed
ATMEGA 328P

- 32K bytes of In-System Programmable Flash
- 1K bytes EEPROM
- 2K bytes SRAM
- 23 general purpose I/O lines
- 32 general purpose working registers
- three flexible Timer/Counters with compare modes, internal and external interrupts
- a serial programmable USART
- a byte-oriented 2-wire Serial Interface, an SPI serial port
- a 6-channel 10-bit ADC
- a programmable Watchdog Timer with internal Oscillator
- five software selectable power saving modes.
Light Dependent Resistor (LDR)

- Resistivity is a function of the incident electromagnetic radiation.

- Based on photoconductivity

- Photo conductivity is an optical phenomenon in which the materials conductivity is increased when light is absorbed by the material.

- When a light dependent resistor is kept in dark, its resistance is very high.
Light Emitting Diode (LED)

- It is a p n junction diode which emits light when activated

- The wavelength of the light emitted, and hence the color, depends on the band gap energy of the materials forming the p-n junction.
Power Supply

230 V AC
50 Hz

12V step down transformer

Bridge rectifier

Filter (470μF)

5V Regulator

5V DC
Software requirements

- Tool
  Arduino IDE

- Programming languages used
  Embedded C/C++
Advantages

• Code compatibility and expandability across different Arduino boards

• Cost is less as Arduino is open source

• High Intensity Discharge (HID) based street lights consume more energy, so white LEDs can be used to save energy

• The schematic of Arduino is open source, for the future enhancement of the project board can be extended to add more hardware features.
Conclusion

• LEDs prove to be a good replacement for HID based street lights

• LDR senses the atmospheric light and when it becomes dark, Arduino microcontroller drives the LEDs on
Future Work

• Intensity of LEDs can be controlled during non peak hours by generating pulse width modulated (PWM) signals using Arduino

• Solar energy panel can be added to the circuit and utilized to light up the street lights
References


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