

Street Light Control based on Light Intensity using Arduino

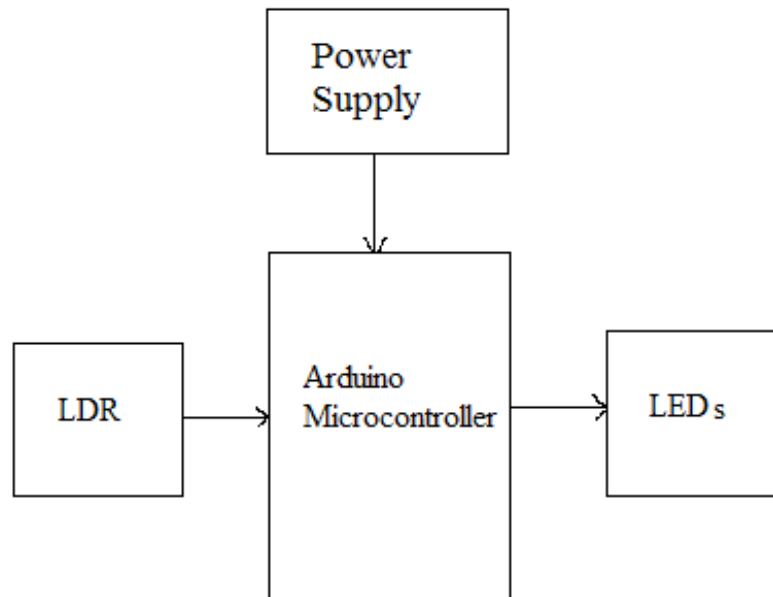
Overview

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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



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.

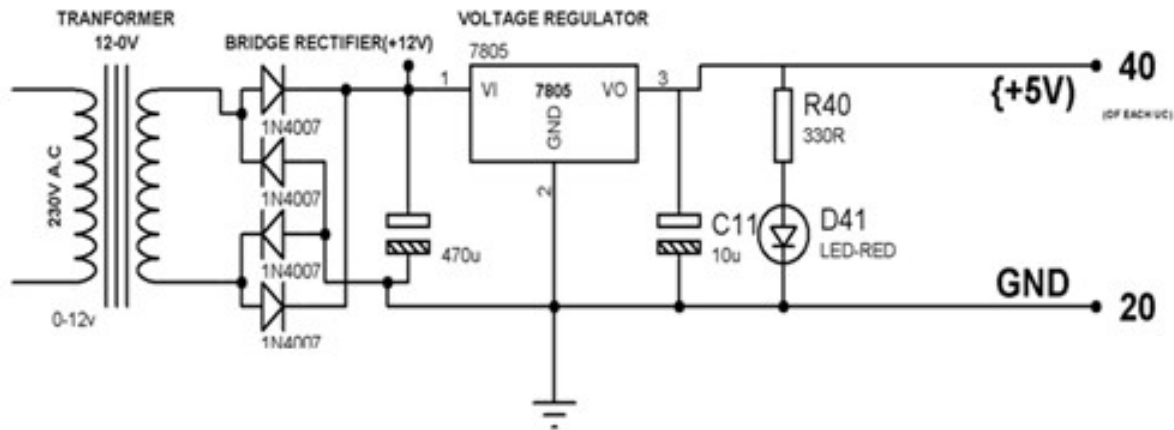
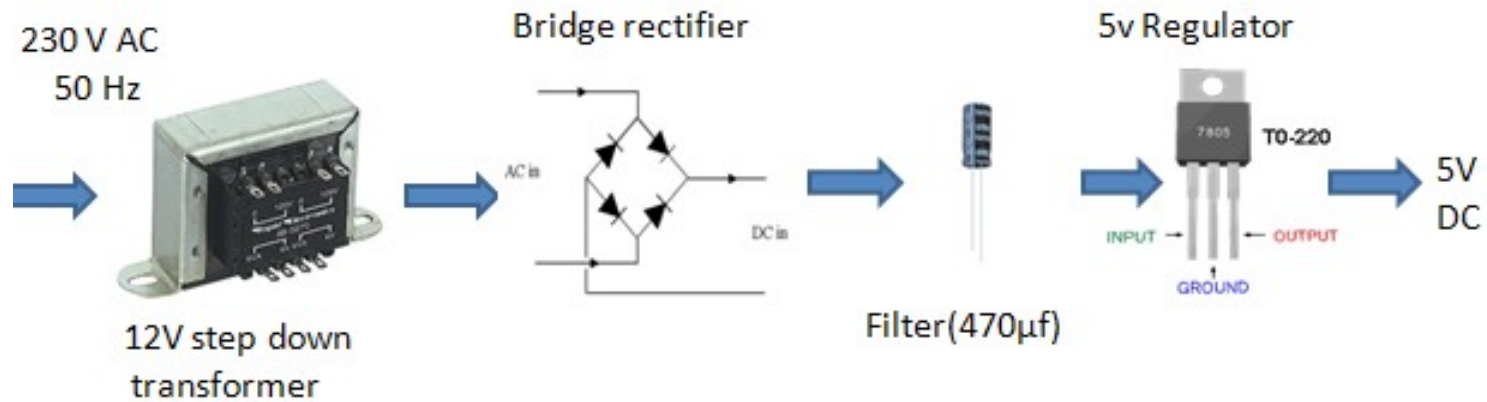


Light Emitting Diode (LED)

- 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



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

1. <http://elementzonline.com/>
2. <https://elementztechblog.wordpress.com/>
3. www.wikipedia.org
4. www.arduino.cc
5. www.circuitstoday.com
6. www.howstuffworks.com