

DIMMING FUNCTIONALITY OF LED BULB: A WORKING MODEL

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Abstract - Now a days, Light-emitting-diodes (LED) are gaining acceptance in the lighting market and replacing traditional lighting sources in a growing list of decorative, display and public lighting applications. The major factors supporting the LED's increasing popularity are its: 1) long lifetime; 2) energy saving property (i.e., high system luminous efficiency). Unlike incandescent and discharge lamps, LEDs are semiconductor devices that are highly sensitive to electrical, thermal, and photonic variations. LED systems should be properly designed and operated, in order to fully utilize their potential benefits. Considering the above features like power saving, high efficiency, long-life use, here implemented led dimming functionality circuit which will control the led at different wattages and hence will be controlled through android app.

Key Words: atmega328, dimmer, arduino uno

1. INTRODUCTION

Lately, as the fourth era of light source, light-emitting diodes (LEDs) have been broadly utilized as a part of numerous applications, for example, road lighting, car, and private lighting as a result of their long lifetime, low support necessity, and condition invitingness. As the execution of LEDs will be impacted clearly by the drivers, analysts have demonstrated a developing enthusiasm for advancing the drivers. Despite the fact that these issues, for example, ebb and flow adjusting, and enhancing the topologies are not new, the high-recurrence high-effectiveness pattern of LED drivers has given rise to additional challenges. Based on a survey on LED drivers and a literature review, a range of LED driver topologies are classified according to their applications, power ratings, performance and their energy storage and regulatory requirements. In order to save power, it is very important to implement led driver which controls the led bulb at different wattages [1]. Hence to make it more convenient to users the whole circuit is driven through an android app.

Here, dimming usefulness is utilized as a part of which dimmers gadgets are utilized to bring down the shine of a light. By changing the voltage waveform connected to the light, it is conceivable to bring down the force of the light output. Although variable-voltage gadgets are utilized for different purposes, the term dimmer is by and large held for those proposed to control light yield from resistive brilliant, halogen, and (all the more as of late) compact fluorescent lights (CFLs) and light-emitting diodes (LEDs). Dimmers run in estimate from little units the span of a light switch utilized for local lighting to high power units utilized as a part of vast theater or architectural lighting installations.

2. WORKING MODEL

From current scenario, it is seen that there are less number of technologies exist which can save power. For this purpose, a model is implemented which will consume power. Arduino board is interfaced with dimmer circuit and control through an android app .Bluetooth module HC05 is used here to connect the app to the circuit .Basically, the Bluetooth module is connected to Tx, Rx pins of the Arduino board. Given the digital output from Arduino board to the dimmer circuit .Then the dimmer circuit will glow the bulb at different wattages such as 5w, 9w, 20w, 30w with different brightness.

A.ARDUINO UNO R3

Arduino/Genuino Uno is a microcontroller board in view of the ATmega328. It has 14 computerized input/output pins (of which 6 can be utilized as PWM output), 6 analog inputs, a 16 MHz quartz crystal, a USB association, a power jack, an ICSP header and a reset catch [2]. It contains everything expected to help the microcontroller.

The Arduino Uno can be controlled by means of the USB association or with an outer power supply. The power source is chosen consequently. The board can work on an outside supply of 6 to 20 volts. In the event that provided with under 7V, in any case, the 5V pin may supply under five volts and the board might be precarious. In the event that utilizing more than 12V, the voltage controller may overheat and harm the board. The prescribed range is 7 to 12 volts

B.ATMEGA 328 IC

The Atmel 8-bit AVR RISC-based microcontroller consolidates 32kB ISP streak memory with read-while-compare abilities, 1kB EEPROM, 2kB SRAM, 23 broadly useful I/O lines, 32 universally useful working registers, three adaptable clock/counters with think about modes, inner and outer intrudes on, serial programmable USART, a byte-arranged 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-diverts in TQFP and QFN/MLF bundles), programmable guard dog clock with inside oscillator, and five programming selectable power sparing modes. The device works between 1.8-5.5 volts.

The device accomplishes throughput moving toward 1 MIPS for every MHz [3].

C.DIMMER CIRCUIT

The board can be utilized as a part of uses where dimming of 110-220V AC control is required like diminishing

of bulb or fan. The input can be basic 4 bit high/low flag from microcontroller working at 3V or 5V which is disconnected with the utilization of opto-couplers. Aggregate of 16 levels of energy control can be set from absolutely off(0%) to full on(100%) according to input control levels

D. BLUETOOTH MODULE

HC-05 module is an easy to utilize Bluetooth SPP (Serial Port Protocol) module, expected for clear remote serial affiliation setup. Serial port Bluetooth module is totally qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio handset and baseband. It uses CSR Blue focus 04-External single chip Bluetooth system with CMOS development and with AFH (Adaptive Frequency Hopping Feature). [4]

E. ANDROID APP

An android App is made here in order to connect Arduino through Bluetooth HC-05. There are various ways in which we can make an Android App. In this project we have use MIT App Inventor 2.

It is an App Inventor for Android is an open-source web application initially gave by Google, and now kept up by the Massachusetts Institute of Technology (MIT). It allows newcomers to PC programming to make programming applications for the Android operating system (OS). It utilizes a graphical interface, fundamentally the same as Scratch and the Star Logo TNG UI, which enables clients to move visual objects to make an application that can run on Android devices.

In making App Inventor, Google drew upon huge earlier research in instructive processing, and additionally work done inside Google on online advancement conditions. [5]

Application Inventor and the undertakings on which it is based are educated by constructionist learning speculations, which underscores that programming can be a vehicle for connecting with intense thoughts through dynamic learning. Accordingly, it is a piece of a continuous development in PCs and training that started with crafted by Seymour Paper and the MIT Logo Group in the 1960s and has additionally showed itself with Mitchel Resnick's work on Lego Mind tempests and Star Logo. MIT App Inventor is likewise upheld with the Firebase Database augmentation. This enables individuals to store information on Google's firebase.

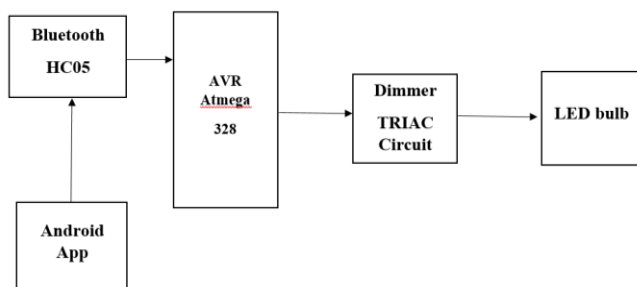


FIGURE1. BLOCK DIAGRAM

3. CONCLUSIONS AND RESULTS

In this module for experiment shortly, 5w named button is pressed in android app, the command A is passed to the dimmer circuit and led bulb glows with 25% brightness, when 9 w named button is pressed B command is send to the dimmer circuit and led bulb glows with 50% brightness, when 20w named button is pressed B command is send to the dimmer circuit and led bulb glows with 75% brightness and also when 30w named button is pressed B command is send to the dimmer circuit and led bulb glows with 100% brightness. When "OFF" button is pressed, E command is send to dimmer circuit and led bulb will turn off.

With dimming functionality of LED bulb using arduino board and dimmer circuit, one can consume energy in daily use. It is basically use to avoid waste of power. As the circuit implemented by us is suitable to drive a led bulb at different wattages such as 5w, 9w, 20w, 30w at different brightness. So one can save the power by operating it on less wattage. One can see that street lights work at same wattage over the full night. But one can reduce their intensity by our led driver when there are no vehicles on the road. This can save power.

4. APPLICATIONS

One can use this dimming functionality circuit using IOT in stadium parks, theatre, homes. Also, in street lights in order to save power.

REFERENCES

- 1) Y. Wang, J. M. Alonso, and X. Ruan, "A review of LED drivers and related technologies," IEEE Trans. Ind. Electron., vol. 64, no. 7, pp. 5754–5765, Jul. 2017.
- 2) AG Smith, "Introduction to Arduino", Sept 2011
- 3) "Atmel 8-bit AVR microcontrollers ATmega328/p" Datasheet complete
- 4) "Remote controlled LED using HC-05 Bluetooth datasheet complete.
- 5) Hardesty, Larry, "The MIT roots of Google's new software".
- 6) "The Arduino source code". The Arduino source code.
- 7) Graf, Rudolf F. "The term crystal oscillator refers to the circuit, not the resonator:" Modern Dictionary of Electronics, 7th Ed. US: Newness'. pp. 162, 163.
- 8) "How Energy-Efficient Light Bulbs Compare with Traditional Incandescent". Energy.gov. February 2018.
- 9) Moreno, Ivan; Avendaño-Alejo, Maximino; Tzonchev, Rumen I. "Designing light-emitting diode arrays for uniform near-field irradiance"
- 10) "Arduino UNO for beginners" - Projects, Programming and Parts". Makerspaces.com. February 2018.
- 11) "The Arduino source code". The Arduino source code