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Instrument To Measure Variation In Intensity Of Light In Terms Of Resistance Of Light Dependent Resistor

NAVEEN KUMAR DUBEY[1]

GITM INSTITUTE OFTECHNOLOGY B.Tech ECE Final Year, Bilaspur, Haryana, India

Dubey.naveen28@gmail.com

Abstract : The proposed instrument is capable of measuring and displaying resistance of LDR (light dependent resistor) with precision. It is created by using MCU (microcontroller unit) as a processing device. This concept of the proposed system has many applications like As itis seen in the day to day life that many times accidents occur when a high beam light falls on the eyes due to the sudden coming of the any vehicle but if the intensity of the light can be varied automatically at that time, then the accident may not occur. Human brain and eyes are not so fast to take decision on this sudden event but this system can make SMART CARS where car is itself taking decision. Similar way the proposed system has applications in street lights, flash lights etc.

Keywords:LDR (light dependent resistor),ATmega16,ADC (Analog to digital convertor),Embedded C, MCU (Microcontroller unit), LCD (liquid crystal display).

I. INTRODUCTION

LDR is used as a sensor to measure light intensity in the industries that's why it is chosen to create proposed system. A processing unit is required to measure the change in light intensity and calibrate it in order to get precise value of variations. LCD is used to display the calibrated value of variation. The variations which is being displayed in LCD can be used to create invents and performed actions. That's why this concept has many applications in real life like in the foggy weather when two vehicles come in front of each other, it is required that as they come closer the intensity of their head light should go a little down so that light intensity of head light may not interfere with the eyesight of opposite vehicle driving driver. But driver is not fast enough to take the sudden decision. Therefore it is better to handover this task to vehicle itself. It can used in the airplane or where variation in light intensity required. Beside this, it also has applications in the medical field, sub-marine, laser technology also.

II. HARDWARE SPECIFICATIONS

AVR architecture based MCU chip ATmega16 is used as a processing unit. It has inbuilt ADC which is used to convert voltage variation into digital value. Equations are written in MCU code for precise calibration.

LDR sensor is used to measure light intensity. Resistance of LDR decreases with increase in intensity of light around it. Its dark resistance is in the range of mega ohms while its light resistance is in the range of low kilo ohms.

An Alphanumeric LCD is used to display the variations. LCD is made to refresh fast in order to display the latest value of variation occur due to change in light.

The proposed system run on 5 volt power supply which is taken out from a voltage regulator IC 7805 and 9 volt battery.

III. CALIBRATION EQUATIONS

$$Va = \frac{(D+1)\ x\ 5}{1024} \qquad (1)$$

$$R = \frac{(5.00-Va)\ x\ R1}{Va} \qquad (2)$$

Va=Input Voltage at Port Pin in Volt

D=Digital converted Value Of analog input

R1=Resistance used in voltage divider in ohms

R=LDR resistance in ohms

IV. WORKING

As the power supply is givento board, it starts reading the voltage at the LDR node. The voltage is in analog which is converted into digital value with high precisionby using ADC of MCU. ADC breaks the analog reference voltage of 5V into 1024 parts which gives a measurement precision of approximately 5mV. MCU is programmed to use its inbuilt ADC. After getting the conversion,code calculatesthe analog value of voltageat theLDR node by using first equation1 mentioned above. Then the resistanceof LDR is calculated and calibrated by using the equation2.After that it will show the value of resistance of LDR in ohms and value of node voltage in volt on alphanumeric LCD. The above process is shown in a flowchart in Fig 1.

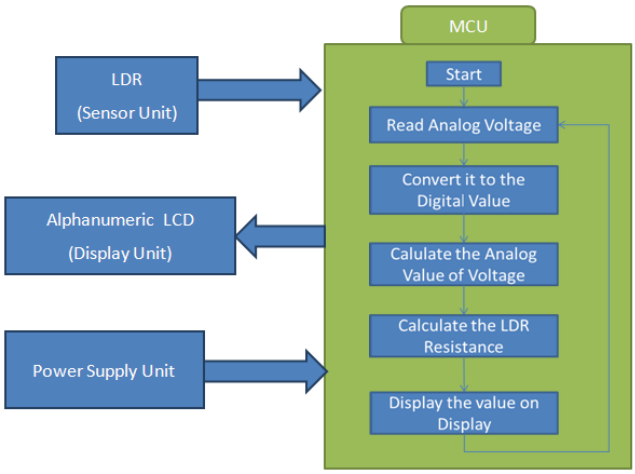

Fig 1. Flow chart of the proposed concept

V. CONCLUSION

The proposed system has successfully measured the change in light intensity with precision and is able to give approximately1024 different events to perform actions. Equations are written in the programming to calibrate and display precision values. This has many applications in real life like in vehicles, airplane, street lights and medicals.

REFERENCES

[1] Ahmed Sharique Anees, Anupriya, Ayushy Chowdhary, Shalini Dubey, Shweta Verma, "SOLAR POWERED LED STREETLIGHT WITH AUTOMATIC INTENSITY CONTROL", INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN ELECTRICAL, ELECTRONICS, INSTRUMENTATION AND CONTROL ENGINEERING, Volume 3, Issue 6, June 2015.

[2] K. Govinda, Udit Mishra, Apurv Ekansh, "Night Lamp Controller", IJSRD - International Journal for Scientific Research & Development, Volume 2, Issue 03, 2014.

[3] K.S. Ruchitha, Neelakshi Agarwal, Soumya Anand, Anurima Das, Rajasree P.M, "Design and Development of Automatic Adjustment of Street Light Intensity", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 5, Issue 4, April 2016.

[4] MUSTAFA SAAD, ABDALHALIM FARIJ, AHAMED SALAH and ABDALROOF ABDALJALIL, "Automatic Street Light Control System Using Microcontroller", Mathematical Methods and Optimization Techniques in Engineering.

[5] Sharath Patil G.S, Rudresh S.M, Kallendrachari.K ,M Kiran Kumar, Vani H.V, "Design and Implementation of Automatic Street Light Control Using Sensors and Solar Panel", Int. Journal of Engineering Research and Applications, Vol. 5, Issue 6, (Part - 1) June 2015.

[6] J. Liu, C. Feng, X. Suo, and A. Yun, "Street lamp control system based on power carrier wave," in Proc. Int. Symp. Intell. Inf. Technol. Appl. Workshops, Dec. 21–22, 2008.