An Experimental Scheme of Optoelectronic One Bit Latch by the Use of LDR and LED Coupling

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Abstract
Optics has many inherent advantages in high speed (over THz) logic operation, Computation and data processing over electronics. Opto-electronic systems are faster than electronic system and optical (photonic) systems are more faster than opto-electronic systems. In this paper the authors have proposed a new scheme of implementing one bit opto-electronic latch (flip-flop) with LDR-LED coupling mechanism, where the light from LED is fed back with LDR input. This latch serves as one bit memory cell also. The scheme is supported by experimental verification also. This latch gives an optical output in respect of an optical input. In this proposed system an optical output is obtained which describes the earlier memory bit stored in it.

Keywords
LDR, LED, Optical Logic, Optical Latch

I. Introduction
Light Emitting Diode (LED) is an important optoelectronic source which gives intensity modulated light from an applied electronic signal. One electronic message signal is given as input here to produce intensity modulated light signal. Any LED can be used also as a light source for fiber optic communication system. Again a LDR (Light dependent resistor) is an electrical conductivity with increased light intensity applied to it. The LDR is used as a sensor in systems where it is necessary to detect the intensity level of light. Therefore it serves as an optical sensor. LDR is a photo-Conductor which is made of Cds, Cdse etc. Normally in absence of light LDR provides a large value of resistance in the order of MΩ, but as it is illuminated with light, its resistance drops to the range of few ohms. It is already established that light has string applications in information processing and data computation [1-4]. There are many proposed optical devices which can act as of optical logic element. These logic gates are fast, reliable and consumes a small power [5-7]. In this paper we have developed an experimental system which couples the LDR with LED and this coupling arrangement gives a prototype optical latch.

II. Operational System of LDR-LED Coupler Based Latch
The experimental circuit diagram for the proposed scheme is shown in figure (Fig. 1). A part of the light given by LED is fed back to the LDR.

From the circuit diagram it is seen that when there is no light, LDR has the maximum resistance in complete darkness. When some light from external source comes to LDR, its resistance drops and therefore LED glows. A part of the light goes to LED as feedback. Now when the external light source is withdrawn the light from LED helps the LDR to continue its lowering of resistance for which LED is also continued to glow, so one can get an output light from the LED. Now when by some obstruction the LED light is made absent to fall on LDR, the circuit goes to its previous state, that is LED stops its glowing. Now to make the LED glow again one should require the external source again.

III. Experimental Results
In Fig. 2, in a running system the voltage − resistance of LDR characteristics is shown from the experimental result and in Fig -3, the voltage current characteristics is shown also from the experimental result of the system designed. By the following truth − table (Table 1) the operation of the latch is described.
Table 1: The Operation of the Latch

<table>
<thead>
<tr>
<th>External source of light</th>
<th>LED light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Given</td>
<td>Obtained</td>
</tr>
<tr>
<td>Withdrawn</td>
<td>Continued</td>
</tr>
</tbody>
</table>

**IV. Conclusion**

This is an optical (Optoelectronic) latch. By this experiment we have established the optical operation of the latch. The response time of LDR is slow. If the LDR is substituted by Photodiode or Photo-transistors the speed of the latch operation will be very fast and it can overcome the speed of operation of an electronic latch.

**References**


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