Light Emitting Diode Basics

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Introduction

- A **light-emitting diode** (**LED**) :-- It is basically a p–n junction diode that emits light when current passing through it. electrons are able to recombine with holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.

Construction
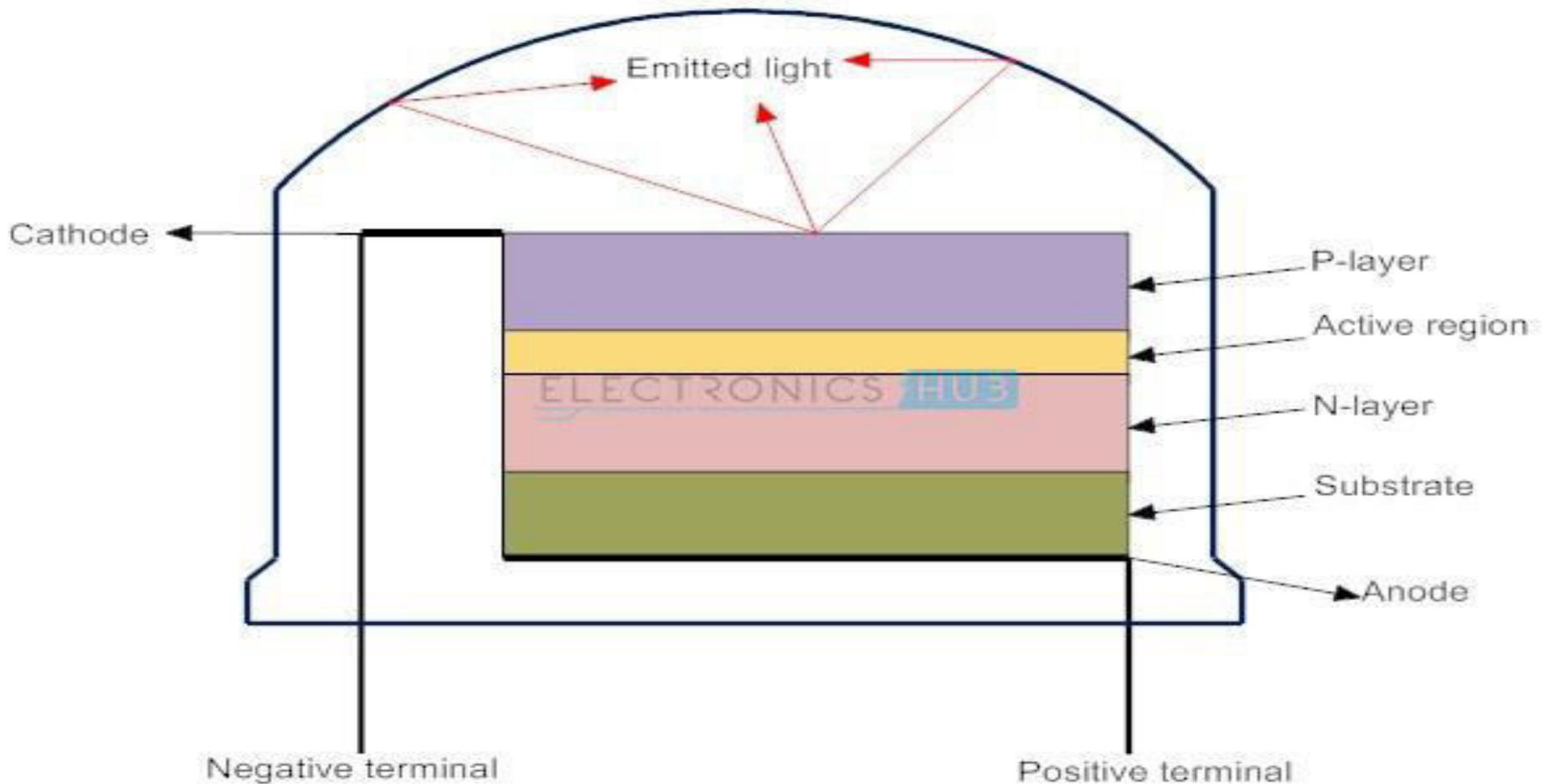
Working of LED
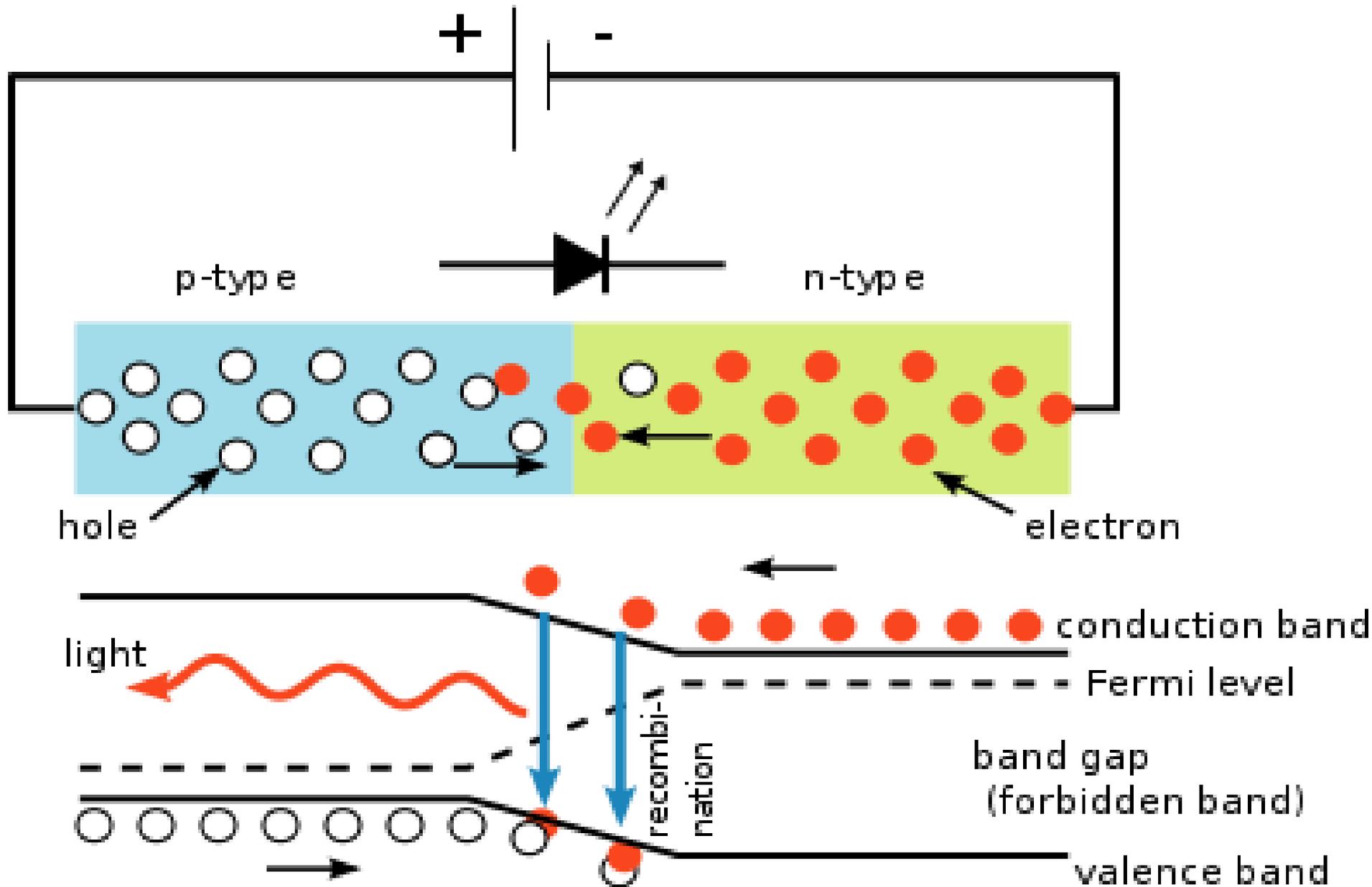
Energy of emitted photon

$$E = h\nu = \frac{hc}{\lambda}$$

E = Energy of a single photon

$h = 6.626 \times 10^{-34} \, \text{J} \cdot \text{s}$ (Planck's constant)

ν = frequency (Hz)

λ = wavelength (m)

$c = 2.998 \times 10^8 \, \text{m}/\text{s}$ (speed of light)
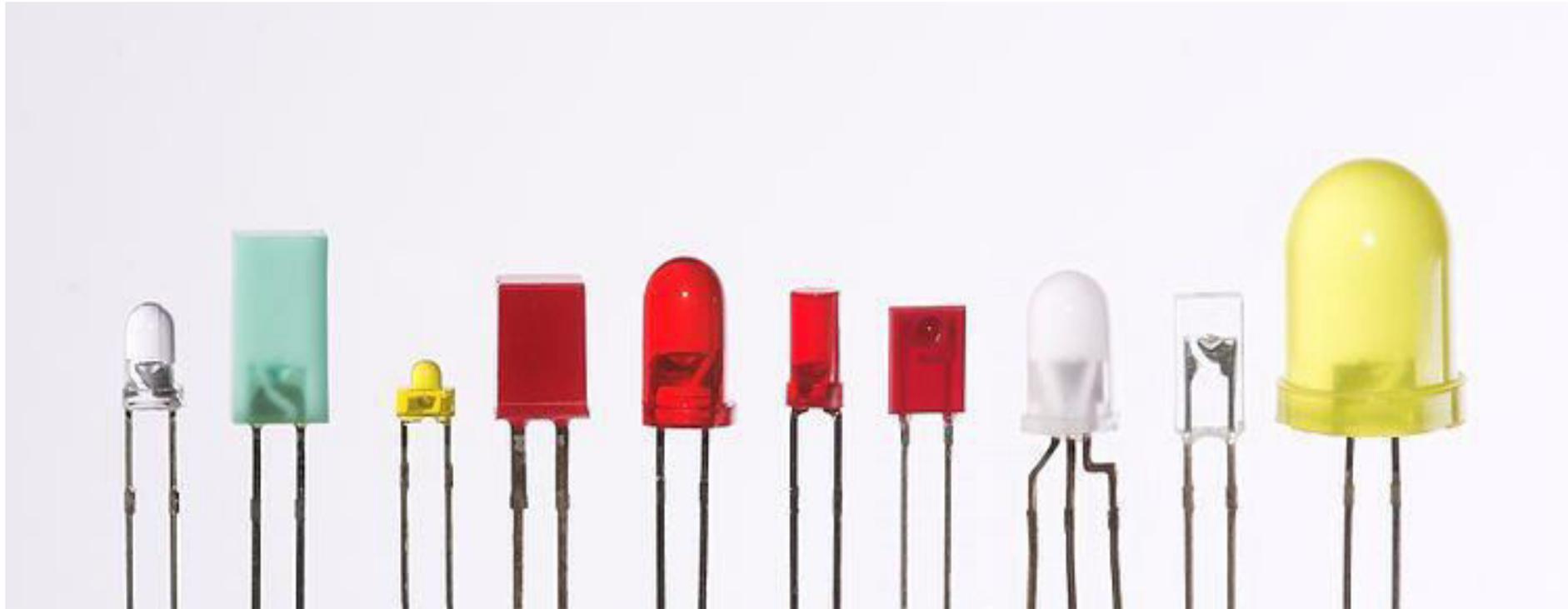
Energy of photon emitted :

- $E_g = E_c - E_v = h\nu$

    Where E_g : energy gap in e.v.

-            E_c : Energy at the conduction band

-            E_v : Energy at the Valence band

LEDs are produced in a variety of shapes and sizes

Colour of LED depends on material

- Ga As (Gallium arsenide) → Infrared Radiation

- Ga P(Gallium Phosphide) → Red OR Green Light

- Ga As P --> Red OR Yellow Light

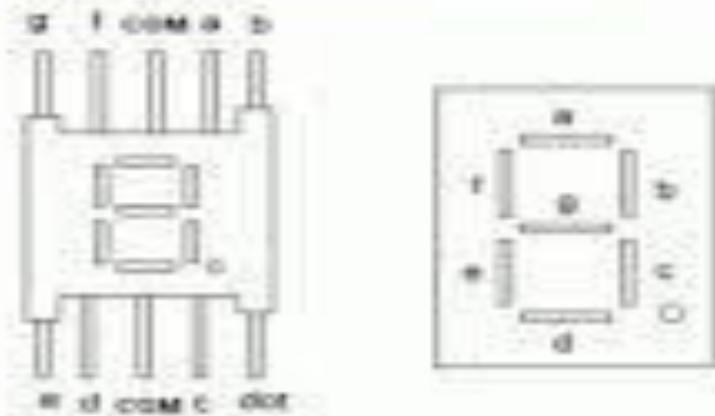# Applications : Traffic signals

Automotive Application for LED:

Led are used in seven segment display

Seven segment displays are used to indicate numerical information. Seven segments display can display digits from 0 to 9 and even we can display few characters like A. b. C. H. E. e. F. etc. These are very popular and have many more applications. Before going to start this concept, get an idea about how to interface LEDs with 8051 Microcontroller.

Seven-Segment Display

LED Applications

LED Applications

- Successfully used today for many markets
  - Signs
  - Traffic signals
  - Displays (change colors for attention)
  - Exit Signs (most common)
  - Indicators
  - Flashlights
  - Parking Garage & Outdoor
  - Commercial
  - Food Freezers
  - Offices

Thank you