LED Light Pen

Myo Min

Physicians and repair engineers often use small light pens for visual examination purposes. Rugged and expensive as these pens may be, their weak point is the bulb, which is a 'serviceable' part. In practice, that nearly always equates to 'expensive' and / or 'impossible to find' when you need one.

LEDs have a much longer life than bulbs and the latest ultra bright white ones also offer higher energy-to-light conversion efficiency. On the down side, LEDs require a small electronic helper circuit called 'constant-current source' to get the most out of them.

Here, T1 and R1 switch on the LED. R2 acts as a current sensor with T2 shunting off (most of) T1's base bias current when the voltage developed across R2 exceeds about 0.65 V. The constant current through the white LED is calculated from

$$R2 = 0.65 / I_{LED}$$

With some skill the complete circuit can be built such that its size is equal to an AA battery. The four button cells take the place of the other AA battery that used to be inside the light pen.

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