

ezSystem elab6 Project 5s: Smart Light Dimmer

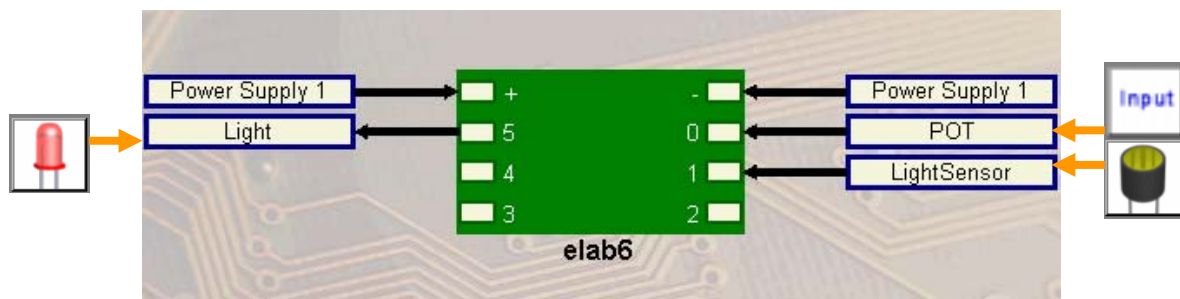
Project description:

The project is a smart light dimmer to save power that uses the elab6, a LED, a Light Dependent Resistor and a potentiometer.

The amount of light emitted by the LED is controlled by the potentiometer by changing the on/off duty cycle at a high frequency. Duty Cycle means the percentage of ON-Time compared to Off-Time. This is called Pulse Width Modulation (PWM).

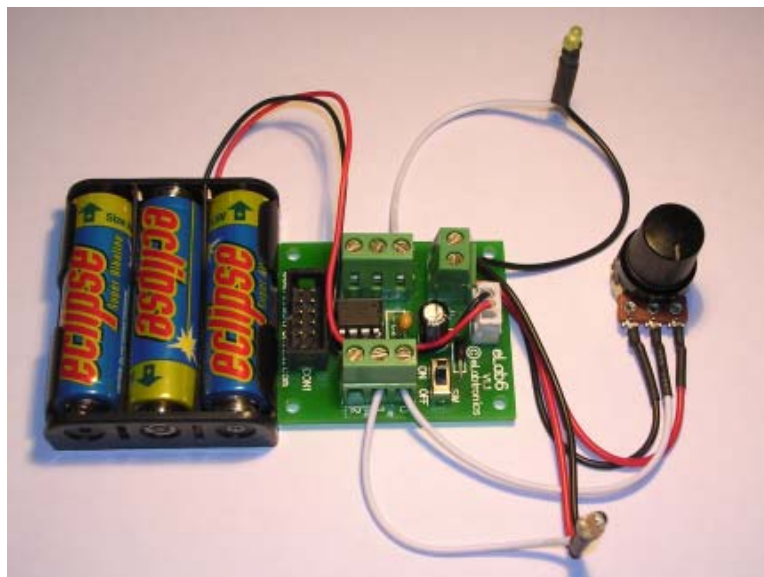
1. Design the Smart Light Dimmer

Use ezCircuit Designer to construct an input / output (I/O) diagram



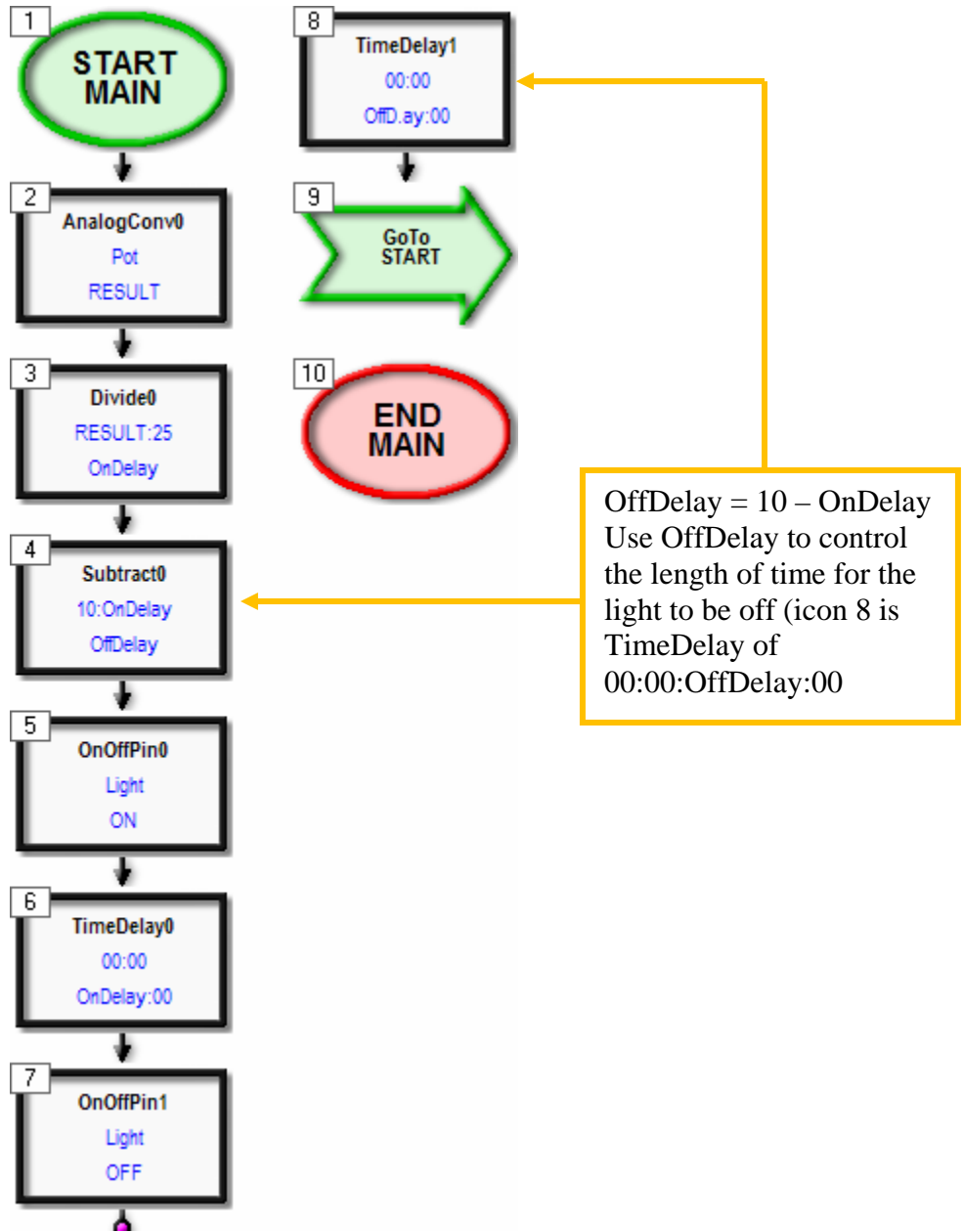
2. Build the Smart Light Dimmer

Use ezCircuit Designer I/O diagram to connect the hardware



3. Program the Smart Light Dimmer

Use ezCoreChart to program the functions of the smart light dimmer



Extension

We can use a Light Dependent Resistor to reduce the brightness of the smart light to save power.

1. Modify the smart light dimmer program so that the light sensor is used to control the brightness of the light. The smart light LED's brightness will be reduced when there is a high level of ambient light and increased when there is a low level of ambient light.

Hint: Pot Setting = Pot Setting – Ambient Light Level from LDR

We can increase the number of brightness levels (resolution) of the smart light e.g. from 10 levels in the original program to 25 levels.

When the analogue value of the potentiometer is converted, the digital value is a number between 0 and 255. The original Smart Light Dimmer program has 10 brightness levels which are calculated by dividing the largest digital value of the potentiometer by 25 ($255 \div 25 = 10$), the remainder is not used. This limits OnDelay to values between 0-10 inclusive (the microcontroller cannot process fractions), thus limiting the brightness levels to ten distinct levels.

2. Modify the Light Dimmer program so that it has 25 brightness levels instead of 10. What effect will this change have on the PWM frequency of the light dimmer?