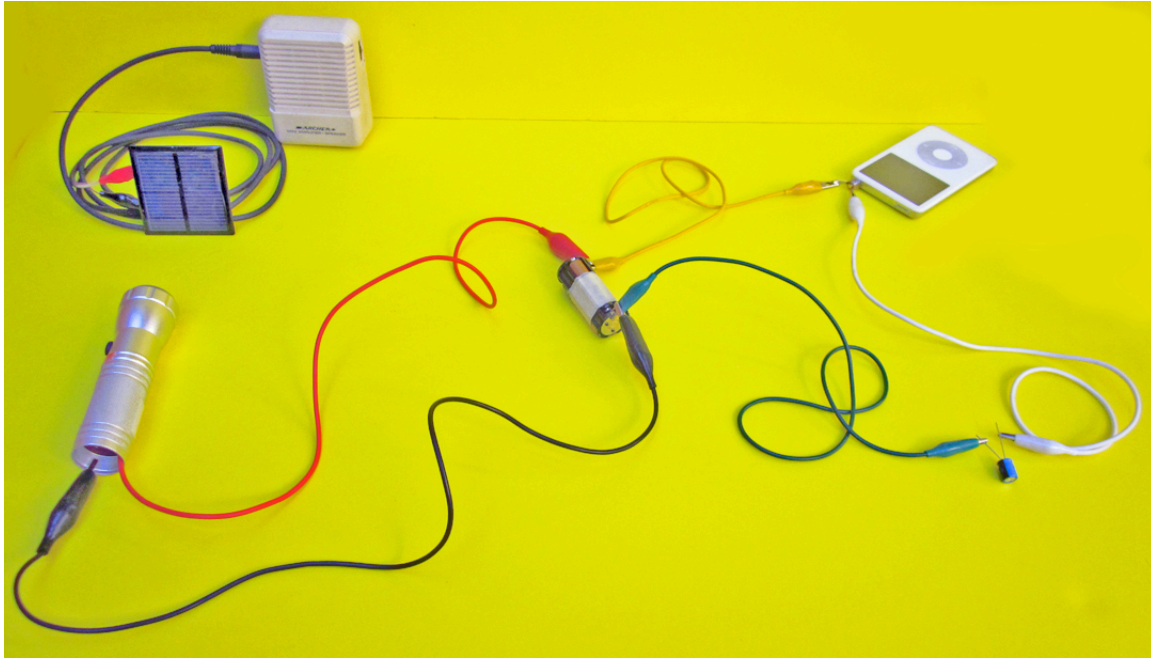


Modulated LED Flashlight

Sound is transmitted on a beam of light

An iPod is used to modulate the light from an LED flashlight. A solar cell converts the modulated light to an electrical signal that is converted back to the original sound by a small amplified speaker.

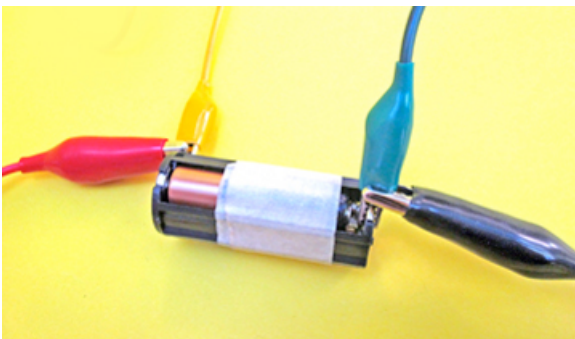
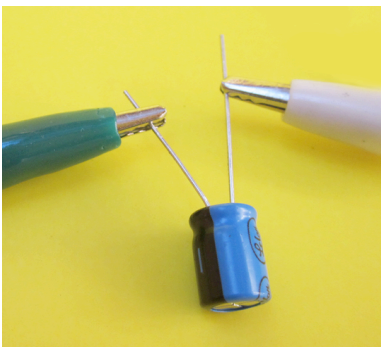


The photo above shows the overall scheme. Photos on the reverse side of the page show details.

LED flashlights with several LED's can be readily and inexpensively obtained at hardware and home improvement stores. They commonly use 3 AAA batteries held in a battery pack. The battery pack is removed from the flashlight body and is wired in series with the body to complete the flashlight circuit (if the flashlight won't light, try reversing the battery pack -- battery polarity must be correct to allow current flow through the LED's). The iPod is then wired in parallel with the battery pack (polarity not a factor for this connection). The light from the modulated beam is directed at a solar cell which is connected to a small amplified speaker.

The photo above shows an external capacitor (lower right part of the photo) in series with the iPod. The iPod used in the photos in this write-up has been used for several years without the capacitor with no ill effects. But the capacitor is shown in place as precautionary protection in the event a different model iPod actually used happens to be inductively coupled rather than capacitively coupled. If the iPod is inductively coupled, the external capacitor will hopefully prevent any shorting of the dc current from the battery pack through the iPod that might result in damage. 100 μ f or 10 μ f both worked well in the setup shown. Thanks to Paul Doherty for this tip.

The venerable amplified speaker model shown was still available at Radio Shack at this writing for \$14.99. Radio Shack # 277-1008.



The original version of Modulated LED can be found in Square Wheels, co-authored by Don Rathjen and Paul Doherty, published by the Exploratorium in 2002, pp. 51-54. It can also be found online at www.exploratorium.edu/square_wheels/modulated_led.pdf www.exo.net/~donr/activities/Modulated_LED.pdf Thanks to Carl Ahlers for the idea of using the LED flashlight as an alternative to the LED, resistor and battery used in the original version.

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