SleepLite

PART NO. 2184157

If you have a hard time sleeping and would like to hack your way to a better sleep, then SleepLite is for you!

It works for anyone that needs to sleep but usually has a hard time due to anxiety, stress, or too many thoughts while trying to go to sleep.

SleepLite works by twinkling a calming blue light at a special rate on your ceiling. As you lay down and stare at the light your mind will soothe into a deep sleep that will produce a fresh new you the next morning.

This kit is fully open source and has the code available online, so you can hack it and tweak it all you want! Hack your way to a better sleep and help yourself!

Time Required: 30 minutes depending on experience

Experience Level: Intermediate

Required tools and parts:

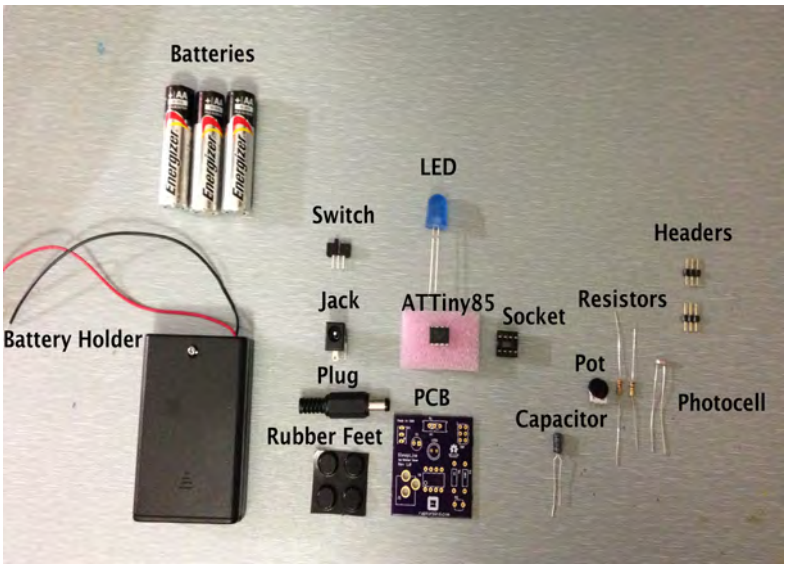
Jumper wires
Small breadboard
Soldering iron
Solder
Helping hand soldering tool
Ventilation for soldering
Wire snips or scissors
Tape

Bill of Materials:

Qty	Jameco SKU	Component Name
1	2152147	Blue LED 10mm
1	2151312	ATTiny85
10	526299	IC Socket
1	101179	Power Jack 2.1mm Barrel
10	1946367	Capacitor 10uF
1	2161393	Potentiometer 5K
1	109171	Switch
1	115035	Header 2x3
10	2157159	Resistor 1K
10	2157167	Resistor 10K
1	202403	Photocell
1	28760	Plug
1	216144	Battery Holder
4	2112444	Batteries
1	2119718	Rubber Feet
1		PCB

Step 1 - Identify Parts

Identify all the parts and make sure you have everything.
These are the battery holder, 3 AA batteries, switch, jack, plug, rubber feet, PCB, ATTiny85 micro controller, blue 10mm LED, socket, 10uF capacitor, 5K potentiometer, 10K resistor, 1K resistor, photocell, headers.



Step 2 - Upload Code to Microcontroller

The ATTiny85 microcontroller is preloaded with the program. You could change the code and re-upload if you want.
To do this you will need an Arduino Uno, computer, USB cable, jumper wires, small breadboard, and you can use the 10uF capacitor that's included with this kit.

Upload the code to the ATTiny85 using our instructions and code on our website: raptorbird.com/RaptorBird/SleepLite_Kit.html

Step 3 - Begin Soldering

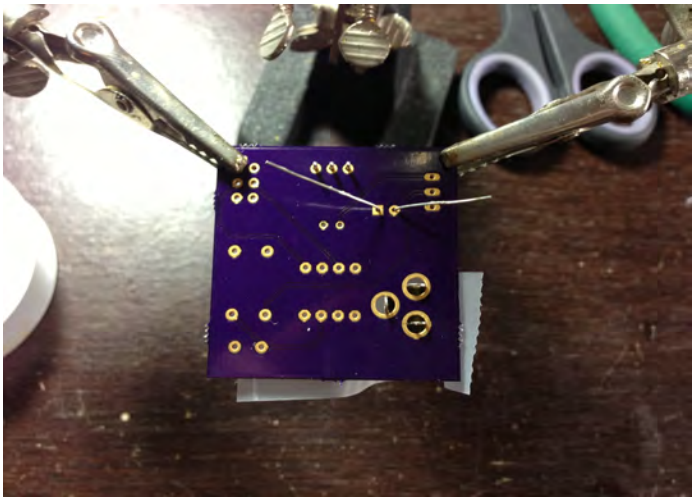
We will begin by soldering the barrel jack connector, switch, and capacitor (make sure to connect the capacitor in the proper orientation, as it's polarized). The negative side of the capacitor should go to the hole marked by a negative symbol on the printed circuit board.
First insert these components into the PCB.

Step 4 - Secure Components

Place some tape over the components to ensure they sit still when we flip the PCB over and solder.

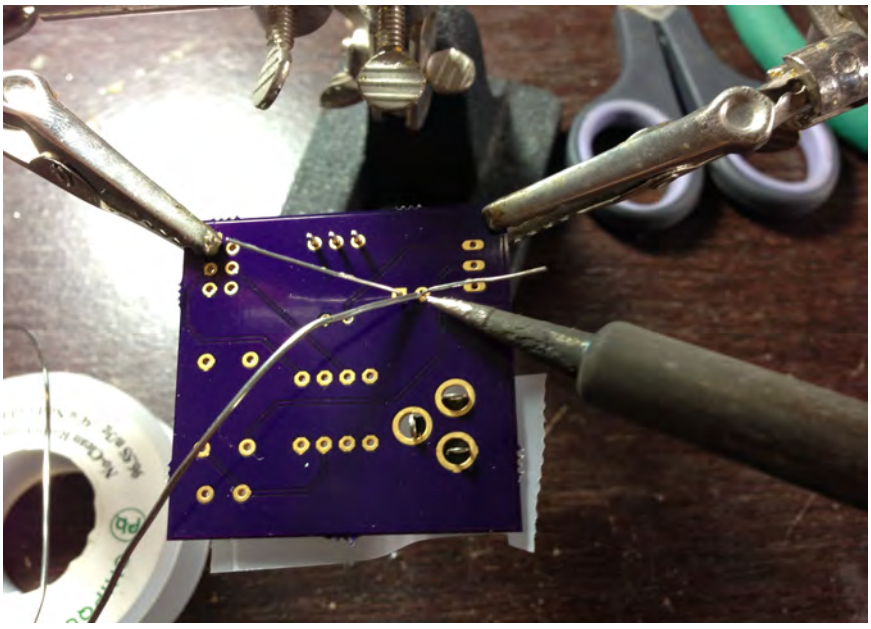
Step 5 - Flip Board Over and Locate Soldering Points

Flip the PCB over and bend the leads of the capacitor to ensure the capacitor doesn't move when soldering. Do this to all of the long lead components in the future.



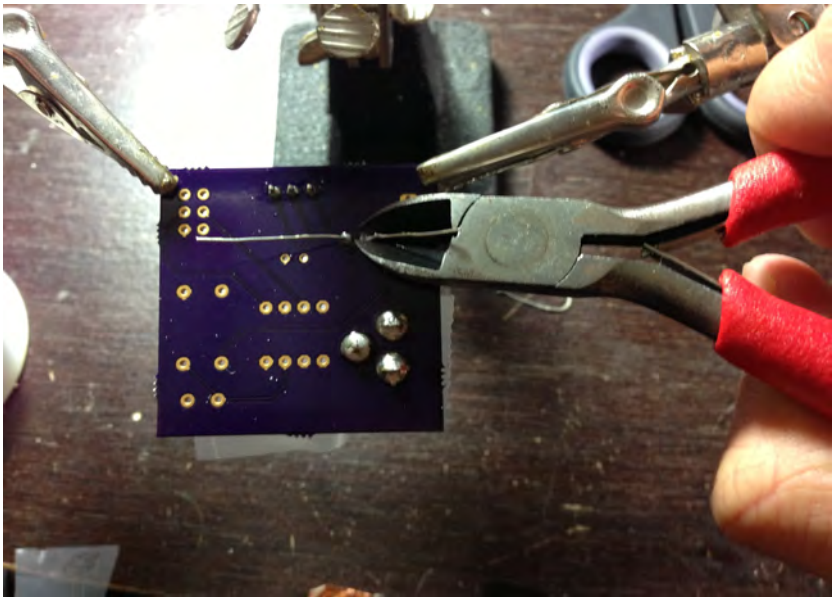
Step 6 - Start to Solder

Start soldering by heating up the component lead with the soldering iron, then push the solder in to the touching point of the iron and the component lead. The solder should flow around the joint, then remove the solder and iron and let cool. Do this to all of the leads from all of the components you've inserted.



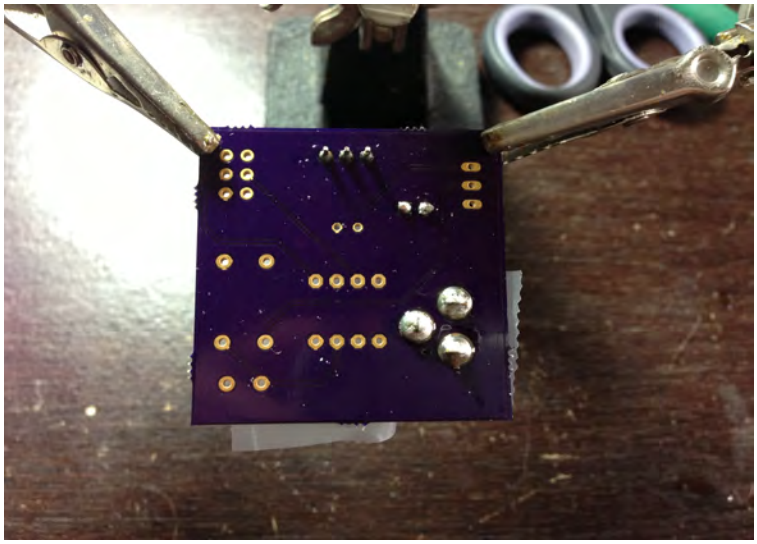
Step 7 - Clip the Leads

Use wire snips or scissors to cut the extra leads extruding from the board. These are excess and aren't needed. Cutting this will also ensure that the board will sit flat on your night stand. Cut right above the solder point, don't cut the actual solder point.



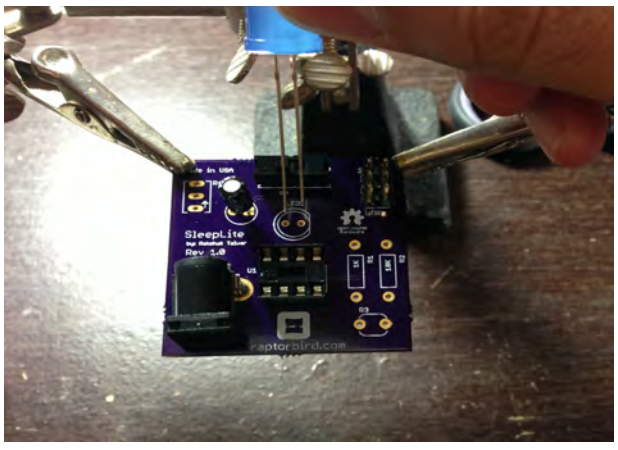
Step 8 - Solder the Rest of the Components on the Board

Finish soldering the rest of the components just as you did before.



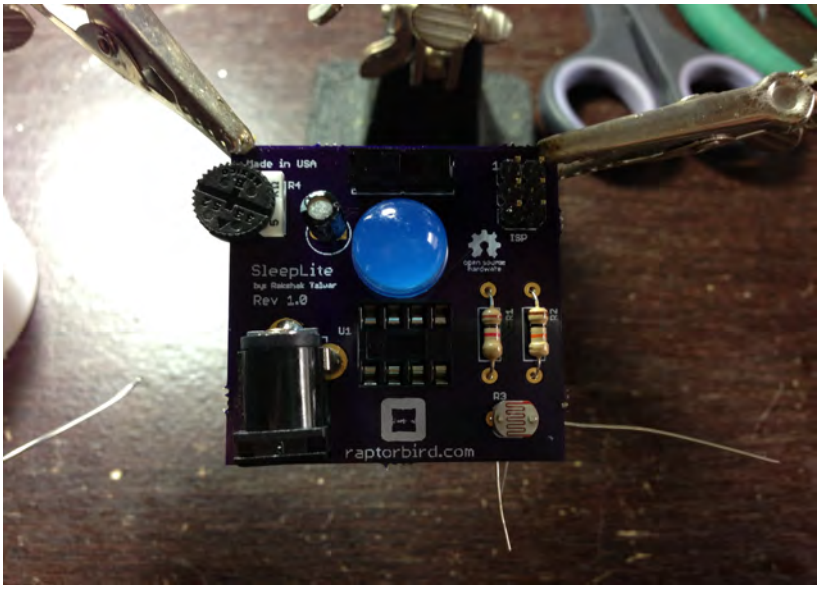
Step 9 - Solder LED and Socket

Next, solder the 8-pin IC socket, blue LED, and 6-pin header.
Ensure that the long lead of the LED goes to the side of the round part of the PCB silkscreen outline. The shorter lead should go to the flat side of the silkscreen outline. Look at the picture for reference.



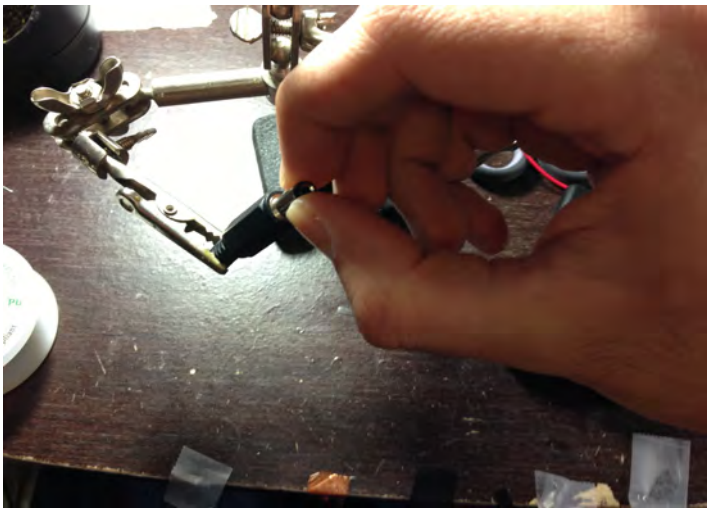
Step 10 - Soldering the Resistors and Photocell

Then solder the photocell, potentiometer, and resistors. Note: Please make sure to put the correct resistor in the correct place. There are two resistors. A 10K Ohm which is color-coded brown-black-orange-gold, and a 1K Ohm which is color-coded brown-black-red-gold. Mixing up these two resistors will cause your circuit to not function.
The printed circuit board has these labeled for your convenience.



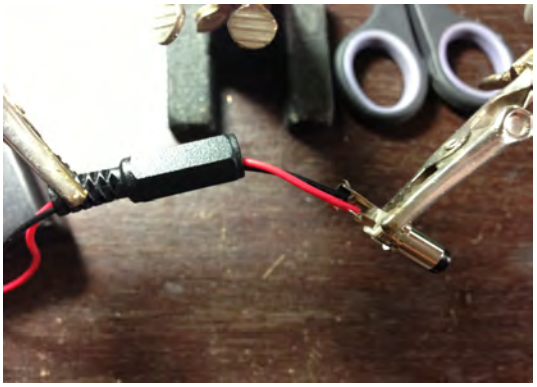
Step 11 - Unscrew Plug

Next you need to solder the battery holder's wires to the barrel jack adapter. Unscrew the metal portion of the barrel jack connector from the plastic base by twisting it in a counterclockwise direction.



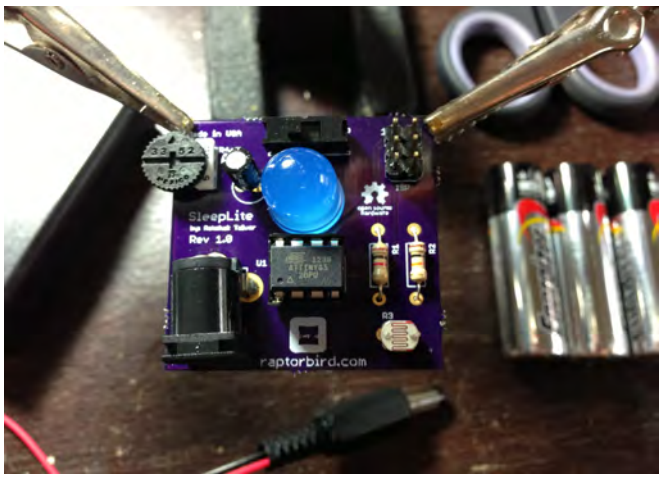
Step 12 - Solder Battery Holder Connectors

Slip both wires from the battery holder through the black base (first through the narrow portion then out the wider portion) and then solder the red wire to the smaller center lead on the metal piece of the barrel jack and the black wire to the larger outer metal piece of the barrel jack adapter. Then screw the metal part of the adapter to the black base.



Step 13 - Insert Microcontroller

Insert ATTiny85 into IC socket. Make sure to place correctly, the little dimple on the ATTiny85 should be towards the bottom left, and the text on the ATTiny85 should be right side up along with the rest of the PCB.

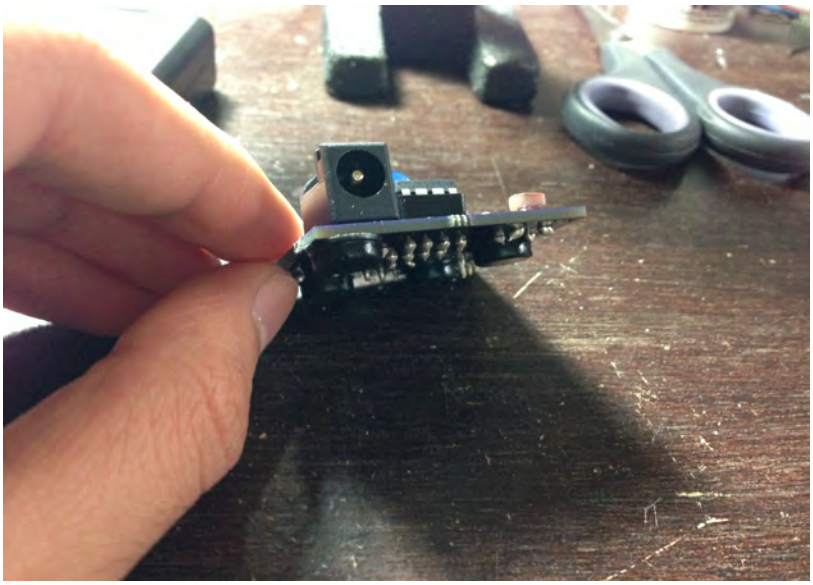


Step 14 - Insert Batteries

Insert batteries into the battery holder (please insert in the proper orientation or you can damage the circuit, the flat negative side of the battery should go to the spring side of the battery holder).

Step 15 - Attach Rubber Feet

Attach the four adhesive rubber bumper feet onto the corners of the bottom of the printed circuit board.



Step 16 - Insert Power and Enjoy!

Plug the battery holder into the barrel jack of the printed circuit board, turn the switch to the left position, and leave on your nightstand.

Step 17 - How to Use SleepLite

When it's dark the LED should fade in and out at specific rates to help you go to sleep. The LED initially fades in and out at 1 Hz (one cycle per second). Then over a period of about 9 minutes the LED oscillates at 0.75 Hz. This gradual change in frequency helps you sleep by gently relaxing your heart rate and lowering your stress and anxiety levels.

In order to see the light fade in and out, place your SleepLite on your nightstand (or any other flat surface) and allow the light to gently illuminate your ceiling. To adjust the light levels, turn the potentiometer knob on the top left of your PCB.

How it works: Your heart usually beats at 60 BPM (beats per minute) which can also be written as 1Hz. The blue LED in the SleepLite follows the same pattern. As your eyes begin to focus on the light, your heart automatically synchronizes with it. Over time, the frequency reduces and your heartbeat follows. This drop in frequency in your heartbeat safely relaxes you to sleep and eliminates your anxiety and stress.
The blue color also helps you relax because our brains are hardwired into finding blue to be a soothing and relaxing color.
So lay down, relax, and watch the light show.

Step 18 - How the Circuit Works

The LED is powered from the ATTiny85 microcontroller. The fading effect is achieved through PWM(Pulse Width Modulation) which changes the duty cycle(amount of time it's on versus amount of time it's off) of the signal, resulting in a change of brightness.
The current through the LED is limited by the 1K Ohm resistor and the potentiometer. You can change the brightness by turning the knob on the circuit because turning the knob changes the resistance of the potentiometer which allows more or less current to get through.

To ensure that the SleepLite is on only when it's dark, there is a photocell. The photocell is a light-sensitive resistor whose resistance changes according to the light it receives. The photocell, along with the 10K Ohm resistor, form a voltage divider. The voltage divider outputs a voltage signal that corresponds with the light level of the surrounding area. This voltage is read by the microcontroller so it knows when to turn the LED on.

Step 19 - Appreciation

Remember that you can change the code and create new features for your SleepLite! The code includes comments to show you exactly what is going on. Feel free to hack it!
If you have any questions, comments or concerns please contact me through my website at: raptorbird.com/

Thanks, I hope you enjoy your SleepLite!

Sincerely,
Rakshak Talwar, Inventor of SleepLite