01 January 2003 - Minor Revision

A Simple Sex Toy Controller You Can Build for Use with StimBot

A Simple Sex Toy Controller You Can Build

This project is a follow up to the original controller. Not everyone has an Intel® based computer (some people actually own Macs) and not everyone wanted to connect their toys directly to the computer. This project uses a light sensitive resistor (cadmium sulfide or CdS cell) to let the program control your toy via the video display (computer monitor). It's powered by 6 volt battery pack.

This project is very simple and should cost you about $20 (ours cost about $3.00 for parts at an electronics discount store) or less to build excluding the toy and batteries. First you'll need to get the following items. The components have been selected from the Radio Shack® web site so you can get them locally from a Radio Shack®store. If you live in a large city you may be able to find an electronics discount store and purchase the components for alot less. If you're talking to the counter person and they ask what you're trying to build just tell them you're building a simple computer interface to experiment with. Cut out the list below and give it to the counter person. Here's what you'll need:In addition to the list you'll also need a 3 volt **BATTERY POWERED** vibrator for either males or females (available from an adult store, takes 2 AA or B cells). You'll also need a soldering iron and some electrical solder

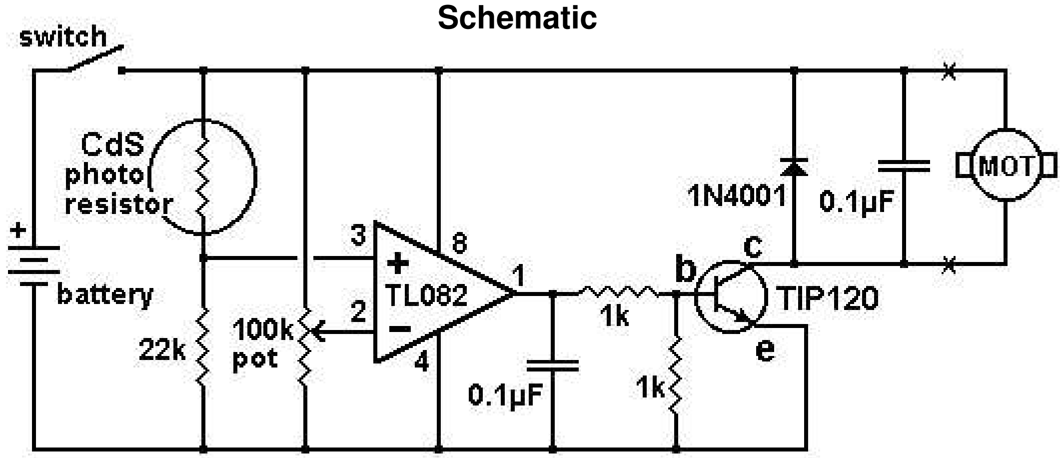
Simple Computer Controller Parts List

Quantity	***Description***	***Radio Shack Cat. #***
2*	**1k resistor, quarter watt 5%**	**271-1321**
1	**22k resistor, quarter watt 5%**	**271-1339**
1	**100k linear taper potentiometer (variable resistor)**	**271-092**
1	**CdS Photo resistor**	**276-1657**
2*	**0.1 µF capacitor, non-polarized, 16 vdc or more**	**272-109**
1	**1N4001 diode**	**276-1653**
1	**TIP120 transistor**	**276-2068**
1	**TL082 JFET Dual Op Amp 8 pin DIP**	**276-1715**
1	**Battery holder 4 D cells**	**270-396**
1	**Switch (spst or spdt)**	**275-603**
1	**Project case and board**	**270-283**

** if you're purchasing from Radio Shack you only need to get one package since each pack contains 5 items of this type*

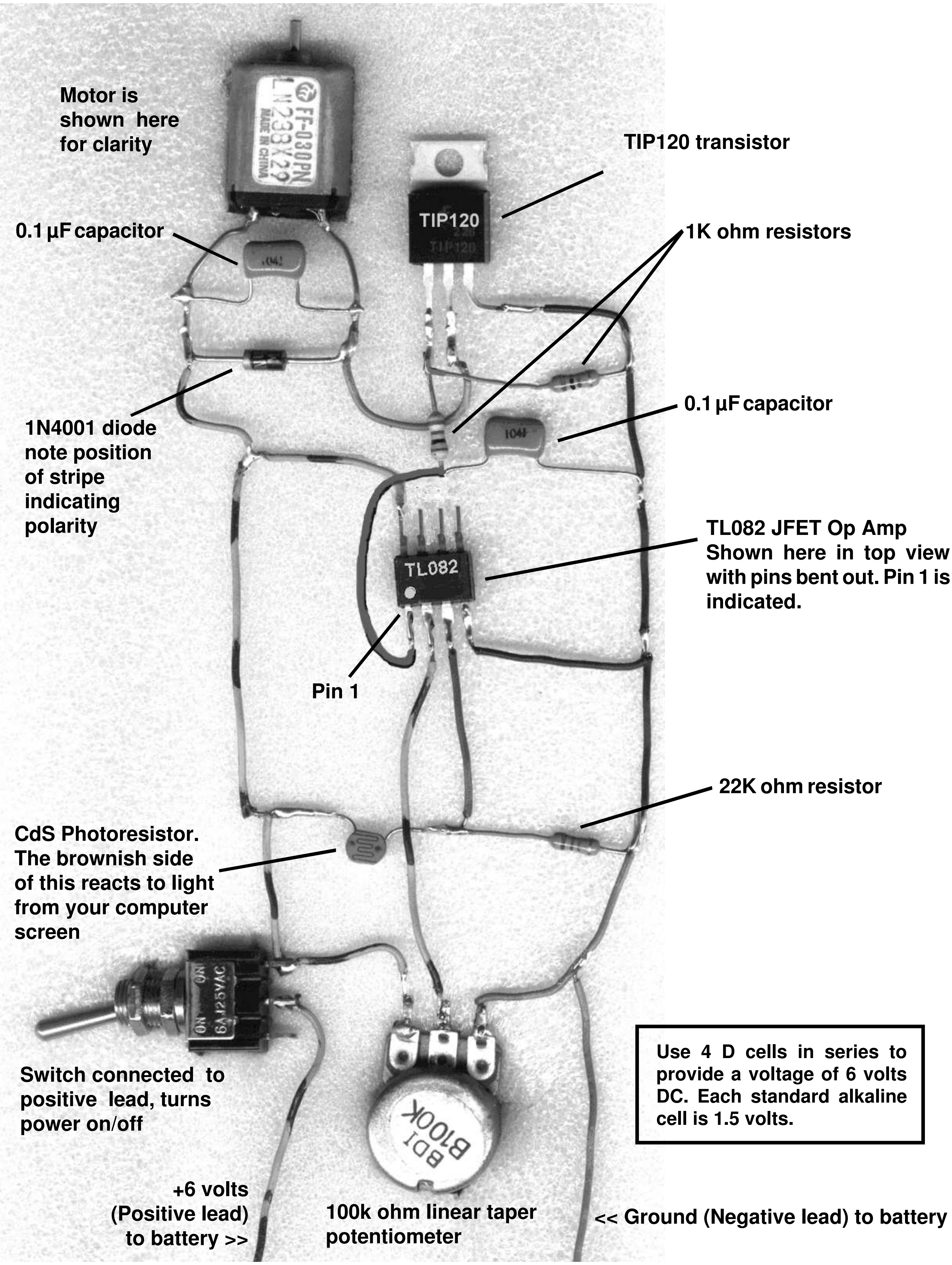
You'll also need some wire (lightweight stranded and solid), some electrical solder, a soldering iron, and a few simple tools.

Schematic

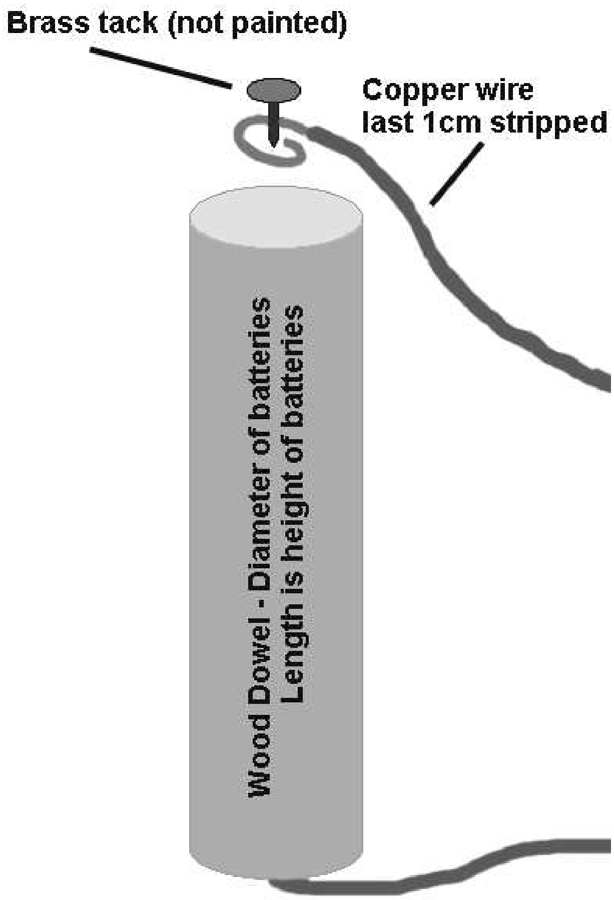


Notes: Battery is 6 volts to operate a 3 volt motor. Resistors are quarter watt, 5%. Capacitors are 16 volts DC or greater. pot is a linear potentiometer 100k ohms Numbers around the TL082 indicate the pin numbers on the 8-pin DIP package.

Photo of completed circuit showing connections and components



(NOT the plumbing type) and doorbell wire (light stranded wire). You' ll also need a wooden dowel that is the same diameter as the batteries that fit in your vibrator and two brass tacks.. The schematic for the circuit showing the interconnections of the components and a photo of the completed circuit are on the previous pages.



To control the vibrator take a dowel the same diameter as the batteries that fit into your vibrator (see diagram to the right). Cut the dowel to match the total length of the batteries in the case. Now take a brass tack (large flat head type) and press in the end of the dowel about half way. Bare about 1cm of copper wire and wrap around the tack then push the tack in all the way to create an electrical contact between the tack and the wire. Now repeat on the other end. Connect the leads from this dowel to the points marked with X' s on the schematic (on each lead going to the motor). When placed in the vibrator this dowel will supply electrical current to the vibrator in place of the batteries. If the battery case is tight you may want to cut a groove down the side of the dowel to run the wires down. A small hole can be drilled or melted in the side of the battery compartment to feed the wire through. Test your connections with a battery to supply power to the wires. Make sure the vibrator is on. With power supplied the vibrator should run.

If you' re using what is sometimes referred to as a "bullet" or an "egg" vibrator; a plastic housing with the motor connected to a control unit by a wire, just cut the wire and connect it directly into the circuit.

The photoresistor can be located inside the project box looking out through a hole or it can be placed at the end of a stiff wire connected to the circuit with a short piece of wire. Whichever way you mount the photoresistor it must be able to see the control window on your computer screen and should be shaded from ambient light. Mount the potentiometer in such a way that you can easily adjust it but not accidently hit it. Rubber feet on the bottom of the project box will keep it from skidding around.

When using adjust the potentiometer so that the motor is fully on and running smoothly when the window is white, but turns off fully when the window switches to black. At high frequencies, the motor may have enough inertia to keep rotating between cycles. Use the StimBot program to test your setup before going on line. Make sure you have fresh batteries and switch the unit off after use.Failure to operate can usually be traced to mistakes in wiring (connected to wrong pin etc.) or a poor soldering job.

How this circuit works

If you' re not interested in how this circuit works you can skip this section. The photoresistor and the 22k resistor form a voltage divider. When light strikes the photoresistor its resistance decreases which increases the voltage at the junction of the photoresistor and the 22k resistor. Another voltage divider is formed by the 100k potentiometer, the output voltage can be varied by turning the shaft of the potentiometer. Both voltages are fed into the TL082 which is configured as a comparator (compares voltages). When the voltage from the photoresistor divider exceeds the voltage set by the potentiometer, the output of the TL082 goes high and causes the TIP120 to conduct, supplying the motor with power. The diode/capacitor combination near the motor reduce electrical noise caused by the motor. The resistors/capacitor between the TL082 and the TIP120 provide form a voltage divider to supply the the proper voltage to the transistor and help to smooth the operation.

Safety for Designers and Do-it-yourselfers

It' s important to create hardware which is intrinsically safe if the builder expects the user to feel comfortable and confident in using it. Here are a few simple guides to follow when designing/building hardware.

1. Don' t use powerful motors or gear motors down to create excessive torque. Keeping the power of motors down helps protect the user from injury and reduces the size and cost of support components (i.e. power transistors, wiring, transformers etc.)

2. Use low voltage (5 -12 volts) direct current where possible. Low voltage direct current has the least chance of causing harm in case the user comes in contact with it.

3. Isolate all high voltage (100 volts and greater) from control lines with opto-isolators. For example, if you wish to control room lighting DON'T connect it directly to the control circuit that your low voltage hardware is connected to. All high voltage lines should be grounded and properly protected from mechanical damage and wear.

4. Safety should be implimented at the hardware level. By this I mean that when malfunctions occur the device should not have to ask the software to shut it down; it should do so on its own and inform the software of the problem, or at least make it apparent that there is a problem (warning lights, buzzers etc.). Limit switches, current limiters for motors, fuses, thermal cutoffs etc. all can keep the hardware well inside the safe operating range. This prevents a software malfunction from creating a dangerous situation.

5. Equipment should reset/start in an off state when power is first applied to the hardware (except where a power on condition is ALWAYS harmless). When power is shut off the hardware should not create any unsafe conditions. Consider what an electrical spike entering the control system at power up or power down might cause the hardware to do.

6. Equipment should be constructed so as to be easily cleaned and maintained to prevent the build up of organic compounds which might harbor bacteria and allow the transmission of infections between users of the hardware. Detailed instructions for cleaning and maintainence should be attached directly to the hardware if possible.

7. Movement of hardware when the user is in direct contact with it should be limited to 1cm or less of linear movement in any one direction. Should more movement be necessary, it must be done in such a way the user can control it easily and it must be slow.

8. All hardware must be properly grounded. Where practical the hardware must have ground fault protection.

9. If hardware makes use of large movements, for example to take up a position, then it must have safety interlocks that prevent movement while in contact with the user. These interlocks should be hardware implimented and not dependent upon software.

10. All sharp corners or metal edges must be removed or covered with a protective material that cannot be displaced. Any gears, belts or rotating shafts must be covered with a secure cover preventing any contact with the user, the user's clothing, jewelery or hair.

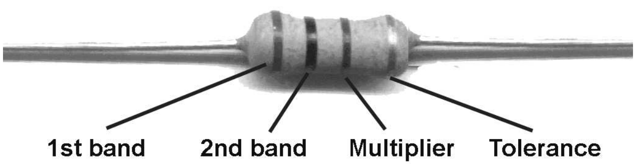
11. Noxious or toxic chemicals must not be used in any hardware interacting with the user. No drugs of any type may be delivered by the machine by any method to the user. Also be aware and prevent the hardware from creating an unsafe environment by the use or misuse of substances. For example, a lubricant or oil sprayed on the floor could cause serious injury if a person slipped in it.

12. Hydralics and pneumatic power sources should be used with great caution. Not only are these sources difficult to control and mechanically powerful, but pneumatic machinery can cause a life-threatening air embolism should air be accidently injected into a body cavity under pressure.

13. Suction for direct stimulation of the user (not pneumatic control) should be limited to the range of -150 to -500mm Hg (-0.2 to 0.7 bar). Where possible this suction should be cycled in an on/off manner to reduce the possiblity of bruising. A fluid collection device should be placed between the vacuum source and the part of the hardware physically in contact with the user to prevent body fluids from entering the vacuum source (prevent cross-contamination between users). Equipment should be designed so that the fluid collection device can be easily emptied /cleaned along with all parts of the system.

Resistor Values

Resistor (200 ohms, 5% tolerance). First band is RED or the digit 2, second band is BLACK or digit 0, third band is the multiplier BROWN for 10 so 20 × 10 = 200 ohms. Gold indicates a tolerance of 5% (resistor may vary by up to 5% on either side of the stated value).



Tolerance (+ or - of nominal value)	
Gold	5%
Silver	10%

Color	Digit	Multiplier
Black	0	0
Brown	1	10
Red	2	100
Orange	3	1 000
Yellow	4	10 000
Green	5	100 000
Blue	6	1 000 000
Violet	7	10 000 000
Grey	8	100 000 000
White	9	1 000 000 000